

Environmental and Social Management Plan (ESMP)

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Revision	Section	Changes	by
R00	All	Draft version	HLI
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General comment:

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Abbreviations

BOCH	Bureau of Cultural Heritage
BOE	Bureau of Energy
CoC	Code of Conduct
CPA	Construction and Planning Agency
CZMP	Coastal Zone Management Plan
E&S	Environmental and Social
EHS	Environment, Health, and Safety
EP	Establishment Permit
EPA	Environmental Protection Administration
ESDD	Wood's Environmental and Social Due Diligence
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
FOU	Foundation
HDD	Horizontal Direction Drilling
HSE	Health, Safety, and Environment
IAC	Inter Array Cable
INS	Installation
IUCN	International Union for Conservation of Nature
LRP	Livelihood Restoration Plan
OWF	Offshore Wind Farm
PAPs	Project Affected Persons
SEP	Stakeholder Engagement Plan
SUB	Substation
WTG	Wind Turbine Generator
YFA	Yunlin Fishery Association

Appendices

Appendix B Summary Table of Environmental/Social Impact and Associated Target

Appendix C Summary Table of Target and Associated Mitigation Measures and Monitoring Plan

Appendix D Onshore Traffic Management Plan

1 Introduction

1.1 Background

The development of offshore wind farms (OWF) has been designed to complement the Taiwan's energy diversification plan and contributes to the Government's goals toward greenhouse gas reduction, low-carbon energy sources, and green industries. In support of Taiwan Government's renewable energy policies, Yunneng Wind Power Co., Ltd. (referred to as the Company below) has planned the development of Yunlin Offshore Wind Farm Project (referred to as the Project below) as a solution to reducing Taiwan's dependency upon a single energy source.

In order to ensure the environmental and social sustainability of the Project, an Environmental and Social Management Plan (ESMP, referred to as the Plan below) is developed in accordance with the ESMP Guidance Note of International Union for Conservation of Nature (IUCN). Various Plans, Reports, and documents of the Project were referred to or used in the Plan, in order to provide a comprehensive documentation and risk management strategy of the Project.

The purposes of the Plan include:

- Provide an overview of the environmental and social requirements, regulations, and standards applicable to the Project;
- Document the risk management strategies, mitigation measures, and monitoring plans of the Project;
- Clarify the environmental and social responsibility and capability of the Company, external experts, and consultants to implement the Plan;
- Ensure the risk management strategies, mitigation measures, and monitoring plans of the Project can be implemented effectively and appropriately; and
- Facilitate the continual improvement and compliance of the Plan.

1.2 Project description

Yunlin Offshore Wind Farm Project locates off the coast of Sihu and Kouhu Townships of Yunlin County, Taiwan. The area of the wind farm is approximately 82 km² and the distance to shore is approximately 8-17 km. The water depth is approximately between 10-35 m. The overall wind farm is at least 3,000 m from the proposed Major Wildlife Habitat of Taiwanese White Dolphin. It is also away from the shipping channels and relevant development plans. The wind farm consists of 80 wind turbine generators (WTGs) of the model SG 8.0-167. The total installed capacity is 640 MW and it is connected directly to two onshore substations via two landfalls. Figure 1 and Figure 2 show the location and the layout of the Project, respectively.

The area and height restriction of this Project are determined by environmental and social restrictions as defined in the approved Environmental and Social Impact Assessment (ESIA) Report. These restrictions are resulted from various permit processes and dialogue with stakeholders relevant to the area such as shipping channels and flight routes, fishery activities, and the existed subsea cables. All the efforts are to ensure the safety and sustainability of this Project from the development to decommissioning phase. This Project is planned under concept of being not only beneficial to the energy security and sustainability, but also to the livelihood of the residents and the surroundings. It is of high importance for this Project to align interests of the usage of the area with all stakeholders to ensure a consensual as well as safe construction and operation of the offshore wind farm.

The activities this Project involves include:

- Surveys and monitoring before, during, and after construction period
- Onshore transportation and construction
- Offshore transportation and construction
- Operation and maintenance

All the works and actions are properly planned with the consideration of project-specific site conditions, applicable legal requirements and regulations, and Taiwan general social and cultural concepts. Relevant risk reduction strategies, mitigation measures, and monitoring plans are also prepared accordingly.

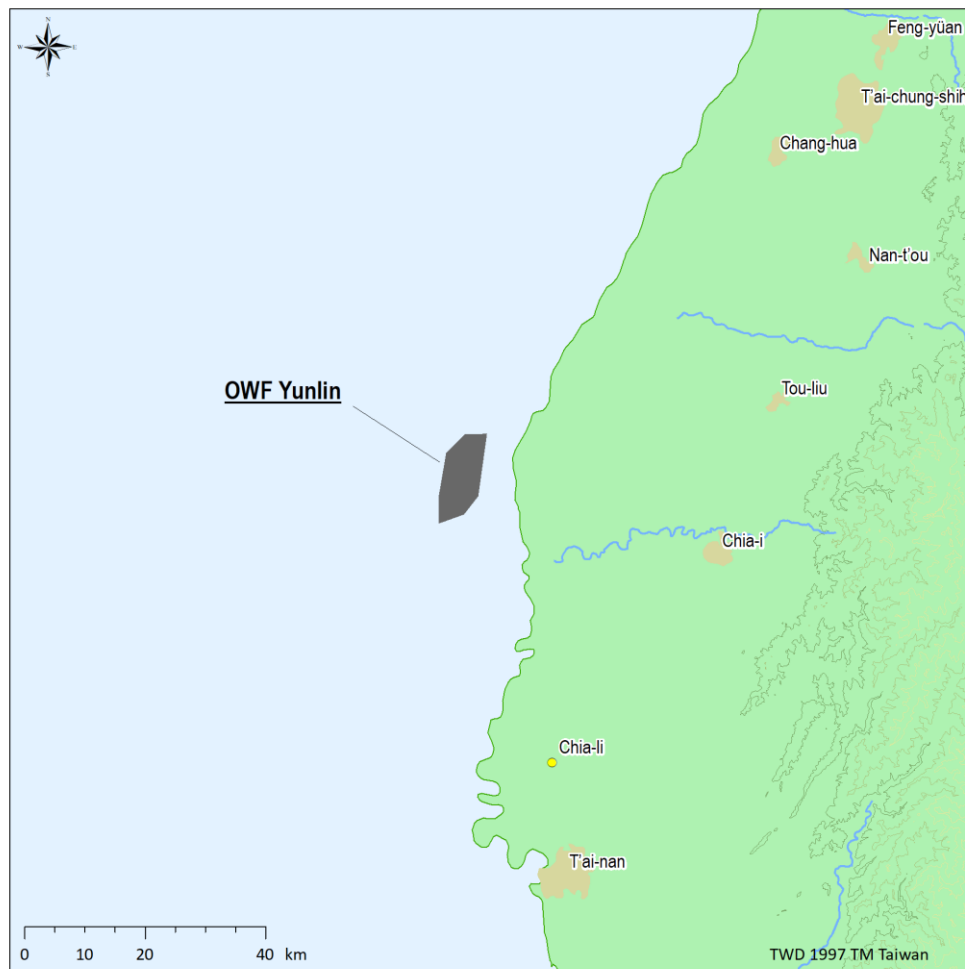


Figure 1 Location of Yunlin Offshore Wind Farm

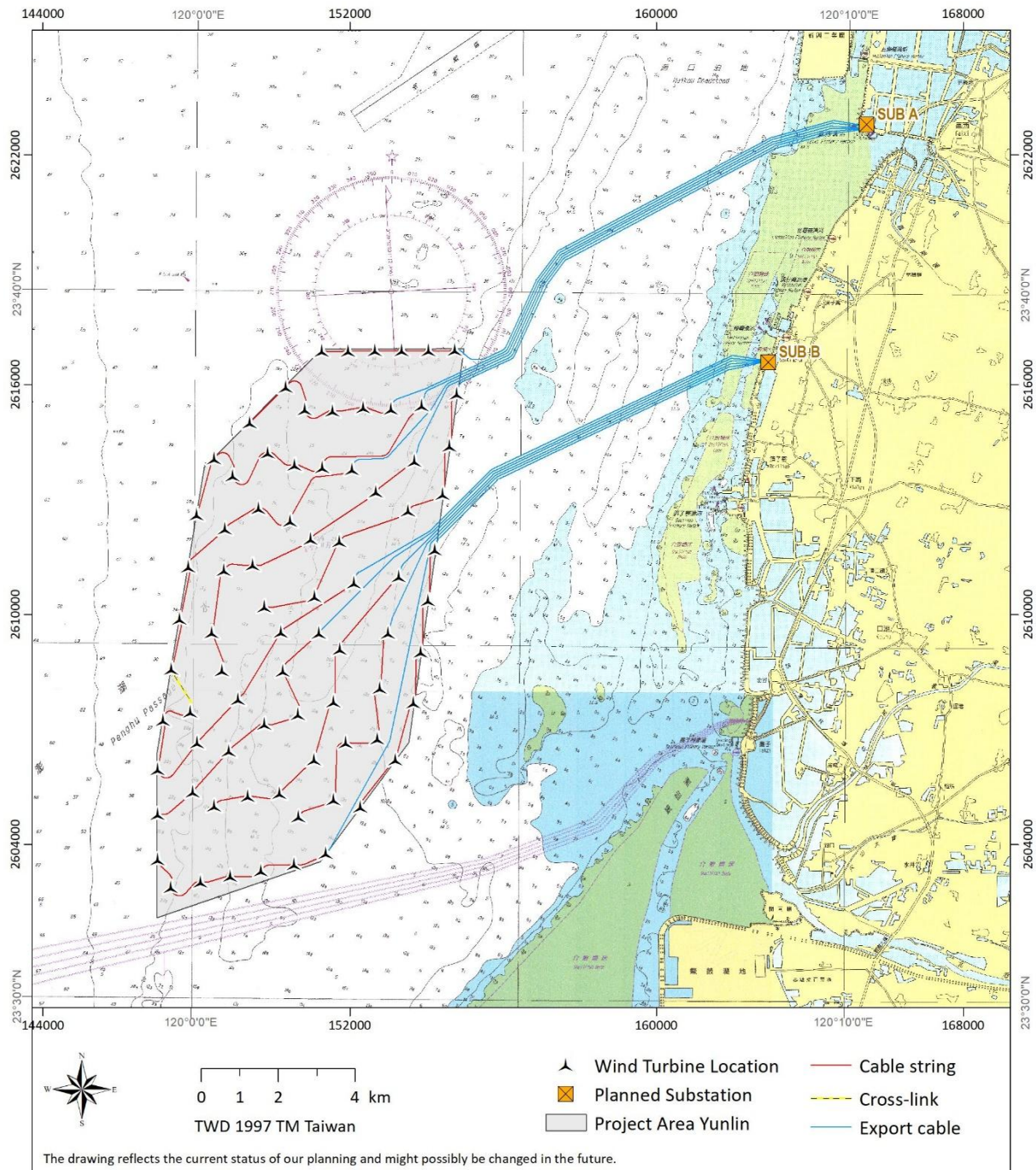


Figure 2 Layout of Yunlin Offshore Wind Farm

1.3 Applicability of ESMP

The ESMP is applicable to the following phase of the Project:

- Pre-construction period
- Construction period
- Operation period

1.4 Requirements to the contractors

The contractors to the project are requested to comply with the ESMP by means of contractual obligations to follow the Project's Code of Conduct (or follow their own equivalent version) and scope specific requirement documents (e.g. the Project's HSE plan). Based on the policies and plans required by the Project, the contractors will create and provide their own management plans and mitigation measures which are specific and relevant to their respective scope of work.

1.5 Reference document of ESMP

This ESMP is developed based on the Project's Code of Conduct (CoC), Environmental and Social Policy Statement (E&S Policy Statement), Policy for an Environmental and Social Management System (ESMS) as well as the Project's permit requirements.

2 Project Requirements, Regulations, and Standards

The E&S Policy Statement of the Company is one of the parent documents for the ESMS. It contains the legal requirements to which Company is committed through the applicable general regulations in the areas of environment and social affairs, further obligations in dealing with the stakeholders of the Project and the obligation to implement these requirements in daily practice. The E&S Policy Statement is to be made available to the stakeholders of the Project. The complete E&S Policy Statement with the compliance with legal requirements is shown in Appendix A.

In addition, the Company is responsible for obtaining relevant environmental and social permits, approvals or opinion letters in order to realize the Project. In the process of application preparation, the Contractors are obliged to provide necessary supporting documents to the Project Company. The environmental and social permits the Project has obtained and to be obtained are listed in Table 1.

Table 1 Environmental and social permits

No.	Permit	Application status	Authority in Charge	Legal requirement	Applicant
1	Agreement letter from Yunlin Fishery Association (YFA)	Obtained on 6 th Jun. 2017 & 17 th May 2019	Yunlin Fishery Association	NA	Project Company
2	Agreement letter from fishery authority	Obtained on 9 th Apr. 2018	Council of Agriculture, Executive Yuan	The Electricity Act	Project Company
3	ESIA approval	Obtained on 21 st Jun. 2018	EPA	Environmental Impact Assessment Act	Project Company
4	Coastal Zone Management Plan (CZMP) approval	Obtained on 23 rd Nov. 2018	CPA	Coastal Zone Management Act	Project Company
5	Establishment Permit (EP)	Obtained on 29 th Nov. 2018	BOE	The Electricity Act	Project Company
6	ESIA comparison table (for change of monitoring plan)	Obtained on 11 th Dec. 2018	EPA	Environmental Impact Assessment Act	Project Company
7	ESIA reference letter (for change of developer name)	Obtained on 30 th Apr. 2019	EPA	Environmental Impact Assessment Act	Project Company
8	Underwater Cultural Heritage Survey Report approval	Obtained on 15 th May 2019	BOCH	Underwater Cultural Heritage Preservation Act	Project Company
9	ESIA deviation analysis report (for change of soil amount due to the need of landfall construction)	Applied on 23 rd Jul. 2019 and passed review meeting on 23 rd Sep. 2019	EPA	Environmental Impact Assessment Act	Project Company
10	Work Permit	Applied on 23 rd Oct. 2019	BOE	The Electricity Act	Project Company
11	Power License	Will be applied after all offshore construction works are complete	BOE	The Electricity Act	Project Company

3 Environmental and Social Management and Control

3.1 General description

To ensure the Project is in accordance with all legal requirements and sustainability considerations, the management and control strategies of environmental and social impacts are set. All the reports and records are kept in local server for at least the whole lifetime of the Project. In addition, the environmental and social monitoring results are reported to relevant authorities in Taiwan (e.g. Environmental Protection Administration, Bureau of Energy, Construction and Planning Agency) for filing and site inspection. It is also the Project's commitment in the ESIA Report that all environmental and social monitoring results shall be disclosed to the public on the website.

The Project's environmental and social management and control focus on the following points:

- The implementation of the Project's environmental and social management system/measures described in the Plan
- The conformity to the requirements, regulations, and standards applicable to the Project
- The responsible staff and their competence
- Contractors' credentials

The following sections describe the potential environmental and social impacts found, the mitigation measures and management plans, and the management structure for implementing these measures and plans.

3.2 Potential environmental and social impacts

The potential environmental and social impacts brought by the activities of the Project have been studied and defined in Chapter 7 of the ESIA Report of the Project. The ESIA Report is a document defines not only the potential sustainable and social impacts of the Project, but also the proposed mitigation measures and monitoring plans. The ESIA Report has been reviewed by experts and the final version has been approved by Environmental Protection Administration of Taiwan in June 2018. In Appendix B Summary Table of Environmental/Social Impact and Associated Target, a summary table of these impacts defines in the ESIA Report is shown. The targets of to which level these impacts are mitigated or restored is also presented.

3.3 Mitigation measures and management plans

3.3.1 High-level summary

This high-level summary is in accordance with the summary given in Chapter 6 Potential Environmental and Social Impacts of ESMS.

In the Project, air quality, noise and vibration are the primary topics regarding onshore construction activities, including land cable route excavation and cable laying and onshore substation construction. However, since the onshore construction sites are located far away from sensitive receptors (residential communities), the estimated pollutant levels are all under relevant emission standards, and therefore, **the onshore construction impact is negligible.**

Regarding marine construction, frequent working vessel transportation as well as underwater noise during monopile driving and export cable works and degradation of water quality are considered to have temporary impacts on marine ecosystem. The Taiwanese White Dolphin and marine mammals are the most sensitive receptors. Without mitigation measures, the impact significance is estimated **to be**

moderate. In order to alleviate the impacts on Taiwanese White Dolphin and marine mammals, the project has planned a series of mitigation measures, seen as **Appendix C**. For example, wind farm area is planned to be with at least 3km distance from the boundary of the proposed Major Wildlife Habitat of Taiwanese White Dolphin, a 750m radius exclusive zone and 1,500m radius precautionary area will be configured with 6 observation vessels and 2 marine mammal observers (MMOs) on each vessel to ensure that there are no marine mammals within precautionary area during piling period. The noise level of piling will be measured real-time and controlled to be lower than 160 dB_{SEL} at 750m distance from each piling canter. The project has planned to use horizontal direction drilling (HDD) at shore-end intertidal area, use silt curtain when the subsea cable laying works at water depth up to 5m, which is to minimize the potential disturbance on seabed and the water quality degradation. With such mitigation measures in place, the impacts will be reduced, resulting in **minor** impact.

The sensitive receptor considered during operation period is the ecology regarding migration birds. Since the wind farm area is at least 8 km offshore to be served as a natural corridor for bird flight and the project in the planning stage has enlarged the spaces between each turbine to facilitate crossing of the birds, the impact during operation period is estimated as **minor**. Table 2 shows a summary of the major potential impacts brought by the project activities in different phases from environmental aspect.

From social aspect, the sensitive receptors (project affected persons (PAPs)) of the Project are defined based on their level of being influenced by the Project. The potential impacts on them have been studied during ESIA, Wood's Environmental and Social Due Diligence (ESDD), and Livelihood Restoration Plan (LRP) stages and will be monitored through the implementation of LRP, live meetings (on demand), and grievance mechanism as well as the quarterly performance report of SEP. Table 3 gives a brief summary of the affected groups, the phase of Project which they are influenced, the activities which influence them, the potential impacts, and the significance of potential impacts with and without mitigation measures. The impacts on YFA (including fishermen in YFA), fishermen not in YFA, oyster farmers, and fishpond users are mitigated through compensation and implementation of LRP. The impacts on people affected by noise, wastes and wastewater during construction period are mitigated through different noise reduction measures, waste and wastewater collection/treatment plans, and commitments made in ESIA. The impacts on people affected by noise, shadow flicker, and blade throw during operation period is negligible according to ESIA so no mitigation measure is needed. And the impacts on communities in the equipment and materials transportation routes are mitigated through good construction management measures including implementation of Onshore Traffic Management Plan, regular maintenance of machines, firmly noise monitoring, well-planned construction time duration, and other various noise, vibration, and traffic management plans committed in ESIA.

Table 2 Summary of primary potential impacts brought by the Project from environmental aspect

Phases of development	Project activities	Primary potential Impacts	Significances of potential impacts	
			Without mitigation measures	With mitigation measures
Onshore construction	<ul style="list-style-type: none"> Construction of onshore substations, land cable and manhole Transportation of surplus/required soil 	<ul style="list-style-type: none"> Degradation of air quality Noise and vibration impacts Degradation of traffic condition 	Negligible	Negligible
Offshore construction	<ul style="list-style-type: none"> Monopile piling driving Subsea cable work Installation of WTGs Transportation of working vessels 	<ul style="list-style-type: none"> Disturbance and displacement of marine mammals by underwater noise Temporary loss of habitat and disturbance for the construction of export cables Degradation of water quality Disturbance or direct injury by working vessel transportation 	Moderate	Minor
Operation Period	<ul style="list-style-type: none"> Wind farm operation and maintenance 	<ul style="list-style-type: none"> Risk of bird collision 	Minor	Minor

Table 3 Summary of affected groups and potential impacts brought by the Project from social aspect

Affected group	Category in SEP	Influenced phase	Type of activities	Potential impacts	Significances of potential impacts	
					Without mitigation measures	With mitigation measures
YFA (including fishermen in YFA)	YFA	Construction period	Offshore installation work	Loss of fishing area due to restriction of for safety issues	Major	Minor
		Operation period	Wind farm operation	Loss of fishing area due to restriction of for safety issues	Moderate	Minor
Fishermen not in YFA	Fishermen not in YFA	Construction period	Offshore installation work	Loss of fishing area due to restriction of for safety issues	Major	Minor
		Operation period	Wind farm operation	Loss of fishing area due to restriction of for safety issues	Moderate	Minor
Oyster farmers	Oyster farmers	Construction period	Export cable laying	All oyster racks need to be removed so no oyster farming activities can take place	Major	Minor
Fishpond users	Fishpond users	Construction period	Land acquisition for substation	The original land of fishpond is used for substation permanently, so no aquaculture activity can take place	Moderate to Major	Negligible to Minor
		Operation period	Land acquisition for substation	The original land of fishpond is used for substation permanently, so no aquaculture activity can take place	Moderate to Major	Negligible to Minor
People affected by noise, wastes and wastewater	Other PAPs	Construction period	Onshore and offshore construction	The noise, wastes, and wastewater produced in the construction period may reduce the life quality of local people	Negligible to Minor	Negligible
People affected by noise, shadow flicker, and blade throw	Other PAPs	Operation period	Wind farm operation	The noise, shadow flicker, and blade throw during operation period may reduce the life quality of local people	Negligible	Negligible
Communities in the equipment and materials transportation routes	Other PAPs	Construction period	Onshore construction	The noise, vibration, and air pollution brought by equipment and material transportation may reduce the life quality of communities in the transportation route	Moderate	Minor

3.3.2 Plans and measures stated in ESIA Report

Based on the mitigation targets derived from Appendix B Summary Table of Environmental/Social Impact and Associated Target, the linkage between mitigation measures and monitoring plan in Chapter 8 of ESIA report with targets is built up in the summary table as shown in Appendix C Summary Table of Target and Associated Mitigation Measures and Monitoring Plan. Depending on the targets, the mitigation measures and monitoring plan are designed for pre-construction, construction or operation period. A brief summary of the environmental monitoring plan before construction, during construction, and during operation period is shown in Table 4, Table 5, and Table 6, respectively. The ESIA Manager is responsible for assurance of implementation and general compliance. The overall management of monitoring plans before construction and during construction has been awarded to Unitech Engineering Co., Ltd. and that during operation is planned to be tendered in 2020.

Table 4 Table of environmental monitoring plan before construction

Category	Monitored items	Location	Frequency
Bird ecology	Radar monitoring	Wind farm area and coast near landfall	Five times every season and 24 hours each time two years prior to marine construction
	Satellite tracking survey	Coast of Yunlin County	Four seasons, in total 30 birds one year prior to marine construction
Cetacean ecology	Underwater acoustic survey	A total of 5 underwater acoustics stations	Four seasons and at least 14 days every season one year prior to marine construction
	Visual monitoring	Wind farm area	30 times one year prior to marine construction
Cultural heritage	Interpretation of underwater culture	Borehole sampling of each wind turbine	Interpretation by professional archaeologists
Terrain monitoring	Seabed terrain	Wind farm area	One time prior to marine construction
Fishery resources	Collect and analyze economic data related to fisheries in the annual fishery report (including the number of fishing boats, forms of fishery activities, fish species, yield of catch, etc.)	Yunlin County	One time, one year prior to marine construction
Note: 1. The period of that the monitoring plan above is carried out shall be considered in accordance with the starting date of marine construction. 2. Marine monitoring items include foundation works, wind turbine installation, and sea cable works.			

Table 5 Table of environmental monitoring plan for the construction period

Category	Monitored items	Location	Frequency
Air quality	Wind direction, wind speed, and particulate matter pollution (TSP, PM ₁₀ , PM _{2.5})	Anxi temple, Yunlin District Fishermen's Association, Kouhu Junior High School	Once every season
Noise and vibration	Equivalent energy sound level and day-night vibration level at each time period (during the day, in the evening, and at night)	Taiwan Provincial Route No. 17/County Route No. 158 (Taixi Junior High School), residential houses on Yugan Road,	24 hours of monitoring, once every season

Category	Monitored items	Location	Frequency
		Zhongzheng Road Section 1 (fire department)	
Construction noise	1. Low frequency (measure Leq at 20 Hz–200 Hz) 2. General frequency (measure Leq and Lmax at 20Hz to 20kHz)	Two stations at the 1-m perimeter of the construction site by the step-up room	Once a month; each measurement lasts at least 2 min
Sea water quality	Water temperature, hydrogen ion concentration, biochemical oxygen demand, salinity, dissolved oxygen, ammonia nitrogen, nutrient salts, suspended solids, chlorophyll a, and coliform bacteria	Five locations in the wind farm area	Once a season
On-shore ecology	Terrestrial animal/plant ecology (carried out in accordance with animal and plant technical specifications of the Environmental Protection Administration)	Land transmission and distribution system (including step-up substation, land cable and nearby area)	Once a season
Bird ecology	The species, quantity, activities including resting, flight route, and seasonal changes of the groups (including shorebirds and waterfowls)	Wind farm area and coast near landfall	Once every winter (December to February), once a month every spring (March to May), summer (June to August) and fall (September to November) during the transit period of migratory birds. (In winter, sea birds are surveyed using off-shore vessels or surveyed indirectly through auxiliary equipment such as video recorders, binoculars, radar, and satellite trackers)
Maritime ecology	1. Intertidal zone ecology	The survey shall be conducted within 50 m on both sides of the subsea cable landing segment	Once a season
	2. Plankton, juvenile fish and fish eggs, benthic organisms	Five locations in the wind farm	
	3. Fish	Three survey lines	
	4. Underwater photography	Wind turbine foundation and surrounding area	Once for each wind turbine after piling
Life of cetaceans	1. Visual monitoring	Wind farm area	30 trips/year
	2. Underwater acoustic survey	A total of 5 underwater acoustics stations	Once every season (no monitoring required if construction cannot proceed in winter)
Underwater noise	Underwater noise with frequency range 20Hz–20kHz; spectrogram and 1-Hz band, 1/3 octave band analysis	Two stations at the border of the wind turbines (Data can be obtained from the underwater acoustics stations for cetacean ecology for analysis.)	Once every season (no monitoring required if construction cannot proceed in winter)
		One location 750 meters to the pile-driving location of wind turbines	Once for each wind turbine during piling

Category	Monitored items	Location	Frequency
Cultural heritage	Excavation side monitoring	Land cable excavation area along the land cable route, excavation site of land facilities	Daily monitoring during excavation
		During the excavation of the intertidal zone when using non-underground construction methods	Daily monitoring during excavation
Fishery resources	Collect and analyze economic data related to fisheries in the annual fishery report (including the number of fishing boats, forms of fishery activities, fish species, yield of catch, etc.)	Yunlin County	Once per year
<p>Note:</p> <ol style="list-style-type: none"> 1. On-shore monitoring items (air quality, noise and vibration, on-shore ecology, and cultural heritage) will be carried out over the duration of on-shore works (step-up substation and cable installation) depending on the actual work progress. 2. Marine monitoring items (sea water quality, bird ecology, marine ecology, fishery resources, cetacean ecology visual monitoring) shall be carried out during the offshore construction period depending on the actual construction progress. 3. Monitoring of construction noise will be performed during construction of step-up substation. Monitoring of underwater acoustics and underwater noise will be performed during the pile-driving stage of wind turbine construction. 4. Two or more cetacean observers will be arranged on each vessel for the visual monitoring survey of cetacean ecology. Video recording will be implemented during the entire piling monitoring period. The monitoring shall occur at a frequency of 30 trips annually, not limited to just the period between April and September. An application for changes should be submitted according to law before any adjustments are made. 5. Regarding the sampling points and survey lines for the sea survey, if the originally planned sampling points and survey lines cannot be used after the wind turbines and wind farm are set up, the investigation location will be adjusted based on the actual situation. 			

Table 6 Table of environmental monitoring plan for the operation period

Category	Monitored items	Location	Frequency
Bird ecology	The species, quantity, activities including resting, flight route, and seasonal changes of the groups (including shorebirds and waterfowls)	Wind farm area and coast near landfall	Once every winter (December to February), once a month every spring (March to May), summer (June to August) and fall (September to November) during the transit period of migratory birds. (In winter, sea birds are surveyed using off-shore vessels or surveyed indirectly through auxiliary equipment such as video recorders, binoculars, radar, and satellite trackers)
Maritime ecology	1. Plankton, juvenile fish and fish eggs, benthic organisms	Five locations in the wind farm area	Once a season
	2. Fish	Three survey lines	Once a season
	3. Underwater photography	Two wind turbines will be selected after the overall operation of the wind farm.	Once a season
Cetacean ecology	1. Visual monitoring	Wind farm area	30 trips/year
	2. Underwater acoustics	A total of 5 underwater acoustics stations	Once a season

Category	Monitored items	Location	Frequency
Underwater noise	Underwater noise with frequency range 20Hz–20kHz; spectrogram and 1-Hz band, 1/3 octave band analysis	Two stations at the border of the wind turbines (Data can be obtained from the underwater acoustics stations for cetacean ecology for analysis.)	Once a season
Electromagnetic field	Magnetic field	One station near the landfall	Once every year
Terrain monitoring	Seabed terrain	Wind farm area	Once every year after the overall operation of the wind farm.
Fishery resources	Collect and analyze economic data related to fisheries in the annual fishery report (including the number of fishing boats, forms of fishery activities, fish species, yield of catch, etc.)	Yunlin County	Once every year
<p>Note:</p> <ol style="list-style-type: none"> Regarding the sampling points and survey lines for the sea survey, if the originally planned sample points and survey lines cannot be used after the wind turbines and wind farm are set up, the investigation location will be adjusted based on the actual situation. Two or more cetacean observers will be arranged on each vessel for the visual monitoring survey of cetacean ecology. The monitoring shall occur at a frequency of 30 trips annually, not limited to just the period between April and September. An application for changes should be submitted according to law before any adjustments are made. 			

The technical feasibility, cultural appropriateness, expected effectiveness of the provided mitigation measures are also shown in Appendix C Summary Table of Target and Associated Mitigation Measures and Monitoring Plan.

3.3.3 Other management plans

Besides ESIA Report, the Company also prepared several other management plans for the Project as summarized in Table 7. The responsible person for assuring the quality of the plans/documents and the review frequency are also described in Table 7.

These environmental and social management plans produced for the Project are consistent with the Project's E&S Policy Statement, and the objective and principles described in the Project's ESMS. Management, mitigation measures, monitoring plans, and actions shall be executed and taken following these plans.

Table 7 Other Environmental and Social relevant Management Plan

No.	Project Management Plan	Issues covered	Quality assurance responsible person	Review frequency
ES-1	Environmental and Social Action Plan (ESAP)	<ul style="list-style-type: none"> Actions to take regarding environmental and social management topics, including responsible party/person, timeline of actions, indicator of completion, and evaluation criteria 	Person of general supervision (Weiwei Tseng)	In accordance with the timeline described in ESAP

No.	Project Management Plan	Issues covered	Quality assurance responsible person	Review frequency
ES-2	Biodiversity Action Plan	<ul style="list-style-type: none"> The baseline of the critical habitats defined in the Project according to applicable regulations and standards Measures proposed to enhance habitats and protect and conserve biodiversity 	Environmental Specialist (Dr. Susanne Schorcht)	In accordance with the timeline described in ESAP
ES-3	Coastal Zone Management Plan (CZMP)	<ul style="list-style-type: none"> The legal framework for the Project to use the coastal area in Taiwan The baseline of the use of coastal area, including terrain, landform, ecological resources, landscape, cultural assets, traffic The mitigation measures, restoration, or alternatives planned for the potential impacts to coastal areas brought by the Project 	ESIA Manager (Chi Lin)	Every December
ES-4	Underwater Cultural Heritage Management Plan (as part of Underwater Cultural Heritage Survey Report)	<ul style="list-style-type: none"> The legal framework of conducting underwater cultural heritage survey, managing the potential cultural heritage, and relevant activities The methods and equipment used to define the potential underwater cultural heritage in Yunlin Offshore Wind farm area The potential cultural heritages found by the aforementioned methods and equipment, and how to handle them according to regulations The planned warning zone between the Project's objects and the potential underwater cultural heritage found 	Permit Manager (Weiwei Tseng)	On demand
ES-5	HSE Plan	<ul style="list-style-type: none"> Scope and summary of all technical, organizational and personal processes and measures that guarantee safety within and around the Project Organizational chart and HSE related roles and responsibilities of HSE Manager, HSE Team, Project Management Team, and all employees of the Project Interrelationship of the HSE Plan with other HSE relevant documentation Contractors' obligations and HSE documentation to deliver Overview of occupational safety regulations applicable to the Project 	HSE advisors (Hergen Koring, Armin Heinsohn and Vera Smid), and HSE manager (Jonathan Lee)	On demand
ES-6	Stakeholder Engagement Plan (SEP)	<ul style="list-style-type: none"> General stakeholder management strategies List of main stakeholders of the Project and their classification Communication strategies and frequency with stakeholders in different phases of the Project Monitoring and evaluation of the SEP and communication with stakeholders 	Community Liaison Officer (Hung-Chun Lin)	Quarterly

No.	Project Management Plan	Issues covered	Quality assurance responsible person	Review frequency
ES-7	Livelihoods Restoration Plan (LRP)	<ul style="list-style-type: none"> • A comprehensive socioeconomic baseline covering all the fishermen, oyster farms, and fishing pond users being affected by the Project • Measures to restore or ensure a continuation of the livelihood to all affected people compared to baseline, including fishermen, oyster farms, and fishing pond users • Monitoring program with measurable targets to review the effectiveness of the proposed measures 	Community Liaison Officer (Hung-Chun Lin)	Quarterly
ES-8	Onshore Traffic Management Plan (Appendix D)	<ul style="list-style-type: none"> • General management concept of onshore traffic and legal frame • Principles in planning mitigation measures, alternatives, and traffic maintenance measures to ensure the road accessibility by public 	SUB Manager (David Chang)	On demand

3.4 Management structure for environmental and social management and control

To ensure the Project complies with all the legal requirements and the mitigation measures and management plans are implemented firmly, the Company established a team to manage and supervise the execution of the commitments and the plans described in this ESMP. The key responsible staff for different topics, their contact detail, and the specific main responsibilities are summarized in Table 8.

Table 8 Key staff, competence and associated responsibilities, and contact details

Role	Responsible person	Email address	Competence	Responsibilities
General Supervision	Weiwei Tseng	Weiwei.Tseng@wpd.tw	<ul style="list-style-type: none"> • MBA degree • Worked for offshore wind farm development in Taiwan for more than 10 years • Experienced in wind farm development, permit management and ESIA management 	<ul style="list-style-type: none"> • Overall accountability of ESMP • Ensure appropriate resources and expertise for executing ESMP • Ensure the implementation of the correct actions defined in ESMP • Ensure the regular review of ESMP effectiveness is in line with requirements
ESIA Manager	Chi Lin	Chi.Lin@wpd.tw	<ul style="list-style-type: none"> • Master of Environmental Management, Macquarie University, Australia • Working experiences in environmental industry for 9 years with more than 10 EIA projects in Taiwan and Macau. • Field of expertise: chem-physical environmental assessments, noise control design, life cycle assessment (LCA), and project management 	<ul style="list-style-type: none"> • Ensure the firmly implementation of environmental related actions described in ESMP • Ensure the regular delivery of environmental monitoring reports
Environmental Specialist	Dr. Susanne Schorcht	s.schorcht@wpd.de	<ul style="list-style-type: none"> • Ph.D. Natural Scientist - Molecular- and Microbiologist • 15 years of work experience in offshore wind as permit manager • Responsible for OWF BARD Offshore 1, Veja Mate, Deutsche Bucht, Butendiek, Nordergründe, and others 	<ul style="list-style-type: none"> • Provide environmental consultation based on the past experiences and the latest finding • Provide and introduce European environmental know-how to the Team • Responsible for the Project's Biodiversity Action Plan
Biodiversity Specialist	Freerk Nanninga	f.nanninga@wpd.de	<ul style="list-style-type: none"> • Worked as permit and environmental manager for several offshore wind farms and participated in several environmental research projects • More than 10 years as a member of the environmental working group "AGOW AG Umwelt Schutz" 	<ul style="list-style-type: none"> • Provide biodiversity consultation based on the past experiences and the latest finding • Provide and introduce European environmental know-how to the Team • Consultation focus: birds, cetacean, and bats

Role	Responsible person	Email address	Competence	Responsibilities
			<ul style="list-style-type: none"> Specialized in bird migration, noise mitigation, etc. 	
Social Engagement Management	Yuni Wang	Yuni.Wang@wpd.tw	<ul style="list-style-type: none"> Worked for Taiwanese wind power industry since 2001 Experienced in supporting authorities in establishing and completing wind power related laws and regulations as well as social engagement 	<ul style="list-style-type: none"> Establish social engagement strategies, including the strong connection between the Project and the Locals and the transparent communication between the Project and stakeholders Ensure the timely and effective communication between the Project and stakeholders Ensure the firmly implementation of social related actions described in ESMP
Community Liaison Officer	Dr. Hung-Chun Lin	h.lin@wpd.de	<ul style="list-style-type: none"> Master of Environmental Engineering; Doctor of Agricultural Sciences Joined the Project team since 2017 as project coordinator Field of expertise: sustainable resource management, sustainability assessment, permit management 	<ul style="list-style-type: none"> File the meeting minutes of all the stakeholder engagement activities Manage all stakeholder engagement and grievance related activities Update and evaluate the Project's SEP with the frequency stated in the SEP Clarify the role and responsibilities mentioned in the Project's ESMS in relation to SEP roles and responsibilities as well as grievance mechanism Responsible for the Project's LRP (e.g. review, monitor, and evaluate the performance of LRP)
HSE Advisor	Hergen Koring	h.koring@wpd.de	<ul style="list-style-type: none"> Graduate Engineer in Electrical and Industrial Engineering; DGQ-Auditor; Occupational Safety Specialist Since 2009: Responsible for HSE-plans, review of HSE-documents, managing and conducting internal/external audits, monitoring of on- and offshore activities 	<ul style="list-style-type: none"> Advise the project management team and all other participants about all occupational health, safety and environmental matters Ensure the Project's conformity with all the applicable HSE regulations and requirements Ensure the firmly implementation of all the

Role	Responsible person	Email address	Competence	Responsibilities
			<ul style="list-style-type: none"> HSE&QM-Manager for OWF Nordergründe, Butendiek, EnBW Baltic1, EnBW Baltic2, Hohe See, He Dreiht, etc. Previous experience: Project-Quality-Engineer in the Oil & Gas Industry, electrical engineer in various industries 	HSE related actions described in ESMP
HSE Advisor	Armin Heinsohn	a.heinsohn@wpd.de	<ul style="list-style-type: none"> Master in the machine-builder profession; safety and health protection specialist More than 11 years of experience as HSE manager Participation in OWF Alpha Ventu, Borkum West II, GlobalTech 1 and Nordergründe Field of expertise: HSE management system, HSE auditing in production and service, both on- and offshore 	<ul style="list-style-type: none"> Advise the project management team and all other participants about all occupational health, safety and environmental matters Ensure the Project's conformity with all the applicable HSE regulations and requirements Ensure the firmly implementation of all the HSE related actions
HSE Advisor	Vera Smid	v.smid@wpd.de	<ul style="list-style-type: none"> Bachelor of Environmental Science; Master of Marine Environmental Science Experience in offshore projects since 2012 Participation in OWF Kaskasi, Baltic 2, and Nordergründe Field of expertise: environment and permit management, EHS management 	<ul style="list-style-type: none"> Advise the project management team and all other participants about all occupational health, safety and environmental matters Ensure the Project's conformity with all the applicable HSE regulations and requirements Ensure the firmly implementation of all the EHS related actions
HSE manager H&S Officer Security Officer	Jonathan Lee	Jonathan.Lee@wpd.tw	<ul style="list-style-type: none"> Environmental engineering degree; Professional Engineer of industrial safety, mineral hygiene, and environmental engineering More than 20 years of experience in HSE management Joined the team since March 2019 	<ul style="list-style-type: none"> Advise the project management team and all other participants about all occupational health, safety and environmental matters Ensure the Project's conformity with all the applicable HSE regulations and requirements Ensure the firmly implementation of all the HSE related actions

Role	Responsible person	Email address	Competence	Responsibilities
				<ul style="list-style-type: none"> • Coordinate between the Company and HSE related authorities in Taiwan • Coordinate the team who carry out HSE related duties (both office based and site based) • Review of method statements, risk assessments and security assessment as relevant for the works • Coordinate or conduct HSE and security audits as appropriate and follow up on action points • Provide input to the project' execution plans with regards to HSE and security matters • Take measures to enhance the awareness and vigilance of project and contractor staff towards HSE and security matters • In case deficiencies and non-conformities during internal audits, periodic reviews, security inspections and verification of compliance, the security officer would address these with the appropriate expedience • Ensure consistency between security and safety requirements (e.g. across several project sites where alternative and yet equivalent arrangement may exists) • Facilitate effective communication and cooperation between the various HSE and security stakeholders
FOU Manager	Tim Benjamin Kühl	t.kuehl@wpd.de	<ul style="list-style-type: none"> • Dipl.-Ing. (FH) Automation technology (Industrial Engineering) • Working experience in offshore wind industry 	<ul style="list-style-type: none"> • Ensure the delivery of all the FOU related ESMP requirements to the FOU Contractor

Role	Responsible person	Email address	Competence	Responsibilities
			<ul style="list-style-type: none"> since 2009, participated in OWF Bard Offshore 1, Butendiek, and Nordergründe 	<ul style="list-style-type: none"> Ensure the correct communication between the Project and FOU Contractor Report the ESMP implementation progress and effectiveness of FOU Contractor Report and align the complaints or problems related to ESMP from FOU Contractors
WTG Manager	Felix Schubert	f.schubert@wpd.de	<ul style="list-style-type: none"> Chartered Engineer, MEng Hons. & EUR ING – FEANI, in Mechanical Engineering / Aeronautics and Certified Project Management Associate (IPMA) With (over) 10 years of professional experience in the energy sector and (over) half of this time in the offshore wind industry managing a wide range of commercial and technical aspects of the WTG package Previous work experience: WTG Package Manager for the Race Bank Offshore Wind Farm (OWF), Warranty Manager for the Lincs OWF, Technical Contract Negotiations Lead for the Lynn & Inner Dowsing OWFs and Senior Readiness Engineering Lead for the East Anglia One OWF 	<ul style="list-style-type: none"> Ensure the delivery of all the WTG related ESMP requirements to the WTG Contractor Ensure the correct communication between the Project and WTG Contractor Report the ESMP implementation progress and effectiveness of WTG Contractor Report and align the complaints or problems related to ESMP from WTG Contractors
	David Chang	David.Chang@wpd.tw	<ul style="list-style-type: none"> 5 years working experiences in power company in South Africa, specialized in power system analysis, planning, and design 16 years working experiences in wind energy and solar energy in Taiwan, specialized in the development, planning, design, analysis, contract 	

Role	Responsible person	Email address	Competence	Responsibilities
			management, and construction of renewable energy power plant	
SUB Manager	David Change	David.Chang@wpd.tw	<ul style="list-style-type: none"> • 5 years working experiences in power company in South Africa, specialized in power system analysis, planning, and design • 16 years working experiences in wind energy and solar energy in Taiwan, specialized in the development, planning, design, analysis, contract management, and construction of renewable energy power plant 	<ul style="list-style-type: none"> • Ensure the delivery of all the SUB related ESMP requirements to the SUB Contractor • Ensure the correct communication between the Project and SUB Contractor • Report the ESMP implementation progress and effectiveness of SUB Contractor • Report and align the complaints or problems related to ESMP from SUB Contractors
	Craig Langhorn	c.langhorn@wpd.de	<ul style="list-style-type: none"> • Bachelor of Engineering in Power Engineering, studied Masters in Business Administration in Project Management • Over 20 years Project, Tender and Marketing Management of large electrical generation/transmission/distribution projects on- and offshore, including 50 high voltage substation turnkey projects • Electrical Work Package Manager offshore wind farms Butendiek, Nordergründe and other development projects in NL, FR, DK, TW 	
IAC Manager	Kai Fitzer	k.fitzer@wpd.de	<ul style="list-style-type: none"> • Bachelor of Science in Maritime Technologies • Working in the offshore industry since 2008; as (Deputy) Project Manager Inter Array Cables since 2015 	<ul style="list-style-type: none"> • Ensure the delivery of all the IAC related ESMP requirements to the IAC Contractor • Ensure the correct communication between the Project and IAC Contractor • Report the ESMP implementation progress and effectiveness of IAC Contractor

Role	Responsible person	Email address	Competence	Responsibilities
				<ul style="list-style-type: none"> Report and align the complaints or problems related to ESMP from IAC Contractors
INS Manager	Julia Ullrich	j.ullrich@wpd.de	<ul style="list-style-type: none"> Diploma in Business Engineering (University of Applied Sciences) Since 2010: Project Manager Offshore Logistics Development and realisation of 2 offshore wind farms (OWF Butendiek & OWF Nordergründe) as part of the installation team thus significant experience in all logistical and installation aspects involving the realisation of an offshore wind farm 	<ul style="list-style-type: none"> Ensure the delivery of all the INS related ESMP requirements to the INS Contractor Ensure the correct communication between the Project and INS Contractor Report the ESMP implementation progress and effectiveness of INS Contractor Report and align the complaints or problems related to ESMP from INS Contractors

To strengthen the assurance and effectiveness of ESMP implementation, external experts and consultancies are contracted for the Project. Table 9 shows the overview of the contracted experts and consultancies, their responsibilities and the selected track records.

Table 9 External experts and consultancies, and their responsibilities and track records

Contractor	Responsibilities	Selected track record
ERM	Environmental and Social Action Plan, PS5 Land Acquisition & Involuntary Resettlement and PS6 Biodiversity	<ul style="list-style-type: none"> Review and localization of EHS MS for an offshore wind farm development in Taiwan Contractor safety training support for offshore wind development in Taiwan Environmental and Social Due Diligence of an Offshore Wind Farm Development Taiwan Equator Principles Review for 7 Wind Farms (4 Operational, 3 in Final Construction Phase), Jilin Province, China for a Confidential US-Listed Investor Health Safety and Environment Due Diligence on a wind farm feasibility consultancy in Japan for a Financial Investor Environmental and Social Responsibility Due Diligence of a 200MW Wind Farm in Jiangsu Province, DEG Environmental and Social Responsibility Due Diligence of two 49.5MW Wind Farm in Inner Mongolia, SCB Independent Environmental and Social Consultant 150-MW Wind Farm in the Philippines 200 MW Offshore Wind Farm, Hong Kong
National Kaohsiung University of	Environmental and Social Action Plan, PS5 Land	<ul style="list-style-type: none"> Taiwan marine environmental protection and conservation overall inspection

Contractor	Responsibilities	Selected track record
Science and Technology, Team of Prof. Wen-Hong Liu	Acquisition & Involuntary Resettlement	<ul style="list-style-type: none"> • The sustainable development of the fishery and marine ecological environment in Penghu • Penghu County Reef Health Index Survey and Covering Net Removal Plan • Aquaculture Village Competitiveness Improvement Demonstration Plan • Main Fishermen's Economic Sample Survey Design and Manpower Training • Building Diversified Fishery Industry and Management • Study on the Statistical System of Fishermen Economic Survey • Fishermen Care and Industrial Competitiveness Enhancement Plan • Ryukyu Township Leisure Fisheries Assessment and Promotion Plan • Research on the Development of Integrated Coastal Management Capability in Taiwan
PDE	Underwater archaeology survey	<ul style="list-style-type: none"> • Yunlin OWF Pre-Geotechnical Investigation, 2017 • Guanyin OWF Pre-Geotechnical Investigation, 2017 • Taoyuan OWF Pre-Geotechnical Investigation, 2017 • Yunlin OWF Main Soil Investigation, 2018-2019 • Yunlin OWF Comprehensive Geophysical Survey, 2018 • Guanyin Comprehensive Geophysical Survey, 2018
Unitech	ESIA	<ul style="list-style-type: none"> • ESIA for Construction Plan, Taoyuan Offshore Wind Farm • ESIA for Shangwei Miaoli Haineng Offshore Wind Power Plan • ESIA for Zhongneng Offshore Wind Power Plan • ESIA for Changhua Xidao Offshore Wind Power Plan • ESIA for Hsinchu Offshore Wind Power Plan, Asia Cement Corporation • ESIA for Ørsted (Wind Farms Nos. 12, 13, 14, 15), Woxu Offshore Wind Power Development Plan • ESIA for Changhua Changfang Offshore Wind Power Plan • ESIA for Changhua Fufang Offshore Wind Power Plan • ESIA of NPI Yushan Energy Source Offshore Wind Power Plan • ESIA of Haiding (Wind Farms 11, 16, 17) Offshore Wind Power Plan (MQ&SWE)
AECOM	CZMP	<ul style="list-style-type: none"> • Environmental Research and Analysis of Wang Gong and Yong Xing Wind Power Plants Project • Environmental Research and Analysis of Penghu Low-Carbon-Island and Wind Power Plant Project • Environmental Monitoring of Taichung Port Area and Wind Power Plants Project • Amendments, Evaluation, Change in EIA and Environmental Monitoring of Changhua Fishing Port Development Project • Environmental Research and Analysis of Taichung Power Plants during the Operation • Environmental Monitoring Project of Budai Port

4 Appendix

Appendix A Environmental and Social Policy Statement

Yunneng Wind Power Co., Ltd.

Environmental and Social Policy Statement

1 Introduction

The development of offshore wind farms (OWF) has been designed to complement the Taiwan's energy diversification plan and contributes to the Government's goals toward greenhouse gas reduction, low-carbon energy sources, and green industries. In support of Taiwan Government's renewable energy policies, Yunneng Wind Power Co., Ltd. (referred to as the Company below) has planned the development of Yunlin Offshore Wind Farm Project (referred to as the Project below) as a solution to reducing Taiwan's dependency upon a single energy source.

With its Code of Conduct, the Company has committed itself to a high level of social responsibility. All ethical and legal requirements applicable to the Company in the performance of its activities shall be complied with. Essential aspects to which the Company wishes to draw a special attention as working conditions and health and safety are already part of this voluntary commitment. This voluntary commitment also includes the protection of the environment and to take care for the people who participate in the Project in different ways. In view of the particular challenges the Project operates, the Company makes a separate commitment to environmental and social issues.

The Environmental and Social (E&S) Policy Statement (referred to as the "Policy Statement") is established in order to ensure the environmental and social sustainability of the Project.

This Policy Statement has been approved by the Company's Member of the Board of Directors, Yuni Wang and Huien Liao on 12th November 2019.

2 Statement of Purpose and Scope

Yunlin Offshore Wind Farm locates off the coast of Sihou and Kouhu Townships of Yunlin County, Taiwan. The area of the wind farm is approximately 82 km² and the distance to shore is approximately 8-17 km. The water depth is approximately between 10-35 m. The overall wind farm is at least 3,000 m from the proposed Major Wildlife Habitat of Taiwanese White Dolphin. It is also away from the shipping channels and relevant development plans. The wind farm



consists of eighty (80) wind turbine generators (WTGs) of the model SG 8.0-167. The total installed capacity is 640 MW and it is connected directly to two onshore substations via two landfalls.

Eighty WTGs will be connected to two self-built onshore substations through two export cable corridors with six export cables each. There will be an equal allocation of 40 WTGs for the northern substation (and export cable corridor) and 40 WTGs for the southern one. The power voltage will be step-up to 161kV and all electricity generated will be connected through 161kV land cables laid underground to TPC's (Taiwan Power Company) existing substations located in Taixi and Sihu Townships respectively.

The activities this Project involves include:

- Surveys and monitoring before, during, and after construction period;
- Onshore transportation and construction;
- Offshore transportation and construction; and
- Operation and maintenance.

This Policy Statement is formulated based on the Project's scope, activities, and impacts defined in the Project's Environmental and Social Impact Assessment (ESIA) Report and covers the environmental and social dimensions of the Project's sustainable development.

3 Commitments to Environmental and Social Sustainability

The Company hereby expressly undertakes to comply with the following requirements in order to fulfil the objectives mentioned in the Code of Conduct in general.

The Company commits to comply with applicable local environmental and social legislation and international requirements such as Equator Principle (EP), International Finance Corporation Performance Standards (IFC PS) and World Bank Group (WBG) Environmental, Health and Safety (EHS) Guidelines.

The Company also commits to comply with the applicable laws and national regulation:

- **Environmental Impact Assessment Act**
 - Environmental Impact Assessment Enforcement Rules
 - Regulations Governing Environmental Impact Assessments for Development Activities



- **Coastal Zone Management Act**
 - Coastal Zone Management Enforcement Rules
- **Waste Disposal Act**
 - Waste Disposal Act Enforcement Rules
- **Water Pollution Control Act**
 - Water Pollution Control Act Enforcement Rules
- **Noise Control Act**
 - Noise Control Act Enforcement Rules
- **Air Pollution Control Act**
 - Management Regulations for Construction Project Air Pollution Control Facilities
- **Occupational Safety and Health Act (OSHA)**
 - Enforcement Rules of the Occupational Safety and Health Act
 - Facility Rules of the Occupational Safety and Health Act
 - Management Rules of the Occupational Safety and Health Act
 - Occupational Safety and Health Education and Training Rules
 - Occupational Safety and Health Marking Guideline
 - Labour Health Protection Rules
 - Safety Standard of Machinery and Equipment
 - Safety Rules of Lifting Machineries
 - Labour Safety Rules for High Pressure Gas
 - Construction Safety and Sanitation Standards
 - Regulations for Safety Inspection of Hazardous Machines and Equipment
 - Regulations for Safety Inspection of Existing Hazardous Machines and Equipment
 - Structure Standards for Fixed Crane Safety Inspection
 - Structure Standards for Mobile Crane Safety Inspection
 - Safety Inspection Standards for Lifting Machineries
 - Safety and Health Facility for Dock Loading and Unloading Regulation
 - Standards of Protection Measures for Labor Work at Height
 - Structure Standards for Gondola Safety Inspection
 - Prevention Standards for Abnormal Pressure Hazards
- **Act for Protecting Worker of Occupational Accidents**
 - Enforcement Rules of Protection for workers Incurring Occupational Accidents Act
 - Occupational Disaster Prevention and Compensation Measures



- **Labour Inspection Act**
 - Enforcement Rules of the Labour Inspection Act
 - Definition of the potential of imminent danger to the labours prescribed in Article 28 of the Labour Inspection Law
- **OSHA Offshore Wind Farm Operation Safety Guideline**
- **Fisheries Act**
- **The Fishermen Association Act**
- **Fishery Compensation Basis for Offshore Wind Farm**
- **National Property Act**
- **Regulations on Real Estate Appraisal**
- **Land Expropriation Act**
- **Regulations Governing the Use and Supervision of Power Development Assistance Fund**

Furthermore, the Company commits to comply with:

- Applicable treaties mentioned in the local Environmental and Social Impact Assessment (ESIA) Report;
- Wood's Environmental and Social Due Diligence (ESDD);
- The Project's Code of Conduct; and
- The Project's executed Common Term Agreement (CTA).

Further commitments of the Company:

- The Company commits to publish the Project's ESIA Report on the Project's website.
- The Company commits that all the activities of the Project follow the Health, Safety, and Environmental (HSE) Plan of the Project.
- The Company commits to be proactive in environmental and ecological education to increase the environmental and ecological awareness of the society.
- The Company commits to implement the Project's Stakeholder Engagement Plan (SEP) firmly and update the SEP according to the actual situation regularly.
- The Company commits to execute the Livelihood Restoration Plan (LRP) firmly to keep the sustainable living of Project Affected People.
- The Company commits to support local community depending on their actual needs.
- The Company commits to follow the offshore and onshore traffic management plans of the Project to ensure safety of existing users.



4 Implementation, Monitoring, and Evaluation

The management of the Company commits to fulfil the abovementioned commitments and is responsible for the preparation and development of the relevant documents. Therefore, the Company has developed a compliance management system for the protection of the environment and social matters to implement the voluntary commitments of this Policy Statement in its daily processes. According to the requirements of the system, the Company implement further documents and mechanism to review their system and documents, control the compliance with the relevant regulation and the aforementioned commitments and to report the results.

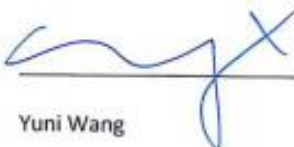
Any revision of the Policy Statement must be approved by the Company's Member of the Board of Directors.

5 Public Information and Disclosure

Disclosing and communicating the Policy Statement to all employees, suppliers, contractors, visitors, and other interested parties of the Project is a way to ensure the transparency, accountability, and effectiveness of the commitments of the Policy Statement. The Company shall announce the Policy Statement next to the Code of Conduct on the Project's website for easy access of stakeholders and general public. The Company shall also communicate the Policy Statement with all employees, suppliers, and contractors in the form of written letter/email to ensure the Policy Statement is disclosed to all of them.

Taipei, November 13, 2019

Directors of Yunneng Wind Power Co., Ltd.



Yuni Wang



Huien Liao



Appendix B Summary Table of Environmental/Social Impact and Associated Target

Topic	Impact assessment after YUN OWF development	Target /Targeted level
Seabed terrain changes	<p>There is a consistent trend of change from the surf zone to the vicinity of the coastal line; specifically, it remains primarily based on onshore-offshore drifting sand mechanism, in which erosion was observed within the surf zone and deposition was detected around the coastal line. Some areas displayed nearshore circulation, causing the presence of both erosion and deposition in areas nearby the coastal line. No considerable change was detected before and after wind turbine installation</p> <p>The calculations for sea terrain change simulation results following installation of wind turbines in typhoon conditions in this Project show insignificant changes to the terrain to the south of the wind farm before and after the construction of the wind turbines. The overall erosion and deposition mostly occur near the foundations of wind turbines</p> <p>Results of the overall changes of the foundations indicate that outside the surf zone, the closer the foundation is to the edge of the surf zone, the larger the impact of the erosion and deposition. The largest influence occurs in the surf zone. The maximum area of localized influence was within the area 8-10 times the diameter of the foundation either parallel or vertical to the wave direction, which is considered a localized influence on the entire area of the sea.</p>	Insignificant or localized impact on the current status
Surface runoff	The total surface runoff Q0 of the step-up substation area before development was 0.55 CMS and the runoff volume Q1 during construction was 1.22 CMS, a 0.67 CMS increase in wastewater runoffs compared with that before development. The runoff in the construction area shall be recycled for watering plants for landscaping at the step-up substation.	Can be recycled for further treatment
Domestic wastewater	Regarding the wastewater generated by construction workers of this Project, the Project site requires approximately 150 workers during the maximum peak period; the land power transmission and distribution system engineering construction zone will not have workers lodging at the construction site, and the workers lodging at the working harbour will be at most 100 people in principle. According to the Design and Technique Directions of Buildings Sewage Treatment Facilities announced by the Construction and Planning Agency, Ministry of the Interior, then the construction workers will generate 37.5 CMD of wastewater during the construction period. Based on a biochemical oxygen demand (BOD) of 250 mg/L, approximately 9.375 kg of waste is generated every day. The domestic wastewater of construction workers will be disposed of by using rental mobile toilets. Instead of discharging it arbitrarily into groundwater, the domestic wastewater will be disposed by commissioning certified disposal companies. During the construction period of this Project, the wastewater generated by construction workers will not influence neighbouring receiving waters.	No impact on neighbouring receiving waters

Topic	Impact assessment after YUN OWF development	Target /Targeted level
<p>Marine suspended solid (SS) concentration</p>	<p>The simulation results indicated that the concentration of SS diffused and reduced quite rapidly. During subsea cable laying at Landfall 1, the ocean current diffused the SS near the construction site (approximately 200 m), diluting the concentration to approximately 3.2 mg/L. The increase in SS concentration 500 m away from the construction site was only approximately 2.5mg/L at low tide, the increase in SS concentration 1000 m away from the construction site was only approximately 1.5mg/L, and the concentration increase near the shore was lower than 0.5mg/L. The concentration level of suspended solids from Landfall 2 has been reduced to about 3.5mg/L at 200m away from the work site, 2.7mg/L at 500m away, 1.7 mg/L at 1,000m away, and less than 0.5mg/L near the shoreline. The concentration level of suspended solids from Landfall 3 has been reduced to about 3.5mg/L at 200m away from the work site, 2.5mg/L at 500m away, 1.8 mg/L at 1,000m away, and less than 0.5mg/L near the shoreline. As the foundation work for wind turbines is performed in deeper waters, the concentration level of suspended solids has been reduced to about 0.9mg/L at 200m away from the work site, 0.7mg/L at 500m away, 0.6mg/L at 1,000 away, and less than 0.1mg/L near the shoreline. These results showed that the SS created during the construction period can be diffused quickly within a short distance following two tidal events a day, thus exerting minimal influence on the sea.</p> <p>In summary, foundation installation and subsea cable laying are temporary activities conducted during the construction period; therefore, their effects on neighbouring seas are considered localized and temporary. Furthermore, a numerical simulation of the construction conditions reveals that these processes exert a low level of influence. To prevent further influencing the quality of nearshore waters, the use of a pollution prevention membrane or silt curtains will be considered when laying subsea cables and installing foundations to confine the scattering SS within the area of the construction.</p>	<p>No impact or localized and temporary impact on sea waters</p>
<p>Groundwater</p>	<p>Because the excavated depth of land power transmission and distribution systems is limited, it is not necessary to pump groundwater for pressure reduction during the construction period. In addition, construction will not cause any groundwater to gush out as the area of each step-up substation is only approximately 3,300 square meters and the construction period is short. Although the infiltration of surface runoff during the construction period will slightly affect groundwater level for a brief period of time, this water level will return to its original level at the end of the construction process, thus generating only a minor influence on the overall groundwater level in the Project site.</p> <p>Concrete is used for grouting works during the excavation period. Existing roads are used as access to the construction site to diminish the area of construction. Construction vehicles are maintained regularly to avoid oil leakages, which might contaminate groundwater. Therefore, this Project exerts no influence on the quality of groundwater during the construction period.</p>	<p>Groundwater level and pressure: no impact or localized and temporary influence</p> <p>Water quality: no impact</p>

Topic	Impact assessment after YUN OWF development	Target /Targeted level
Substation construction air pollutant emissions	<p>TSP:</p> <p>The simulation results for total suspended particulates (TSP) diffusion indicate that the maximum increase over a period of 24 hours and the maximum annual mean increase were 46.43µg/m³ and 12.55 µg/m³, respectively. The increase over a 24-hour period and maximum annual mean increase following diffusion at the sensitive receiver Anxi Temple were 0.28µg/m³ and 0.04 µg/m³, respectively. The increase over a 24-hour period and maximum annual mean increase following diffusion at the sensitive receiver Yunlin Fishermen's Association were 0.46µg/m³ and 0.09 µg/m³, respectively. The sum of TSP increase and background concentration conform to air quality standards.</p> <p>PM10:</p> <p>The maximum daily mean increase was 46.43µg/m³ and the maximum annual mean increase was 12.55µg/m³. The increase over a 24-hour period and maximum annual mean increase following diffusion at the sensitive receiver Anxi Temple were 0.28µg/m³ and 0.04 µg/m³, respectively. The increase over a 24-hour period and maximum annual mean increase following diffusion at the sensitive receiver Yunlin Fishermen's Association were 0.46µg/m³ and 0.09 µg/m³, respectively. The sum of PM10 increase and background concentration conform to air quality standards.</p> <p>PM2.5:</p> <p>The increase in PM2.5 diffusion in the neighbouring environments shows that the maximum daily mean increase and maximum annual mean increase were 24.48 µg/m³ and 7.11 µg/m³, respectively. The maximum daily mean increase and maximum annual mean increase of PM2.5 near sensitive receiver Anxi Temple were 0.14 µg/m³ and 0.025 µg/m³, respectively. The maximum daily mean increase of PM2.5 to the sensitive receiver Yunlin Fishermen's Association was 0.25µg/m³ and the maximum annual mean increase was 0.050µg/m³. The increase of PM2.5 to sensitive receivers and background concentration conform to air quality standards.</p> <p>SO2:</p> <p>The maximum hourly mean increase was 0.85ppb; the maximum daily mean increase was 0.14ppb; the annual mean increase was 0.04ppb. The maximum hourly mean increase of SO2 at the sensitive receiver Anxi Temple was 0.007ppb; the maximum daily mean increase was 0.0008ppb; the annual mean increase was 0.00015ppb. The maximum hourly mean increase of SO2 at the sensitive receiver Yunlin Fishermen's Association was 0.019ppb; the maximum daily mean increase was 0.0014ppb; the</p>	<p>Meeting air quality standards:</p> <p>TSP: 24-hour value 250 µg/m³, yearly average value 130 µg/m³</p> <p>PM10: daily average value 125 µg/m³, yearly average value 65 µg/m³</p> <p>PM2.5: 24-hour value 35 µg/m³, yearly average value 15 µg/m³</p> <p>SOx: highest hourly value 250 ppb, daily average value 100 ppb, yearly average value 30 ppb</p> <p>NO2: highest hourly value 250 ppb, yearly average value 50 ppb</p>

Topic	Impact assessment after YUN OWF development	Target /Targeted level
	<p>annual mean increase was 0.00029ppb. The sum of SO₂ increase and background concentration conform to air quality standards.</p> <p>NO₂:</p> <p>The maximum hourly mean NO₂ increase was 91.03ppb and the maximum annual mean increase was 5.19ppb. The maximum hourly mean increase of NO₂ at the sensitive receiver Anxi Temple was 1.10ppb and the maximum annual mean increase was 0.023ppb. The maximum hourly mean increase of NO₂ at the sensitive receiver Yunlin Fishermen's Association was 3.32ppb and the maximum annual mean increase was 0.048ppb. The sum of NO₂ increase and background concentration conform to air quality standards.</p>	
<p>Marine time construction air pollutant emissions</p>	<p>The maximum ground concentration is situated in areas around the construction site.</p> <p>TSP:</p> <p>The increase of TSP over a 24-hour period and maximum annual mean increase following diffusion over long distances at the sensitive receiver Anxi Temple were 0.018 µg/m³ and 0.002 µg/m³, respectively. The increase over a 24-hour period and maximum annual mean increase following diffusion at the sensitive receiver Yunlin Fishermen's Association were 0.046µg/m³ and 0.008 µg/m³, respectively. The increase and background concentration conform to air quality standards.</p> <p>PM₁₀:</p> <p>The increase of PM₁₀ over a 24-hour period and maximum annual mean increase following diffusion over long distances at the sensitive receiver Anxi Temple were 0.018µg/m³ and 0.002 µg/m³, respectively. The increase over a 24-hour period and maximum annual mean increase following diffusion at the sensitive receiver Yunlin Fishermen's Association were 0.046µg/m³ and 0.008 µg/m³, respectively. The increase and background concentration conform to air quality standards.</p> <p>PM_{2.5}:</p> <p>The increase of PM_{2.5} over a 24-hour period and maximum annual mean increase following diffusion over long distances at the sensitive receiver Anxi Temple were 0.015µg/m³ and 0.002µg/m³, respectively. The increase over a 24-hour period and</p>	<p>Meeting air quality standards:</p> <p>TSP: 24-hour value 250 µg/m³, yearly average value 130 µg/m³</p> <p>PM₁₀: daily average value 125 µg/m³, yearly average value 65 µg/m³</p> <p>PM_{2.5}: 24-hour value 35 µg/m³, yearly average value 15 µg/m³</p> <p>SO_x: highest hourly value 250 ppb, daily average value 100 ppb, yearly average value 30 ppb</p>

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	<p>maximum annual mean increase following diffusion at the sensitive receiver Yunlin Fishermen's Association were 0.039µg/m³ and 0.006µg/m³, respectively. The increase and background concentration conform to air quality standards.</p> <p>SO₂:</p> <p>The maximum average hourly increase of SO₂ following diffusion over long distances at the sensitive receiver Anxi Temple was 3.786ppb; the maximum daily mean increase was 0.172ppb; the maximum annual mean increase was 0.022ppb. The maximum average hourly increase of SO₂ following dispersion over long distances at the sensitive receiver Yunlin Fishermen's Association was 7.267ppb; the maximum daily mean increase was 0.456ppb; the maximum annual mean increase was 0.076ppb. The increase and background concentration conform to air quality standards.</p> <p>NO₂:</p> <p>The maximum average hourly increase of NO₂ and maximum annual mean increase following diffusion over long distances at the sensitive receiver Anxi Temple were 0.305ppb and 0.002ppb, respectively. The maximum average hourly increase of NO₂ and maximum annual mean increase following diffusion at the sensitive receiver Yunlin Fishermen's Association were 0.551ppb and 0.006ppb, respectively. The increase and background concentration conform to air quality standards.</p>	<p>NO₂: highest hourly value 250 ppb, yearly average value 50 ppb</p>
<p>Air pollution from surplus soil transport and construction vehicles</p>	<p>Within 200 m of the Provincial Highway 17, TSP increase was <5.50 µg/m³; PM₁₀ increase was <2.54µg/m³, PM_{2.5} increase was <0.32µg/ m³, SO₂ increase was 0 ppb, NO₂ increase was <4.98 ppb, and CO increase was <3.36 ppb</p> <p>Within 200 m of the County Highway 160, TSP increase was <5.06 µg/m³; PM₁₀ increase was <2.33µg/m³, PM_{2.5} increase was <0.30µg/ m³, SO₂ increase was 0 ppb, NO₂ increase was <4.58 ppb, and CO increase was <3.07 ppb.</p> <p>Most of the onsite background air quality parameters satisfied the environmental air quality standards after incorporating the total amount of increase. Maximum TSP increase occurs in the early stage of the excavation process because of the frequent transportation of soil. However, the adoption of prevention measures such as tire-cleaning and water-spraying can reduce 50% of particulate emission. Furthermore, excavation is a short-term construction process; therefore, it will slightly influence the surrounding air quality, but after the excavation process is completed, the effect of surplus soil transportation on the surrounding air quality will be reduced.</p>	<p>Meeting air quality standards:</p> <p>TSP: 250 µg/m³</p> <p>PM₁₀: 125 µg/m³</p> <p>PM_{2.5}: 35 µg/m³</p> <p>SO₂: 250 ppb</p> <p>NO₂: 250 ppb</p> <p>CO: 35,000 ppb</p>

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Onshore power transmission and distribution facilities construction noise	<p>Construction noise generated by the construction of the step-up substation in the north was assessed and simulated. The noise attenuated to 45.3dB(A) at the residential house near the step-up substation. This noise was combined with the background value of 65.4dB(A) which was derived from measurements, equalling the Lday predicted combined value of 66.2dB(A), which is in compliance with the environmental sound standard 74dB(A). Noise level increase was 0.8dB(A)(0-5), which exerts no influence or negligible influence according to the impact assessment process of this Project. The noise from the southern step-up substation attenuated to 47.5dB(A) at the residential house on Yugang Road. This noise was combined with the background value of 64.8dB(A) which was derived from measurements, equalling the Lday predicted combined value of 65.9dB(A), which is in compliance with the environmental sound standard 74dB(A). Noise level increase was 1.1dB(A)(0-5), which exerts no influence or negligible influence according to the impact assessment process of this Project.</p> <p>The noise of transportation vehicles attenuated to Lday 62.2 dB(A) after reaching the residential houses near the northern step-up substation. This noise was combined with actual background noise of 65.4 dB(A), yielding an increase of 1.8 dB(A) (0-5) which is in compliance with the sound control standard 74dB(A) and exerts no influence or negligible influence according to the noise impact assessment of the Project. The noise of transportation vehicles attenuated to Lday 19.9 dB(A) after reaching the residential houses on Yugang Road. This noise was combined with actual background noise of 64.3 dB(A), equalling an Lday predicted combined value of 64.3dB(A) and an increase of 0 dB(A) (0-5) which is in compliance with the sound control standard 74dB(A) and exerts no influence or negligible influence according to the noise impact assessment of the Project.</p>	Meeting environmental sound standard: 74dB(A)
Onshore power transmission and distribution facilities construction vibration	<p>In the pile driving phase, which generates the greatest vibration level in the construction of the step-up substation, the vibration level of all construction machinery is reduced to 41.1dB 50 m from the source of vibration, suggesting that the vibration level is not perceptible to the human body (55 dB is the threshold at which the body perceives vibration). In a typical construction situation, because there are more than 50 m (linear distance of at least 950 m) of residential houses nearest to the construction site of the step-up substation in this project, the construction process generated slight influence on residents of neighbouring areas.</p> <p>The maximum increase in transport vibration during the construction period and background vibration was 5.9 dB and the maximum combined vibration was 48.6 dB, which corresponds to the requirement of Japan's vibration law for Type-2 area (70 dB).</p>	<p>Construction machinery vibration: threshold at which the body perceives vibration (55 dB)</p> <p>Transport vibration: Japan's vibration law for Type-2 area (70 dB)</p>

Topic	Impact assessment after YUN OWF development	Target /Targeted level
Operation noise	<p>Full-frequency noise:</p> <p>The full-frequency noise generated when all wind turbines are operating at the same time after acoustic attenuation before reaching closest receiver (noise at the exterior of residential houses near the step-up substation) would result in a receiver noise level of 0.0dB(A) and an all-time ranges noise level increase of 0.0dB(A). It shows that full-frequency noise generated from wind turbines during the operation period of the Project has no impact or only negligible impact to sensitive receptors nearby.</p> <p>Low-frequency noise:</p> <p>The low-frequency noise generated when all wind turbines are operating at the same time after acoustic attenuation before reaching closest receiver (noise at exterior of residential houses near the step-up substation) would result in a receiver noise level of 0.0dB(A) and an all-time ranges noise level increase of 0.0dB(A). It shows that low-frequency noise generated from wind turbines of the Project has no impact or only negligible impact to sensitive receptors nearby.</p>	<p>Full-frequency noise: an all-time ranges noise level increase of 0.0dB(A)</p> <p>Low-frequency noise: an all-time ranges noise level increase of 0.0dB(A)</p>
Underwater noise in construction period	<p>Before noise mitigation:</p> <p>The simulation results from Section 7.1.4 of ESIA report indicated that the pile-driving noise at all points would be attenuated to 170 dB within 300-600m with the exception of M5 which is attenuated to 170 dB at 100m. In addition, except for noise from M5 which is attenuated to 160 dB within 900m, noise from all other points are attenuated to 160 dB within 2,300m. With the exception of M5 whose sound pressure level is lower than 161 dB at a distance of 750m of the pile-driving location, the SPL of all points would be attenuated to 164–167 dB at 750m of the pile-driving location.</p> <p>After noise mitigation:</p> <p>The distances required for the attenuation to 170 dB of the sound spreading from the sound sources into the direction of open seas are within 100m and the distances required for attenuation to 160 dB are all within 400m. With the exception of M5 whose SPL is lower than 151 dB at a distance of 750m of the pile-driving location, the SPL of all points would be attenuated to 154–156 dB within 750m of the pile-driving location.</p>	SEL 160dB
Underwater noise in operation period	The conservatively estimated maximum distance of 40 dB transmission loss at 125 Hz is between 200 and 900 m.	Continuously monitoring

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Electromagnetic field	<p>The calculation results show that the measurements at T13 of Route 5 and T7 of Route 6 are higher than measurements at other points because the distance of the sensitive points to cables are shorter. However, the predicted figures are still far lower than the 833.3mG reference value of the EPA. As for other power transmission circuits or sensitive receivers along the facilities, the calculated electromagnetic field value is between 0.20 and 8.10mG while predicted results are between 0.33 and 7.06mG. The electromagnetic impact on the checkpoints caused by the cable plus the background values in actual measurements is still far lower than the 833.3mG reference value of the EPA.</p>	Reference value of the EPA: 833.3 mG
Waste	<p>A maximum of 250 construction workers would be employed at the same time during the construction period of the project zone. Statistical data by the EPA reveal that each person in Yunlin County, where this project is based, generated 0.41 kg of waste per day in 2015. Based on this figure, 102.5 kg of waste are generated every day. Waste produced in the construction period will be recycled for reuse to achieve the goal of resource sustainability and waste reduction. Such waste will be properly collected in the waste containers at the site offices in each district area. Certified waste disposal companies will be commissioned to clear the collected waste. Because the produced waste is not typically high in quantity and consists mostly of general domestic waste, such waste will have no impact on waste disposal companies or disposal facilities in Yunlin County.</p> <p>The operation of offshore wind turbines and step-up substations in this project is unmanned, indicating that no waste will be generated, thereby exerting no impact on neighbouring waste disposal facilities.</p>	All waste can be treated properly and will not generate impacts on the surrounding environment
Surplus soil	<p>Surplus soil from subsea cable laying:</p> <p>Surplus soil from wind turbine foundations will be entirely back-filled. Subsea cables will be laid by burying into the excavated ground. All soils dug up from the ground will be filled back in, and therefore should not create any surplus soil. If surplus soils do arise in the future, the developer commits not to dispose of soil or discharge wastewater into the intertidal zone over the construction period. Instead, surplus soil shall be removed from the work site and transported preferentially to a nearby soil treatment plant in Yunlin County.</p> <p>Surplus soil from excavation of land cable step-up substation construction:</p> <p>In this project, the engineering work of on-shore power transmission/distribution is the only work likely to create surplus soil. The Project expects to excavate approximately 62,250 cubic meters of (loose) soil throughout the construction period; deduct which will be back-filled, leaving approximately 8,850 cubic meters of soil that must be purchased from external sources.</p>	All surplus soil can be treated properly and will not generate impacts on the surrounding environment

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Impacts brought by surplus soil transporting vehicles	<p>The construction period of the step-up substation is estimated to be eight months with an average filling volume of approximately 2,475 cubic meters. Assuming that during the 8-month peak construction period (construction of cables, manholes and step-up substations are carried out at the same time) the filling volume is about 1,562 cubic meters/month, and assuming 25 construction days per month and eight hours per day, the frequency of one-way soil transport by trucks on the Provincial Route No. 17 is estimated to be two trips per hour (1,562 m³/25 day/8 hours/12 m³).</p> <p>Traffic impact:</p> <p>Two-way traffic flow will increase by 4 vehicles per hour; the assessment results indicated that this traffic volume can still maintain the level of service for roads connecting to external areas at Level A. The service level would not be diminished.</p> <p>Air pollution:</p> <p>TSP increase < 5.50µg/m³; PM10 increase < 2.54µg/m³; PM2.5 increase < 0.32µg/m³; SO₂ increase < 0.001ppb; NO₂ increase < 4.98ppb; CO increase < 3.36ppb</p> <p>Noise impact:</p> <p>The noise level increase was 1.8 dB(A) following the attenuation of noise from construction vehicles to two residential houses near the north step-up substation; and 0dB(A) (0–5) following the attenuation to residential houses near the south step-up substation. No impact or negligible impact.</p> <p>Vibration impact:</p> <p>An increase in combined vibration from the transportation in the construction period and background vibration of 5.9dB and a maximum combined vibration of 48.6dB. It meets vibration requirements for Category region 2 (70dB) in Japan's Vibration Regulation Law and it is expected to cause extremely minor impact along the transportation routes.</p>	No impact or minor impact
Communication interference	After using simplified methods to evaluate the interference of a wind farm on the detection capabilities of coastal radar systems, preliminary findings showed that the construction of the wind farm will cause sectional cloaking interference on nearby radar stations and impact the detection performance on targets behind the wind farms.	Generating no impact on CGA's mission execution

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Plant ecology	<p>Biodiversity:</p> <p>The vegetation surveyed contained 48.06% native species, 25.24% naturalized species, and 24.76% cultivated species. The percentage of exotic species equals that of native species. The construction operations will eradicate the vegetation, generating a greater impact on habitats, but the damage caused by reducing the biodiversity of this area is limited.</p> <p>Influence on rare and endemic species:</p> <p>An investigation of endemic plants shows that there are 4 endemic species, <i>Chamaesyce taihsiensis</i>, <i>Chloris formosana</i>, <i>Phoenix hanceana</i>, and <i>Gynura divaricata</i>. Rare plants include <i>Heritiera littoralis</i>, <i>Podocarpus costalis</i>, <i>Garcinia subelliptica</i>, <i>Crossostephium chinense</i>, <i>Livistona chinensis</i>, and <i>Diospyros ferrea</i>, all of which are artificially planted and not among the list of Taiwan's rare and valuable plant species in the EPA Technical Regulations for Plant Ecology Assessment. They are species listed in the Preliminary Red List of Taiwanese Vascular Plants which do not require special conservation.</p> <p>Impact on vegetation ecology:</p> <p>Based on the currently chosen route, there should be little or no damage from forest development, however construction units have a tendency to purposefully open space in the forest to temporarily store material or waste soil. The construction units shall be strongly requested to mind these details.</p>	<p>Biodiversity: no impact or localized and temporary minor impact</p> <p>Rare and endemic species: no impact</p> <p>Vegetation ecology: no impact or localized and temporary minor impact</p>
Animal ecology	<p>General species:</p> <p>This interference from construction activities and the use of construction machinery is expected to have localized and temporary impacts on amphibians and reptiles. Construction vehicles entering/exiting the construction site might cause roadkill.</p> <p>Protected species:</p> <p>The surveys over two seasons showed that the many-banded krait, a reptile, is distributed around the land cable in the mid-section, implying possible roadkill during future construction works. The movement speed of construction vehicles should be considered, and employee education enhanced to reduce the corresponding possibility.</p>	<p>General species: no impact or localized and temporary minor impact</p> <p>Protected species: do not lower population number</p>

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Marine ecology	<p>In summary, offshore wind power generation may produce noise and change factors such as electromagnetic field, hydrology, water quality, seabed habitat substances, terrain, and landforms that may impact living organisms such as the benthos, cetaceans, seabirds, and bats.</p> <p>Construction period:</p> <p>The main impact of the construction of the wind turbine foundations and transmission lines on marine ecology includes the noise generated during pile driving, the change in conditions of habitats, and the dispersion of suspended substances. The noise or shock waves generated during pile driving would definitely impact and harm marine life within a short range because of the strong sound pressure. Marine life that are able to swim or crawl would exhibit evasive behaviour and those that could not evade in time may suffer harm or death. Fortunately, Taiwan's western coast consists mainly of sandy soil environments and fish species are mostly migratory instead of reef fish species which inhabit specific areas. The impact should therefore be smaller. In addition, marine life in the surface and mid layers of the water and benthic zone would escape to areas some distance away during pile driving. They would then return after the completion of construction. Large invertebrates that move slower on the surface of the seabed such as echinoderms, shrimps, crabs, and creatures living below the seabed may suffer greater impact. The exact extent of the impact and whether such impact causes death can only be answered by underwater surveys before and after actual construction in the future construction period.</p> <p>Piling will inevitably disrupt the terrain and bottom substances of the original seabed. However, it would influence a relatively small area compared to the entire area of the wind farm. Thus, the effects on plankton, phytoplankton, and nekton living in the surface and mid layers of the water are minor. For benthos that inhabit the soft sandy soil on the sea bed would leave areas affected by the construction or areas where the bottom substances have been changed. They may move 5 to 50 meters away from the foundations of the wind turbines. In addition, pile driving will raise sandy soil or suspended particles and increase the turbidity of the seawater in the area. The dispersion caused by the sea currents would restore the normal state of the water within a short time. The concentration of the suspended particles would not be excessively high or lasting and their impact on the marine ecology can be ignored. The location of pile driving during construction is considered a single point. The effect of noise and shock waves should be considerably greater than that of scattering dusts. As subsea cables are laid in shallow waters, operators would invariably choose to bury the cables to prevent subsequent tearing or destruction by bottom trawling. The laying of the cables would affect the sea bed along the route but reefs would generally be avoided and cables are mostly laid under sandy soil. Therefore, the seabed ecology would quickly recover. Global reports of subsea cable laying have indicated its</p>	No impact or localized and temporary minor impact

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	<p>minor impact on the undersea environment, which therefore can be restored quickly to its original state. The aforementioned disturbance occurs only at specific times during the construction period.</p> <p>Operation period:</p> <p>After construction is complete, biological organisms such as algae, bryozoa, sponge, cnidaria, and even ascidians, bivalvia, and balanidae would grow on the surface of turbine structures and underwater foundations, leading to positive effects on the increasing biodiversity. In other words, the original sandy soil ecosystem or habitat would gradually be turned into a reef-like ecosystem that increases the biodiversity of the habitat. The effects are particularly prominent in waters around Taiwan where most of the seabed consists of sandy soil with low biodiversity. Therefore, the changes to the habitats should prove to be favourable. The only negative impact caused by wind turbines on marine life or the ecology in the operation period is the low-frequency noise generated by wind turbines during operations. However, there has been little research on this subject.</p>	
Fishery resources	<p>Construction period</p> <p>Impacts on fish:</p> <p>A significant escape response in fish is observed when sound waves exceed the hearing threshold for fish (e.g., with 2 km and 0.6–2.5 km radius for salmon and cod, respectively). However, a majority of these data cover only species in temperate zones. Although there is a considerable number of species living in the tropical and subtropical zones, no research has been conducted on these species. Except for adult fish, the body size of different fish species also varies at different stages of the life cycle. It is inferred that juvenile fish are not strong enough to quickly swim away and escape and they are subject to greater impact than adult fish. Numerous benthic fish such as cynoglossidae lack or have degenerated swim bladders; therefore, this type of fish is less sensitive to sound pressure levels compared with migratory fish in the middle epilimnion. However, benthic fish and migratory fish in the middle epilimnion are equally sensitive to suspended particles. The pile driving in the construction period repels fish but they mostly return to the wind farms after construction is completed.</p> <p>Impacts on fishery:</p> <p>Surface gillnets and bottom gillnets are used in sea areas around the wind farm. The impact of construction vessels entering local sea fish farm during the construction period of the offshore wind turbines is mainly caused by the area of operations by working vessels that obstruct the navigation of fishing boats or rafts. Fishermen currently perform fishing operations in sea</p>	<p>Fish: no impact or localized and temporary minor impact</p> <p>Fishery: reaching agreement with fishery association about compensation before starting offshore construction. In addition, restriction of fishery activities during construction with proper education shall be provided to fishery association (fishermen)</p>

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	<p>areas near the planned wind farm and there are risks of collision between working vessels and fishermen's vessels in the construction period. To protect the safety of local fishermen and to ensure the smooth progression of the OWF construction, operations of fishing boats in the construction area must be restricted and education for fishermen must be enhanced.</p> <p>There are a few bottom trawling operations in sea areas near the wind farm. The construction of the wind turbines will directly obstruct and reduce the fishermen's area of operations. The working vessels' area of activities will directly obstruct the bottom trawling operations of fishermen during fishing season and there are risks of collision between working vessels and fishermen's vessels in the construction period. To protect the safety of local fishermen and to ensure the smooth progression of the OWF construction, the navigation and operations of bottom trawling fishing boats in the construction area must be restricted and safe distances must be maintained.</p> <p>As pole and line fishing operate in less fixed locations, although the wind farm is at a distance relatively far for pole and line fishing boats, there are risks of collision between working vessels and fishermen's vessels in the construction period. To protect the safety of local fishermen and to ensure the smooth progression of the OWF construction, operations of pole and line fishing boats in the construction area must be restricted and sufficient education must be provided.</p> <p>Operation period</p> <p>Impacts on fish:</p> <p>As evident fish gathering effects have been observed near foundations of wind turbines that have been in operations for several years in foreign countries, we deduce that the noise of wind turbines should have little impact on fish. However, we still require continuous follow-up research for proof. Therefore, we've planned the monitoring plan for fish during operation period.</p> <p>Impacts on fishery:</p> <p>Fishery operations that may be affected after the construction of the wind farm include gillnetting, bottom trawling, and pole and line. Therefore, fishery compensation for the obstruction or reduction of areas that affect fishermen after the wind turbines enter operations shall be based on the status of the local catch in the past few years, as outlined in the fishermen compensation formula announced by the Taiwan government .</p>	

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	<p>The statistics on total fishery production volume in Yunlin County in 2015 (Table 6.3.3-16) showed that gillnetting accounted for only 0.16%. It is evident that gillnetting is not the main fishing method in Yunlin. In addition, gillnetting operations are mostly performed in nearshore areas within 2-3 nautical miles of the shore. The eastern boundaries of the project wind farm are more than 3 nautical miles from shore and it has therefore avoided the main gillnetting sites. The construction of the wind farm should not reduce the original gillnetting operation scope.</p> <p>The construction of the future wind farm may reduce the operations of fish trawlers. However, the wind farm does not affect pair trawling operations which are permitted only outside the 12nm boundary.</p> <p>Although the wind farm is relatively far from the operations of regular pole and line fishing boats, there are increasing risks of collision between fishermen's vessels and wind turbines in the operation period.</p> <p>As Yunlin County has a broad area for fishery operations, the wind farm may place restrictions on bottom trawling in the area after the completion of construction. It may increase the fishermen's cost in fishing operations as most fishing rafts in the county are smaller and have more limited manoeuvrability. Therefore, the conflict for the future use of space between the wind farm and fishing operations is inevitable. It is an issue that must be faced by both the wind farm developer and the fishermen who should negotiate and seek out solutions to such issues.</p> <p>Decommissioning period</p> <p>Decommissioning (DCM) exerts similar effects on fishery activities as those of turbine installation, which is mainly the risk of collision between working vessels and fishing vessels from fishermen. To prevent the property losses (e.g., fishing boats and nets) of fishermen and to facilitate DCM, it is absolutely necessary to keep fishing vessels (gillnetters and pole-and-line vessels) away from the sailing routes of working vessels during DCM and maintain a safe distance between these vessels. DCM generates only a temporary influence.</p>	
Cetacean	<p>According to current research results, although the Taiwanese White Dolphin is most sensitive to sound in the ultrasound frequency range, a detailed comparison of the frequency ranges of the Taiwanese White Dolphin's whistles (1.7–29.7 kHz) shows that noise might still influence the social communication function between individuals and pods.</p>	Underwater piling noise shall not exceed SEL

Topic	Impact assessment after YUN OWF development	Target /Targeted level
	<p>Because offshore wind turbines are recent cases of development, no studies have determined the impacts of noise from offshore turbine on the long-term immunity of individuals. However, within the range of perceptible noise, after cetaceans are exposed to noise that was non-existent in their original habitat, the influence of this noise on their long-term immune response warrants increased attention.</p>	<p>160dB so no hearing loss of cetacean will occur</p>
<p>Bird ecology</p>	<p>Predatory birds:</p> <p>The Chinese sparrowhawks' southbound migratory route in September 2015 and 2016 did not pass over the wind farm. They had entered Taiwan in areas north of Changhua or in Hualien and Taitung. Chinese sparrowhawks were found over the air of OWF Yunlin in spring 2017. No hawk groups passed over the wind farm site in spring 2016 and the two subsequent falls. There were 5 and 3 flocks on April 16 and 19, 2017, respectively, and a total of 1,858 birds flew over the wind farm site. The lower edge of flight paths taken by an estimated 33 Chinese sparrowhawks were lower than the height of rotating wind turbine blades (<200m) and the number accounts for 0.029% of the total number of the season (113,971 sparrowhawks).</p> <p>During 2015 to 2017, with the exception of fall 2017 in which no grey-faced buzzards flew over the wind farm site, hawks have flown over the sites in three other seasons in two years. For instance, 6 flocks of 3,013 grey-faced buzzards flew over the wind farm site in the spring of 2016 but no grey-faced buzzards had flown within the sweeping height of the blades in this season. Subsequently, 2 large flocks of 3,521 grey-faced buzzards flew over the wind farm site in fall 2016 between October 26 and 27 but no grey-faced buzzards had flown within the sweeping height of the blades in this season. 10 flocks of 1,332 grey-faced buzzards flew over the wind farm site in the spring of 2017 but no grey-faced buzzards had flown within the sweeping height of the blades in this season either.</p> <p>Protected terns:</p> <p>According to the research of Professor Hsiao-Wei Yuan of the School of Forestry and Resource Conservation of National Taiwan University, the 24 Class II protected species <i>T. bergii</i> that breed in Matsu and Penghu Islands migrate separately to Indochina and the Philippines in August and September. Three quarters of the <i>T. bergii</i> from Matsu fly south to Indochina for wintering and three quarters of <i>T. bergii</i> from Penghu fly to the Philippines for wintering. The <i>T. bergii</i> from Matsu migrate along China's southeast coast while those from Penghu fly directly south without passing through the wind farm site</p>	<p>Continuously monitoring in order to know if there is any impact</p>

Topic	Impact assessment after YUN OWF development	Target /Targeted level
	<p>However, the possibility of that the aforementioned terns that appeared in Taiwan were from Penghu, Matsu, or islands north of Taiwan cannot be ruled out. Their numbers and whether their migratory routes pass through the wind farm remains to be discovered.</p> <p>Black-faced spoonbills:</p> <p>According to the current available information, the black-faced spoonbills from Korean Peninsula generally do not fly over the wind farm site when they fly over the Taiwan Strait or the seas in the north. Their speed is approximately 68 to 76 kilometres an hour. However, whether the migration routes of black-faced spoonbills are higher than herons shall be analysed through radar information and ground surveys.</p> <p>Radar observation of bird species and data analysis:</p> <p>Based on the analysis of results from observation performed in June 2017 and July 2016, a total of approximately 6,721 waterfowl consisting mainly of terns flew over the top of OWF Yunlin. Among them were 806 waterfowls that were determined to be at risk of collision. Based on the micro-avoidance rate (97.6%) of birds that flew into the 36-wind turbine OWF Egmond aan Zee (Krijgsveld 2010), the number of birds that suffered collisions would amount to 50.7. The number of collisions in July was approximately 9.1 times the number in June. It may be related to the juvenile terns that joined the group at the end of the breeding season. The 50.7 figure is based on the micro-avoidance rate within the 36-wind turbine wind farm. For this Project which contains 105 wind turbines, the collision frequency may be 147.9. This number would account of <0.51% of the groups of terns in Penghu and the west coast of Taiwan which number close to 30,000.</p>	
<p>Scenic beauty and recreational influence</p>	<p>As the wind turbines account for a very small area in the open view, the changes are small and the visual impact is limited (0-0.40%).</p> <p>The project area is primarily composed of ocean, the beach, windbreak forests, and fishing harbour, exhibiting simple landscape elements. Therefore, the construction vehicles and machinery, stacking of construction materials, hoisting and assembly processes, and other construction activities in the construction period in the future will bring about unpleasant visual effects. Due to their significant impact on visual effects, the hoisting and assembly processes should be shortened as much as possible. With consideration of colour for this project, large areas of wind turbines move with wind, forming a special visual landscape that creates pleasant visual experience.</p>	<p>Minor impact or localized and temporary impact</p>

Topic	Impact assessment after YUN OWF development	Target /Targeted level
<p>Recreational environmental influence</p>	<p>Impacts of construction on the traffic accessibility of a recreation area: in the construction period of this engineering project, the traffic caused by construction machineries and trucks carrying construction materials will influence the accessibility of Provincial Highway 17, West Coast Highway 61, County Highway 160 and 164, thereby affecting the environmental quality of recreation areas. The use of construction roads should be avoided during rush hours and long weekends, and construction road plans should be developed to facilitate mitigating the traffic impact during the construction period.</p> <p>Impacts of construction on the recreational experience in neighbouring recreation areas:</p> <p>In the construction period of the wind turbine units, stacks of material or the exposed ground surface after land grading will influence the visuals of the area. When turbines are installed, it might influence the recreational experience of tourists visiting neighbouring recreation areas.</p> <p>Visual influence of wind turbine installation:</p> <p>It is expected that after installation is completed, the wind turbine units of this project will become the new visual focus and create new visual experience, leading to positive influence on the number of tourists. However, certain areas may exert visual pressure on viewers due to the sheer number of wind turbines. Therefore, the colours of the wind turbines shall be carefully considered and coordinated with surrounding environments to alleviate the negative visual impact caused by the wind turbines.</p> <p>Traffic accessibility of recreation areas:</p> <p>After construction is completed and the wind farm is in operation, the main traffic routes will be restored to their original state.</p> <p>According to the assessments of neighbouring recreational environment and various recreation areas of the project before and after construction, the construction period exerts mostly slightly negative to minor impact or no influence on tourists' recreational experience, recreation accessibility, and the number of tourists. Once the wind farm begins operation, traffic services will be restored to its existing level. Due to the far distance and poor visibility, the Project shall cause minor or no impact on recreational activities.</p> <p>The recreation areas in this region are mostly situated in coastal areas and project activities can be viewed from certain sights. However, most recreational areas are more distant and the views are blocked by vegetation, buildings, and embankments. The impact is therefore low. The types of recreational resources offered in these areas include ecological landscape, historical</p>	<p>Construction period: localized and temporary impact</p> <p>Operation period: no impact or minor impact</p>

Topic	Impact assessment after YUN OWF development	Target /Targeted level
	<p>culture, and old temple buildings. Therefore, it is advisable to properly plan the construction movements and times. During construction, it is advisable to shorten the transport time of construction vehicles and avoid weekends and rush hours. Furthermore, large-scale construction activities should be reduced to mitigate the visual impact for landscape viewers.</p>	
<p>Social environment</p>	<p>Demographic Characteristics:</p> <p>It is estimated that the project area requires roughly 250 construction workers on a daily basis during rush hours of the construction period. Because most of the construction works are outsourced to domestic civil engineering, hydroelectricity, mechanical, and electromechanical companies, except for technical jobs, mostly local workforce are hired, with some non-locals. This employment structure slightly influences the local population.</p> <p>A fully automated monitoring system is employed to directly monitor the operation of the wind turbine units during the operation period of this project. The system maintains real-time connection with the wind farm to facilitate immediate access to the operational status of the wind farm and to record relevant operational data. Except for monitoring and maintenance staff when the wind turbine is in need of repair and maintenance, there is generally no one in the area, exerting no influence on the neighbouring population.</p> <p>Public facilities:</p> <p>Public health care amenities are required during the construction period. This project shall employ a regional hospital or clinic near the construction site for medical assistance for an emergency or accidents. During the operation period, the wind turbine units are monitored using a fully automated system. There will be no operators at the site; therefore, it does not influence the supply of relevant public amenities.</p>	<p>No impact or minor impact</p>
<p>Economic environment</p>	<p>Employment status:</p> <p>The effect on employment during construction period can be divided into direct and indirect employment. Direct employment refers to the manpower needed for the construction works during the construction period, including administrative technicians and local construction workers or non-local employees. Direct employment exhibits a slightly positive influence on the employments of the construction industry. Indirect employment refers to the hiring of relevant working personnel to contribute to the prosperity of the mid-stream industry. Only few personnel will be required to monitor and maintain the wind farm once it commences operation; the project therefore has no impact on local employment.</p>	<p>No impact or minor impact</p>

Topic	Impact assessment after YUN OWF development	Target /Targeted level
	<p>Socioeconomic environment:</p> <p>This wind farm project involves using the abundance of wind energy resources near the coast of Yunlin County to generate electricity. The wind farm can attract tourists after it commences operation. Therefore, the complete construction of the wind turbine units facilitates boosting the development of the local tourism industry.</p> <p>Fishery industry:</p> <p>In the future, the project shall process fishery compensation in accordance with the "Offshore Wind Power Fishery Industry Compensation Guidelines" announced by the Fisheries Agency in the Order. Nong-Yu-Zi-Di 1051328879A on November 30, 2016. The developer shall reach agreements on fishery compensation with the Fishermen's Association to ensure the rights and interests of fishermen and the smooth progression of construction. In addition, the Preparatory Office has obtained the conditional approval from Yunlin Fishermen's Association in the letter Yun-Yu-Tui-Zi-Di 1060000448 dated June 6, 2017 and shall comply by the instructions given in Description 3 of the Letter. After obtaining the concession approval, the developer shall reach agreements with Yunlin Fishermen's Association on fishery compensation, loss of fishery rights, resource restoration, and feedback mechanisms before beginning construction.</p>	
<p>Traffic environment</p>	<p>Traffic impact in construction period:</p> <p>Considering the traffic volume caused by the Project in the construction period, the service quality of the roads and of the intersections will be maintained at current conditions</p> <p>Traffic impact before operations:</p> <p>Despite the increase in the natural growth of traffic volume, the service quality of the roads and of the intersections will be maintained at current conditions.</p> <p>Traffic impact after operations:</p> <p>Despite the increase in the number of recreational trips after operations, the service quality of the roads and of the intersections will be maintained same as before operation</p>	<p>The service quality of the roads and of the intersections to be maintained at current conditions</p>

Topic	Impact assessment after YUN OWF development	Target /Targeted level
Cultural heritage	<p>The two land-based field surveys did not uncover structures or archaeological sites or remains along the land cable routes or at the sites of step-up substations and surrounding areas. The land cable routes mostly pass through fish farms and unirrigated farmland. Designated tangible Cultural Heritage "Kouhu Xialiao Wanshan Tombstone" is located within 500 meters of the land cable in the southern region. However, the transmission lines are buried beneath existing roads and do not cause direct impact on the historical sites. Indirect impact must be avoided during construction. An intangible asset related to the Tombstone, the "Kouhu Water Lanterns", are mainly at Jinhu Wanshan Temple and Xiahugang Wanshan Temple. They are 3.6km away from the southernmost land cables of the Project and would not impact the event. In addition, the Project has continuously monitored the excavation areas of the land cables and the consolidated land area survey results showed no direct impact of land cables and step-up substations on cultural heritage.</p> <p>With regard to marine surveys, as underwater cultural heritage consists mostly of sunken ships and their cargo, they may be buried by sedimentation or broken up and scattered. They would be difficult to discover. Fishermen had discovered blue and white ceramic bowls off the coast of Taizi Harbor and there have also been reports of fishermen retrieving related underground relics. It shows that sunken boats or related cargo may have been buried off the coast of Yunlin. The project wind farm site is located near the coast of Taizi Harbor. It is advisable to pay particular attention to the laying of subsea cables and any discovery shall be processed in accordance with relevant regulations to prevent unnecessary damage to cultural heritage.</p>	No impact
Safety assessment	<p>Earthquake risks:</p> <p>Based on the onshore wind farm seismic parameters calculated by our preparatory office in Changhua Coastal Industrial Park, although Taiwan is situated on the seismic belt, the seismic load is lower than the upper and lower limits of the extreme design load. In addition, when designing subsea foundations, the office takes into consideration seismic parameters. Therefore, compliance with seismic requirements of IEC shall be ensured in future detail designs.</p> <p>Typhoon risks:</p> <p>In Taiwan, our preparatory office employs the IEC Class 1 onshore wind turbine, which is able to resist a wind speed of 70 m/s. There are onshore wind turbines in operation in Taoyuan, Hsinchu, Miaoli, Taichung, and Changhua. The results verified that IEC Class 1 turbines are capable of resisting typhoon. When Typhoon Soudelor, with level 17 intensity on the Beaufort Scale, struck Taiwan in 2015, the other wind turbines belonging to our preparatory office measured an instantaneous wind speed of</p>	Low risk

Topic	Impact assessment after YUN OWF development	Target /Targeted level
	<p>64 m/s. However, no damage was sustained by the 140 turbine units across Taiwan, and most of these units remained to generate electricity at full capacity. To date, there have been no reports of wind turbine from us damaged by typhoons.</p> <p>The Project will take the extreme condition of wind intensity into consideration in the design phase of this project in accordance with IEC 61400 regulations. Take wind turbines selection for example, we have measured the onsite wind speed and will subsequently compare the measured results with other information for long-term prediction. Therefore, wind turbines will be selected according to the wind conditions at the site. The wind turbine model is then certified by a third party to ensure that the selected turbine is applicable for the environment of the site. The wind turbines selected by the Project will be capable of withstanding a maximum wind speed of 70m/s.</p>	
Vessel collision risk	<p>Because vessels seldom cross the project development site of the OWF, after the OWF is installed without changing the traffic distribution (crossing vessels avoid the project site), the risks of collision between vessels can be deemed as unaffected. The frequency of vessels under powered conditions failing to avoid the OWF (adjusted scope) and collision with wind turbines is only 6.60E-4 times/year, equivalent of 1 occurrence every 1515 years. The main impact on navigation risks after the installation of the OWF mainly lies in: The risk of drifting collision with wind turbines in the wind farm. Based on the current traffic flow conditions, the frequency of drifting collision with the structures of the wind farm is approximately 1.58E-2 times/year after the adjustment of the scope of the OWF, which is equivalent to 1 occurrence every 63.29 years. The frequency is 70.2% lower than that of the original scope of the wind farm.</p>	Low risk
Lightning strike risk	<p>The turbine blades are the component most commonly struck by lightning in an OWF, according to the experiences of European countries such as Germany, Denmark, and Sweden. Therefore, effective lightning protection for turbine blades must be carefully devised to effectively protect wind turbines from lightning damage.</p> <p>Transient overvoltage on the electrical power system and control system occurs when lightning strikes a wind turbine. An effective grounding system can reduce the damage caused by this phenomenon. The tower and foundation of OWF are installed in the seawater. The resistivity of seawater is considerably lower than that of land. With adequate grounding design and construction, the damage induced by lightning strike on the electrical power system and control system of the wind turbine can be reduced.</p> <p>Installing a voltage dependent resistor (VDR) on the power circuit and control signal circuit can reduce the damage to electrical equipment caused by lightning-induced overvoltage.</p>	Low risk

Topic	Impact assessment after YUN OWF development	Target /Targeted level
Health risk	This development project involves the development of clean renewable wind energy. In the operation period, natural wind energy is used to operate the wind turbines. No hazardous chemical substances prescribed in Article 3 of the Technical Guideline of Health Risk Assessment (amended on July 20, 2011) are used. This project does not increase the health risks for neighboring residents. Hence, health risk assessment is not required.	Low risk

Appendix C Summary Table of Target and Associated Mitigation Measures and Monitoring Plan

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan		Technical feasibility	Cultural appropriateness	Expected effectiveness
Marine terrain changes	Insignificant or localized impact on the current status	Pre-construction period	1. There will be one marine terrain monitoring for the OWF area.	Good	Good	Sufficient
			2. Each wind turbine location will undergo thorough drilling in the subsequent detailed design stage, including on-site tests, laboratory tests and preliminary analysis of the earth to further understand the local geological characteristics, and confirm the presence of methane gas or not. Probabilistic Seismic Hazard Analysis (PSHA) will be conducted before the construction, and soil liquefaction potential analysis will be conducted again based on the results of PSHA and wind turbine drilling. The analysis results will be included in the design and installation of wind turbine foundations. The construction will be planned in accordance with the geological characteristics of the site.	Good	Good	Good
		Operation period	1. There will be marine terrain monitoring for the OWF area once a year.	Good	Good	Sufficient
Surface runoff	Can be recycled for further treatment	Construction period	1. Regarding wastewater from construction operations, engineering contractor is requested to collect such waters at fixed locations and, depending on the amount collected, non-periodically entrust agencies for disposal. The contractor is strictly prohibited against arbitrary discharge of contaminated water bodies.	Good	Good	Good
			2. Construction materials are stored and covered at fixed locations. Machinery repair zones are covered and isolated in order to reduce the possibility of coming into contact with rainwater and prevent surface runoff pollution.	Good	Good	Good

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan		Technical feasibility	Cultural appropriateness	Expected effectiveness
			3. Wastewater (oil) from construction machinery repairs contains large amount of fat. Instruct responsible contractors to replace engine oil and lubricants at fixed locations and collect wastewater (oil) into default collection tanks, which are properly stored to prevent leakage. Depending on the amount collected, the contractor shall non-periodically entrust agencies for disposal and shall be strictly prohibited against arbitrary discharge of contaminated water bodies.	Good	Good	Good
Domestic wastewater	No impact on neighbouring receiving waters	Constructi-on period	1. Domestic wastewater of construction workers is disposed of by using rental mobile toilets, and qualified disposal agencies shall be regularly commissioned to dispose of such wastewater	Good	Good	Good
Marine suspended solid (SS) concentration	No impact or localized and temporary impact on sea waters	Construction period	1. In consideration of the safety of construction, construction activities (e.g., turbine foundation construction, subsea cables laying, and construction dates) suitable for different climate conditions shall be defined. Additionally, for the sake of personnel safety during construction and machine operation processes, meteorological information (e.g., wind, waves, etc) shall be obtained on a regular basis during the construction period.	Good	Good	Good
			2. To avoid collisions or other accidents caused by intrusion of unauthorized vessels in the construction area, relevant construction warning signs will be set up.	Good	Good	Good

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan		Technical feasibility	Cultural appropriateness	Expected effectiveness
			<p>3. Construction plans will be made and construction progress will be controlled to keep track of the construction period, minimize the interference of the water body by the unsettled sea floor substances resulting from wind turbine foundation installation and subsea cable laying, ensure the safety of construction personnel, vessels and equipment operation, and match the weather conditions suitable for construction. Water quality and environment will be monitored during the construction period to keep track of the impact of marine engineering on the water quality and environment of the surrounding sea areas.</p>	Good	Good	Good
			<p>4. In order to minimize the influence from the spread of suspended solids and reduce the chances of maritime creatures or fish entering the construction area when laying subsea cables at landfall, silt curtains will be set up along shallow areas (about 5 meters deep) where the cables are laid. Doing so would contain suspended solids within the construction area, prevent them from spreading and further reduce its impact.</p>	Good	Good	Good
			<p>5. Instruct contractors to prevent any emission, spillage, leakage, or disposal of wastewater (effluent), waste oil, solid waste, hazardous substance, or any pollutant specified by the central authority into the ocean.</p>	Good	Good	Good
			<p>6. Furthermore, in this project, pile-driving works will be performed for only one wind turbine at a time to reduce the large-scale construction works within the maritime space.</p>	Good	Good	Good
Groundwater	Groundwater level and pressure: no impact or localized and	Construction P	<p>1. Regarding wastewater from construction operations, engineering contractor is requested to collect such waters at fixed locations and, depending on the amount collected, non-periodically entrust agencies for disposal. The contractor is strictly prohibited against arbitrary discharge of contaminated water bodies.</p>	Good	Good	Good

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan	Technical feasibility	Cultural appropriateness	Expected effectiveness
	temporary influence Water quality: no impact	2. Construction materials are stored and covered at fixed locations. Machinery repair zones are covered and isolated in order to reduce the possibility of coming into contact with rainwater and prevent surface runoff pollution.	Good	Good	Good
		3. Wastewater (oil) from construction machinery repairs contains large amount of fat. Instruct responsible contractors to replace engine oil and lubricants at fixed locations and collect wastewater (oil) into default collection tanks, which are properly stored to prevent leakage. Depending on the amount collected, the contractor shall non-periodically entrust agencies for disposal and shall be strictly prohibited against arbitrary discharge of contaminated water bodies.	Good	Good	Good
		4. Domestic wastewater of construction workers is disposed of by using rental mobile toilets, and qualified disposal agencies shall be regularly commissioned to dispose of such wastewater	Good	Good	Good
Substation construction air pollutant emissions	Meeting air quality standards: TSP: 24-hour value 250 µg/m3, yearly average value 130 µg/m3 PM10: daily average value 125 µg/m3, yearly average value 65 µg/m3	Construction period 1. Matters are handled in accordance with laws and regulations of the Executive Yuan Environmental Protection Administration to implement measures for preventing air pollution caused by construction engineering processes.	Good	Good	Good
		2. Functional construction machineries and transport vehicles are selected and periodically/non-periodically maintained, and maintenance records are kept in order to reduce contaminant concentration of exhaust.	Good	Good	Good
		3. Water shall be sprinkled at all on-shore power transmission and distribution construction sites moderately. Accumulated soil must be cleared to minimize the spread of dust. When performing civil works for the step-up substation, water should be sprinkled moderately on exposed ground surfaces on dry days. Roads near the construction site must be maintained and cleaned to minimize the spread of dust.	Good	Good	Good

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan	Technical feasibility	Cultural appropriateness	Expected effectiveness	
	PM2.5: 24-hour value 35 µg/m3, yearly average value 15 µg/m3 SOx: highest hourly value 250 ppb, daily average value 100 ppb, yearly average value 30 ppb NO2: highest hourly value 250 ppb, yearly average value 50 ppb		4. Vehicles must be properly covered when transporting soil, so that the soil does not spread and pollute nearby environments. Contractors will be instructed to use dust covers to suppress the spread of dust.	Good	Good	Good
			5. The transportation route should avoid passing through highly populated areas. If it is impossible to avoid highly populated areas, the contractor must be instructed to implement and enforce appropriate driving rules, and reduce vehicle speeds to prevent the spread of dust.	Good	Good	Good
			6. Vehicles entering/exiting the construction site must be washed with water before driving out of the construction site.	Good	Good	Good
			7. Instruct contractors to use fuels and oils that comply with pollution control standards for all machinery and tools used in construction works duly and strictly. Machinery and tools shall also be subjected to regular servicing to minimize the emission of pollutants.	Good	Good	Medium
			8. Use vehicles that conform to the latest emission standards during the construction period for minimal environmental impact.	Good	Good	Medium
			9. Land excavation equipment (excavators) shall meet the emission standards of phase III diesel vehicles or higher, or install smoke filters and undergo regular maintenance, which can improve the PM2.5 emissions.	Good	Good	Good
			10. Execute air quality monitoring at 3 stations every quarter during onshore construction works (step-up substation and cable installation).	Good	Good	Sufficient

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan		Technical feasibility	Cultural appropriateness	Expected effectiveness
Maritime construction air pollutant emissions	Meeting air quality standards: TSP: 24-hour value 250 µg/m3, yearly average value 130 µg/m3 PM10: daily average value 125 µg/m3, yearly average value 65 µg/m3 PM2.5: 24-hour value 35 µg/m3, yearly average value 15 µg/m3 SOx: highest hourly value 250 ppb, daily average value 100 ppb, yearly average value 30 ppb NO2: highest hourly value 250 ppb, yearly average value 50 ppb	Construction period	1. All working vessels will use the oil with the lowest sulphur content available on the market in Taiwan at the time of construction.	Good	Good	Medium
			2. Smoke filters, activated carbon filters or other best available commercialized control technologies at the time of construction will be installed on the exhaust pipes on the working vessels.	Good	Good	Good

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan		Technical feasibility	Cultural appropriateness	Expected effectiveness
Air pollution from surplus soil transport and construction vehicles	Meeting air quality standards: TSP: 250 µg/m3 PM10: 125 µg/m3 PM2.5: 35 µg/m3 SO2: 250 ppb NO2: 250 ppb CO: 35,000 ppb	Construction period	1. Functional construction machineries and transport vehicles are selected and periodically/non-periodically maintained, and maintenance records are kept in order to reduce contaminant concentration of exhaust.	Good	Good	Sufficient
			2. Vehicles must be properly covered when transporting soil, so that the soil does not spread and pollute nearby environments. Contractors will be instructed to use dust covers to suppress the spread of dust.	Good	Good	Good
			3. The transportation route should avoid passing through highly populated areas. If it is impossible to avoid highly populated areas, the contractor must be instructed to implement and enforce appropriate driving rules, and reduce vehicle speeds to prevent the spread of dust.	Good	Good	Good
			4. Vehicles entering/exiting the construction site must be washed with water before driving out of the construction site.	Good	Good	Good
			5. Instruct contractors to use fuels and oils that comply with pollution control standards for all machinery and tools used in construction works duly and strictly. Machinery and tools shall also be subjected to regular servicing to minimize the emission of pollutants.	Good	Good	Medium
			6. Use vehicles that conform to the latest emission standards during the construction period for minimal environmental impact.	Good	Good	Medium
			7. Execute air quality monitoring at 3 stations every quarter during onshore construction works (step-up substation and cable installation).	Good	Good	Sufficient
		Operation period	1. Encourage employees to take public transport or replace the two-stroke scooters. The employees will be prohibited from riding the two-stroke scooters to the operation and maintenance centre (O&M centre).	Good	Good	Good

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan	Technical feasibility	Cultural appropriateness	Expected effectiveness
		<ol style="list-style-type: none"> Priority shall be given to electric vehicles or hybrid vehicles commercially available when the O&M centre purchases the company vehicles under the name of the O&M centre during the operating years. Electric vehicle charging base will be reserved in the parking lot of the O&M centre. 	Good	Good	Good
Onshore power transmission and distribution facilities construction noise	Meeting environmental sound standard: 74dB(A)	<ol style="list-style-type: none"> Contractors' construction guidelines will be established to incorporate noise control standards applicable for the project area and noise control standards for construction activities. Contractors will be instructed to exercise control, replace machinery/tools or take further actions to reduce noise based on the level of noise measured, thereby keeping noise volume within standards. 	Good	Good	Sufficient
		<ol style="list-style-type: none"> Apply speed and load limits for construction vehicles. Construction vehicles must not exhibit sudden acceleration, braking or use of horns when traveling near sensitive areas such as schools, residential complexes, or houses, as doing so would create noise. Cement trucks should operate at lower rotational speed to reduce noise when the trucks are idly parked at the construction site. 	Good	Good	Good
		<ol style="list-style-type: none"> For directional mechanical noise, the machinery will be positioned so that sound travels in the opposite direction of sensitive receivers. 	Good	Good	Good
		<ol style="list-style-type: none"> All machinery, tools and transport vehicles used by contractors must be serviced and repaired regularly to prevent noise and vibration caused by loosened mechanical parts. 	Good	Good	Good
		<ol style="list-style-type: none"> Depending on the construction progress, construction noise monitoring and environmental noise monitoring during the construction period shall be performed to understand the impact of noise along the area during the process of the current construction project. 	Good	Good	Sufficient
		<ol style="list-style-type: none"> Construction time shall be properly planned to prevent generating high noise volume at night or early in the morning, and construction shall be managed more stringently. 	Good	Good	Good

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan	Technical feasibility	Cultural appropriateness	Expected effectiveness
		7. In excavating the land for installing land cables, transmission lines, and pipelines, when the excavator transfers soil stones to the truck, the truck shall be parked near the excavator so as to avoid increasing unnecessary noise when the noisy excavator moves back and forth to the truck.	Good	Good	Good
		8. Low-noise and low-vibration construction machinery are employed on land construction sites; it shall be maintained frequently to ensure functionality for normal operation.	Good	Good	Good
		9. Impact between construction machinery and the ground shall be avoided when operating the construction machineries.	Good	Good	Good
		10. Execute noise monitoring at 3 stations once every quarter for 24 hours during onshore construction works (step-up substation and cable installation).	Good	Good	Sufficient
		1. Execute construction noise monitoring at 2 stations once per month, 1 m in the perimeter of the construction site by the step-up room.	Good	Good	Sufficient
Onshore power transmission and distribution facilities construction vibration	Construction machinery vibration: threshold at which the body perceives vibration (55 dB)	1. All machinery, tools and transport vehicles used by contractors must be serviced and repaired regularly to prevent noise and vibration caused by loosened mechanical parts.	Good	Good	Good
		2. In excavating the land for installing land cables, transmission lines, and pipelines, when the excavator transfers soil stones to the truck, the truck shall be parked near the excavator so as to avoid increasing unnecessary noise when the noisy excavator moves back and forth to the truck.	Good	Good	Good
	Transport vibration:	3. Impact between construction machinery and the ground shall be avoided when operating the construction machineries.	Good	Good	Good

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan		Technical feasibility	Cultural appropriateness	Expected effectiveness
	Japan's vibration law for Type-2 area (70 dB)		4. Execute vibration monitoring at 3 stations once every quarter for 24 hours during onshore construction works (step-up substation and cable installation).	Good	Good	Sufficient
Noise in operation period	Full-frequency noise: an all-time ranges noise level increase of 0.0dB(A) Low-frequency noise: an all-time ranges noise level increase of 0.0dB(A)	Because there is no impact or minor impact, no mitigation measure is needed.		N/A	N/A	N/A
Underwater noise in construction period	SEL 160dB	Construction period	1. During the piling of the wind farm project, one hydrophone will be set up at the western boundary of the proposed Major Wildlife Habitat of Taiwanese White Dolphin to monitor the piling noise.	Good	Good	Good
			2. If the competent authority and the government authority in charge of the relevant business formulate a standard method for detecting underwater noise or stricter control standards, this project will follow the latest regulations.	Depends on the standard published	Depends on the standard published	Depends on the standard published
			3. Protection measures before percussive piling and during piling:			

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan	Technical feasibility	Cultural appropriateness	Expected effectiveness
		<p>a. Before the wind turbine piling operation, deterrence devices will not be used in this Project to temporarily drive wild animals away.</p>	Good	Good	Medium
		<p>b. An exclusive zone will be planned for the maximum underwater noise tolerance. The exclusive zone is centred on the pile-driving site and the radius is about 750 meters from the centre, while the precautionary area is about 750 to 1500 meters from the centre.</p>	Good	Good	Good
		<p>c. To protect cetaceans, if percussive piling is adopted for the installation of the wind turbine foundation, the noise level of underwater piling should be lowered. Noise mitigation measures that have been commercialized and are suitable for the site should be adopted in the entire piling period so that the underwater sound exposure level (SEL) at the exclusive zone within the 750-meter radius from the piling centre may not exceed 160 [(dB)re. 1μPa2s]. Hydrophones shall be set up for monitoring. (Calculation of underwater SEL is based on a single piling event. In a 30-second analysis, the number of pilings (N) and equivalent SEL (or average level, Leq30s) are calculated and converted into the SEL of a single piling event (average within 30 seconds) to determine whether the SEL exceed the threshold value.)</p>	Good	Good	Good
		<p>d. An underwater acoustic monitoring system will be adopted, and vessels when weather permits to set sail for visual inspection of the environment to determine the absence of cetacean activities in the exclusive zone 30 min before the pile-driving process.</p>	Good	Good	Good
		<p>e. Underwater acoustic monitoring system: Four underwater acoustic monitoring facilities will be set up in four directions 750 meters away from the piling site to continuously monitor the presence of cetaceans nearby.</p>	Good	Good	Good

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan	Technical feasibility	Cultural appropriateness	Expected effectiveness
		<p>f. Monitoring by cetacean observers: Observation vessels will be configured in four directions at the 750-meter exclusive zone during piling period and two more observation vessels will be added to the 1500-meter precautionary area. Each observation vessel will have two or more observers, who will continue to observe cetacean ecology during the foundation piling process. If cetaceans appear within the 1500-meter precautionary area, the construction unit shall stop piling if the construction condition permits (e.g., metocean conditions, whether the depth of the foundation pile is sufficient, etc.) Additional night vision equipment will be used at night. The cetacean observers on the observation vessels will observe and confirm whether cetaceans enter the precautionary area. Video recording will be implemented during the entire piling monitoring period. The relevant monitoring locations are detailed in Figure 8.1.1-1.</p>	Good	Good	Good
		<p>g. Pile-driving is adopted in a progressive manner, starting from low to maximal intensity. Soft start for at least 30 minutes so that cetaceans are given sufficient time to leave the source of pile-driving noise.</p>	Good	Good	Good
		<p>h. If cetaceans are found within the 1500-meter precautionary area during the piling period, the countermeasure protocols for percussive piling will be restarted after the cetaceans leave the precautionary area.</p>	Good	Good	Good
		<p>i. The piling operation of a new turbine shall be started two hours before sunset at the latest. No piling operation of a new turbine can be started between two hours before sunset and sunrise.</p>	Good	Good	Good

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan		Technical feasibility	Cultural appropriateness	Expected effectiveness
			4. Monitoring underwater noise with frequency range 20Hz – 20kHz with spectrogram and 1-Hz band and 1/3 octave band analysis at two stations at the border of the wind turbines (data can be obtained from the underwater acoustics stations for cetacean ecology for analysis) once a season.	Good	Good	Sufficient
			5. Monitor at one location 750 meters to the pile-driving location of wind turbines once for every wind turbine during piling period.	Good	Good	Sufficient
Underwater noise in operation period	Continuously monitoring	Operation period	1. Monitoring underwater noise with frequency range 20Hz – 20kHz with spectrogram and 1-Hz band and 1/3 octave band analysis at two stations at the border of the wind turbines (data can be obtained from the underwater acoustics stations for cetacean ecology for analysis) once a season.	Good	Good	Sufficient
Electromagnetic field	833.3mG Reference value of the EPA: 833.3 mG	Operation period	1. Magnetic field will be monitored at one station near the landfall once every year.	Good	Good	Sufficient
Waste	All waste can be treated properly and will not generate impacts on the surrounding environment	Construction period	1. General waste created over the construction period shall be collected using sealed containers to prevent spread, contamination and odour. The waste also needs to be transported by qualified disposal service providers or local cleaning crews to the waste treatment plant (site).	Good	Good	Good
			2. Waste generated by workers must be collected and sorted at the construction site for recycling purposes, and should be processed by the local garbage handling system and taken away by local garbage trucks and recycling trucks.	Good	Good	Good

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan		Technical feasibility	Cultural appropriateness	Expected effectiveness
			3. Solid wastes, including spare parts, tires, battery jar, and solvents, from repair and maintenance of machineries in all construction sites during the construction period shall be properly collected. Except for recyclable wastes which shall be recycled, other non-recyclable wastes shall be disposed of in accordance with regulations pertaining to the disposal of general industrial wastes to prevent arbitrary disposal of wastes causing environmental pollution around the construction site.	Good	Good	Good
			4. Contractors will be instructed to refrain from overloading and to apply proper cover when transporting soil and construction waste, and thereby avoid impacts to the nearby environment.	Good	Good	Good
Surplus soil	All surplus soil can be treated properly and will not generate impacts on the surrounding environment	Construction period	1. During the outsourcing stage, contractors will be instructed to back-fill soil as the top priority. The required soil will be reported over the construction information system for exchange.	Good	Good	Good
Impacts brought by surplus soil transporting vehicles	No impact or minor impact	Construction period	1. In excavating the land for installing land cables, transmission lines, and pipelines, when the excavator transfers soil stones to the truck, the truck shall be parked near the excavator so as to avoid increasing unnecessary noise when the noisy excavator moves back and forth to the truck.	Good	Good	Good
			2. Contractors will be instructed to refrain from overloading and to apply proper cover when transporting soil and construction waste, and thereby avoid impacts to the nearby environment.	Good	Good	Good

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan		Technical feasibility	Cultural appropriateness	Expected effectiveness
Communication interference	Generating no impact on CGA's mission execution	Wind turbine tower design stage	CGA responded in the Shu-Tong-Kong No. 1050008439 dated May 19, 2016 stating: "After the adjustment... the area is still inside the scope of the Administration's radar and preliminary evaluation concludes that it shall still affect the Administration's coastal radars. The Administration agrees in principle... When the Project enters the "Wind turbine tower design" stage... Use rolling amendments to assess the impact and plan improvement plans and submit them to the Administration for reference." The Preparatory Office shall provide related information to the CGA for reference during the "Wind turbine tower design" stage in accordance with the CGA's letter mentioned above.	Good	Good	Good
Plant ecology	Biodiversity: no impact or localized and temporary minor impact Rare and endemic species: no impact Vegetation ecology: no impact or localized and temporary minor impact	Construction period	1. Although the vegetation will be removed for the self-built step-up substation construction, the resulting impact is limited because of the highly repeated vegetation in the construction area. However, the contractor shall prevent the plant ecology outside the construction area from being affected by the construction.	Good	Good	Good
			2. Avoid frequently spraying chemicals such as fertilizers, pesticides, or herbicides in the early stages of planting tasks.	Good	Good	Good
			3. Air pollution prevention tasks shall be strengthened in the construction period to spray water over exposed earth at all times to prevent the release of dust. The stored materials, earth piles, and gravel trucks should be covered to reduce the impact of dust on plant growth.	Good	Good	Good
			4. Water will be sprinkled regularly onto vegetation along construction roadways over the construction period, and hence reduce the spread of dust over the vegetation.	Good	Good	Good
			5. Conduct onshore plant ecology survey for land transmission and distribution system (including step-up substation, land cable and nearby area) every quarter.	Good	Good	Good

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan		Technical feasibility	Cultural appropriateness	Expected effectiveness
		Operation period	1. Apply habitat restoration works (landscaping) around on-shore facilities to help with the return of environmentally sensitive animals.	Medium	Good	Depends on the type of environmental sensitive animal
			2. Use native plants for landscape.	Good	Good	Good
			3. Avoid spraying chemicals such as fertilizers, pesticides, or herbicides in the early stages of planting tasks.	Good	Good	Good
			4. Vehicles should be prevented from directly crossing during the maintenance of the step-up substation to avoid destruction of plants and disturbing the habitats of wild animals.	Good	Good	Good
Animal ecology	General species: no impact or localized and temporary minor impact	Construction period	1. Underground construction method will be used to bring the subsea cable at the intertidal zone across the seawall to the landfall. The progress of cable installation works will be outlined prior to work commencement. The scheduling of the installation of cables at the intertidal zone will avoid the period from November to March of the next year.	Good	Good	Medium
			2. During the construction period, construction equipment management will be strengthened and low-noise appliances will be used to avoid interference caused by construction noise in that area.	Good	Good	Good
	3. To minimize the disturbance of subsea cable installation to the existing mud flat ecosystem in the intertidal zone, the discharge of effluent or soil waste shall be avoided during the construction period. Instead, waste must be managed centrally during the construction period.		Good	Good	Good	
	4. Minimizing disturbances to the on-shore environment and damage to habitat during construction of on-shore facilities					
	Protected species: do not lower population number					

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan	Technical feasibility	Cultural appropriateness	Expected effectiveness
		a. Primarily use existing roadways where possible, so that the existing environment can be preserved and the habitat protected against damage from construction activities.	Good	Good	Good
		b. Construction workers shall be trained for a fixed number of hours to prevent interfering with the conservation of bird habitats caused by negligence.	Good	Good	Good
		5. Contractors will be instructed to enhance training over their workers, and prohibit workers from capturing, disturbing, or abusing wild animals, and avoid unknowingly disturbing the habitat of conserved birds.	Good	Good	Good
		6. The entry and exit of construction vehicles and the excavation of the base will still destroy existing plants but other unnecessary impact should be avoided in order to preserve the integrity of the coastal woods.	Good	Good	Good
		7. Traveling speed of construction vehicles shall be restricted. Construction vehicles may run over amphibians and reptiles crossing the road. Therefore, a limit on vehicle driving speed shall be imposed, particularly along the land cable regions, to reduce the possibility of roadkill.	Good	Good	Good
		8. Conduct onshore animal ecology survey for land transmission and distribution system (including step-up substation, land cable and nearby area) every quarter.	Good	Good	Medium
		Operation p. 1. Apply habitat restoration works (landscaping) around on-shore facilities to help with the return of environmentally sensitive animals.	Medium	Good	Depends on the type of environmental sensitive animal

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan		Technical feasibility	Cultural appropriateness	Expected effectiveness
			2. Vehicles should be prevented from directly crossing during the maintenance of the step-up substation to avoid destruction of plants and disturbing the habitats of wild animals.	Good	Good	Good
Marine ecology	No impact or localized and temporary minor impact	Construction period	1. Subsea cables should be installed to connect to landfall using the shortest length that is technically feasible and reasonable. This is to reduce the impact of construction on the environment.	Good	Good	Good
			2. Subsea cables will be installed on a section-by-section basis. The environment will be restored to its previous state once a section is completed for reducing impact.	Good	Good	Good
			3. Furthermore, in this project, pile-driving works will be performed for only one wind turbine at a time to reduce the large-scale construction works within the maritime space.	Good	Good	Good
			4. Conduct maritime ecology survey including intertidal zone ecology, plankton, juvenile fish and fish eggs, benthic organisms and fish every quarter.	Good	Good	Medium
		Operation period	1. Conduct maritime ecology survey including plankton, juvenile fish and fish eggs, benthic organisms and fish every quarter, and also underwater photography at two wind turbines after the overall operation of the wind farm once per season.	Good	Good	Medium
Fishery resources	Fish: no impact or localized and temporary minor impact	Pre-construction period	1. The background information of fishery resources (including the number of fishing boats, form of fishery activities, fish species and yield of catch) at Yunlin County will be established one year before marine construction starts.	Good	Good	Good

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan		Technical feasibility	Cultural appropriateness	Expected effectiveness
	Fishery: lowering the impacts on fishermen by compensating them	Construction period	1. The background information of fishery resources (including the number of fishing boats, form of fishery activities, fish species and yield of catch) within the wind farm boundaries will be established as a basis for comparing post-operation impact and a reference for controlling fishery activities. One survey will be conducted one year before marine construction starts, and surveys will be conducted once per year during the marine construction period.	Good	Good	Sufficient
			2. Underwater photography will be arranged once for each wind turbine after piling during the construction period to examine the impact of piling construction on the fish.	Good	Good	Sufficient
		Operation period	1. Horns Rev in Denmark is one of the largest offshore wind farms in the world. It is located in shallow water zone not more than 20 m deep. In the research conducted by the National Institute of Aquatic Resources on Horns Rev wind farm, a comparison of the data on aquatic resources before construction and after wind turbine operation showed that the wind turbines did not adversely affect local fish activities. With regard to the wind turbine foundation and materials used to prevent seabed scouring, in addition to the consideration of biofouling ability, the products made of slag should be excluded in order to create an artificial habitat that is ecologically compatible and to prevent the invasion of alien organisms.	Good	Good	Good
			2. Once the overall operation of the wind farm begins, two wind turbines will be chosen every quarter to observe fish aggregation near the wind turbine foundations by underwater photography.	Good	Good	Sufficient

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan	Technical feasibility	Cultural appropriateness	Expected effectiveness
		<p>3. The preparatory office shall process fishery compensation in accordance with the "Offshore Wind Power Fishery Industry Compensation Guidelines" announced by the Fisheries Agency in the Order No. Nong-Yu-Zi-Di 1051328879A on November 30, 2016. The subsequent development unit will reach an agreement with the Fishermen Association on fishing compensation to ensure the rights of fishermen and the smooth progress of the project. The part involving the aquaculture production area in Xialun District will be handled by the competent authority of municipalities or counties (cities) in accordance with the relevant provisions of the Fisheries Act and the Guidelines for the Establishment and Management of Aquaculture Production Areas (draft).</p>	Good	Good	Good
		<p>4. In the future, in addition to visiting and communicating with local fishermen groups and local opinion leaders and listening to the needs of local fishermen, we will invite local fishermen groups to attend pre-construction public meetings, and visit Yunlin Fishermen Association for further communication and coordination. In future, areas involved in this project that will influence the interests and rights of fishermen activities shall be handled after this development project (including environmental impact assessment) has been approved by the government, and the compensation for fishing rights will be handled in accordance with the relevant provisions of the Fisheries Act.</p>	Good	Good	Good
		<p>5. With regard to whether the relevant fishing activities or fishing boats passage are allowed in the wind farm in the future, the Bureau of Energy (Ministry of Economic Affairs), Fisheries Agency and other agencies will formulate relevant regulations. If the regulations come into force in the future, this Project will follow the regulations.</p>	Depends on the regulation published	Good	Depends on the regulation published

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan		Technical feasibility	Cultural appropriateness	Expected effectiveness
			6. The background information of fishery resources (including the number of fishing boats, form of fishery activities, fish species and yield of catch) within the wind farm boundaries will be established once per year.	Good	Good	Sufficient
Cetacean	Underwater piling noise shall not exceed SEL 160dB so the no hearing loss of cetacean will occur	Pre-construction period	1. Place a total of 5 underwater acoustics stations one year before construction for four seasons and at least 14 days or times every quarter for underwater acoustic survey.	Good	Good	Good
			2. Visual monitoring on cetacean ecology within wind farm area for 30 times one year before construction.	Good	Good	Good
		Construction period	1. The proposed Major Wildlife Habitat of Taiwanese White Dolphin has been excluded from the predetermined wind turbine boundaries, while the eastern boundary of the wind farm is 3,000 meters away from the proposed Major Wildlife Habitat of Taiwanese White Dolphin to lower the impact on the Taiwanese White Dolphin.	Good	Good	Sufficient
			2. During the piling of the wind farm project, one hydrophone will be set up at the western boundary of the proposed Major Wildlife Habitat of Taiwanese White Dolphin to monitor the piling noise.	Good	Good	Good
			3. If the competent authority and the government authority in charge of the relevant business formulate a standard method for detecting underwater noise or stricter control standards, this project will follow the latest regulations.	Depends on the standard published	Good	Depends on the standard published
			4. Protection measures before percussive piling and during piling:			
a. Before the wind turbine piling operation, deterrence devices will not be used in this project to temporarily drive wild animals away.	Good	Good	Medium			

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan	Technical feasibility	Cultural appropriateness	Expected effectiveness
		<p>b. An exclusive zone will be planned for the maximum underwater noise tolerance. The exclusive zone is centred on the pile-driving site and the radius is about 750 meters from the centre, while the precautionary area is about 750 to 1500 meters from the centre.</p>	Good	Good	Good
		<p>c. To protect cetaceans, if percussive piling is adopted for the installation of the wind turbine foundation, the noise level of underwater piling should be lowered. Noise mitigation measures that have been commercialized and are suitable for the site should be adopted in the entire piling period so that the underwater sound exposure level (SEL) at the exclusive zone within the 750-meter radius from the piling centre may not exceed 160 [(dB)re. 1μPa2s]. Hydrophones shall be set up for monitoring. (Calculation of underwater SEL is based on a single piling event. In a 30-second analysis, the number of pilings (N) and equivalent SEL (or average level, Leq30s) are calculated and converted into the SEL of a single piling event (average within 30 seconds) to determine whether the SEL exceed the threshold value.)</p>	Good	Good	Good
		<p>d. An underwater acoustic monitoring system will be adopted, and vessels when weather permits to set sail for visual inspection of the environment to determine the absence of cetacean activities in the exclusive zone 30 min before the pile-driving process.</p>	Good	Good	Good
		<p>e. Underwater acoustic monitoring system: Four underwater acoustic monitoring facilities will be set up in four directions 750 meters away from the piling site to continuously monitor the presence of cetaceans nearby.</p>	Good	Good	Good

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan	Technical feasibility	Cultural appropriateness	Expected effectiveness
		<p>f. Monitoring by cetacean observers: Observation vessels will be configured in four directions at the 750-meter exclusive zone during piling period and two more observation vessels will be added to the 1500-meter precautionary area. Each observation vessel will have two or more observers, who will continue to observe cetaceans ecology during the foundation piling process. If cetaceans appear within the 1500-meter precautionary area, the construction unit shall stop piling if the construction condition permits (e.g., metocean conditions, whether the depth of the foundation pile is sufficient, etc.) Additional night vision equipment will be used at night. The cetacean observers on the observation vessels will observe and confirm whether cetaceans enter the precautionary area. Video recording will be implemented during the entire piling monitoring period. The relevant monitoring locations are detailed in Figure 8.1.1-1.</p>	Good	Good	Good
		<p>g. Pile-driving is adopted in a progressive manner, starting from low to maximal intensity. Soft start for at least 30 minutes so that cetaceans are given sufficient time to leave the source of pile-driving noise.</p>	Good	Good	Good
		<p>h. If cetaceans are found within the 1500-meter precautionary area during the piling period, the countermeasure protocols for percussive piling will be restarted after the cetaceans leave the precautionary area.</p>	Good	Good	Good
		<p>i. A new wind turbine piling operation shall be started two hours before sunset at the latest, and shall be stopped between two hours before sunset and before sunrise.</p>	Good	Good	Good
		<p>5. To protect the Taiwanese White Dolphins, only one output subsea cable will be constructed at a time when passing through the proposed Major Wildlife Habitat of Taiwanese White Dolphin to reduce the large-scale construction.</p>	Good	Good	Sufficient

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan		Technical feasibility	Cultural appropriateness	Expected effectiveness
			6. The speed of construction vessels shall be limited to 6 knots or lower at the proposed Major Wildlife Habitat of Taiwanese White Dolphin and within 1500-meter radius outside of the boundaries.	Good	Good	Good
			7. Execution of environmental monitoring plan.	Good	Good	Good
			8. Place a total of 5 underwater acoustics stations and monitor once every season for underwater acoustic survey. (no monitoring required if construction cannot proceed in winter)	Good	Good	Good
			9. Visual monitoring on cetacean ecology within wind farm area for 30 times every year.	Good	Good	Good
		Operation period	1. Place a total of 5 underwater acoustics stations and monitor once every season for underwater acoustic survey.	Good	Good	Good
			2. Visual monitoring on cetacean ecology within wind farm area for 30 times every year.	Good	Good	Good
Bird ecology	Continuously monitoring in order to know if there is any impact	Pre-construction period	1. Sea bird radar surveys will be conducted within the wind farm boundaries and the seashore near the landfalls two years prior to construction. The surveys will be conducted five times a quarter, lasting 24 hours each time. In addition, a total of 30 birds will be tracked by satellites for four quarters near the seashore of the wind farm one year prior to the construction in order to understand the main migration path of the birds in this area.	Good	Good	Good
			2. Satellite tracking survey with 30 birds along coast of Yunlin County will be conducted one year prior to construction.	Good	Good	Good
		Construction period	1. Ecological surveys on birds will be conducted within the wind farm boundaries and the seashore near the landfalls during the construction period. The surveys will be conducted once in winter and every month in spring, summer and fall. A total of ten surveys will be conducted throughout the year.	Good	Good	Medium

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan		Technical feasibility	Cultural appropriateness	Expected effectiveness
			2. Minimizing disturbances to the on-shore environment and damage to habitat during construction of on-shore facilities			
			a. Primarily use existing roadways where possible, so that the existing environment can be preserved and the habitat protected against damage from construction activities.	Good	Good	Good
			b. Construction workers shall be trained for a fixed number of hours to prevent interfering with the conservation of bird habitats caused by negligence.	Good	Good	Good
			3. Contractors will be instructed to enhance training over their workers, and prohibit workers from capturing, disturbing, or abusing wild animals, and avoid unknowingly disturbing the habitat of conserved birds.	Good	Good	Good
		Operation period	1. After the installation of the wind turbines, the preparatory office will install aircraft warning lights in accordance with the Standards Governing the Installation of Aviation Obstruction Signs and Lights issued by the Civil Aeronautics Administration, and obtain an approval letter from the Civil Aeronautics Administration.	Good	Good	Good
			2. After the wind turbines are installed, three high-efficiency monitoring devices that have been commercialized will be installed at appropriate locations in the wind farm. In additions, wind turbines at four directions will be selected for the installation of the automatic continuous monitoring system (high-efficiency radar, thermal imaging camera, sonic microphone) or more advanced monitoring equipment for bird imaging recording to continuously monitor the bird flying activities in the wind farm.	Depends on the device/equipment, location, and the type of birds	Good	Depends on the device/equipment, location, and the type of birds
			3. The above automatic continuous monitoring system will be included in planning designs to ensure that when wind turbine operates normally, it can supply the required power.	Depends on the system	Good	Depends on the system

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan	Technical feasibility	Cultural appropriateness	Expected effectiveness
		<p>4. With regard to the necessary review of bird passage, an environmental impact assessment report should be submitted in accordance with Article 18 of the Environmental Impact Assessment Act after the bird investigation between fall 2017 and spring 2018 is done. The plan will be finalized after review.</p>	Good	Good	Good
		<p>5. In order to minimize the risks of bird strike, this project will ensure that the spacing between wind turbines is greater than 950 meters at the parallel prevailing wind direction and greater than 550 meters at the vertical prevailing wind direction to facilitate crossing of the birds.</p>	Good	Good	Good
		<p>6. Ecological surveys on birds will be conducted within the wind farm boundaries and the seashore near the landfalls during the operation period. The surveys will be conducted once in winter and every month in spring, summer and fall. A total of ten surveys will be conducted throughout the year.</p>	Good	Good	Sufficient
		<p>7. Bird investigation will continue to be conducted for this project during the transit period. The feasibility of the latest technology and relevant mitigation measures will continue to be studied for the future research based on the accumulated bird investigation data and the development of relevant technology. In addition, if it is found during the environmental monitoring that a massive number of conserved bird species or large birds will pass through the wind farm, we promise to use a feasible mechanism to slow down the wind turbines.</p>	Depends on the mechanism	Good	Good

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan		Technical feasibility	Cultural appropriateness	Expected effectiveness
Scenic beauty and recreational influence	Minor impact or localized and temporary impact	Construction period	1. In the construction phase, temporary storage of construction machineries and materials and waste materials must take into consideration the overall landscape during the construction period. These materials may not be placed sporadically to prevent negatively affecting the visual quality of landscape views. Additionally, this area is characterized by a wide field of view and large turbine structure. The process of installing wind turbines tends to negatively influence the visual and psychological perceptions of viewers. A wind turbine is a single unit that is installed in sequential order, which can slightly reduce the unpleasant visual landscape impact for the public and tourists.	Good	Good	Sufficient
		Operation period	1. The colour scheme of the entire wind turbine unit shall comprise bright, lively, natural colours such as white, grey white, or blue to reduce the visual effect of the wind turbines and provide local residents or tourists a special visual experience. Thereafter, the appearance and colour of wind turbine units shall be regularly checked and repainted to reduce their effects on visual qualities.	Good	Good	Good
Recreational environmental influence	Construction period: localized and temporary impact	Construction period	1. During the construction stage, the construction roads and construction fences near recreational sites must specify the construction period and reduce the control periods of the main roads in order to alleviate the impact on the accessibility of recreation sites.	Good	Good	Sufficient
			2. Avoid moving heavy equipment in or out of construction sites during public holidays or days of high leisure activities. If it is absolutely necessary to control traffic, advance arrangements for the use of alternative roadways shall be made.	Good	Good	Sufficient
			3. Construction sites and entrance of traffic artery shall have temporary U-turn space and signs. During rush hours caused by recreational event, the construction unit shall dispatch personnel to assist with traffic flow.	Good	Good	Sufficient

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan		Technical feasibility	Cultural appropriateness	Expected effectiveness
			4. Dusts on roads shall be controlled by sprinkling water to reduce its impact on the quality of neighbouring recreational activities and reduce the unpleasant experiences of passing tourists.	Good	Good	Sufficient
			5. If roads to neighbouring major recreational sites or other roads are damaged by construction vehicles and in the process of machinery transport, these roads shall be mended at all times to prevent influencing the road experiences of visitors traveling in their own car or on tour buses.	Good	Good	Sufficient
	Operation period: no impact or minor impact	Operation period	1. During the operation period, appropriate indicators or interpretation facilities based on recreational resources and landscape shall be established near the project area. While taking a break, tourists can obtain relevant information, thereby adding to the diversity of their recreational experience.	Good	Good	Good
Social environment	No impact or minor impact	Because there is no impact or minor impact, no mitigation measure is needed.		N/A	N/A	N/A
Economic environment	No impact or minor impact	Pre-construction period	1. The preparatory office shall process fishery compensation in accordance with the "Offshore Wind Power Fishery Industry Compensation Guidelines" announced by the Fisheries Agency in the Order No. Nong-Yu-Zi-Di 1051328879A on November 30, 2016. The subsequent development unit will reach an agreement with the Fishermen Association on fishing compensation to ensure the rights of fishermen and the smooth progress of the project. The part involving the aquaculture production area in Xialun District will be handled by the competent authority of municipalities or counties (cities) in accordance with the relevant provisions of the Fisheries Act and the Guidelines for the Establishment and Management of Aquaculture Production Areas (draft).	Good	Good	Good

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan		Technical feasibility	Cultural appropriateness	Expected effectiveness
			2. In the future, in addition to visiting and communicating with local fishermen groups and local opinion leaders and listening to the needs of local fishermen, we will invite local fishermen groups to attend pre-construction public meetings, and visit Yunlin Fishermen Association for further communication and coordination. In future, areas involved in this project that will influence the interests and rights of fishermen activities shall be handled after this development project (including environmental impact assessment) has been approved by the government, and the compensation for fishing rights will be handled in accordance with the relevant provisions of the Fisheries Act.	Good	Good	Good
		Operation period	1. With regard to whether the relevant fishing activities or fishing boats passage are allowed in the wind farm in the future, the Bureau of Energy (Ministry of Economic Affairs), Fisheries Agency and other agencies will formulate relevant regulations. If the regulations come into force in the future, this Project will follow the regulations.	Depends on the regulation published	Good	Depends on the regulation published
			2. The background information of fishery resources (including the number of fishing boats, form of fishery activities, fish species and yield of catch) within the wind farm boundaries will be established once per year during the operation period.	Good	Good	Sufficient
Traffic environment	The service quality of the roads and of the intersections to be maintained at current conditions	Construction period	1. Assign workers to direct traffic and ensure traffic safety at all times when laying underground cables.	Good	Good	Sufficient
			2. Complete work section-by-section to minimize the impact on local traffic.	Good	Good	Sufficient
			3. Make alternative road access during the construction period. Place signs and assign workers to direct traffic so that it is still convenient for the public to use the part of road.	Good	Good	Sufficient

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan	Technical feasibility	Cultural appropriateness	Expected effectiveness
		<p>4. Inspect road conditions as often as possible during the construction period. Devise traffic maintenance plans and maintain the condition of roads used by construction machinery and vehicles. Take measures to improve the safety of vehicles and personnel within the construction site.</p> <p>5. Instruct contractors to abide by traffic rules for all transport vehicles, and use the designated routes to avoid affecting other roads.</p> <p>6. Time of transportations shall be flexible in order to mitigate traffic congestion.</p> <p>7. Transporting vehicles shall be clearly labelled to help the general public identify the engineering unit to which it belongs and thereby fulfil the management responsibility of the construction unit.</p> <p>8. Guidance shall be provided for engineering contractors or sandstone transporters working within the perimeter of the construction site to ensure they are insured, thereby protecting the rights and interests of the driver and pedestrians.</p>	Good	Good	Sufficient
			Good	Good	Good
			Good	Good	Good
			Good	Good	Good
			Good	Good	Good
Cultural heritage	No impact	<p>Underwater:</p> <p>1. The Project received approval from the Ministry of Culture for the "preliminary assessment report on the underwater cultural heritage of Yunlin Offshore Wind Farm Construction Project" on May 22, 2017. We have also submitted the underwater cultural heritage re-examination plan to the Ministry of Culture on November 3, 2017 for review. A comprehensive side-scan sonar survey is performed with high-density bathymetric survey, magnetic and geologic section survey for comparison. High-precision side-scan sonar, high-density bathymetric survey, magnetic and geologic section survey shall be performed for target objects. Where necessary, photography and diving surveys shall be performed to determine the characteristics of the target object for review.</p>	Good	Good	Good
		Pre-construction period			

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan	Technical feasibility	Cultural appropriateness	Expected effectiveness
		<p>2. The 2017 12th review meeting on the underwater cultural heritage for this project was held on December 8, 2017, and the Letter Wen-Tsi-Wu-Yi-Di. 1073000617 was issued by the Bureau of Cultural Heritage, Ministry of Culture on January 12, 2018. The conclusion of the meeting is summarized below: "... The committee member proposed to "submit the revision to the review panel after the committee members' review..." The first Underwater Cultural Heritage Review Panel of Ministry of Culture held the 15th meeting on February 23, 2018. The survey will be conducted in accordance with the approved investigation plan.</p>	Good	Good	Good
		<p>3. Relevant measures will be implemented for the target objects with cultural heritage value confirmed by subsequent investigation based on their types, scale and scope of protection, as well as the analysis on the possible scope of interference resulting from the construction operation or the facilities themselves. The relevant measures include:</p>			
		<p>a. Adjustment of facility layout: For example, change the bypass of cable laying route to the site, or change the wind turbine location.</p>	Good	Good	Good
		<p>b. Partial adjustment of wind farm area: Partially change and adjust the wind farm area, while maintaining the same total installed capacity.</p>	Good	Good	Good
		<p>c. Protection measures: Assess, investigate and plan protection measures in the area with cultural heritage, and actively discuss with the competent authority to plan feasible protective measures.</p>	Good	Good	Good

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan	Technical feasibility	Cultural appropriateness	Expected effectiveness																										
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px;"></td> <td data-bbox="651 339 1512 427">4. Interpretation of underwater culture by professional archaeologists for borehole sampling for each wind turbine.</td> <td data-bbox="1512 339 1675 427">Good</td> <td data-bbox="1675 339 1897 427">Good</td> <td data-bbox="1897 339 2085 427">Good</td> </tr> <tr> <td rowspan="5" style="writing-mode: vertical-rl; text-orientation: mixed; text-align: center;">Construction period</td> <td data-bbox="651 427 1512 483">Onshore:</td> <td data-bbox="1512 427 1675 483"></td> <td data-bbox="1675 427 1897 483"></td> <td data-bbox="1897 427 2085 483"></td> </tr> <tr> <td data-bbox="651 483 1512 699">1. Field investigations have been done along the route of the power transmission line. No archaeological relics were found during the investigation. In the future, qualified archaeological personnel will be entrusted to supervise the construction onshore or at the intertidal zone every day during the cable excavation period that are not using underground construction method.</td> <td data-bbox="1512 483 1675 699">Good</td> <td data-bbox="1675 483 1897 699">Good</td> <td data-bbox="1897 483 2085 699">Good</td> </tr> <tr> <td data-bbox="651 699 1512 986">2. If any relics are found during the onshore construction period, they should be handled in accordance with Article 57 of the Cultural Heritage Preservation Act. "If a suspected archaeological site is discovered during construction or other development activities, the construction or development activity shall be immediately suspended, and the local competent authority of Yunlin County shall be notified to take necessary protection measures. The project may not be resumed before the relevant review procedures are completed".</td> <td data-bbox="1512 699 1675 986">Good</td> <td data-bbox="1675 699 1897 986">Good</td> <td data-bbox="1897 699 2085 986">Good</td> </tr> <tr> <td data-bbox="651 986 1512 1066">3. Daily monitoring during excavation of land cable area along the land cable route and land facilities.</td> <td data-bbox="1512 986 1675 1066">Good</td> <td data-bbox="1675 986 1897 1066">Good</td> <td data-bbox="1897 986 2085 1066">Good</td> </tr> <tr> <td data-bbox="651 1066 1512 1153">4. Daily monitoring during the excavation of the intertidal zone when using non-underground construction methods.</td> <td data-bbox="1512 1066 1675 1153">Good</td> <td data-bbox="1675 1066 1897 1153">Good</td> <td data-bbox="1897 1066 2085 1153">Good</td> </tr> </table>		4. Interpretation of underwater culture by professional archaeologists for borehole sampling for each wind turbine.	Good	Good	Good	Construction period	Onshore:				1. Field investigations have been done along the route of the power transmission line. No archaeological relics were found during the investigation. In the future, qualified archaeological personnel will be entrusted to supervise the construction onshore or at the intertidal zone every day during the cable excavation period that are not using underground construction method.	Good	Good	Good	2. If any relics are found during the onshore construction period, they should be handled in accordance with Article 57 of the Cultural Heritage Preservation Act. "If a suspected archaeological site is discovered during construction or other development activities, the construction or development activity shall be immediately suspended, and the local competent authority of Yunlin County shall be notified to take necessary protection measures. The project may not be resumed before the relevant review procedures are completed".	Good	Good	Good	3. Daily monitoring during excavation of land cable area along the land cable route and land facilities.	Good	Good	Good	4. Daily monitoring during the excavation of the intertidal zone when using non-underground construction methods.	Good	Good	Good			
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Safety assessment	Low risk	This project has conducted risk assessments and proposed response measures for future reference, focusing on the following aspects: area of onshore assembly site, rental site limitation, offshore construction period limits (percentage of typhoon period and period in which construction can be carried out), operating conditions and usage limitation of pile-driving vessels and large ultra-high crane vessels, special large ultra-high load-bearing towers, wind turbine transportation and installation operation and fishermen communication, risk of vessel collision, and maintenance during operation period.	Good	Good	Good																										

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan	Technical feasibility	Cultural appropriateness	Expected effectiveness
		1. Typhoon and earthquake contingency measures			
		Personnel shall pay attention to typhoon development at all times and prepare for urgent evacuation 2 days before the announcement of sea warning for the typhoon. Urgent evacuation shall be executed after the announcement of sea warning for the typhoon. Working vessel team shall adhere to the following evacuation procedure:	Good	Good	Good
		d. Cease hoisting activities and other installation-related operations.	Good	Good	Good
		e. Retrieve underwater equipment and place it on the deck.	Good	Good	Good
		f. Fixate all machineries and equipment.	Good	Good	Good
		g. Anchor boat and tugboat collectively retrieve anchor and anchor rope.	Good	Good	Good
		h. All workers must board the vessel to ensure safety.	Good	Good	Good
		i. Tugboat is used to carefully tow the working vessel into the harbour and anchor it at the designated harbour.	Good	Good	Good
		After an earthquake, personnel shall pay close attention to tsunami warnings. If the working vessel cannot withstand the impact of a tsunami, it shall quickly transport crew members on board to a bigger working vessel or to a completed wind turbine tower for refuge.	Good	Good	Good
		2. Area of onshore assembly site and construction pier, rental site limitation The government is planning to use the Port of Taichung for the subsequent offshore wind farm development. In support of the government's infrastructure initiatives, the Project will plan to make the Port of Taichung its priority operating dock. However, the actual working port and pier that meet the construction requirements will be selected for this project after considering the subsequent overall planning.	Good	Good	Good

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan	Technical feasibility	Cultural appropriateness	Expected effectiveness
		<p>3. Offshore construction period limits</p> <p>Suitable marine engineering operation period is generally between March and September every year when waves are smaller. However, from May to August in summer every year is typhoon season, which makes the construction period profoundly influenced by the typhoon frequency and route.</p> <p>Countermeasures:</p> <p>Before construction, meteorological and oceanographic information shall be evaluated carefully to estimate the percentage of typhoon period to the period in which construction can be carried out. Thus, construction plan and preparations can be made in advance to ensure construction safety.</p>	Good	Good	Good
		<p>4. Operating conditions and usage limitation of pile-driving vessels and large ultra-high crane vessels</p> <p>The assembly and installation of foundation, which is the lower structure of this engineering, and jacket truss, and the installation of the upper structures of this engineering, including load-bearing tower and welding of turbine blades, are considered special, large, ultra-high load-bearing constructions on the sea.</p> <p>Countermeasures:</p> <p>The performance, capability, and characteristics of pile-driving vessels and large ultra-high crane vessels shall be carefully evaluated before installation. Vessels and machinery combinations capable of completing all primary operations shall be selected to ensure installation safety.</p>	Good	Good	Good

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan	Technical feasibility	Cultural appropriateness	Expected effectiveness
		<p>5. Load-bearing tower, wind turbine transportation and installation</p> <p>The installation of upper structures in this engineering project is considered to be highly specialized and risky.</p> <p>Countermeasures:</p> <p>Before installation, operating vessels and machinery combination must be carefully selected, and construction plan as well as simulation of construction vessel collision shall be properly established. Personnel who have completed professional vessel and machinery hoisting training shall be selected to enhance sea construction safety and work efficiency, thereby reducing occupational hazards and risk of financial loss.</p>	Good	Good	Good

		<p>6. Fishermen communication</p> <p>Because the construction location of this engineering project covers a vast water area, the following factors must be communicated to fishermen in advance: number of working vessels at sea during construction period, transport route, and the effects of offshore foundation installation and crane vessels operation.</p> <p>Countermeasures:</p> <p>Constructions shall adhere to the environmental management plan. Coordination and communication with local fishermen and fishery associations shall be strengthened. Neighbouring operating ships shall be informed of the construction content, scope of influence, and construction schedule. Actions for taking care of the local community shall be effectively carried out at the same time. During construction, environmental pollution monitoring shall be strengthened to control the expansion of environmental pollution in sea areas. Working vessels entering, leaving, and operating at sea shall comply with the construction plan, and they shall operate and sail within the designated seaway and construction zone. State of alert shall be maintained at all times to avoid colliding into fishing boats or damaging fishery facilities.</p>	Good	Good	Good
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Topic	Target /Targeted level	Associated mitigation measures and monitoring plan		Technical feasibility	Cultural appropriateness	Expected effectiveness
Vessel collision risk	Low risk	Construction period	1. In offshore constructions, all vessel operations and reporting thereof shall be in compliance with vessel safety management procedures and contingency plans. All vessels will reduce speed near the construction site and approach slowly. With the exception of large work boats, all supporting vessels are small boats of high manoeuvrability, therefore the chances and impacts of vessels colliding are relatively low. Furthermore, areas near the construction site will be designated a controlled zone for safety reasons.	Good	Good	Good
			2. Contractor shall deploy vessels and appropriate signs on the sea around the construction area so as to avoid other vessels from entering the construction sea area by mistake.	Good	Good	Good
		Operation period	1. To prevent collision of non-powered vessels, the operational management unit shall work with coast guard, harbor bureau, and disaster prevention units to establish a quick reporting mechanism, which enables incidents to be reported immediately. This mechanism provides sufficient time to respond and mitigate the disaster, thereby reducing occurrence of collision incidents and lowering disaster loss.	Good	Good	Good
			2. The following measures should be taken to prevent collisions of motorized vessels: placement of alarms, enhancing training for wind turbine service boats to reduce collisions during docking, or the use of light-weight supply and service boats.	Good	Good	Good
			3. Regarding disaster mitigation, a disaster response measure shall facilitate achieving the goals of real-time reporting, immediate disaster prevention, and effective disaster mitigation. Adopt the use of fenders to reduce collision force and damage.	Good	Good	Good
			4. When constructing an OWF, a responsible unit shall be set up for the purpose of overseeing offshore safety during construction, operation and maintenance periods. This unit is also responsible for devising safety and disaster response measures at sea.	Good	Good	Good

Topic	Target /Targeted level	Associated mitigation measures and monitoring plan		Technical feasibility	Cultural appropriateness	Expected effectiveness
			5. In the future, we will plan navigation aid and navigation warning facilities for this project based on the actual wind turbine location, the IALA regulations and the relevant regulations of Maritime and Port Bureau during the development stage in order to meet the international and relevant national regulations.	Good	Good	Good
Lightning strike risk	Low risk	Bad weather conditions	Avoid conducting maintenance tasks in bad weather conditions (particularly when there is risk of lightning strikes).	Good	Good	Good
Health risk	Low risk	Because there is no impact or minor impact, no mitigation measure is needed.		N/A	N/A	N/A

Appendix D Onshore Traffic Management Plan

1 Introduction

The Onshore Traffic Management Plan (OTMP) of Yunlin Offshore Wind Farm Project (referred to as “the Project” below) was established to effectively manage traffic conditions of the onshore construction site, mitigate the impact on general public’s daily life, and prevent traffic accidents from occurring. Construction machinery and vehicles transporting materials during the construction period may cause traffic congestion in nearby areas. Hence, the OTMP also aims to lower the impact on nearby traffic while ensuring that construction is smoothly carried out.

To comply with Taiwan regulations, if control facilities need to be installed in road sections, the facilities shall be installed in accordance with the “Regulations for Road Traffic Signs, Markings, and Signals” and “Road Traffic Safety Regulations.”

The OTMP sets forth basic guidelines. As for detailed traffic control plans for each road section and construction site, because detailed information of specific road traffic systems is required, they are not covered in the scope of the OTMP but individual traffic management plans of each contractor, such as the Yunlin Offshore Wind Farm Traffic Control Plan of GE dated August 2018 (approved by Yunlin Country Government on 03 October 2018). However, in principle, the following site-specific matters are taken into consideration while setting detailed traffic control plans:

1. Land use characteristics and road characteristics
2. Traffic characteristics
3. Bus route and station distribution and control method
4. Current status of traffic control
5. Pedestrian route
6. Traffic load
7. Mass transportation system

2 Traffic Management Plan

As a general concept, construction of road sections used by the Project is carried out during daytime (08:00-18:00). Traffic control is implemented during the construction period. Smooth traffic flow must be maintained in the construction area. Warning facilities must be properly installed in accordance with the “Regulations for Road Traffic Signs, Markings, and Signals” and schematic diagram of traffic control in the traffic control plan of each contractor, in order to remind vehicles and pedestrians to slow down and pay attention, thereby maintaining safe traffic. Checkered steel plates are used to cover the area of work each day for vehicles to be able to pass through.

Main plans of the OTMP are as follows:

1. Detour measures
 - If the road section affected is a one-lane access road for both directions without a direction separation line and is less than 5m wide, vehicles cannot pass through during construction. In this case, the road is be closed for construction. Traffic control facilities are set up for construction during nighttime, so the unused part of lanes can be used for passage. However, if the remaining road width is not enough to allow four-wheel vehicles to pass through, a no-entry sign is placed at the opening at the front and back of the construction part of the road.
 - If the affected road section is about 8m wide and both directions use the same lane without a direction separation line, vehicles should drive on the right. Half of the road width is occupied by the construction for digging a pipe trench, traffic flow in both directions takes

turns using the other half of the road. However, due to the need to use large excavators and scrapers, the width occupied may not exceed 4 m with consideration to the actual construction situation. If the remaining half of the road is used for passage, it does not result in a severe traffic jam.

- If the affected road section is about 12m wide and there is one lane in each direction, one lane is occupied by the construction, and traffic flow in both directions takes turns using the other lane. At the junction of access roads, the access road is closed for construction. However, due to the need to use large excavators and scrapers, the width occupied may not exceed 4 m with consideration to the actual construction situation. If the remaining lane is used for passage, it does not result in a severe traffic jam.
- If the affected road section is about 16.5m wide and there is one lane in each direction in some parts of the road, one lane is occupied by the construction, and traffic flow in the original direction is directed to the other lane using traffic control facilities. However, due to the need to use large excavators and scrapers, the width occupied may not exceed 4 m with consideration to the actual construction situation. If the remaining lane is used for passage, it does not result in a severe traffic jam. On sections where both directions use the same lane without a direction separation line, vehicles should drive on the right. Half of the road width is occupied by the construction for digging a pipe trench, traffic flow in both directions takes turns using the other half of the road. However, due to the need to use large excavators and scrapers, the width occupied may not exceed 4 m with consideration to the actual construction situation. If the remaining half of the road is used for passage, it does not result in a severe traffic jam.
- If the affected road section is about 20m wide and there is a median island with two lanes in each direction, the outer lane is occupied by the construction, and traffic flow originally in two lanes is directed to the inner lane using traffic control facilities. However, due to the need to use large excavators and scrapers, the width occupied may not exceed 4m with consideration to the actual construction situation. There is still one lane for passage, so there does not result in a severe traffic jam.
- If construction is necessary at an intersection, then detour measures are determined based on the construction site and intersection characteristics. In principle, access roads and intersections of access roads are not wide enough for vehicles to pass through during the construction period, so both ends are closed for construction. At the intersection of an access road and road with one lane in each direction, one lane is occupied and the access road is closed during the construction period. At the intersection of roads that both have a direction separation line, the construction at the intersection is divided in half; the construction is firstly carried out on one lane, and then on the other lane when the first lane is completed. If the road that branches off the main road of the construction does not have a direction separation line, the road is temporarily closed because the width is not enough for the construction to be divided in half, the construction is quickly carried out and then steel plates are placed for temporary passage.
- If the excavation crosses the road, construction at intersections is divided in half to allow vehicles to pass through. The length of each construction is 1-2 days, and the other half is carried out after the first half is completed so that traffic is not obstructed.

- If the construction site is a fish farm, temporary ramps are placed at the entrance based on construction requirements for large construction machinery and vehicles carrying materials and waste soil. This temporary ramp does not occupy any road, so it does not cause a traffic jam.

2. Traffic control measures

Traffic control facilities during the construction period are placed in accordance with laws and regulations and traffic control plans of contractors, including road excavation for pipeline burying. Pipeline burying after road excavation is carried out during daytime (08:00-18:00). Construction safety shall comply with project requirements, the “Regulations for Road Traffic Signs, Markings, and Signals,” and traffic control plans of each contractor. If the construction causes a traffic jam and it is necessary to suspend construction to restore traffic order, then construction shall be immediately suspended and then restarted after traffic order is restored. Warning lights must be installed in accordance with regulations in the event of rain or nighttime catch-up.

The contractor should assign 1-2 people to direct traffic before construction machinery and vehicles carrying materials and waste soil enter the construction site. After each phase is completed, machinery that is no longer needed are removed from the site as soon as possible. The access method and route of trucks that has the lowest impact on traffic are be used and personnel is assigned for dispatching.

2.1 Basic principles for lane allocation

Lane allocation principles for different road sections, locations, and burying methods are summarized below:

- On two-lane roads with a direction separation line, the construction occupies one lane for road excavation, and traffic flow in two directions takes turns using the other lane.
- On four-lane roads with a median island, the construction occupies the outer lane for road excavation, and traffic flow in the two lanes is directed to the inner lane by traffic control facilities.
- On roads which are 8m (or above) wide without a direction separation line, half of the road width is occupied by the construction for digging a pipe trench. Traffic flow in both directions takes turns using the other half of the road. However, due to the need to use large excavators and scrapers, the width occupied may not exceed 4m with consideration to the actual construction situation. If the remaining half of the road is used for passage, it does not result in a severe traffic jam and traffic flow in both directions takes turns using the other half of the road.
- Access roads or roads which are 5m wide or less are closed for construction because they cannot allow vehicles to pass through at the same time. Traffic control facilities are set up at the construction site during the night, and the unused portion of the road is opened for passage. Vehicles are directed to make a detour to reduce the impact on traffic during construction by using alternative roads around the construction site. The road portion of construction each day is covered with checkered steel plates for vehicles to pass through. At nighttime, a portion of the road is open for passage. If the road is not wide enough for sedans or trucks to pass through, place a no-entry sign for trucks or sedans at the entrance.

2.2 Basic principles for traffic control

The control area extends a certain distance up and down the road from the construction site, and traffic safety control measures are implemented in this area. The measures and settings in each section of this area are described below.

- Early-warning section: The purpose is to set up warning signs before the road conditions start to change, so that drivers have certain time to adjust their speed and prepare to change lanes.
- Front transition section: When the number of lanes is reduced due to any reason, there must be sufficient distance to guide vehicles away from their normal lane to the lane changing section; clearly visible facilities are used for channelization in this area.
- Buffer section: When drivers overlook the previous sections and are unable to react in advance, the buffer section provides an area for vehicles to brake and stop, so that vehicles do not crash into the construction site. Instruments, vehicles, equipment, and personnel are prohibited in this section.
- Work area: Traffic cones are used to suitably separate vehicles and use warning lights to increase the visibility at night or during bad weather. The length is determined by the actual construction requirements.
- A flag bearer is set up at an appropriate distance in front of the transition section if necessary, in order to warn the approaching cars and protect the safety of construction workers. Construction vehicles are instructed to drive slowly, and construction workers set up facilities in the direction of traffic flow and make adjustments until the facilities comply with the required distances and layout principles.

2.3 Traffic control facilities and notices for the construction period

Traffic control facilities that are used during the construction period of this project and related notices are as follows:

- Set up the construction notice, construction signs, warning signs, restriction signs, mobile barricades, traffic cones, connecting rods, flash lights at night and other necessary safety facilities in accordance with the “Regulations for Road Traffic Signs, Markings, and Signals” and traffic control plans of each contractor to remind drivers to stay safe.
- During the construction period, flash lights or other reflective or suitable warning lights and necessary safety facilities are set up at night.
- When setting up nighttime flash lights and other necessary safety facilities and construction lighting, make sure the brightness (or illumination) does not affect the view of drivers.
- Assign additional personnel to inspect the construction site during the rainy season or rainy days to protect the safety of drivers. Fill in any holes in the ground to maintain road traffic safety.
- When arranging traffic safety control measures, appropriately and effectively send messages to vehicles and pedestrians passing through; the instructions must be clear and specific.
- Pay attention to the maintenance of traffic safety facilities during the construction period to maintain the clarity, completeness, and effectiveness of the appearance. Make sure there are reflective or suitable warning lights at night and any damaged facilities are immediately replaced or renewed. Keep photo records of the position when moving facilities and add an entry in the daily work log.
- Remove any inappropriate lines and signs to avoid confusion.
- Assign dedicated personnel to direct traffic when necessary.

- Dedicated personnel are appointed to handle traffic safety affairs of the construction site, so as to ensure the effectiveness of traffic safety control and facilities. Main tasks are as follows:
 - Check if traffic safety facilities comply with the traffic control plan at any time.
 - Traffic safety facilities are changed as needed based on actual safety consideration, but still comply with installation principles.
 - In the event of an accident at the construction site, immediately analyze the cause and determine whether it was caused by deficiencies in traffic safety facilities. Then establish reinforcement or improvement measures on this basis.
- If a road is closed for construction, coordinate with related units and make a public announcement one week in advance. Set up barricades and traffic cones at both ends of the closed road and instruct vehicles to make a detour. Set up warning lights at night so that vehicles pay attention to the change of road conditions.
- When the construction only leaves one lane for traffic, the flag bearer is equipped with a walkie talkie while directing traffic. When the traffic flow in one direction is larger, the time for vehicles in that direction to use the single lane is extended.

2.4 Traffic control information dissemination plan

Besides implementing safety measures in accordance with the traffic control plan during the construction period, if the decision is to provide nearby residents and drivers with information on the construction to avoid impacting traffic during the construction period, information dissemination measures are as follows:

- Put up posters: Print notices on vehicles; notify residents to move their vehicles out of the construction site (roadside parking spaces) during the construction period, so as to prevent their vehicles from being damaged and delaying the construction.
- Detour recommendation signs: Set up a detour recommendation sign in front of the closed road along with barricades and a Jersey barrier to notify drivers of the construction, so that they can change lanes in advance.