

Environmental Monitoring Report of Formosa II

Pre-construction Phase (2020 April to June)

Monitoring & Improvement Summary

Monitoring Item		Monitoring Site	Monitoring Result Summary	Measures & Effects
Bird Ecology	Offshore Bird	Wind farm and its periphery	<p>1. Species composition: 7 families, 12 species and 110 individuals were documented in this quarter, including White-winged Tern, Common tern, Whiskered Tern, Greater crested tern, Grey-faced Buzzard, barn swallow, Northern pintail, Chinese Spot-billed Duck, Red-necked phalarope, Intermediate Egret, Chinese Egret and, Streaked shearwater.</p> <p>2. Flying Altitude: flying altitude under 25m is 100%, which is obviously lower than that observed in previous quarters and in EIA phase. Max flying altitude is 20m, which is under the sweeping zone.</p>	—

Monitoring Item	Monitoring Site	Monitoring Result Summary	Measures & Effects	
	Coastal birds	1. Xihu National Wetland 2. Periphery coast	1. 8 orders, 19 families and 2,209 individuals were recorded. 6 protected species were recorded, including 5 class II species (Painted Snipe, Little Tern, Chinese Egret, Black-shouldered kite and, Crested Serpent-Eagle and 1 class I species (Brown Shrike). 2. Regarding records in this quarter, time section with highest frequency is 01:00; lowest frequency is 06:00. In general, frequency of the whole night is relatively higher. Only 22.3% of the tracks have past wind farm area	—
	Nighttime Radar	Wind farm located at Chunan (north coast of Chunggang estuary) and Houlong (Haowang Cape)	1. Flying direction: mainly N or NE. 2. Activity mode: Max frequency is recorded at 01:00, while min frequency is recorded at 06:00. Overall, activity frequency is relatively higher at night.	—
	Fishery	3 survey lines in wind farm area	1. Fish: 16 families, 24 species and 130 individuals. Spadenose shark takes the majority. 2. Fish egg: 13 families and 16 genre, 362 eggs. Toothpony of Leiognathidae takes the majority. 3. Fish larva: 12 families and 13 genre, fish: Saddleback silver-biddy of Gerreidae takes the majority.	—

Monitoring Item	Monitoring Site	Monitoring Result Summary	Measures & Effects
Cetacean Ecology	Wind farm and its periphery	Only 1 herd of 50 bottlenose dolphins were spotted on April 25, 2020 in this quarter.	—
Underwater Noise (including cetacean acoustic survey)	5 stations within wind farm area	<p>1. Whistles: HM-1 observes 7 whistles and HM-2 observes 18 whistles. No whistles are observed in the rest of the spots/time sections.</p> <p>2. Clicks: HM-1 observes 587 clicks and HM-2 observes 61 clicks, HM-3 observes 45 clicks, HM-4 observes 23 clicks, HM-5 observes 78 clicks.</p> <p>(1) Time Distribution No obvious difference between day/nighttime were observed.</p> <p>(2) Tidal Distribution Clicks observed tend to increase after high tide. A bigger difference between observed amount is found between 1 hour before high tide and 3 hours after high tide; with most clicks observed 3 hours after high tide.</p>	—
Marine Water Quality	10 stations within wind farm area	pH value is 8.2, water temperature is between 25.6-26.5°C, dissolved oxygen is between 6.1-6.4 mg/L, salinity is between 33.9-43.2 psu, transparency is between 80-130 cm, Coliform group is between 10-1,300 mg/L, Chlorophyll a is between 1.31-3.48 mg/L, BOD is between 0.6-0.8mg/L, SS is between 1.4-10.1 mg/L, fat is between N.D.-1.1 mg/L.	

Monitoring Item	Monitoring Site	Monitoring Result Summary	Measures & Effects
Marine and intertidal ecology	10 stations within wind farm area	<ol style="list-style-type: none"> 1. Marine ecology: phytoplankton: 4 phylum, 46 genus, 100 species; Chlorophyll a is between 0.06-1.93 µg/L, zooplankton: 14 phylum, 36 genre; benthic organism: 10 orders, 13 families, 14 genre. 2. Intertidal ecology: Benthic organism: 6 orders, 10 families and 11 species 	
Underwater Photography	2 stations within wind farm area	Trichiuridae of Perciformes, Blowfish of Tetraodontiformes, <i>Sergia lucens</i> of Decapoda and sea urchins of Echinoidea are observed in survey of this quarter.	
Terrestrial Ecology	Terrestrial power transmission system (including step-down station, land cable and its periphery)	<ol style="list-style-type: none"> 1. Plantation : 64 families, 170 genre and 238 species were recorded. 5 rare species were recorded, including Taiwan Incense Cedar, Lanyu Podocarp, Common Garcinia, Seremban and Fan Palm, all are cultivated. 2. Mammal : 2 orders, 2 families, 2 species and 6 individuals of mammals; 1 order, 1 family, 5 species and 246 individuals of bats were recorded. No protected species were recorded. 3. Amphibian : 1 order, 5 families, 6 species and 196 individuals were recorded. No protected species were recorded. 4. Reptile : 2 orders 7 families, 8 species and 72 individuals were recorded. No protected species were recorded. 5. Butterfly : 5 families, 33 species and 236 individuals were recorded. No protected species were recorded. 6. Odonata : 3 families, 11 species and 54 individuals were recorded. No protected species were recorded. 7. Bird : 7 orders, 19 families, 32 species were recorded. No protected species were recorded. 	—

Monitoring Item	Monitoring Site	Monitoring Result Summary	Measures & Effects
Intertidal Ecology	Planned important wetland in Chunan	<ol style="list-style-type: none"> 1. Plantation : 8 orders, 9 genre and 9 species were recorded. No rare species were observed. 2. Fish : 6 families, 10 species and 212 individuals were recorded. No protected species were recorded. 3. Crabs and Shrimps : 3 families, 3 species and 161 individuals were recorded. No protected species were recorded. 4. Conch : 7 families, 12 species and 937 individuals were recorded. No protected species were recorded. 5. Aquatic insects (including Odonata) : 4 families, 4 species and 23 individuals were recorded. No protected species were recorded. 	—
Cultural Heritage (Archeology monitoring during onshore construction)	excavation area	Only a piece of blue-and-white porcelain fragment is found at the ground surface on May 7, 2020. Since its origin (local relic or brought from other land) is indiscernible, it is determined that report according to Cultural Heritage Preservation Act is not necessarily. No archeological remnant is discovered.	—
Air Quality	1 station in residency around booster station	Day average value for TSP is 56µg/m ³ , Day average value for PM ₁₀ is 26µg/m ³ , Day average value for PM _{2.5} is 9µg/m ³ , Hourly max average value for SO ₂ is 2 ppb, and day average value is 2 ppb. Hourly max average value for NO is 8 ppb, and day average value is 3 ppb. Hourly max average value for NO ₂ is 9 ppb, and day average value is 6 ppb. Hourly max average value for CO is 0.3 ppm, and average value in 8 hours is 0.2 ppm. Hourly max average value for O ₃ is 23 ppb, and average value in 8 hours is 18 ppb. Major wind direction is ESE, day average wind speed is 0.9m/s. All monitoring items comply with air quality standard. No abnormal issue observed.	—

Monitoring Item		Monitoring Site	Monitoring Result Summary	Measures & Effects
Noise Vibration	Noise Vibration	<ol style="list-style-type: none"> 1. 1 station in residency around booster station 2. 1 station in residency along land cable 3. Zhonggang Cihyu Temple 	<ol style="list-style-type: none"> 1. Noise : In all stations (residency around booster station, residency along land cable and Zhonggang Cihyu Temple) L_{day}, L_{night} and $L_{midnight}$ are between 52.6-61.8dB(A), 53.4-59.6dB(A) and 49.0-54.4dB(A) respectively. Value of each station/time section comply to Second Type of Construction Noise Control Standard where is 8m or above away from road. 2. Vibration : In all stations (residency around booster station, residency along land cable and Zhonggang Cihyu Temple) L_{day} and L_{night} are between 30.0-41.1dB and 30.0-31.6dB respectively. Value of each station/time section comply to Japanese Control Standards of First Type of Zone. 	—
	Construction Noise	1 station in booster station periphery (1m)	<ol style="list-style-type: none"> 1. Normal frequency (20Hz-20kHz) : L_{max} is between 67.7-79.1dB(A), L_{eq} is between 60.6-65.4dB(A), monitoring results comply with Second Type of Construction Noise Control Standard. 2. Low frequency(20 Hz-200 Hz) : $L_{eq,LF}$ is between 39.0-42.3dB(A). monitoring results comply with Second Type of Construction Noise Control Standard. 	—

Monitoring Item	Monitoring Site	Monitoring Result Summary	Measures & Effects
Groundwater Quality	1. water output location 2. Planned important wetland in Chunan	<p>1. Water output location : pH value is between 7.7-8.1; BOD is between 2.2-6.8mg/L; COD is between 10.5-20.2mg/L, SS is between 2.0-17.4mg/L, Ammonia nitrogen is between 0.27-0.466mg/L, ADMI is between N.D.-33mg/L, fat is between 13-17mg/L, water temperature is between 26.5~28.1°C, NO₃-N is between 0.02-0.4, TP is between 0.226-0.508 mg/L, Dissolved oxygen is between 3.8-7.0mg/L. All items comply to water quality standard for construction water output.</p> <p>2. Planned important wetland in Chunan : pH value is between 7.9-8.9; BOD is between 21.0-33.5mg/L; COD is between 76.5-159mg/L, SS is between 28.5-73.0mg/L, Ammonia nitrogen is between 0.031-0.080mg/L, ADMI is between 37-45mg/L, fat is between 2.0-6.5mg/L, water temperature is between 25.8-32.1°C, NO₃-N is between 0.04-0.06, TP is between 0.203-0.285mg/L, Dissolved oxygen is between 5.9-8.6mg/L. All items comply to class IV water body quality standard except for BOD value.</p>	<p>Fence and spill proof foundation were properly installed in TJB construction and booster station. Therefore, there is no nonpoint source pollution caused by waste runoff.</p> <p>In addition, BOD measured in EIA and DA phases is also higher than class IV water body quality standard (referring to Protection Project of National Important Wetlands: https://wetland-tw.tcd.gov.tw/). It is inferred that the value is affected by organic pollutants in water from agriculture, water cultural, household and industry discharged into the wetland, which belongs to background value and is not caused by the construction of the Project.</p> <p>Monitoring will be continued to clarify its changes.</p>