

Environmental Monitoring Report of Formosa II

Construction Phase (2020 October to December)

Monitoring & Improvement Summary

Monitoring Item		Monitoring Site	Monitoring Result Summary	Measures & Effects
Under construction-Bird Ecology	Offshore Bird	Wind farm and its periphery	<ol style="list-style-type: none"> 1. Species composition: 2 families, 9 species and 512 individuals were documented in this quarter. 2. Protected species: 2 protected species were documented in this quarter, including Little tern (II) and Greater crested tern (II). 3. Flying Altitude: flying altitude under 25m is 99%. Max flying altitude is 10-15m, which is under the sweeping zone. 	—
	Coastal birds	<ol style="list-style-type: none"> 1. Xihu National Wetland 2. Periphery coast 	<ol style="list-style-type: none"> 1. 8 orders, 14 families, 39 species and 4,239 individuals were documented. 2. Protected species: 5 protected species were recorded, including Greater painted-snipe(II), Little tern(II), Brown shrike(III), Black-winged kite(II) and Crested serpent eagle(II). 	—

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	Nighttime Radar	Wind farm located at Chunan (north coast of Chunggang estuary) and Houlong (Haowang Cape)	<ol style="list-style-type: none"> 1. Flying direction: mainly S or SE. 2. Activity mode: Max frequency is recorded between 00:00 to 04:00 or 05:00, while min frequency is recorded at 06:00. Overall, activity frequency is relatively higher at night. 13.2% of the tracks past wind farm area. 	—
	Under construction-Fishery	3 survey lines in wind farm area	<ol style="list-style-type: none"> 1. Fish: 14 families, 19 species and 461 individuals. Big-head pennah croaker takes the majority. 2. Fish egg: 10 families and 11 genre, 3,078 eggs. Reeve's croaker of Sciaenidae takes the majority. 3. Fish larva: 10 families and 12 genre, 97 individuals: Red-spot monocle bream of Nemipteridae takes the majority. 	—
	Under construction-Cetacean Ecology	Wind farm and its periphery	No cetacean was sighted in the 3 trips in this quarter.	—

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<p>Under construction- Underwater Noise (including cetacean acoustic survey)</p>	<p>5 stations within wind farm area</p>	<p>1. Whistles: 101 whistles were documented in this quarter.</p> <p>(1) Time Distribution From analysis on the 5 spots, it is known that more whistles were observed in daytime. Whistles observed in HM-1 and HM-2 were distributed in morning, HM-5 in afternoon and night; HM-3 and HM-4 have less detection.</p> <p>(2) Tidal Distribution Whistles are mostly observed during low tide to high tide, including HM-1, HM-2, HM-3, HM-5. HM-5 has higher detection during low tide to high tide.</p> <p>2. Clicks: 80 clicks were documented in this quarter.</p> <p>(1) Time Distribution From analysis on the 5 spots, it is known that more clicks were observed from dawn to noon (0700-1500, 2300-0500).</p> <p>(2) Tidal Distribution From analysis on the 5 spots, clicks are mostly observed during low tide in HM-2. However, clicks are observed in all time sections, overall distribution is even.</p>	<p>—</p>

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Under construction- Marine Water Quality	10 stations within wind farm area	pH value is 8.1-8.2, water temperature is between 18.7-19.4°C, dissolved oxygen is between 6.4-6.5 mg/L, salinity is between 33.5-33.8 psu, transparency is between 60-80 cm, Coliform group is between 15-95 mg/L, Chlorophyll a is between 0.7-1.6 mg/L, BOD is between 0.6-0.7 mg/L, SS is between 2.4-9.8 mg/L, fat is 0.5-0.6 mg/L.	
Under construction- Marine and intertidal ecology	10 stations within wind farm area	<ol style="list-style-type: none"> 1. Marine ecology: phytoplankton: 4 phylum, 47 genus, 98 species; Chlorophyll a is between 0.02-0.76 µg/L, zooplankton: 15 phylum, 38 genre; benthic organism: 9 orders, 10 families, 11 genre. 2. Intertidal ecology: Benthic organism: 8 orders, 14 families and 19 species 	
Under construction- 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 : 3 orders, 4 families, 5 species and 8 individuals of mammals; 1 order, 2 family, 7 species of bats were recorded. No protected species were recorded. 3. Amphibian : 1 order, 4 families, 5 species and 23 individuals were recorded. No protected species were recorded. 4. Reptile : 2 orders 6 families, 8 species and 126 individuals were recorded. No protected species were recorded. 5. Butterfly : 5 families, 34 species and 472 individuals were recorded. No protected species were recorded. 6. Odonata : 3 families, 11 species and 103 individuals were recorded. No protected species were recorded. 7. Bird : 4 orders, 15 families, 29 species were recorded. 1 protected species Brown shrike (III) were recorded. 	—

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Under construction- 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 : 4 families, 5 species and 1,232 individuals were recorded. No protected species were recorded. 3. Crabs and Shrimps : 4 families, 5 species and 154 individuals were recorded. No protected species were recorded. 4. Conch : 4 families, 6 species and 195 individuals were recorded. No protected species were recorded. 5. Aquatic insects (including Odonata) : for Odonata, 3 families, 8 species and 222 individuals were recorded; for aquatic insects, 2 orders, 4 families, 4 species and 8 individuals were recorded. No protected species were recorded. 	—
Under construction- Cultural Heritage (Archeology monitoring during onshore construction)	excavation area	No archeological remnant is discovered.	—
Under construction- Air Quality	1 station in residency around booster station	<p>Day average value for TSP is 56$\mu\text{g}/\text{m}^3$, Day average value for PM₁₀ is 27$\mu\text{g}/\text{m}^3$, Day average value for PM_{2.5} is 10$\mu\text{g}/\text{m}^3$, Hourly max average value for SO₂ is 2 ppb, and day average value is 1 ppb. Hourly max average value for NO is 4 ppb, and day average value is 2 ppb. Hourly max average value for NO₂ is 8 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 0.3 ppm. Hourly max average value for O₃ is 45 ppb, and average value in 8 hours is 42 ppb. Major wind direction is E, day average wind speed is 2.9m/s. All monitoring items comply with air quality standard. No abnormal issue observed.</p>	—

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Under construction-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 56.5-69.1 dB(A), 53.7-65.9 dB(A) and 51.9-63.9 dB(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 30.0-42.0dB dB and 30.0-33.8 dB 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 72.2-78.1 dB(A), L_{eq} is between 61.0-62.1 dB(A), monitoring results comply with Second Type of Construction Noise Control Standard. 2. Low frequency(20 Hz-200 Hz) : $L_{eq,LF}$ is between 37.8-40.1 dB(A). monitoring results comply with Second Type of Construction Noise Control Standard. 	—

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Under construction-Groundwater Quality	1. water output location 2. Planned important wetland in Chunan	1. Water output location : pH value is between 7.7-8.0; BOD is between 0.8-1.5 mg/L; COD is between 1.8-4.9 mg/L, SS is between 5.2-20.6 mg/L, Ammonia nitrogen is between 0.07-0.44 mg/L, ADMI is N.D. mg/L, fat is between N.D.-1.3 mg/L, water temperature is between 21.0-27.8°C, NO3-N is between 0.26-0.35, TP is between 0.028-0.134 mg/L, Dissolved oxygen is between 5.2-6.1 mg/L. All items comply to water quality standard for construction water output. 2. Planned important wetland in Chunan : pH value is between 8.1-8.9; BOD is between 26.6-37.8 mg/L; COD is between 110.0-135.0 mg/L, SS is between 21.1-76.5 mg/L, Ammonia nitrogen is between 0.06-3.20 mg/L, ADMI is between 65-130 mg/L, fat is between 2.0-3.7 mg/L, water temperature is between 21.2-27.4°C, NO3-N is between N.D.-0.26, TP is between 0.423-9.23 mg/L, Dissolved oxygen is between 4.2-6.7 mg/L. All items comply to class IV water body quality standard except for BOD value.	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; it shall not affect SS concentration in Planned important wetland in Chunan. 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. Monitoring will be continued to clarify its changes.