

**Firefly Floating Offshore  
Wind Power Project  
EIA-Scoping Report**

2022. 02.

**Equinor South Korea Corp. Ltd.,**

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# **Ch. 1**

# **Project Overview**

**1.1 Background and Purpose**

**1.2 History and Plan**

**1.3 Background of EIA Implementation**

**1.4 Project Outline**

**1.5 Project Details**

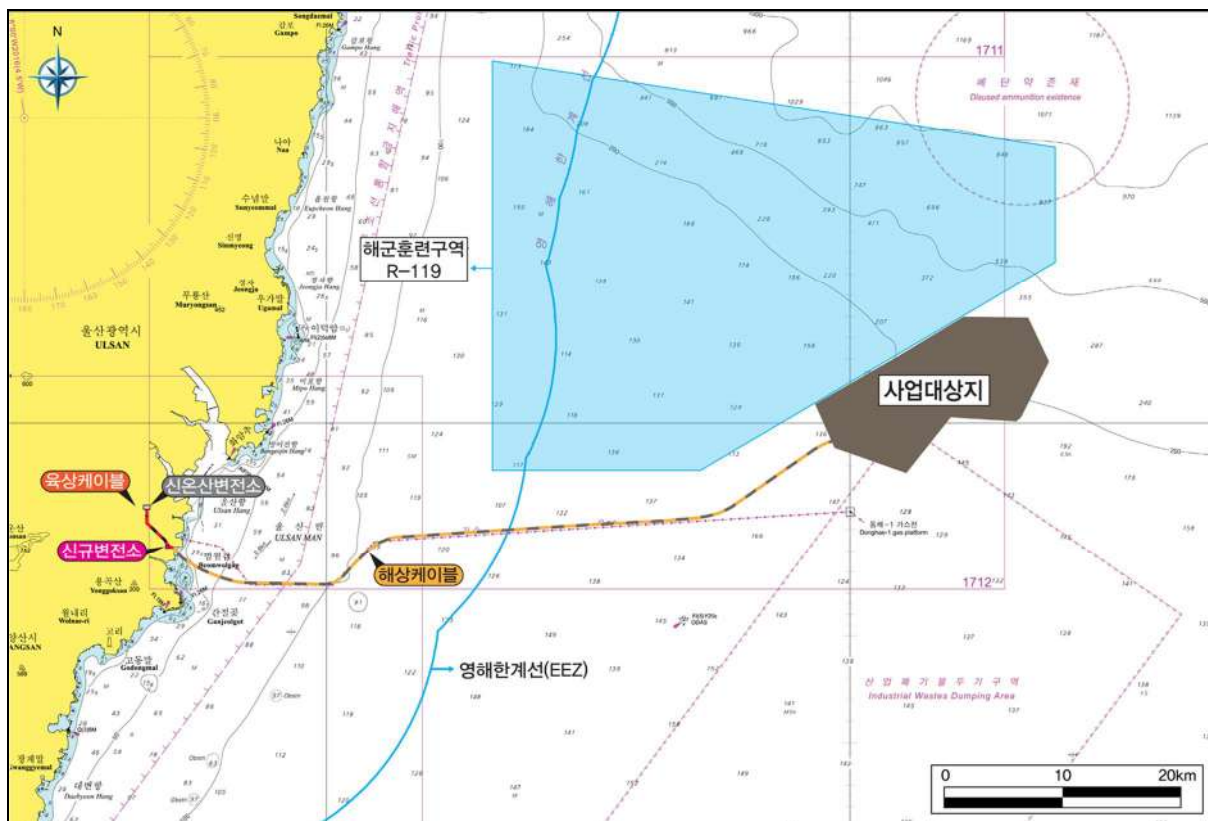
**1.6 Expectation**



# Chapter 1 Project Overview

## 1.1 Background and Purpose

- Existing carbon-intensive traditional energy use causes environmental problems such as climate change and fine dust. Therefore, the energy transition policy toward clean energy resources is getting attention to reduce carbon emission and pursue sustainable development.
- As safe energy and environment issues get more attention around the world, the Korean government announced 「The 9<sup>th</sup> Master Plan for Electricity Supply and Demand(2020~2034)」, 「The 3<sup>rd</sup> Energy Master Plan」, 「The Korean New Deal」, and 「Renewable Energy 3020」 with a goal to raise energy supply of renewable energy by 2034 to 22.2%.
- 「The 5<sup>th</sup> Comprehensive National Territorial Planning(2020~2040)」 was announced to respond global changes in a systematic manner, Ulsan Metropolitan City has a plan of becoming a future energy hub to lead an energy transition by creating floating offshore wind farm and wind farm cluster for infrastructure.
- The project of firefly offshore wind farm aims to build a floating offshore wind farm, a power plant generating green energy with wind, in accordance with national energy policy, considering environment and safety.

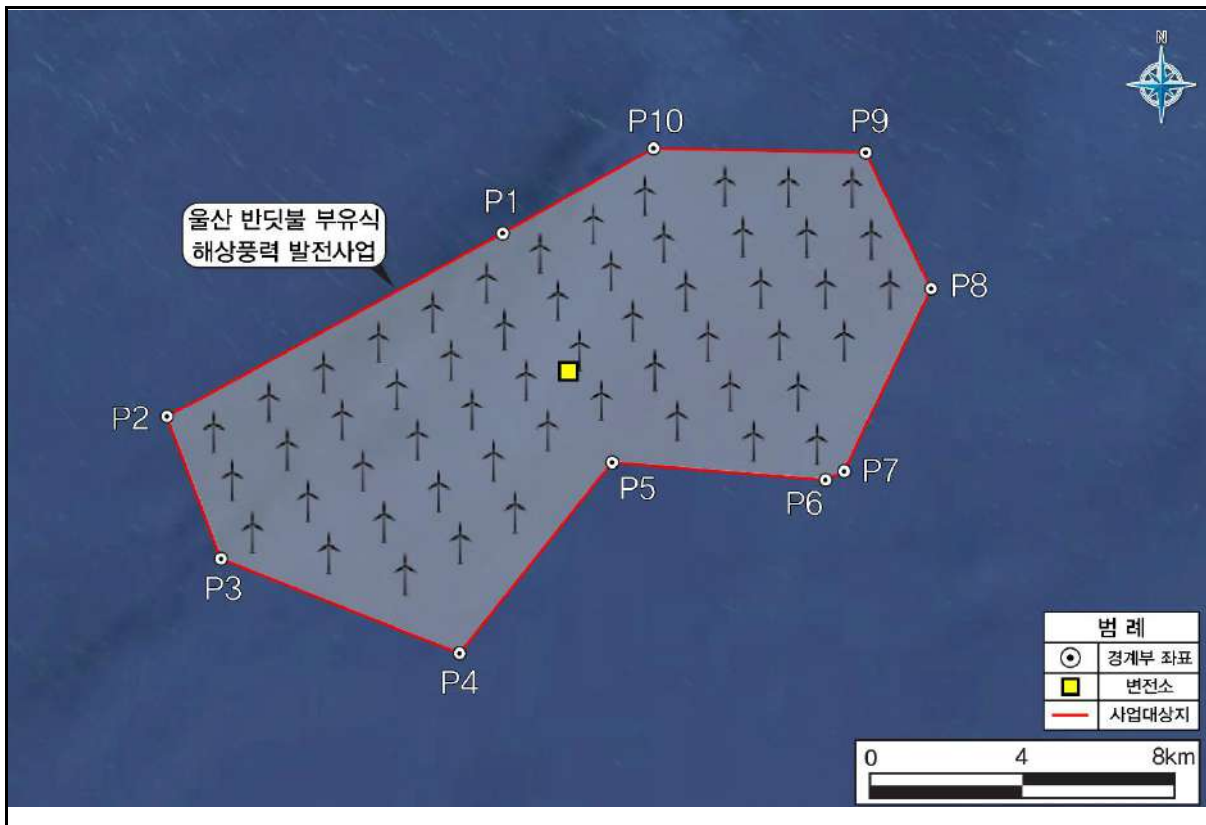


Picture 1.1-1 Planned location for the project

# Firefly Floating Offshore Wind Power Project

**Table 1.1-1 Boundary of the offshore wind farm**

Point	Coordinate		Remark
	Latitude	Longitude	
P1	35°33'41.48"N	130°03'55.62"E	-
P2	35°30'57.77"N	129°58'10.30"E	-
P3	35°28'57.67"N	129°59'16.43"E	-
P4	35°27'41.76"N	130°03'25.40"E	-
P5	35°30'22.94"N	130°05'59.30"E	-
P6	35°30'11.14"N	130°09'43.97"E	-
P7	35°30'17.62"N	130°10'01.65"E	-
P8	35°32'57.10"N	130°11'35.25"E	-
P9	35°35'00.00"N	130°10'27.89"E	-
P10	35°35'00.00"N	130°06'41.58"E	-



**Picture 1.1-2 Boundary of the project area**

**1.2 History and Plan**

**1.2.1 History**

- 2020. 06. : LiDAR (2ea) installation
  - LiDAR 1 (latitude – 35°30'55.40"N, longitude - 130°2'18.39"E) : wind speed 8.91m/s (Avg.)
  - LiDAR 2 (latitude – 35°32'59.42"N, longitude - 130°7'56.39"E) : wind speed 8.99m/s (Avg.)
- 2021. 08. 05 : Agreement ceremony for firefly offshore wind farm  
(Equinor-Fishermen committee for offshore wind farm)
- 2021. 11. 30 : Project permission (Ministry of Trade, Industry and Energy 2021-120)

**1.2.2 Plan**

- Releasing results of the review by EIA Association (over 14 days)
- Submitting and publishing a draft of EIA (reviewed by agencies)
- Gathering residents' opinions (releasing how to reflect the opinions: over 14 days)
- Finalizing an agreement on EIA
- Getting a permission for public waters and execution plan
- Getting a permission for construction
- Commencing construction

**1.3 Background of EIA Implementation**

- According to Article 22 of 「Environmental Impact Assessment Act」 and [Table 3] of Article 31 (2) of Enforcement Decree, we reviewed categories and scope of subjects to environmental impact assessment.
- As a result, this project building a wind farm with a capacity over 810MW is a subject to environmental impact assessment following 「Electric Utility Act」 because the capacity of a wind farm is over 100 MW.

**Table 1.3-1 Background of EIA Implementation**

Category	Type and scope of subjects to EIA	Requesting consultations
3. A plan to develop energy sources	D. Installing one of electric facilities prescribed in Article 2(16) of 「Electric Utility Act」 1) Power plant with capacity over 10 MW; However, in case it comes with a dam or a reservoir, a plant over 3 MW, and in case of a plant in factory/industry site, over 30 MW, and in case of a plant using solar/ <u>wind</u> energy and fuel cell, <u>over 100 MW</u>	Before getting a permission or making a report about construction following Article 61 of 「Electric Utility Act」 or Article 8 of 「Electrical Safety Management Act」
Scale	◦ Capacity of a wind farm : <b>810 MW</b> (810,000 kW)	

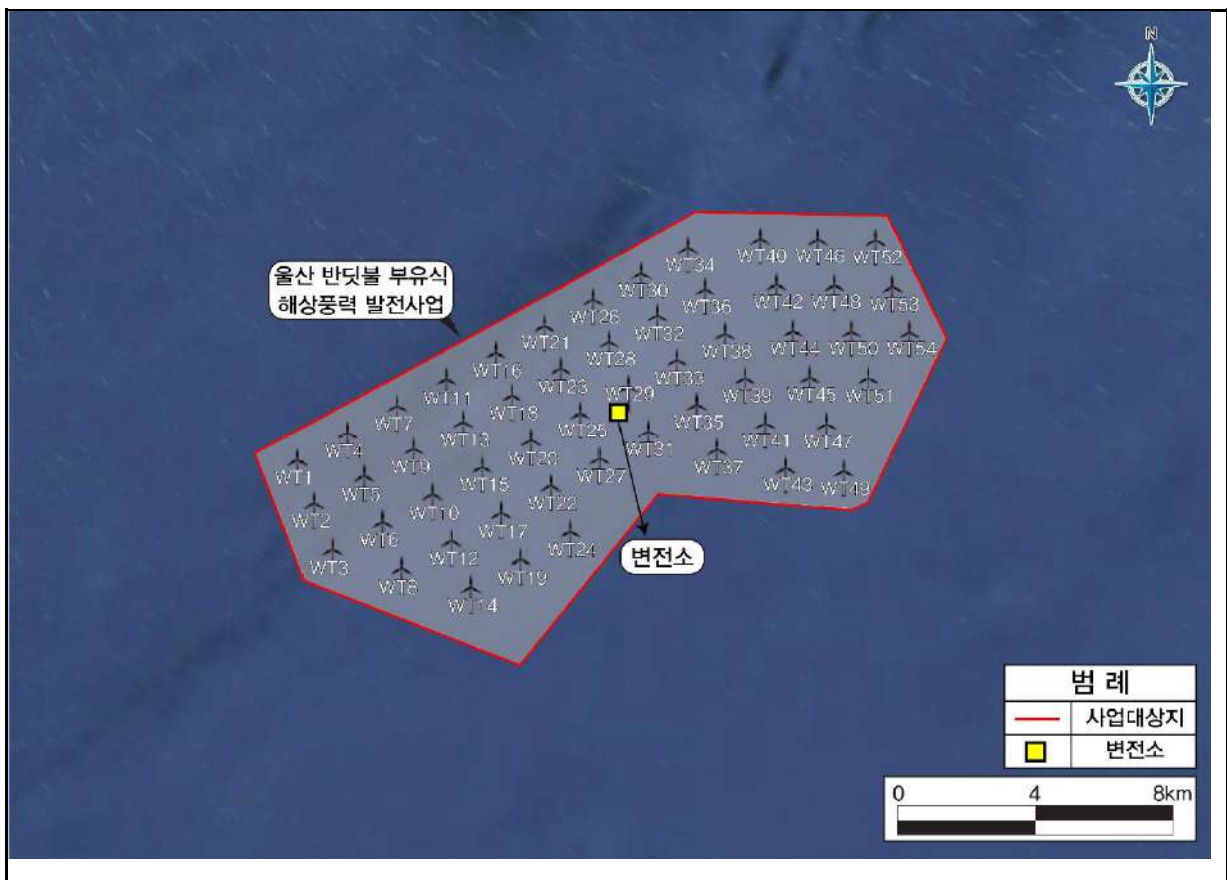
Reference: 「Enforcement Decree of the Environmental Impact Assessment Act」 [Table 3], Ministry of Environment



# Firefly Floating Offshore Wind Power Project

## 1.4 Project Outline

- Project : Firefly Floating Offshore Wind Power Project
- Category : Energy Sources Development (Offshore Wind Farm)
- Location : EEZ public waters, 60~70km away from the east coast of Ulsan Port (Ulsan Metropolitan city)
- Period
  - Construction : January, 2024 ~ October, 2025
  - Operation : October, 2025 ~ October, 2050 (25 years after commercial operation)
- Project operator : Equinor South Korea
- Permission agency : Ministry of Trade, Industry and Energy
- Consultation agency : Ministry of Environment
- Total cost : about 5 trillion 677 billion KRW
- Project scale
  - Capacity : 810MW (15MW × 54ea)
  - Total area : 154km<sup>2</sup>
  - Exclusive area using public waters : 154km<sup>2</sup>
- (will separate direct and indirect use after finalizing turbine locations, marine cable and other details)
- Marine and on-land substation/switching station, marine/ground power cable, etc.



Picture 1.4-1 Planned location of wind turbines

Table 1.4-1 Location of Wind Turbines

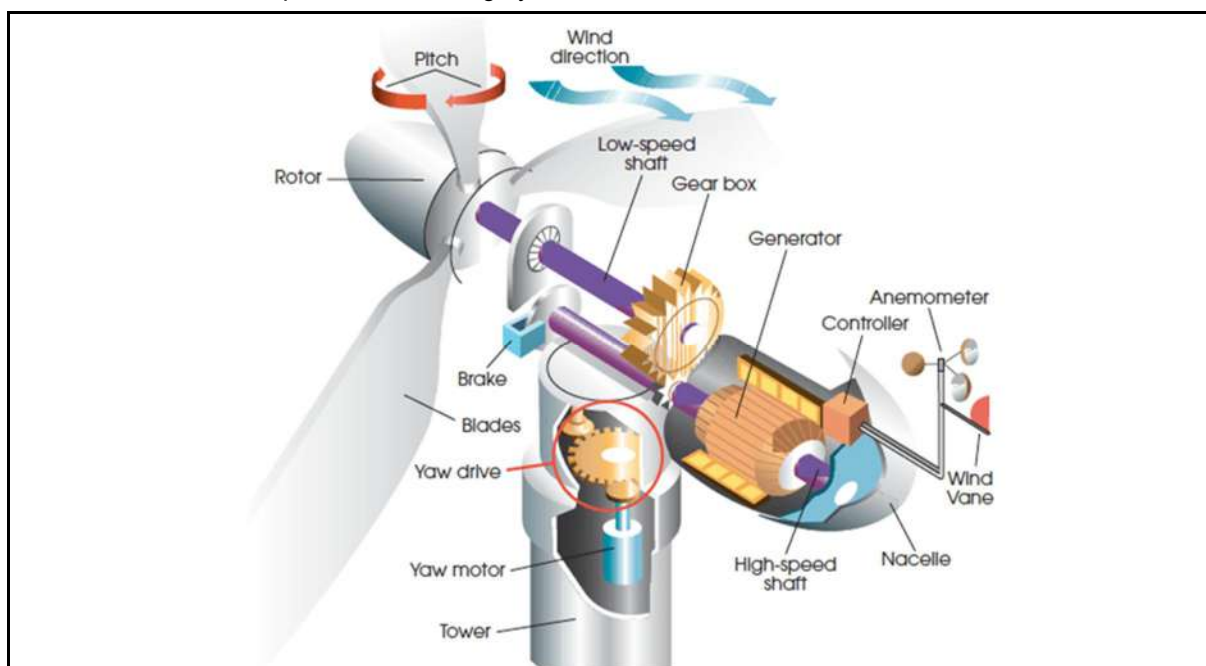
Point	Coordinate		Point	Coordinate	
	Latitude	Longitude		Latitude	Longitude
WT-1	35°30'43.68"N	129°58'59.90"E	WT-28	35°32'41.99"N	130°04'58.23"E
WT-2	35°30'02.61"N	129°59'21.89"E	WT-29	35°31'58.46"N	130°05'22.01"E
WT-3	35°29'19.10"N	129°59'45.71"E	WT-30	35°33'50.30"N	130°05'34.72"E
WT-4	35°31'10.36"N	129°59'56.28"E	WT-31	35°31'14.93"N	130°05'45.79"E
WT-5	35°30'29.19"N	130°00'17.92"E	WT-32	35°33'08.53"N	130°05'54.32"E
WT-6	35°29'45.68"N	130°00'41.74"E	WT-33	35°32'25.00"N	130°06'18.10"E
WT-7	35°31'37.04"N	130°00'52.66"E	WT-34	35°34'16.23"N	130°06'29.68"E
WT-8	35°29'02.17"N	130°01'05.55"E	WT-35	35°31'41.46"N	130°06'41.87"E
WT-9	35°30'55.77"N	130°01'13.96"E	WT-36	35°33'35.05"N	130°06'50.42"E
WT-10	35°30'12.25"N	130°01'37.77"E	WT-37	35°30'57.93"N	130°07'05.64"E
WT-11	35°32'03.70"N	130°01'49.05"E	WT-38	35°32'51.52"N	130°07'14.19"E
WT-12	35°29'28.74"N	130°02'01.58"E	WT-39	35°32'07.99"N	130°07'37.96"E
WT-13	35°31'22.33"N	130°02'10.01"E	WT-40	35°34'25.84"N	130°07'55.62"E
WT-14	35°28'45.22"N	130°02'25.37"E	WT-41	35°31'24.45"N	130°08'01.72"E
WT-15	35°30'38.82"N	130°02'33.82"E	WT-42	35°33'40.39"N	130°08'15.00"E
WT-16	35°32'30.36"N	130°02'45.45"E	WT-43	35°30'40.92"N	130°08'25.47"E
WT-17	35°29'55.30"N	130°02'57.62"E	WT-44	35°32'54.94"N	130°08'34.37"E
WT-18	35°31'48.89"N	130°03'06.07"E	WT-45	35°32'09.49"N	130°08'53.74"E
WT-19	35°29'11.78"N	130°03'21.41"E	WT-46	35°34'25.80"N	130°09'04.29"E
WT-20	35°31'05.37"N	130°03'29.87"E	WT-47	35°31'24.04"N	130°09'13.10"E
WT-21	35°32'57.02"N	130°03'41.87"E	WT-48	35°33'40.34"N	130°09'23.66"E
WT-22	35°30'21.85"N	130°03'53.66"E	WT-49	35°30'38.59"N	130°09'32.45"E
WT-23	35°32'15.44"N	130°04'02.14"E	WT-50	35°32'54.89"N	130°09'43.02"E
WT-24	35°29'38.33"N	130°04'17.45"E	WT-51	35°32'09.44"N	130°10'02.38"E
WT-25	35°31'31.92"N	130°04'25.94"E	WT-52	35°34'25.74"N	130°10'12.96"E
WT-26	35°33'23.66"N	130°04'38.29"E	WT-53	35°33'39.50"N	130°10'32.65"E
WT-27	35°30'48.40"N	130°04'49.72"E	WT-54	35°32'54.83"N	130°10'51.67"E

### 1.5 Project Details

#### 1.5.1 Wind Turbine

##### A. Principle of Electricity Generation

- A wind turbine is a device converting the wind's kinetic energy into electrical energy with the rotation of horizontal blades (rotor) running a synchronous generator with permanent magnet. It consists of the below systems.
  - Rotor system : turning the wind's energy into rotational kinetic energy
  - Power transferring system : transferring mechanical energy from a rotor to power converting system
  - Power converting system : turning mechanical rotational energy into electrical energy and converting produced electricity to have required spec
  - Supplemental equipment : control system for automatic operation, supporting structure for rotor, power transferring system and others



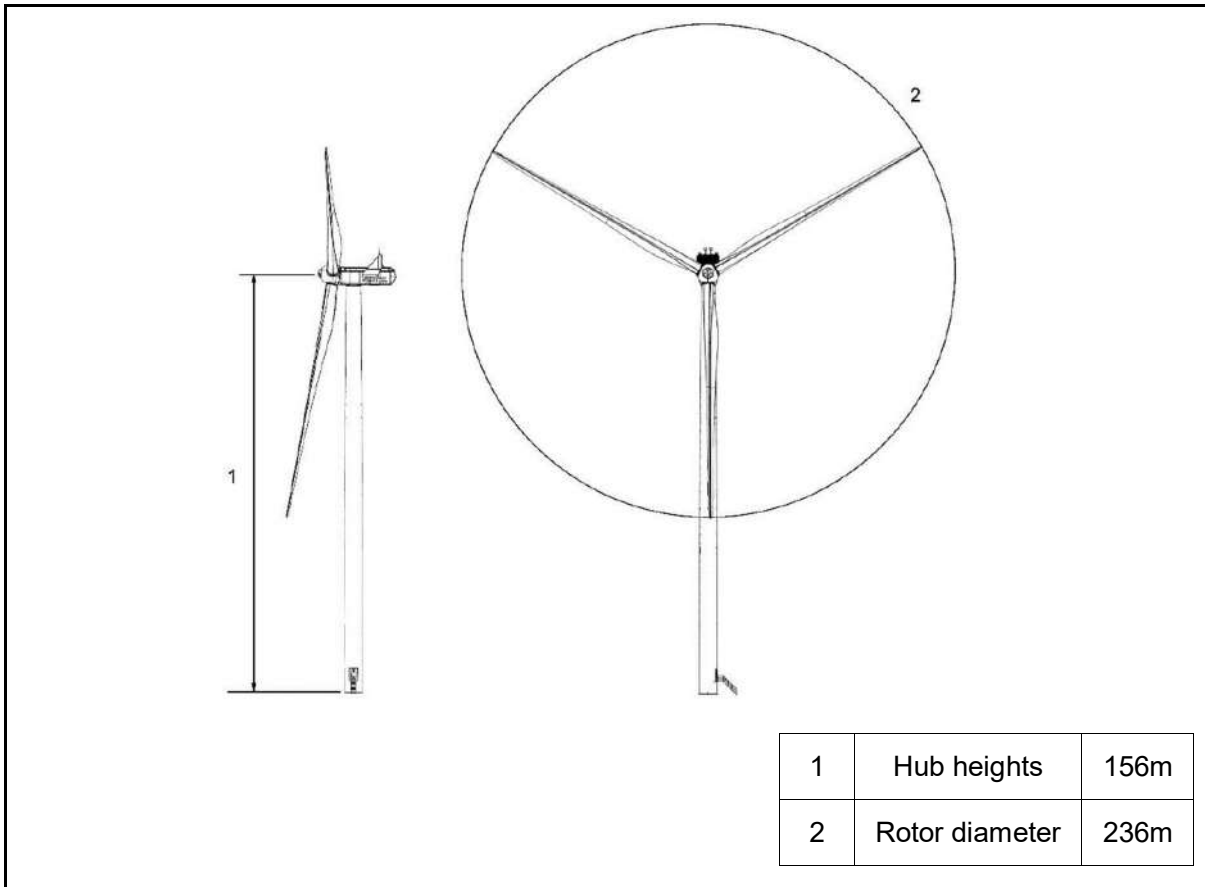
##### • Equipment of wind turbine

1. Tower : propping wind turbine equipment
2. Blade : turning wind's energy into rotational kinetic energy
3. Hub : connecting low-speed shaft and blades
4. Low-speed shaft : transferring rotational kinetic energy to a gearbox or generator
4. Gearbox : turning the slow rotation of the blades into quicker rotation
5. Generator : turning kinetic energy from gearbox into mechanical energy
6. Yawing system : Align the blade to the wind direction
7. Pitch system : adjusting angles following wind speeds
8. Brake : controlling motions of rotor and yaw
9. Control system : operating wind turbine without human operators
10. Monitoring system : controlling and checking the status of systems in a distance

**Picture 1.5-1 Structure of Wind Turbine (Example)**

**B. Generator**

- The wind turbine to be installed is planned to have 15 MW(54 ea in total) and the entire generation capacity will be 810 MW.



**Picture 1.5-2 Specification of Wind Turbine**

**C. Floating**

- The floating type of offshore wind farm can be classified by its shape and a mooring method into Spar Buoy, Semi- Sub, and Tension Leg Platform. We reviewed these three types to select the best floating body, considering each type's features.
- We select the Semi-Sub type because there are several Korean shipbuilding companies with experience in manufacturing the type. Therefore, multiple productions of floating bodies is possible during manufacture. Also, it is appropriate when considering manufacture, water depth, shipping, installation and maintenance.

**Table 1.5-1 Different type of floating**

Category	Spar Buoy	Semi-Sub	Tension Leg Platform
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## Firefly Floating Offshore Wind Power Project

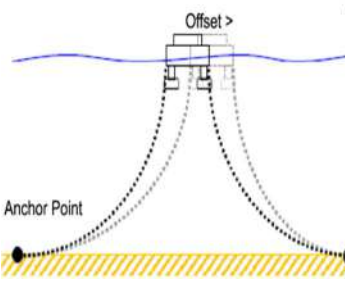


Design			
Selection		©	

1) TRL : Technology Readiness Level

### D. Mooring Equipment

- Mooring line is appropriate to Semi-sub floating, and general catenary will be selected, used for mooring system of floating wind farm, vessel mooring, and mooring system of Oil & Gas FPSO.
- Mooring system to secure catenary will be decided after oceanographic survey.

**Table 1.5-2 Different mooring system**

Category	Mooring Line	Mooring Anchor & Foundation (TBC)	
Design			
Type	Catenary	Drag Anchor	Suction Pile

## 1.5.2 Power Transmission and Transformation

### A. Offshore Substation

- Name : Substation of Firefly Offshore Wind Farm
- Location : Firefly Offshore Wind Farm, Ulsan
- The entire capacity is 810 MW. Underwater cables (12 lines with 66 kV from each generator) will be connected to each turbine. At the offshore substation (floating or fixed type), the voltage will be raised to 230 kV and then it will be connected to the on-land substation.

**Table 1.5-3 Installation plan for offshore substation**

Category	Standard	Voltage	Quantity
Switch	GIS	66kV	1

	HV GIS	230kV	1
Transformer	430 MVA	66kV/230kV	2
Transformer Service	500 kVA	66kV/380V	2

**B. Transmission Line and Landing Point**

- Underwater cable: From the offshore substation to the landing point in a length of about 70 km (along the pipelines for gas reservoirs in the East Sea of KNOC)
- Landing point: Onsan (Southern Ulsan) – where underwater cable makes landfall
- Underground Transmission Line(landing point ~ on-land substation) : As making a landfall, the 3-phase cable will be separated into single-phase cable and connected to an on-land substation. The cable’s length under/on the ground will be about 0.5km.

**Table 1.5-4 Transmission line and landing point**

Category		Quantity	Length	Voltage
Offshore Sub.	Landing Point	2	70km	230 kV AC

**C. On-land Substation**

- Name : Transformation Room for Firefly Offshore Wind Farm (345kV)
- Location : Onsan, Southern Ulsan

**Table 1.5-5 Standard for On-land Substation**

Category	Standard	Voltage	Quantity
Switch	GIS	230kV	1
	GIS	345kV	1
Transformer	480 MVA	230kV/345kV	2
Shunt Reactor	140 MVar	230kV	2

**D. KEPCO Substation**

- Name : Shinonsan Substation (345kV)
- Location : 1140 Hwasan-li, Onsan-eup, Ulju-gun, Ulsan, Republic of Korea

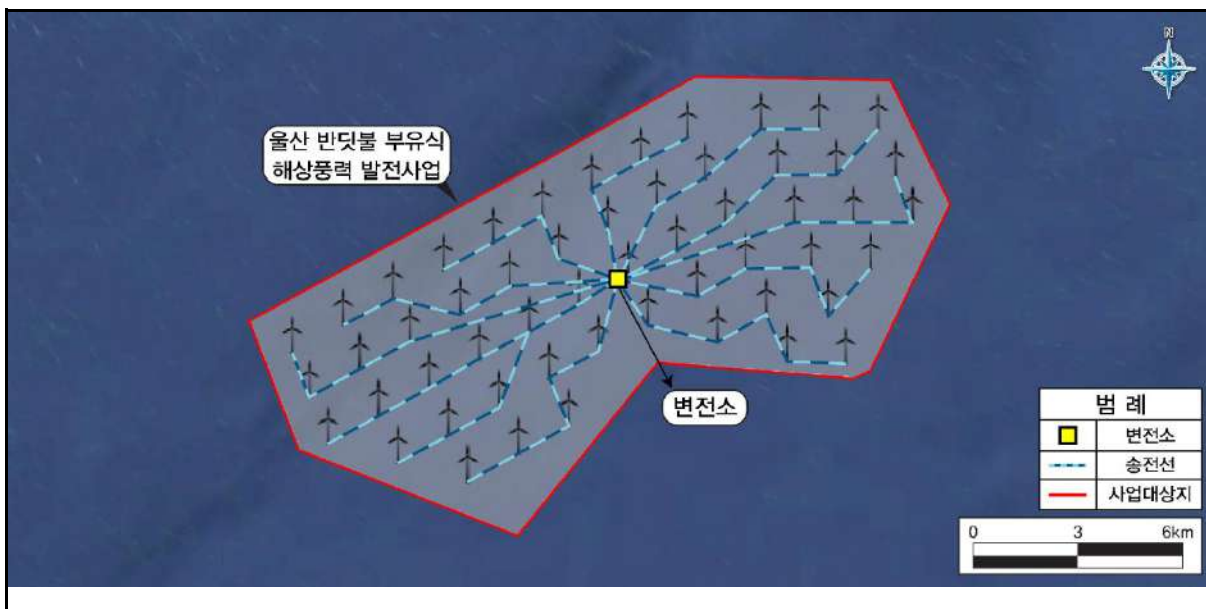
# Firefly Floating Offshore Wind Power Project

## E. Transmission Line

- Voltage : 230kV, 345kV
- Distance: about 75.5km (ocean: 70km, land: 5.5km)

**Table 1.5-6 Transmission Lines (details)**

Section	Length (km)	Capacity (MVA)	Voltage (kV)
On-land Sub. ~ Shinonsan Sub.	5	1,023	345
Landing Point ~ On-land Sub.	0.5	500 × 2ea	230
Offshore Sub. ~ Landing Point	70	420 × 2ea	230



**Picture 1.5-3 Location of the offshore substation**





Picture 1.5-4 Planned transmission (Land area)

### 1.6 Expectation Effect

- Wind farm generates electricity by turning the wind's kinetic energy into mechanical energy with blades. It contributes to achieving zero carbon as a green energy, promoting clean energy.
- As offshore wind farm is growing rapidly around the world, Korean government is carrying out government-led offshore wind farm projects. (Renewable Energy 3020)
- It can create new jobs while actively responding to the running-out of fossil fuel.
- Floating offshore wind farm can minimize environmental impact.
- It produce green energy to meet renewable portfolio standards (RPS).
- It can present a good example of social acceptance with a co-existing model with residents.



**Ch. 2**

**Designation of  
EIA Target Area**

**2.1 Designation of EIA Target Area**

**2.2 Prediction and Analysis of EIA**



## Chapter 2 Designation of EIA Target Area

### 2.1 Designation of EIA Target Area

- The target areas of EIA will be set to analyze environmental impact by predicting the area where the project could affect ecology, air, land, society and economy.
- The target areas of EIA are set based on 「Regulation on Creating Environment Impact Assessment, 2020.12.12, Notice by Ministry of Environment, No. 2020-289」, and 「Guideline for Target Area Set-up of Environment Impact Assessment, 2013.01, Ministry of Environment.
- The target areas of EIA are presented by each category, which is based on similar EIA cases and their data as well as environmental research guidelines for offshore wind farm such as 「Environment Monitoring Guideline for Offshore Wind Farm, 2019.11, Ministry of Trade, Industry and Energy」 and 「Manuel for Environmental Research/Assessment of Offshore Wind Farm, 2021.06., Ministry of Environment· Korea Environment Institute」.

#### 2.1.1 Spatial Scope

- General condition
  - EEZ public waters, 60~70 km away from the east of Ulsan Port (Project site at Ulsan City)
  - Ulju-gun and Dong-gu in Ulsan where transmission line will be laid
- Environmental condition
  - Within 5 km from the project area and 5 km from transmission lines
- Predictable impact
  - Sea area around the project(waters) and locals(land)

#### 2.1.2 Time Scope

- Construction period: January, 2024 ~ October, 2025
- Operation period: October, 2025 ~ October, 2050 (25 years after starting commercial operation)

#### 2.1.3 EIA Target Area Set-up by Category

- Major environmental impacts during the construction are floating particles cause by excavation to lay marine cables, environmental pollution and waste from construction and vessel operation, oil spill by marine accidents and others.
- In particular, operation could affect fishes due to electromagnetic field while wind turbine can create a noise as it rotates. Also, birds could collide with wind farm structure.
- Therefore, considering features of the project and location, target areas of EIA are set by each category as follows.

**Table 2.1-1 Target area of EIA**

<b>Category</b>	<b>Target</b>	<b>Description</b>	<b>Target Area of EIA</b>	<b>Time to Implement</b>
Ecology	Land organisms	<ul style="list-style-type: none"> <li>◦ Impact on habitat of land organisms</li> <li>◦ A survey of the center of land</li> </ul>	<ul style="list-style-type: none"> <li>◦ Project and the surrounding area (Including birds)</li> <li>-Land structure: within 0.5 km</li> </ul>	Const. Ops.
	Marine organisms	<ul style="list-style-type: none"> <li>◦ Impact on marine organisms by spread of suspended particles from offshore construction</li> </ul>	<ul style="list-style-type: none"> <li>◦ Project and the surrounding area</li> <li>-Marine structure: within 5 km</li> </ul>	Const. Ops.
	Environment	<ul style="list-style-type: none"> <li>◦ Impact to the environment</li> </ul>	<ul style="list-style-type: none"> <li>◦ Project and the surrounding area</li> </ul>	Const. Ops.
Air	Weather	<ul style="list-style-type: none"> <li>◦ Gathering raw data to predict and analyze impacts</li> </ul>	<ul style="list-style-type: none"> <li>◦ Project area and nearby weather station</li> </ul>	Const.
	Air quality	<ul style="list-style-type: none"> <li>◦ Level and impact of air pollutants cause by construction equipment</li> </ul>	<ul style="list-style-type: none"> <li>◦ Project and the surrounding area</li> </ul>	Const.
	Greenhouse gas	<ul style="list-style-type: none"> <li>◦ Change in greenhouse gas emission following construction and operation</li> </ul>	<ul style="list-style-type: none"> <li>◦ Project and the surrounding area</li> </ul>	Const. Ops.
Water	Water quality	<ul style="list-style-type: none"> <li>◦ Impact from civil engineering (soil erosion) and wastewater</li> </ul>	<ul style="list-style-type: none"> <li>◦ Project area and surrounding water ecosystem</li> </ul>	Const. Ops.
	Marine environment	<ul style="list-style-type: none"> <li>◦ Impact from suspended particles when laying cables</li> <li>◦ Change in water flow due to offshore floating structure</li> </ul>	<ul style="list-style-type: none"> <li>◦ Project and the surrounding area</li> <li>-Marine structure: within 5 km</li> </ul>	Const. Ops.
Land	Land use	<ul style="list-style-type: none"> <li>◦ Change in use of land and ocean since the project</li> </ul>	<ul style="list-style-type: none"> <li>◦ Project and the surrounding area</li> </ul>	Ops.
	Soil	<ul style="list-style-type: none"> <li>◦ Impact from labors and construction equipment</li> </ul>	<ul style="list-style-type: none"> <li>◦ Project and the surrounding area</li> </ul>	Const.
	Geography/ Geographical features	<ul style="list-style-type: none"> <li>◦ Geographical change by installing overland cables and substations</li> <li>◦ Geographical change in ocean floor due to offshore substations and marine cables</li> </ul>	<ul style="list-style-type: none"> <li>◦ Project and the surrounding area</li> </ul>	Const. Ops.
Lifestyle	Recycling	<ul style="list-style-type: none"> <li>◦ Construction waste</li> </ul>	<ul style="list-style-type: none"> <li>◦ Within the project area</li> </ul>	Const.
	Noise/ Vibration	<ul style="list-style-type: none"> <li>◦ Impact when operating construction equipment</li> <li>◦ Noise when operating wind turbines</li> </ul>	<ul style="list-style-type: none"> <li>◦ Overland noise/vibration</li> <li>-Project and the surrounding area</li> <li>◦ Marine noise</li> <li>-Marine structure: within 5 km</li> </ul>	Const. Ops.
	Landscape	<ul style="list-style-type: none"> <li>◦ Affecting landscaped due to offshore structure</li> </ul>	<ul style="list-style-type: none"> <li>◦ Project and the surrounding area</li> </ul>	Ops.
	Radio interference	<ul style="list-style-type: none"> <li>◦ Impact from radio waves of a power plant</li> </ul>	<ul style="list-style-type: none"> <li>◦ Project and the surrounding area</li> <li>-Surrounding transmission lines</li> </ul>	Ops.
Society & Economy	Industry	<ul style="list-style-type: none"> <li>◦ Industrial change due to the operation</li> </ul>	<ul style="list-style-type: none"> <li>◦ Project and the surrounding area</li> </ul>	Ops.

Footnote) Const.: (during) construction / Ops.: (during) operation

Table 2.1-2 Reference for EIA set-up plan

Category	Subject	Details		Result
Ecology	Overland organisms	Reg.1	<ul style="list-style-type: none"> <li>◦ Vegetation Floras, the herptile, land insect : 150m</li> <li>◦ Mammal/Bird : 500m</li> <li>◦ Fish/Benthic macro-invertebrate : 100m</li> </ul>	Project and the surrounding area (Including birds) (within 0.5km from land structure)
		Reg.2	-	
		Research	◦ Bird: habitat for migratory birds and path	
		Case 1	◦ Project and the surrounding area (Within 0.3 km from land structure)	
		Case 2	◦ Surrounding substations (Within 0.3 km from land substations)	
		Case 3	◦ Project and the surrounding area (including nearby island)	
		Case 4	◦ Project and the surrounding area	
		Case 5	◦ Project and the surrounding area	
		Case 6	-	
	Submarine organisms	Reg.1	-	Project and the surrounding area (Including birds) (within 5km from marine structure)
		Reg.2	-	
		Research	<ul style="list-style-type: none"> <li>◦ Fishery and marine resource: Within a 15 km radius and where underwater noise/ vibration reach</li> <li>◦ Fish egg and larva: Within a 15 km radius</li> <li>◦ Sea mammal: (estimated area) Water quality and sedimentary facies are affected, and underwater noise and vibration reach</li> <li>◦ Others: Considering a result of marine modeling</li> </ul>	
		Case 1	◦ Within 4.0 km from the marine structure	
		Case 2	◦ Within 4.0 km from the marine structure	
		Case 3	◦ Within 4.0 km from the marine structure (in direction of the tidal current: within 4~12 km)	
		Case 4	◦ Within 2.0 km from the project boundary	
		Case 5	◦ Within 3.0 km from the project boundary	
		Case 6	◦ Within 2.0 km from the project boundary	
Atmospheric environment	Air quality	Reg.1	-	Project and the surrounding area
		Reg.2	◦ Within 500m (apply linear project)	
		Research	-	
		Case 1	◦ Project and the surrounding area (Within 0.3 km from land structures)	
		Case 2	◦ Project and the surrounding area (Within 0.3 km from land structures)	
		Case 3	◦ Within 0.5 km from the project boundary	
		Case 4	◦ Within 2.0 km from the project boundary	
		Case 5	◦ Within 2.0 km from the project boundary	
		Case 6	◦ Within 2.0 km from the project boundary	

Table 2.1-2 Continue

Category	Subject	Details		Result
Marine environment	Water Quality	Reg.1	-	Project and the surrounding area (within 5km from marine structure)
		Reg.2	-	
		Research	◦ Considering a result of marine modeling	
		Case 1	◦ Within 4.0 km from the marine structure	
		Case 2	◦ Within 4.0 km from the marine structure	
		Case 3	◦ Within 4.0 km from the marine structure (in direction of the tidal current: within 4~12 km)	
		Case 4	◦ Within 3.0 km from the project boundary	
		Case 5	◦ Within 3.0 km from the project boundary	
		Case 6	◦ Within 2.0 km from the project boundary	
	Marine sediment	Reg.1	-	
		Reg.2	-	
		Research	◦ Considering a result of marine modeling	
		Case 1	◦ Within 4.0 km from marine structure	
		Case 2	◦ Within 4.0 km from marine structure	
		Case 3	◦ Within 4.0 km from marine structure (in direction of the tidal current: within 4~12 km)	
		Case 4	◦ Within 3.0 km from the project boundary	
		Case 5	◦ Within 3.0 km from the project boundary	
		Case 6	◦ Within 2.0 km from the project boundary	
	Marine geophysics	Reg.1	-	
		Reg.2	-	
		Research	-	
		Case 1	◦ Within 4.0 km from marine structure	
		Case 2	◦ Within 4.0 km from marine structure	
		Case 3	◦ Within 4.0 km from marine structure (in direction of the tidal current: within 4~12 km)	
		Case 4	◦ Within 3.0 km from the project boundary	
		Case 5	◦ Within 3.0 km from the project boundary	
		Case 6	◦ Within 2.0 km from the project boundary	
	Spread of suspended lands (1 mg/L)	Reg.1	-	
Reg.2		-		
Research		-		
Case 1		◦ Farthest spread distance: 2.5 km (구적)		
Case 2		◦ Farthest spread distance: 7.96 km (0.2 mg/L)		
Case 3		◦ Farthest spread distance: 0.12 km (1 mg/L)		
Case 4		◦ Farthest spread distance: 2.258 km		

	Case 5	◦ Farthest spread distance: 2.38 km (2 mg/L)	
	Case 6	◦ North and South: 14 km (구적) (2 mg/L)	

Table 2.1-2 Continue

Category	Subject	Details		Result
Noise/ Vibration	Marine noise	Reg.1	-	Project and the surrounding area (Within 5 km from marine structure)
		Reg.2	-	
		Research	◦ 1 km (depending on project scale)	
		Case 1	-	
		Case 2	-	
		Case 3	◦ Power plant and surrounding sea area	
		Case 4	-	
		Case 5	-	
		Case 6	-	
	Overland noise/vibration	Reg.1	-	Project and the surrounding area
		Reg.2	◦ Within 500m (선형사업 적용)	
		Research	-	
		Case 1	◦ Project and the surrounding area (Within 0.3 km from land structure)	
		Case 2	◦ Within 1.5 km from marine structure (Within 0.3 km from land structure)	
		Case 3	◦ Within 0.5 km from the project boundary	
		Case 4	◦ Within 1.0 km from the project boundary	
Case 5		◦ Within 1.0 km from the project boundary		
Case 6	◦ Within 1.0 km from the project boundary			

Reference: 1. Reg. 1 : Regulation on Creating Environment Impact Assessment, 2020-289, Notice by Ministry of Environment  
2. Reg. 2 : Guideline for Target Area Set-up of EIA (air quality-bad smell-noise-vibration), 2013. 1. 1, Ministry of Environment  
3. Research : Study on Tidal and Offshore Wind Power Project : II. Offshore Wind Farm, 2012, Mokpo Regional Office of Oceans and Fisheries  
4. Case 1 : EIA on Test Bed of Hanlim Offshore Wind Farm, 2013.10, Korea Environment Institute  
5. Case 2 : EIA on Handong Pyeongdae Offshore Wind Farm in Jeju, 2019. 12, Jeju Energy Corporation  
6. Case 3 : EIA on Yeonggwang Nagwol Offshore Wind Farm, 2020. 9, Myeongun Development Company

- 7. Case 4 : EIA on Heugsan-island Port Development, 2018. 2, Mokpo Regional Office of Oceans and Fisheries
- 8. Case 5 : EIA on Tugboat Dock Construction at Mokpo New Port, 2018. 05, Mokpo Regional Office of Oceans and Fisheries
- 9. Case 6 : EIA on Maintenance of Fishery Facility in Gyema Port (renegotiation), 2015. 06, Mokpo Regional Office of Oceans and Fisheries



Footnote 1) EIA on Test Bed of Hanlim Offshore Wind Farm, 2013.10, KEPCO E&C  
 2) EIA on Handong Pyeongdae Offshore Wind Farm in Jeju, 2019. 12, Jeju Energy Corporation  
 3) EIA on Yeonggwang Nagwol Offshore Wind Farm, 2020. 9, Myeongun Development Company



4) EIA on Heugsan-island Port Development, 2018. 2, Mokpo Regional Office of Oceans and Fisheries

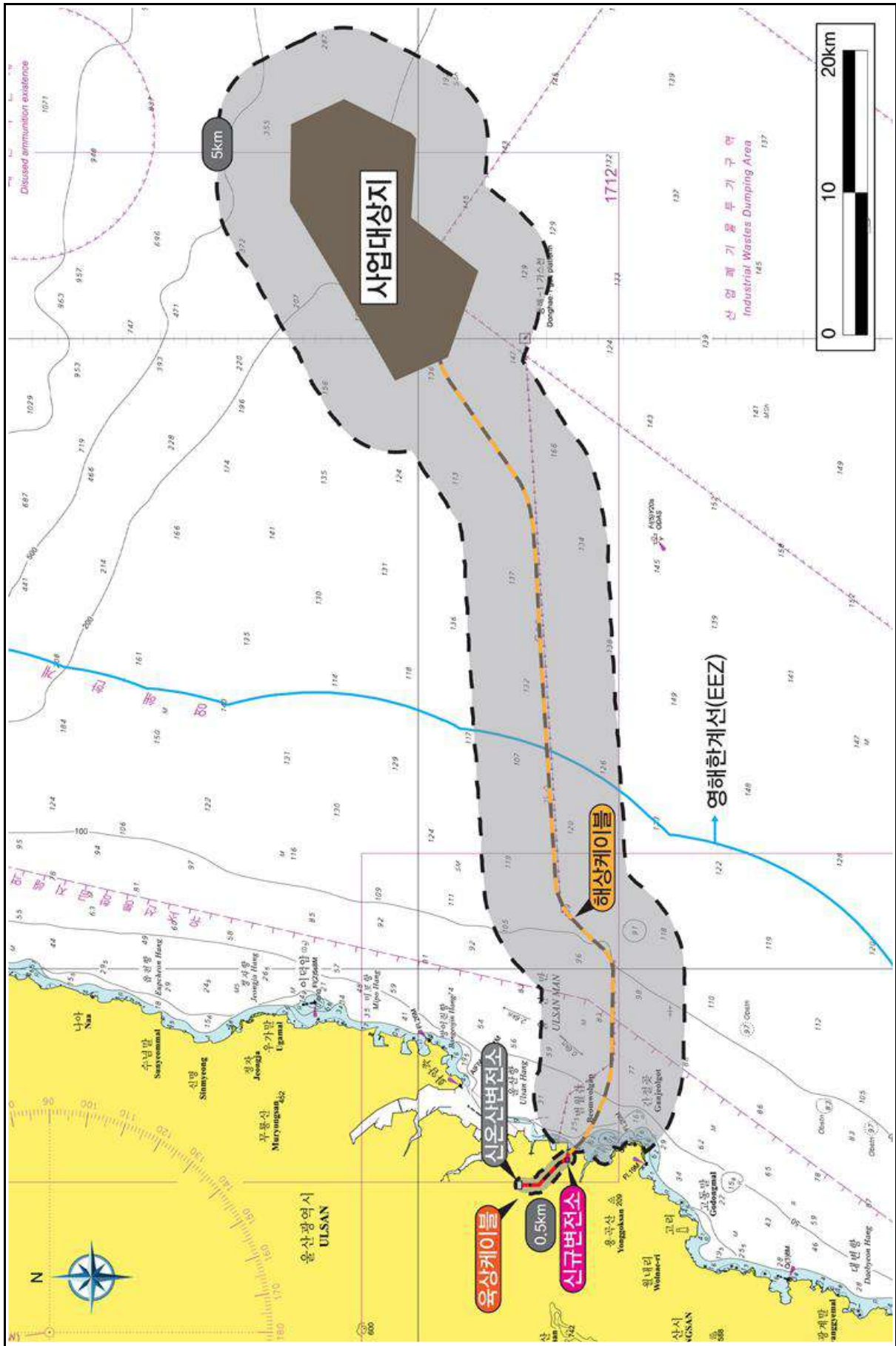
5) EIA on Tugboat Dock Construction at Mokpo New Port, 2018. 05, Mokpo Regional Office of Oceans and Fisheries

6) EIA on Maintenance of Fishery Facility in Gyema Port (renegotiation), 2015. 06, Mokpo Regional Office of Oceans and Fisheries

Reference : 1. EIASS ([www.eiass.go.kr](http://www.eiass.go.kr))

2. Jeju EIA ([www.jeju.go.kr](http://www.jeju.go.kr))

**Picture 2.1-1 Location of Reference Project**



**Picture 2.1-2 Map about EIA Target Area**

## 2.2 Prediction and Analysis of EIA

- The followings are methods to predict and analysis environmental impacts during the project.

**Table 2.2-1 Method for prediction and analysis**

Category	Target	Description	Sources
Ecology	Land organisms	<ul style="list-style-type: none"> <li>◦ Change in land organisms near ground cables</li> <li>◦ Change in moving patterns of winter migrants and other legal protected species because of offshore wind farm</li> </ul>	<ul style="list-style-type: none"> <li>◦ Site inspection (guideline on monitoring offshore wind farm, Environment Assessment Manual for Offshore Wind Farm) and literature review</li> </ul>
	Marine organisms	<ul style="list-style-type: none"> <li>◦ Analyzing the status of marine organism and comparing with literature review</li> <li>◦ Checking the habitat of marine mammals and the impact on fishes due to operation noise and electromagnetic field</li> </ul>	<ul style="list-style-type: none"> <li>◦ Site inspection</li> <li>◦ Literature review (national marine ecosystem monitoring program, etc.)</li> <li>◦ Standard for underwater noise damages</li> </ul>
	Environment	<ul style="list-style-type: none"> <li>◦ Distribution of natural environment resources around the project area and checking future impact</li> </ul>	<ul style="list-style-type: none"> <li>◦ Related acts</li> <li>◦ National Ecosystem Survey report</li> </ul>
Air environment	Weather	<ul style="list-style-type: none"> <li>◦ Analyzing weather data for the 10 years</li> <li>◦ Checking general weather conditions near the project area</li> <li>◦ Utilizing as baseline data to predict and analyze air conditions</li> </ul>	<ul style="list-style-type: none"> <li>◦ Weather statistical yearbook</li> </ul>
	Air quality	<ul style="list-style-type: none"> <li>◦ Analyzing air quality around the project area</li> <li>◦ Setting emission considering pollutant emission factors</li> <li>◦ Calculating pollutant production and predicting concentration with a diffusion model (scattered dust, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>◦ Site inspection</li> <li>◦ Standard for the measurements of air pollution</li> <li>◦ Compilation of air pollutant emission factors, U.S. EPA</li> <li>◦ AERMOD, U.S. EPA</li> </ul>
	Greenhouse gas	<ul style="list-style-type: none"> <li>◦ Predicting greenhouse gas emission during construction</li> <li>◦ Predicting reduction of greenhouse gas emission after the operation</li> </ul>	<ul style="list-style-type: none"> <li>◦ Related acts about greenhouse gas emission intensity</li> </ul>
Water environment	Water quality	<ul style="list-style-type: none"> <li>◦ Impact by soil runoff during construction</li> <li>◦ Predict generation amount by construction personnel using statistics</li> <li>◦ Project area (substation) and of surrounding water environment</li> </ul>	<ul style="list-style-type: none"> <li>◦ Literature review (statistical yearbook)</li> <li>◦ Method to calculate number of people to treat waste water by building's purpose</li> </ul>

	Marine environment	<ul style="list-style-type: none"> <li>Analyzing marine environment around the project area</li> <li>Predicting impacts on marine environment with a numerical model test (sea water flow, sediment move, spread of suspended lands, wave change, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Site inspection (Guideline on Monitoring Offshore Wind Farm, Environment Assessment Manual for Offshore Wind Farm) and Literature review</li> <li>Standard methods for marine environment</li> <li>Numerical model test</li> </ul>
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**Table 2.2-1 Continue**

Category	Target	Description	Sources
Land environment	Land use	<ul style="list-style-type: none"> <li>Predicting change in land use by analyzing business plan and related plan</li> </ul>	<ul style="list-style-type: none"> <li>Literature review (Statistical yearbook)</li> <li>Report on feasibility study</li> </ul>
	Soil	<ul style="list-style-type: none"> <li>Checking the status of soil pollution</li> <li>Predicting soil pollution due to soil spill and obstacle removal</li> </ul>	<ul style="list-style-type: none"> <li>Site inspection</li> <li>Literature review (Factual survey on land pollution)</li> </ul>
	Geography/ Geographical features	<ul style="list-style-type: none"> <li>Analyzing water depth and geological map</li> <li>Analyzing the geotechnical investigation on the project area</li> <li>Review on change in ocean floor due to project plan</li> </ul>	<ul style="list-style-type: none"> <li>Report on feasibility study</li> <li>- contour map, geological map, stratum and bathymetric chart, geotechnical investigation, etc.</li> </ul>
Lifestyle	Recycling	<ul style="list-style-type: none"> <li>Analyzing the trend of waste production based on statistics</li> <li>Predict generation amount by feature of waste ejector using statistics</li> </ul>	<ul style="list-style-type: none"> <li>Statistical yearbook</li> <li>Status of national waste production</li> <li>Standard of construction estimated price</li> </ul>
	Noise/ Vibration	<ul style="list-style-type: none"> <li>Analyzing the status of noise and vibration around the project area</li> <li>Predicting effect by noise and vibration of construction based on their features and the distance-attenuation equation</li> <li>Predicting noise and vibration during operation</li> </ul>	<ul style="list-style-type: none"> <li>Site inspection (guideline on monitoring offshore wind farm, Environment Assessment Manual for Offshore Wind Farm)</li> <li>Measurement Method for Noise and Vibration Standard</li> <li>Study on vibration and noise of construction equipment and machine</li> <li>Standard for underwater noise damages</li> <li>Modeling on underwater noise</li> </ul>
	Landscape	<ul style="list-style-type: none"> <li>Current status of landscape surrounding the project area</li> <li>Predicting the change by wind farm</li> </ul>	<ul style="list-style-type: none"> <li>Site inspection</li> <li>Literature review (Environmental Geographic Information Service)</li> <li>Analysis on landscape simulation</li> </ul>
	Radio interference	<ul style="list-style-type: none"> <li>Predicting radio interference by transmission line during operation (underground and underwater)</li> </ul>	<ul style="list-style-type: none"> <li>Literature review</li> <li>(Home and abroad research, etc.)</li> </ul>
Society economy	Industry	<ul style="list-style-type: none"> <li>Predicting the impact by the project on the local industry and economy</li> </ul>	<ul style="list-style-type: none"> <li>Literature review</li> <li>Related data about the project</li> </ul>

**Ch. 3**

**Land Use Plan**



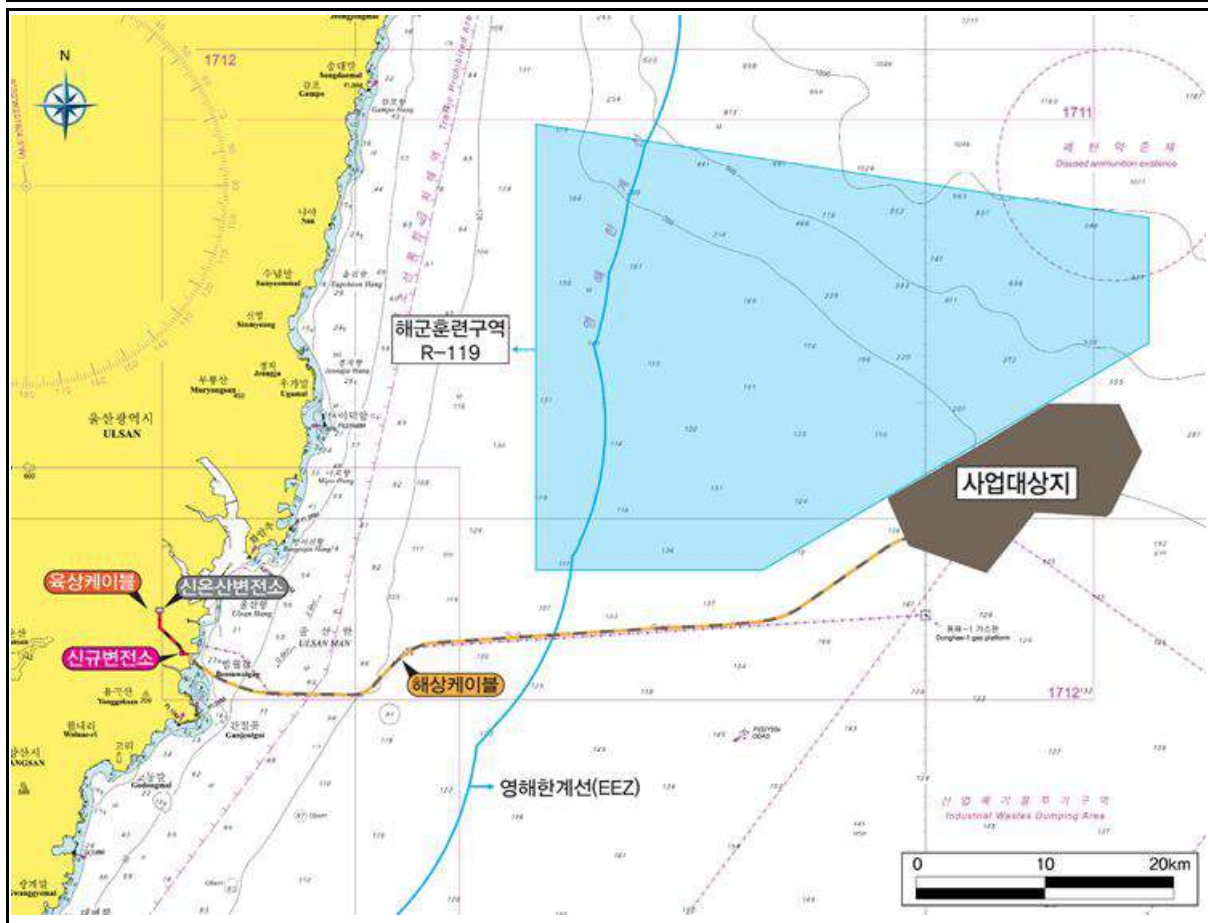


## Chapter 3 Land Use Plan

- This project is to build an offshore wind farm with the entire capacity of 810 MW in public waters of the exclusive economic zone (EEZ), 60~70 km away from the eastern Ulsan Port in Ulsan Metropolitan City.

**Table 3-1 Project plan**

Category	Description	Remark
Name	◦ Firefly Offshore Wind Farm	-
Location	◦ Public waters of the EZZ, 60~70 km away from the eastern part of Ulsan Port in Ulsan Metropolitan City	-
Capacity	◦ 810 MW (15 MW × 54 ea)	-
Used Area/Point in Public Water	◦ 154 km <sup>2</sup>	-
Transmission Plan	◦ Underwater Transmission Cable: laying the cables in a length of about 70km along the pipelines for gas reservoirs in the East Sea of Korea National Oil Corporation (KNOC) ◦ Underground Transmission Cable: laying the cables from a landing point to the Shinonsan Substation in a length of about 5.5km	-



**Picture 3-1 Map about project area**

## **Ch. 4**

# **Regional Condition**

**4.1 General Status**

**4.2 Current Land Use**

**4.3 Designation Status of Environment-related  
District/Area**

**4.4 Environmental Standard**

**4.5 Status of Facilities that Cause  
Environmental Damage**

**4.6 Current Status of Major Facilities  
Subject to Protection**

**4.7 Current Status of Facilities  
Environmental Consideration Required**

**4.8 Status of Environmental Basic Facilities**

**4.9 Status of Fishing Rights**





## Chapter 4 Regional Condition

### 4.1 General Status

- Baekdu-Daegan, a watershed-crest-line from Baekdusan Mountain to Taebaeksna Mountain and Jirisan Mountain, runs along with the East Sea and Nakdong River. Ulsan sits on the east from mountain-system, so-called *Yeongnam Alps*, including Gasigan Mountain, Neungdongsan Mountain, Shinbulsan Mountain and other mountains with a height over 1,000m, while Taehwa River runs over 40 km through the city toward the East Sea. On the left side of the Taehwa river, there is an old downtown, Jung-gu, and on the right side, Nam-gu is placed and being developed quickly.
- The Dongcheon River flowing from the north, which is toward Gyeongju, flows into Ulsan Port from the Taehwa River and downstream, and Bangeojin Port and Jangsaengpo Port are located at both ends of the port. The hilly land of Yanghang Port, which formed the inner bank through these two ports, has 8 million pyeong of industrial water, and the ground is made of hard rock, making it easy to construct a factory. Also, industrial water is abundant in here.
- In Onsan Industrial Complex, southern Ulsan, there are many factories manufacturing nonferrous metal products and petrochemicals. The cluster with different-sized factories in related fields keeps the reputation of Ulsan City as an industrial city.

**Table 4.1-1 General details**

Address (City Hall)	End Point	Location of the End Point		Length (km)
		Address	Coordinate	
201, Jungang-ro, Nam-gu, Ulsan, Republic of Korea	East	265-2, Dangsa-dong, Buk-gu	129° 27' 47"E	West-East 44.03
	West	San143-2, Icheon-ri, Sangbuk-myeon, Ulju-gun	128° 58' 14"E	
	South	374-3, Sinam-ri, Seosaeng-myeon, Ulju-gun	35° 19' 36"N	North-South 43.18
	North	San109-1, Bogan-ri, Duseo-myeon, Ulju-gun	35° 43' 19"N	

Reference: 2020 Statistical Yearbook of Ulsan Metropolitan City, 2021, Ulsan Metropolitan City Hall

### 4.2 Current Land Use

#### 4.2.1 Administrative District

- According to the survey on administrative districts in Ulsan Metropolitan City, the entire area is 1,062.04km<sup>2</sup> with 5 Gu·Gun, 5 Eup, 7 Myeon, 116 Dong, and 1,615 Tong·Li.
- In case of Ulju-gun, Ulsan Metropolitan City, near project areas, the entire area is 758.13km<sup>2</sup> with 5 Eup, 7 Myeon, and 376 Li, while Dong-gu has 36.07km<sup>2</sup> of total area with 17 Dong, and 228 Tong.

**Table 4.2-1 Administrative Districts**

Category	Area		Gu·Gun	Eup·Myeon·Dong			Tong·Li		반		
	km <sup>2</sup>	Ratio(%)		Eup	Myeon	Dong	Tong	Li			
Ulsan City	1,062.04	100.00	5	128	5	7	116	1,615	1,239	376	11,291
Ulju-gun	758.13	71.38	1	12	5	7	-	376	-	376	2,075
Dong-gu	36.07	3.40	1	17	-	-	17	228	228	-	1,465

Reference : 2020 Statistical Yearbook of Ulsan Metropolitan City, 2021, Ulsan Metropolitan City Hall

### 4.2.2 Land Use by Purpose

- According to the survey on land use by purposes in Ulsan Metropolitan City, forest accounts for the largest portion with 667.34km<sup>2</sup>(62.84%) among the entire land area of 1,062.04km<sup>2</sup>, followed by paddy of 92.64km<sup>2</sup>(8.72%), and building site of 51.45km<sup>2</sup>(4.84%).
- In case of Ulju-gun, Ulsan Metropolitan City, near project areas, forest also accounts for the largest portion with 518.56km<sup>2</sup>(68.40%) among the entire land area of 758.13km<sup>2</sup>, followed by paddy of 71.56 km<sup>2</sup>(9.44%), and road of 25.85km<sup>2</sup>(3.41%).
- In case of Dong-gu, forest also accounts for the largest portion with 18.16km<sup>2</sup>(50.35%) among the entire land area of 36.07km<sup>2</sup>, followed by building site of 4.67km<sup>2</sup>(12.95%), and road of 2.82km<sup>2</sup>(7.82%).

**Table 4.2-2 Land use by purpose**

Category		Total	Field	Paddy	Forest	Building Site	Road	Others
Ulsan City	Area(km <sup>2</sup> )	1,062.04	32.00	92.64	667.34	51.45	46.79	171.82
	Rate(%)	100.00	3.01	8.72	62.84	4.84	4.41	16.18
Ulju-gun	Area(km <sup>2</sup> )	758.13	21.63	71.56	518.56	20.55	25.85	99.98
	Rate(%)	100.00	2.85	9.44	68.40	2.71	3.41	13.19
Dong-gu	Area(km <sup>2</sup> )	36.07	0.77	0.98	18.16	4.67	2.82	8.67
	Rate(%)	100.00	2.13	2.72	50.35	12.95	7.82	24.03

Footnote) Others include orchard, mineral site, factory, pasture, school, parking lot, gas station, warehouse, railroad, river, bank, ditch, fish farm, water supply site, park, gym, amusement park, religion site, historic site, burial ground, etc.

Reference: 2020 Statistical Yearbook of Ulsan Metropolitan City, 2021, Ulsan Metropolitan City Hall

### 4.2.3 Use District

- According to the research for special-purpose areas in Ulsan Metropolitan City, among 1,144.60km<sup>2</sup> of the entire area, urban area consists of green area of 522.04km<sup>2</sup>(45.61%) and factory site of 82.44 km<sup>2</sup>(7.20%) in order while rural area is 382.87km<sup>2</sup>(33.45%).
- In case of Ulju-gun, Ulsan Metropolitan City, near the project area, among 839.62km<sup>2</sup> of the entire special-purpose area, urban area consists of green area of 352.72km<sup>2</sup>(42.01%) and undesignated area of 81.52km<sup>2</sup>(9.70%) in order while rural area is 345.60km<sup>2</sup>(41.16%).
- In case of Dong-gu, among 36.35km<sup>2</sup> of the entire special-purpose area, urban area consists of green area of 22.33km<sup>2</sup>(61.45%), and factory site of 7.03km<sup>2</sup> (19.34%) in order while rural area does not exist.

**Table 4.2-3 Status of Special=Purpose Area**

Category		Total	Urban Area						Rural Area
			Subtotal	Residence	Business	Factory	Green	Un-Dsgn.	
Ulsan City	Area (km <sup>2</sup> )	1,144.60	761.73	68.00	7.68	82.44	522.04	81.57	382.87
	Rate(%)	100.00	66.55	5.94	0.67	7.20	45.61	7.13	33.45
Ulju-gun	Area (km <sup>2</sup> )	839.62	494.02	22.24	1.64	35.90	352.72	81.52	345.60
	Rate(%)	100.00	58.84	2.65	0.20	4.28	42.01	9.70	41.16
Dong-gu	Area (km <sup>2</sup> )	36.35	36.35	6.14	0.80	7.03	22.33	0.05	-
	Rate(%)	100.00	100.00	16.89	2.20	19.34	61.45	0.12	-

Footnote) The entire area could be different from the data of land use by purpose  
Un-Dsgn.: undesignation

Reference: National Statistical Portal (as of 2020), 2021, Statistics Korea

**4.2.4 Coastline and Island**

- According to the research on coastline and islands in Ulsan Metropolitan City, the length of the entire coastline is 168.80km and there are three uninhabited islands, and the total island area is 22.44km<sup>2</sup>.
- It was investigated that the total coastline of Ulju-gun in Ulsan, adjacent to the project site, is 60.29km long, and the total island area is 21.82km<sup>2</sup> with two uninhabited islands(Area 21.82km<sup>2</sup>). In the case of Dong-gu, the total length of the coastline is 44.58km with no islands.

**Table 4.2-4 Coastline and Island**

Category	Coastline(km)	Current Island			
		Umber of Island (EA)			Area(km <sup>2</sup> )
		Subtotal	Inhabited	Uninhabited	
Ulsan City	168.80	3	-	3	22.44
Ulju-gun	60.29	2	-	2	21.82
Dong-gu	44.58	-	-	-	-

Reference : 2020 Statistical Yearbook of Ulsan Metropolitan City, 2021, Ulsan Metropolitan City Hall

**4.3 Designation Status of Environment-related District/Area**

- The current status of designation of districts and regions related to the environment of the project site and surrounding areas is as follows.

**Table 4.3-1 Designation status environment-related district/region**

Category	Name of protected areas	Relevant law	Designation status
Environment-related conservation area	Environmental management area (Environmental conservation area and special management area)	Article 15 of the 「Marine Environment Management Act」	◦ 1 place has been designated - "Ulsan Coastal Special Management Sea" is about 48.6km apart to the west of the project site.
	Marine protection zone	Article 25 of the 「Marine Ecosystem Conservation and Management Act」	◦N/A
	Marine scenic area	Article 28 of the 「Framework Act on Maritime and Fisheries Development」 and Article 20 of the Enforcement Decree of the same Act	◦N/A
	Specific island	Article 4 of the 「Special Act on Ecosystem Conservation of Island Areas such as Dokdo」	◦N/A
	Natural environment conservation area	Article 6 of the 「National Land Planning and Utilization Act」	◦A total of 43.51km <sup>2</sup> has been designated. - About 49.5km apart to northwest of the project site
	Fishery resource protection zone	Article 40 of the 「National Land Planning and Utilization Act」	◦N/A

Table 4.3-1 Continue

Category	Name of protected areas	Relevant law	Designation status
Environment -related conservation area	Uninhabited island	Article 10 of 「Act on the Conservation and Management of Uninhabited Islands」	◦ A total of 4 locations have been designated. - 'Seonam' (the closest) is about 48.1km to the west of the project site.
	Reserved area	Article 46 of the 「Fisheries Resources Management Act」	◦ N/A
	Wetland protection, wetland management, wetland improvement area and Ramsar wetland	Articles 8 and 9 of the 「Wetland Conservation Act」	◦ One location is designated. -The 'Mujechinup' wetland protection area is about 74.4km apart to west of the project site.
	Ecology/landscape conservation area and city/province ecology/landscape conservation area	「Natural Environment Conservation Act」 Articles 12 and 23	◦ One location is designated. - 'Taehwa River' is about 54.1km apart to the west of the project site.
	Fishery resource management water	「Fisheries Resources Management Act」 Article 48	◦ One location is designated. - 'Aquatic resource management water in Jujeon Sea Forest' is about 46.0km apart to the west of the project site.
	Wildlife conservation area	Article 33 of the 「Wildlife Protection and Management Act」	◦ A total of 5 locations have been designated. - 'Songjeong-dong, Buk-gu, Ulsan' (the closest) is about 53.4km apart to the west of the project site.
	Special protection area for wildlife	Article 27 of the 「Wildlife Protection and Management Act」	◦ N/A
	Natural park	「Natural Parks Act」 Article 4	◦ A total of 2 locations have been designated. - 'Gajisan' (the closest) is about 73.4km to the west of the project site.
	Designated sea area	Article 71 of the 「Agricultural and Fishery Products Quality Control Act」	◦ N/A
	Fishery management area	Article 5 of the 「Fishery Management Act」	◦ N/A
	Protective property or area.	Article 27 of the 「Cultural Property Protection Act」	◦ A total of 30 sites have been designated within a radius of about 5km from the Ulsan Metropolitan City coastline. - 'Ugasan Yupo Bongsudae' (the closest) is about 47.1km to the west of the project site.
	Natural monument	Article 25 of the 「Cultural Property Protection Act」	◦ A total of 3 locations have been designated. - 'Ulju Mokdo Evergreen Forest' is about 56.2km to the west of the project site.

Table 4.3-1 Continue

Category	Name of protected areas	Relevant law	Designation status
Environment - related conservation area	Water source protection area	Article 7 of the 「Waterworks Act」	◦ A total of 2 locations have been designated. - 'Hoeya Dam' (the closest) is about 61.7km to the west of the project site.
	Waterfront area	Article 4 of the Act on the 「Management and Support for Residents in the Yeongsangang River and Seomjin River Basin」	◦ One location is designated. - 'Sangbuk-myeon, Ulju-gun (Icheon-ri and Sohor-ri only)' is about 85.5km west of the planned project site.
	Forest genetic resource protection area	Article 7 of the 「Forest Protection Act」	◦ A total of 5 locations have been designated. - 'Ulsan Daeunsan Wetland' (the closest) is about 66.7km to the west of the project site.
	Ecosystem change observation area	Article 31 of the 「Natural Environment Conservation Act」	◦ A total of 2 locations are designated. - 'Gajisan' (the closest) is about 73.4km to the west of the project site.
	Habitats for migratory birds	Ministry of Environment	◦ 'Taehwa River', a major migratory bird habitats designated by the Ministry of Environment ◦ A total of 5 winter bird habitats have been designated. - 'Ulsan-Guryongpo Coast' (the closest) is about 45.0km to the west of the project site.
	Geopark	Article 34-3 of the 「Natural Environment Conservation Act」	◦ N/A
	Baekdudaegan protected area	Article 6 of the Act on the 「Protection of Baekdudaegan」	◦ N/A
	Sea area separation for ecological classification	Article 13 of the 「Marine Environment Conservation and Utilization Act」	◦ Corresponding to the open sea of the Korea Strait and the East Sea
	Areas by grade according to ecology and nature	Article 34 of the 「Natural Environment Conservation Act」 and Article 24 & 25 of the same enforcement decree	◦ N/A
	Marine eco-map	Article 12 of the 「Act on the Conservation and Management of Marine Ecosystems」	◦ N/A
Establishment and management of specific sea areas for traffic safety	Article 10 of the 「Maritime Safety Act」	◦ One location is designated. - About 36.3km west to the "Ulsan District" project site.	

Table 4.3-1 Continue

Category	Name of protected areas	Relevant law	Designation status
Environment - related conservation area	Range of Low sulfur oil supply area & facilities	Article 41 of the 「Air Environment Conservation Act」 and Article 40 of the Enforcement Decree of the same Act	◦ Ulsan Metropolitan City has been designated as a heavy oil supply and use area with a sulfur content of 0.3% or less.
	Areas to which discharge limit (wastewater) is applied	Article 32 of the 「Water Environment Conservation Act」	◦ Onsan-eup is designated as “B” area
	Special measures area	Article 38 of the 「Environmental Policy Framework Act」	◦ One location is designated. - ‘Ulsan Mipo and Onsan National Industrial Complex’ is about 47.6km to the west of the project site.
	Coastal pollution control area	Article 15 of the 「Marine Environment Management Act」 , Ministry of Oceans and Fisheries Directive No. 404.	◦ One location is designated. - The ‘Total Pollution Control Area in the Specially Managed Sea of Ulsan Coast’ is about 54.1km to the west of the project site.
	Discharge facility installation-restricted area	Article 33 of the 「Water Environment Conservation Act」	◦ N/A
	Air quality management area	Article 1 of the 「Special Act on the Improvement of Air Quality in Air Quality Management Areas」 and Article 2 of the Enforcement Decree of the same Act	◦ All Ulsan Metropolitan City designated as air quality management area
Environmental Conservation Area	Malodor control area	Article 6 of 「Malodor Prevention Act」	◦ A total of 4 locations are designated.
	Total water pollution load management	Article 9 of 「Act on Water Management and Residents Support in the Nakdong River Basin」 and Article 4 of the 「Water Environment Conservation Act」	◦ A part of Sangbuk-myeon, Ulju-gun, designated as a total water pollution management area
	Natural asbestos management area.	Article 14 of the 「Asbestos Safety Control Act」	◦ N/A
	Training area	Article 12 of the 「Ocean Spatial Planning and Management Act」	◦ One location is designated. - ‘R-119 Naval Training Area’ is partially in conflict with the planned project site.

Note) The separation distance is the shortest distance between the project site and the protected area.

**4.3.1 Environmental Management Sea Area**

- Environmental management sea areas are divided into environmental conservation sea areas and special management sea areas in accordance with Article 15 of the 「Marine Environment Management Act」, and Ulsan Metropolitan City has designated 'Ulsan Coastal Special Management Sea Area'.
- The total area of 'Ulsan Coastal Specially Managed Sea Area' is 200.85 km<sup>2</sup>, Land area is 144.29 km<sup>2</sup>, and sea area is 56.56 km<sup>2</sup>, which is about 48.6km to the west of the project site.

**Table 4.3-2 Status of Environmental Conservation Sea Areas**

Category	Area(km <sup>2</sup> )		Location	Separation distance
	Land area	Sea area		
Ulsan Coast Specially Managed Waters	144.29	56.56	Parts of Dong-gu, Jung-gu, and Nam-gu in Ulsan Parts of Onsan-eup, Seosaeng-myeon, Onyang-myeon, and Cheongnyang-myeo in Ulju-gun	About 48.6km west of the project site



Source: Designated as environment conservation area and special management area (Ministry of Oceans and Fisheries Notice No. 2000-3), February 14, 2000, Ministry of Oceans and Fisheries



Table 4.3-3 Designation of environmental conservation sea area

Category	Details
<p style="text-align: center;">Marine Environment Management Act</p>	<p>Article 15 (Designation and Management of Environmental Management Sea areas)</p> <p>① Where deemed necessary for the preservation and management of the marine environment, the Minister of Oceans and Fisheries may designate and manage environmental conservation areas and special management areas (hereinafter referred to as "Environmental Management Seas") according to the following sub-paragraphs. In this case, consultations with the head of the relevant central administrative agency and the competent Si/Do Governor shall be made in advance.</p> <ol style="list-style-type: none"> <li>1. Environmental conservation sea area: Among sea areas with good marine environment and ecosystem, the sea area that requires continuous management for the maintenance of marine environmental standards pursuant to Article 13 (1) of the 「Marine Environment Conservation and Utilization Act」 determined and publicly notified by the Minister of Oceans and Fisheries(including land directly affecting marine pollution)</li> <li>2. Specially managed sea area: A sea area in which it is difficult to maintain marine environment standards under Article 13 (1) of the Marine Environment Conservation and Utilization Act, or a sea area where there is or is likely to cause a significant obstacle to the conservation of the marine environment and ecosystem; Sea areas determined and publicly notified by the Minister of Fisheries (including land directly affecting marine pollution)</li> </ol> <p>② The Minister of Oceans and Fisheries may cancel or change the designation of all or part of the designation of the environmental management sea area if the designation purpose of the environmental management sea is achieved, or if the designation purpose is lost. In this case, consultation shall be made in advance with the Mayor/Do Governor in charge of the target area.</p> <p>③ The Minister of Oceans and Fisheries shall consider the following matters when designating, canceling or changing the environmental management area under paragraphs (1) and (2).</p> <ol style="list-style-type: none"> <li>1. Results of investigation of marine environmental monitoring network under Article 9;</li> <li>2. Results of investigation of persistent pollutants under Article 39;</li> <li>3. Results of a comprehensive national marine ecosystem survey pursuant to Article 10 of the 「Marine Ecosystem Conservation and Management Act」</li> <li>4. Results of marine environment and ecosystem-related surveys continuously conducted by the national and local governments for more than three years</li> </ol> <p>④ Matters necessary for the designation, cancellation, and change of the environmental management area under paragraphs (1) through (3) shall be prescribed by Presidential Decree.</p>

Source: 「Marine Environment Management Act」, Ministry of Oceans and Fisheries

Table 4.3-4 Limit of behavior in the environmental conservation sea area

Category	Details
Marine Environment Management Act	Article 15-2 (Restrictions on Activities in Environmental Management Areas, etc.) (1) The Minister of Oceans and Fisheries shall measure and investigate the marine environment condition and pollution sources in the environment conservation area according to Article 13 (1) of the 「Marine Environment Conservation and Utilization Act」. Where it is recognized that there is a risk of serious damage to public health or the growth of living things by exceeding marine environmental standards, the installation or change of facilities prescribed by Presidential Decree in the environmental conservation area may be restricted.
Marine Environment Management Act Enforcement Decree	Article 10 (Restriction of facility installation in environmental management waters) ③ The term "facilities prescribed by Presidential Decree" in Article 15-2 (1) of the Act means any of the following facilities. 1. Facilities with a daily wastewater discharge of 2,000 cubic meters or more. However, facilities that introduce wastewater discharged from the facility into public wastewater treatment facilities and public sewage treatment facilities or treat it below the standard for water quality of discharged water under laws and regulations applicable to the area are excluded. 2. In the case of new construction, renovation, extension, or modification pursuant to Article 8 (1) 1 of the Public Waters Management and Reclamation Act, docks, breakwaters, bridges, floodgates, or buildings that must be approved by the management agency.

Reference : 「Marine Environment Management Act」, Ministry of Maritime Affairs and Fisheries

#### 4.3.2 Natural Environment Conservation Area

- In Ulsan Metropolitan City adjacent to the planned project site, 43.51km<sup>2</sup> of natural environment conservation area is designated in accordance with Article 6 of the 「National Land Planning and Utilization Act」.
- The closest natural environment conservation area was found to be located about 49.5km west of the project site.

Table 4.3-5 Status of Natural Environment Conservation Area

Category	Non-urban area	Natural environment conservation area	The ratio for non-urban areas	Separation distance
Ulsan	382.87km <sup>2</sup>	43.51km <sup>2</sup>	11.36%	About 49.5km northwest of the project site

Source: National Statistics Portal (based on 2020), 2021, Statistics Korea

#### 4.3.3 Uninhabitable Islands

- In Ulsan Metropolitan City where the project site is located, a total of 4 uninhabited islands are designated and managed according to Article 10-1 of the 「Act on the Conservation and Management of Uninhabited Islands」 and Article 11 of the enforcement decree of the same Act.
- The uninhabited island closest to the project site is 'Seonam', which was found to be about 48.1km apart to the west of the WT-1.

**Table 4.3-6 Designation status of uninhabited islands**

Category	Name of the island	Location	Area (m <sup>2</sup> )	Management type	Separation distance(km)
Ulsan	Myungseondo	San 60, Jinha-ri, Seosaeng-myeon, Ulju-gun	6,744	Available to use	About 57.3km west of the project site
	Mokdo	San 13, Bangdori, Onsan-eup, Ulju-gun	15,074	Absolute preservation required	About 56.0km west of the project site
	<b>Sunam</b>	<b>Donggu, Ilsan-dong</b>	-	Available to use	<b>About 48.1km west of the project site</b>
	Cheoyongam	668-1, Hwangseong-dong, Nam-gu	622	Semi-preservation needed	About 56.1km west of the project site

Source: Comprehensive information on uninhabited islands(<http://uii.mof.go.kr>), Ministry of Oceans and Fisheries

#### 4.3.4 Wetland Protection, Management around Wetlands, Wetland Improvement Areas

- In Ulsan Metropolitan City, which is adjacent to the project site, it was found that one wetland protected area was designated and managed in accordance with Articles 8 and 9 of the 「Wetland Conservation Act」.
- It was investigated that the 'Mujechinup' wetland protected area is located about 74.4km to the WT-2.

**Table 4.3-7 Designation status of wetland protection areas**

Category	Name of the area	Location	Characteristics	Designated date (Ramsar registered)	Separation distance(km)
Ulsan	Mujechineup	Joili, Ilwon, Samdong-myeon, Ulju-gun, Ulsan	Mountain wetland	1999.08.09. (2007.12.20)	About 74.4km to the west of the project site

Source: Designation status of Wetland protection area (as of December 2020), 2020, Ministry of Environment

#### 4.3.5 Ecology and Landscape Conservation Area

- According to the Article 12 and 23 of the 「Natural Environment Conservation Act」 in Ulsan Metropolitan City, which is adjacent to the project site, it was investigated that there is one city/province ecological landscape conservation area.
- The ecological landscape conservation area, the closest area to the project site, 'Taehwa River' was found to be located about 54.1km to the west of the WT-1.

**Table 4.3-8 Designation status of ecology and landscape conservation areas**

Name of the area	Location	Area(km <sup>2</sup> )	Characteristics	Date of designation	Separation distance(km)
Taehwa River	Downstream of Taehwa River in Myeongchon-dong, Buk-gu, Ulsan	0.983km <sup>2</sup>	Habitats of wild animals and plants such as migratory birds	2008.12.24	About 54.1km west of the project site

Source: Designation Status of Ecological Landscape Conservation Area (as of December 2020), 2020, Ministry of Environment

#### 4.3.6 Fisheries Resource Management Water

- In Ulsan Metropolitan City adjacent to the project site, one fishery resource management water is designated and managed pursuant to Article 48 of the 「Fisheries Resource Management Act」, and the total area is 24.0ha
- It was investigated that the "Fishery Resource Management Water in the Sea Forest Development Area of Jujeon" is located about 46.0km west of the WT-1.

**Table 4.3-9 Designation status of fisheries resource management water**

Location	Zone of water (The inner water of the line connecting A, B, C, and D in sequence)			Type	Area (ha)	Period of designation	Separation distance(km)
	Category	Latitude	Longitude				
The sea area of Jujeon-dong, Dong-gu, Ulsan	A	35°33.574'	129°27.583'	Fish such as rockfish, sea bream, and mackerel Shellfish such as abalone, sea urchin, sea cucumber, and conch	24.0	'16.10.06~'21.10.05	About 46.0km to the west of the project site
	B	35°33.574'	129°27.847'				
	C	35°33.249'	129°27.583'				
	D	35°33.249'	129°27.847'				

Source: Aquatic Resource Management Water Surface Designation Notice (Ulsan Metropolitan City Public Notice No. 2016-1158), 2016.10.06, Ulsan Metropolitan City Hall

#### 4.3.7 Wildlife Conservation Area

- In Ulsan Metropolitan City adjacent to the planned project site, a total of 5 wildlife protection zones are designated and managed in accordance with Article 33 of the 「Wildlife Protection and Management Act」
- The wildlife protection zone closest to the project site is Songjeong-dong, Buk-gu, Ulsan, which is about 53.4km apart from the WT-1.

**Table 4.3-10 Designation status of wildlife protection area**

Category	Name of region	Location	Area(km <sup>2</sup> )	Year of designation	Separation distance(km)
Ulsan	Songjeong-dong, Buk-gu, Ulsan	San 6-1, Songjeong-dong, Buk-gu, Ulsan	0.28	2003	About 53.4km to the west of the project site
	Myeongchondong, Buk-gu, Ulsan	46 parcels and 1000 Myeongchondong, Buk-gu, Ulsan Metropolitan City	0.94	2008	About 55.4km to the west of the project site
	Seonam-dong, Nam-gu, Ulsan	22 parcels and 42, Seonam-dong, Nam-gu, Ulsan	0.23	2009	About 57.2km to the west of the project site
	Taehwa-dong, Jung-gu, Ulsan	10 parcels and 969-3 Taehwa-dong, Jung-gu, Ulsan	0.74	2008	About 59.7km to the west of the project site
	Mugeudong, Nam-gu, Ulsan	48 parcels and 3, Mugeo-dong, Nam-gu, Ulsan	1.55	2009	About 60.9km to the west of the project site

Data: Designation status of wildlife protection zones, 2018, Ministry of Environment

### 4.3.8 Natural Park

- According to Article 4 of the 「Natural Parks Act」, a total of two natural parks are designated and managed in Ulsan Metropolitan City, which is adjacent to the project site.
- The closest natural park to the project site is Mt. Gaji, which is about 73.4km to the west of the WT-1.

**Table 4.3-11 Designation status of Natural parks**

Category	Designation	Name of parks	Location	Area(km <sup>2</sup> )	Separation distance(km)
Ulsan	Provincial park	Gaji Mountain	Ulsan, Gyeongnam Yangsan, Miryang	104.35	About 73.4km to the west of the project site
	County park	Shinbul Mountain	Sangbuk-myeon and Samnam-myeon, Ulju-gun, Ulsan	11.59	About 76.8km to the west of the project site

Data: 1. Status of Provincial Parks (As of December 19), 2020, Ministry of Environment  
 2. Status of county parks (As of December 19), 2020, Ministry of Environment

### 4.3.9 Protective Goods or Conservation Area

- In Ulsan Metropolitan City, which is adjacent to the project site, a total of 148 protected objects or protected areas have been designated and managed according to Article 27 of the 「Cultural Heritage Protection Act」.
- A total of 30 places turned out to be designated and maintained according to the survey of protected goods or protected areas within a radius of about 5 km based on the coastline of Ulsan Metropolitan City and the protected objects or protection areas closest to the project site is the 'Ugasan Yupo Bongsudae (Provincial Monument No. 13)' which was found to be approximately 47.1km to the west of the WT-1.

**Table 4.3-12 Current designation status of protected objects or protected areas (within a radius of about 5 km from the shoreline)**

Category	Designation type and number	Name	Location	Quantity/Land cadastre	Separation distance(km)
Ulsan Metropolitan City	Provincial Monument No.13	Ugasan Yupo Bongsudae	230, Dangdang-dong, Buk-gu and 1 site	1	47.1km to the west of the project site
	Provincial monument No.44	Daean-dong Sae-Burriter	San 177, Daedan-dong, Buk-gu	1	54.4km to the west of the project site
	Cultural heritage material No.9	Daean-dong Sinheungsa Temple, Goo Daewoongjeon	299, Daedan 4-gil, Buk-gu	1	54.4km to the west of the project site
	Provincial monument No.44	Gangdong Hwaam Jusangjeolli Cliff	Sea Area Department, 952-1 Sanha-dong, Buk-gu	1	49.6km to the west of the project site
	Provincial monument No.17	Yupo Seokbo	1455-6, Donghaean-ro, Buk-gu	1	48.9km to the west of the project site
	Provincial monument No.38	Kwakam	Under the sea level in Panji Village, Gangdong-dong, Buk-gu	1	47.9km to the west of the project site

Table 4.3-12 Continue

Category	Designation type and number	Name	Location	Quantity / Land cadastre	Separation distance(km)
Ulsan Metropolitan City	Provincial tangible cultural property No.6	Seated Rock-carved Buddha in Eomul-dong	San 122, Eomul-dong, Buk-gu	3	48.6km to the west of the project site
	Provincial monument No.39	Oesol Choi Hyun-bae birthplace	15 Byeongyeong 12-gil, Jung-gu	1	56.6km to the west of the project site
	Historic site No.320	Ulsan Gyeongsangjwado Byeongyeongseong Fortress	149-8, Seodong, Jung-gu, and others	72,895.9m <sup>2</sup>	56.8km to the west of the project site
	Historic site No.528	Ulsan Yaksa-dong Embankment	22-28, Jongga 14-gil, Jung-gu	3,599.5m <sup>2</sup>	57.5km to the west of the project site
	Cultural heritage material No.7	Ulsan Waseong Fortress	54, Hakseong Park 3-gil, Jung-gu, Ulsan	59,678m <sup>2</sup>	57.1km to the west of the project site
	Provincial tangible cultural property No.10	Hyoja Songdo teacher Jeong Ryeo-bi	350-1 in Bukjeong-dong, Jung-gu	1	58.7km to the west of the project site
	Provincial tangible cultural property No.1	Ulsan Dongheon and Naeah	167 Dongheon-gil, Jung-gu	2	58.7km to the west of the project site
	Provincial tangible cultural property No.7	Ulsan Hyanggyo	117, Myeongnyun-ro, Jung-gu	10	59.3km to the west of the project site
	Cultural heritage material No.12	Yugok-dong dinosaur footprints fossils	54-1 area, former Yugok-dong	1	59.3km to the west of the project site
	Cultural heritage material No.1	Lee Hyu jeong	20, Ihyyujeong-gil, Nam-gu	1	60.6km to the west of the project site
	Provincial tangible cultural property No.11	Dongchuksa three-story stone pagoda	93, Okryu-ro, Dong-gu	1	50.0km to the west of the project site
	Provincial monument No.18	Nammokmaseong	14 lots including San197-1, Dongbu-dong, Dong-gu	1	48.5km to the west of the project site
	Provincial monument No.3	The main beacon	Area around San 192-2, Jujeon-dong, Dong-gu	1	47.4km to the west of the project site
	Provincial monument No.14	Hwajeongcheon Nae Beacon Fire Station	29-2, Bongsu-ro, Dong-gu	1	50.4km to the west of the project site
	National registered cultural property No. 106.	Ulsan Ulgi Lighthouse old light tower	155 Deungdae-ro, Dong-gu	1dong, 3 <sup>rd</sup> floor, total area 22.4m <sup>2</sup>	47.6km to the west of the project site

Table 4.3-12 Continue

Category	Designation type and number	Name	Location	Quantity/Land cadastre	Separation distance(km)
Ulsan Metropolitan City	Provincial monument No.6	Gaeunpo shrine	Around 81 Seongamdong, Nam-gu	21,899m <sup>2</sup>	56.7km to the west of the project site
	Provincial monument No.4	Cheoyongam	668-1, Hwangseongdong, Nam-gu	207,000m <sup>2</sup>	56.2km to the west of the project site
	Natural monument No.65	Ulju Mokdo evergreen forest	San 13, Bangdori, Onsan-eup, Ulju-gun	5,074m <sup>2</sup>	56.1km to the west of the project site
Ulsan	Cultural heritage material No.15	Biok-sanseong Fortress	San 294, Deoksin-ri, Onsan-eup, Ulju-gun	1	62.1km to the west of the project site
	Cultural heritage material No.14	Unwhali shrine	San 159, Unhwa-ri, Onyang-eup, Ulju-gun, Ulsan	1	66.9km to the west of the project site
	Provincial monument No.36	Hasan Beacon Fire Station	San 66, Gangyang-ri, Onsan-eup, Ulju-gun	1	57.6km to the west of the project site
	Provincial monument No.35	Seosaengpo Manhojinseong	San 68, Hwajeong-ri, Seosaeng-myeon, Ulju-gun	1	59.3km to the west of the project site
	Cultural heritage material No.8	Seosaengpo Japanese Fortress	711 Seosaeng-ri, Seosaeng-myeon, Ulju-gun	91,453.1m <sup>2</sup>	58.7km to the west of the project site
	Provincial monument No.15	Seosang Igil Beacon Fire Station	San 36, Nasa-ri, Seosaeng-myeon, Ulju-gun	1	59.0km to the west of the project site

Source : 1. Cultural Heritage Spatial Information Service (<http://gis-heritage.go.kr/main.do>), Cultural Heritage Administration  
 2. Our local cultural heritage, 2021, Cultural Heritage Administration

#### 4.3.10 Natural Monument

- In Ulsan Metropolitan City, which is adjacent to the project site, three natural monuments have been designated and managed according to Article 25 of the 「Cultural Heritage Protection Act」 .
- The closest natural monument to the project site is 'Ulju Mokdo Evergreen Forest', which is located about 56.2km to the west of the WT-2.

Table 4.3-13 Status of natural monument designation

Category	Name	Location	Quantity/Area	Date of designation	Separation distance(km)
Ulsan	Ginkgo tree in Guryang-ri, Ulju (Natural Monument No. 64)	860 Guryang-ri, Duseo-myeon, Ulju-gun	1	1962.12.07	75.5km to the west of the project site
	Ulju Mokdo Evergreen Forest (Natural Monument No. 65)	San 13, Bangdori, Onsan-eup, Ulju-gun	5,074m <sup>2</sup>	1962.12.07	56.2km to the west of the project site
	Azalea tree colony in Gajisan Mountain. (Natural Monument No. 462)	San 232-2, Deokhyeon-ri, Sangbuk-myeon, Ulju-gun	1,116,035m <sup>2</sup>	2005.08.19	86.4km to the west of the project site

Source: Our local cultural heritage, 2021, Cultural Heritage Administration

#### 4.3.11 Water Source Protection Area

- In Ulsan Metropolitan City, which is adjacent to the project site, it was investigated that two water supply protection zones were designated and managed in accordance with Article 7 of the 「Water Supply and waterworks Act」 .
- The water source protection area closest to the project site is the Hoeya Dam, which is located about 61.7km to the west of the WT-1.

**Table 4.3-14 Designation status of water source protection areas**

Category	Name of the protected area	Designated area	Date of designation	Separation distance(km)
Ulsan	Hoeya Dam	5.89	1991.06.08.	61.7km to west of the project site
	Daegok (Sayeon) Dam	5.19	2004.12.01.	70.0km to west of the project site

Data: Status of water source protection zones(September 2020), Ministry of Environment

#### 4.3.12 Waterfront Area

- In Ulsan Metropolitan City, which is adjacent to the project site, it was investigated that one waterfront area was designated and managed in accordance with Article 4 of the 「Act on Water Management and Resident Support of the Nakdong River System」 .
- The project site was found to be separated about 85.5km to the west of the water front area of Sangbuk-myeon, Ulju-gun (Only Icheon-ri and Sohori) and of the WT-1.

**Table 4.3-15 Designation status of waterfront areas**

Category	Range	Designated area	Designation date	Separation distance(km)
Ulsan	Sangbuk-myeon, Ulju-gun (only for Icheon-ri and Sohori-ri)	4.96km <sup>2</sup>	2002.09.18	85.5km to west of the project site

Data: Designation status of waterfront areas (As of the end of December, 2019), 2020, Ministry of Environment

#### 4.3.13 Forest Genetic Resources Protection Area

- According to Article 7 of the 「Forest Protection Act」 , 5 forest genetic resource protection areas have been designated and managed in Ulsan Metropolitan City, which is adjacent to the project site.
- The forest genetic resource protection area closest to the project site is 'Ulsan Daeunsan Wetland', which is 66.7 km to the west of the WT-2.

**Table 4.3-16 Designation status of forest genetic resources protection areas**

Category	Date of designation	Name of protected area	Location	Designation type	Separation distance(km)
Ulsan	2008.12.05	Cheonhwangsan	San 143-2, Icheon-ri, Sangbuk-myeon, Ulju-gun	Habitats of rare plant species	85.5km to the west of the project site
	2012.11.28	Cheonhwangsan	San 143-1, Icheon-ri, Sangbuk-myeon, Ulju-gun	Habitats of rare plant species	85.5km to the west of the project site
	2012.11.28	Cheonhwangsan	San 143-9, Icheon-ri, Sangbuk-myeon, Ulju-gun	Habitats of rare plant species	85.5km to the west of the project site
	2009.11.16	Ulsan Daeunsan Wetland	San 159-1, Unhwa-ri, Onyang-eup, Ulju-gun	Forest wetlands and valley streams in forests	66.7km to the west of the project site
	2017.06.30	Yeongchuksan	San 253, Gachon-ri, Samnam-myeon, Ulju-gun	Alpine region	82.2km to the west of the project site

Source: Designation Status of National Forest Genetic Resources Protection Area (Final) including tree species at the end of 2019, 2021, Korea Forest Service



#### 4.3.14 Ecological Change Observation Area

- According to Article 31 of the 「Natural Environment Conservation Act」, it was investigated that two areas to observe changes in the ecosystem are managed in Ulsan Metropolitan City, which is adjacent to the project site.
- Meanwhile, the closest area to observe ecological change to the project site is 'Gaji Mountain', which is about 73.4km to the west of the project site.

**Table 4.3-17 Designation status of areas to observe the change of ecosystem**

Category	Name of region	Location	Status	Separation distance(km)	Remarks
Ulsan	Gajisan	Sangbuk-myeon, Ulju-gun, Ulsan Sannae-myeon, Miryang-si, Gyeongsangnam-do	Excellent natural scenery, Various insect habitats (provincial parks)	73.4km to the west of the project site	Areas for odd years
	Shinbulsan	Samnam/Sangbuk-myeon, Ulju-gun, Ulsan	Hornbeam, Mongolian oak, etc. Colony formed	76.8km to the west of the project site	

Data: Status of area observed on the change(as of 21.5.), 2021, Nakdonggang River Basin Environmental Office

#### 4.3.15 Wintering Sites for Migratory Birds

- 「Status of Major Migratory Bird Arrival Sites, 2019, Ministry of Environment」 survey results show that there is a major migratory bird arrival site "Taehwagang River" designated by the Ministry of Environment in Ulsan Metropolitan City, adjacent to the project site.
- As a result of the January 2020 winter bird census by the Ministry of Environment, there are 5 winter migratory bird sanctuaries in Ulsan Metropolitan City where the project site is located.
- The survey on the appearance of endangered species found a total of 5 species in 'Hoeyaho (166)' and one species 'in Busan-Ulsan Coast (172)'. No endangered species were identified in 'Ulsan-Guryongpo Coast (173)', 'Ulsan Bay (174)' and 'Taehwa River (Myeongcheon Bridge-Samho Bridge)' (175).

**Table 4.3-18 Status of major migratory bird arrival sites designated by the ministry of environment of Ulsan metropolitan city**

Region	Location	Characteristics	Remarks
Taehwa River	Downstream of the Taehwagang River in Ulsan	Habitat of wild animals and plants such as migratory birds	Ecological landscape conservation area

Source: Status of habitats for migratory birds, 2019, Ministry of Environment

**Table 4.3-19 Species and number of individuals by area surveyed for migratory birds in winter**

No.	Area name	December 2019		January 2020		Endangered wild life identified		Separation distance(km)
		Number of species	number of individuals	Number of species	Number of individuals	Class I	Class II	
166	Hoyaho	28	1,013	27	1,256	1species	4species	63.0km to the west of the project site
172	Busan-Ulsan Coast	37	9,221	34	32,730	-	1species	52.1km to the west of the project site
173	<b>Ulsan-Guryongpo Coast</b>	<b>38</b>	<b>26,647</b>	<b>39</b>	<b>11,658</b>	-	-	<b>45.0km to the west of the project site</b>
174	Ulsan Bay	22	1,411	25	1,218	-	-	50.7km to the west of the project site
175	Taehwa River (Myeongcheon Bridge - Samho Bridge)	25	105,314	30	96,597	-	-	55.5km to the west of the project site

Source: Simultaneous Census of Algae in Winter 2019-2020, 2020, National Institute of Biological Resources

#### 4.3.16 Classification of Sea Areas Dividing Ecology

- According to the marine environment standard "Notice No. 2018-10 (Jan. 23, 2018) by the Ministry of Oceans and Fisheries" that is under Article 13 of the 「Marine Environment Conservation and Utilization Act」, the project site was investigated as belonging to the 'Open sea of the Korea Strait' and the 'Open sea of the East Sea', and the classification of sea areas is as follows.

**Table 4.3-20 Sea area classification dividing ecology**

Sea area name	Range of sea area
Open sea of the Korea Strait	The boundary between the coast of the Korea Strait and the open sea of the Korea Strait (33°51'7"N, 127°48'45"E), the boundary between the coast of the Korea Strait and the southern EEZ (33°51'22"N, 128°23'39"E), the boundary between the coast of the Korea Strait and the eastern EEZ (35°15'44"N, 130°41'17"E), the surface of the sea connecting the boundary(35°43'8"N, 129°44'22"E) between the coast of the Korea Strait and the open sea of the Korea Strait
Open sea of the East Sea	The boundary between the open sea of the east sea and the east coast(35°43'8"N, 129°44'22"E), the eastern EEZ of the open sea of the east sea(35°15'44"N, 130°41'17"E), the eastern side of the EEZ boundary(38°29'47"N, 134°23'37"E), the sea surface connecting the northern boundary of the eastern open sea and the eastern coast(38°37'13"N, 128°39'25"E)

Source: Marine Environment Standards (Ministry of Oceans and Fisheries Notice No. 2018-10), 2018.01. Ministry of Oceans and Fisheries



Figure 4.3-1 Sea Area Classification Map

#### 4.3.17 Ecological Zoning Map

- According to the Article 34 of the 「Natural Environment Conservation Act and the Article 24 and 25 of the same act, ecological zoning map is an index, indicating levels of the nationwide natural environment based on the ecological characteristics such as distribution status of endangered species or protected wildlife biofacies and landscape to utilize in the establishment of development plans, the use of the land and conserve the natural environment by evaluating the ecological value, naturalness, value of the landscape.
- Meanwhile, the ecological zoning map covers about 800 regions across the country (based on 1/25,000 topographic maps). It is not announced separately for island areas that are separated from the mainland due to geographical characteristics and for areas requiring protection and security of military facilities (civilian control areas, etc.).
- Therefore, it was confirmed that, among the facilities subject to this project, the area where the power generation complex and marine cables were located did not have any ecological zoning maps prepared and announced due to geographical factors, and the area where land substations and land cables were located was classified as a grade 3 area.

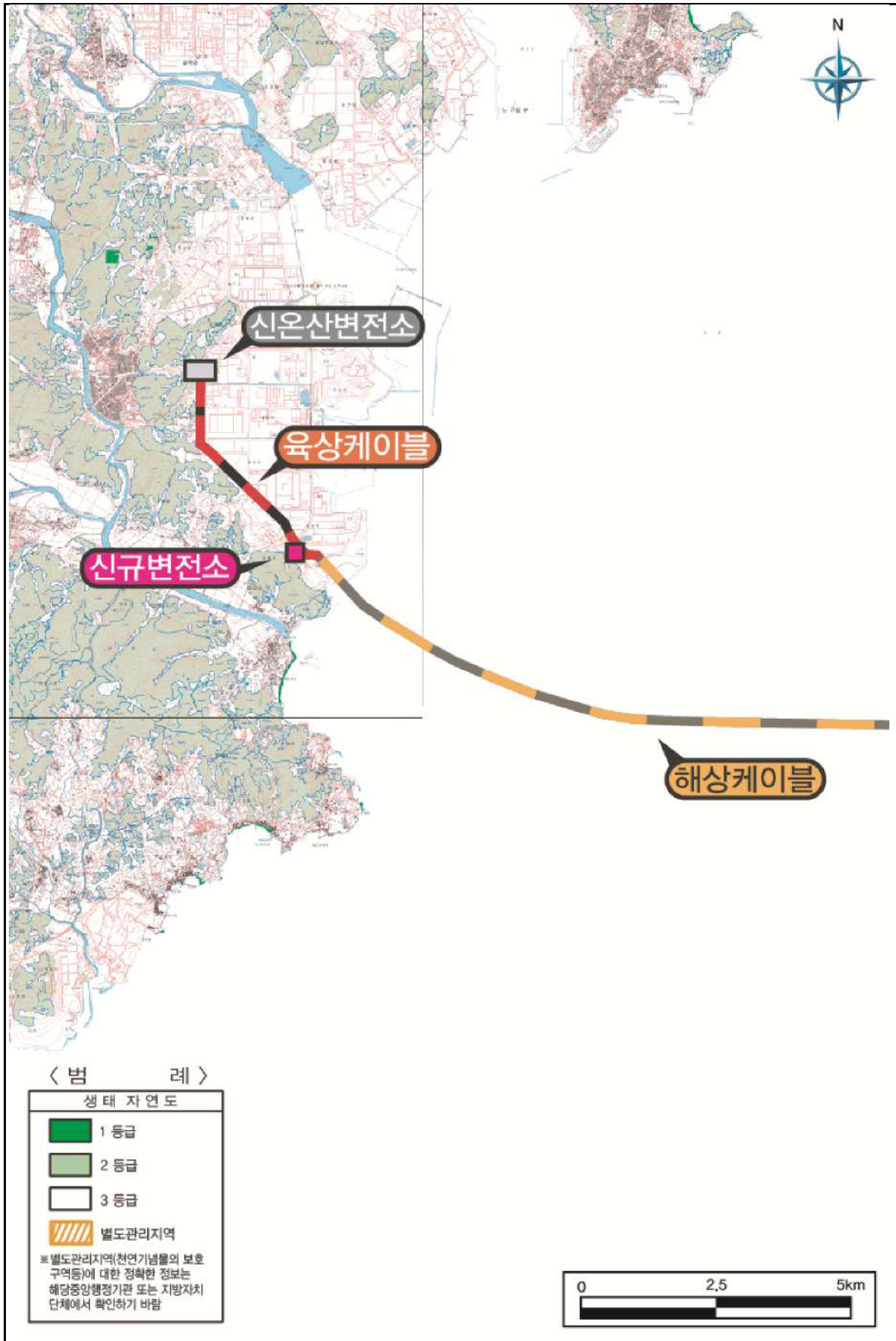


Figure 4.3-2 Ecological Zoning Map

**Table 4.3-21 Characteristics of ecological zoning map grade**

Grade of ecological zoning map	Content
Grade 1	<ul style="list-style-type: none"> <li>◦ Areas that become the main habitats, the seasonal home, and major ecological axis or major ecological channel of endangered wildlife(hereinafter referred to as "endangered wildlife") pursuant to Article 2-2 of the 「Wildlife Protection and Management Act」 .</li> <li>◦ Areas with excellent ecosystems or beautiful scenery</li> <li>◦ Areas of ecosystem located at the limits of the geographical distribution of living things or areas representing major types of vegetation</li> <li>◦ Regions, where biodiversity is particularly abundant and biological resources with high conservation value exist</li> <li>◦ Other areas with an ecological value equivalent to that of the first-class area, which meet the criteria set by the Presidential Decree.               <ul style="list-style-type: none"> <li>a. Natural native forest or nearby forests or alpine meadows</li> <li>b. Rivers, lakes, and estuaries close to the natural state</li> </ul> </li> </ul>
Grade 2	<ul style="list-style-type: none"> <li>◦ A region equivalent to the first-class area and valuable for future conservation or an area outside the first-class area and necessary for the protection of the first-class area</li> </ul>
Grade 3	<ul style="list-style-type: none"> <li>◦ Areas subject to development or use other than those classified as first grade, second grade, and separate management areas</li> </ul>
Separate management area	<ul style="list-style-type: none"> <li>◦ Areas of historical, cultural and scenic value among areas preserved under the provisions of other laws, or areas managed for urban green space conservation, etc. that fall under any of the following items               <ul style="list-style-type: none"> <li>a. Forest protection zone pursuant to Article 7-1 of the 「Forest Protection Act」 .</li> <li>b. Natural parks pursuant to Article 2-1 of the 「Natural Parks Act」 .</li> <li>c. Areas designated as natural monuments pursuant to Article 25 of the 「Cultural Heritage Protection Act」 (including such protected areas)</li> <li>d. A special wildlife protection zone pursuant to Article 27-1 of the 「Wildlife Protection and Management Act」 or a wildlife protection zone pursuant to Article 33-1 of the same Act.</li> <li>e. Fisheries resource protection zone pursuant to Article 40 of the 「National Land Planning and Utilization Act」 (excluding areas included in the sea)</li> <li>f. Wetland protection area pursuant to Article 8-1 of the 「Wetland Conservation Act」 (excluding coastal wetland protection area)</li> <li>g. Baekdudaegan Mountain Range protection area pursuant to Article 6 of the Act on the 「Protection of Baekdudaegan Mountain Range」 .</li> <li>h. Ecological and landscape conservation area pursuant to Article 12 of the Act.</li> <li>i. Ecological and landscape conservation area of a city/province pursuant to Article 24 of the Act.</li> </ul> </li> </ul>

Source: Article 34 of 「Natural Environment Conservation Act and Articles 24 and 25 of the Enforcement Decree of the same Act, and Environmental Geo-spatial Information Service of the Ministry of Environment

#### 4.3.18 Marine Eco-map

- In accordance with Article 12 of the 「Marine Ecosystem Conservation and Management Act」 and Article 6 of the Enforcement Decree of the same Act, the marine ecology map is used to establish a basic plan by evaluating the ecological and landscape values of marine ecosystems across the country. And it is an index indicating the grade according to the ecological characteristics such as the distribution status of marine protected organisms and marine landscape so that it can be considered in the case of development activities, etc. Reference was made to the “Marine Environment Information Map” presented in the Marine Environment Information Portal of the Ministry of Oceans and Fisheries.
- Meanwhile, according to the Ministry of Oceans and Fisheries Notice No. 2014-182, the marine ecological map targets coastal waters (within 12 nautical miles of territorial sea) nationwide in Korea. Therefore, it was confirmed that the planned project site was located outside the territorial waters limit line and there was no marine ecology map created or announced due to geographical factors, and the sea area near the shore crossing was found to be a first-class area.

Table 4.3-22 Marine ecology grade characteristics

Grade of marine eco-map	Content
Grade 1	a. Areas and sea areas that are the main habitats, spawning areas, and major travel routes of marine protected organisms. b. Areas and waters with particularly excellent marine ecosystems or particularly beautiful marine scenery. c. Areas located in the geographical distribution limit of living things, and regions and sea areas representing the type of marine vegetation. d. Regions and waters where marine biodiversity is particularly abundant and marine resources with high conservational value exist e. Other areas and sea areas with marine ecological value in accordance with the provisions from (a) to (d) that meet the standards prescribed by Presidential Decree. ◦ Area designated as a marine protected area ◦ Area designated as a city/province marine protection zone
Grade 2	◦ Areas and sea areas equivalent to the first-class area and with future marine ecological conservation value, or areas and sea areas outside of the first-class area and necessary for the protection of the first-class area
Grade 3	◦ As areas not classified as first-class areas, second-class areas and separate management areas, areas and sea areas subject to development or use
Separate management area	◦ An area designated by Presidential Decree as a region of scenic value among those preserved under the provisions of other Acts. a. Environmental conservation waters b. Wetland protection area (limited to coastal wetlands) c. Fisheries resources preservation area d. Natural parks (limited to places corresponding to the ocean) e. Areas designated as natural monuments and their protected areas (limited to those corresponding to the ocean) f. Wildlife special protection area (limited to those corresponding to the ocean)

Source: 1. 「Conservation and Management of Marine Ecosystems Act」 Article 12  
 2. Ministry of Oceans and Fisheries Notice 2014-182  
 3. Marine Environment Information Map, Ministry of Oceans and Fisheries Marine Environment Information Portal (<https://www.meis.go.kr/portal/main.do>)



Figure 4.3-3 Marine Ecology Map



#### 4.3.19 Specific Sea Areas for Traffic Safety

- It was investigated that a specific traffic safety area was designated in accordance with Article 10 of the 「Maritime Safety Act」 in Ulsan Metropolitan City adjacent to the planned project site. On the other hand, it was investigated that the traffic safety specific waters was located about 35.8km to west of the project site.

**Table 4.3-23 Designation status of specific sea area for traffic safety**

Gate gory	Range of specific waters	Separation distance
Ulsan	With 35° 24 ' 37 " north latitude and 129° 27 ' 52 " east longitude, the sea area formed by the arc and Ulsan Port's port line with a radius of 6.0 miles	36.3km to the west of the project site

Source: Enforcement Decree of the Maritime Safety Act [Annex 1], 2021, Ministry of Legislation

#### 4.3.20 The Area of Low Sulfur Oil Supplied and the Range of Facility to Use

- Ulsan Metropolitan City, adjacent to the project site, is an area where diesel with a sulfur content of 0.1% or less and heavy oil(LSWR) with a sulfur content of 0.3% or less is to be used in accordance with the Enforcement Decree of the 「Air Environmental Conservation Act」 [Attachment 10-2].

**Table 4.3-24 The supply area of low sulfuric oil and the range of facilities to be used.**

1. Low-sulfur oil supply/use area and use period	
<b>a. Diesel (sulfur content less than 0.1%): nationwide</b>	
Note) In addition to diesel, kerosene, by-product fuel oil No. 1 (kerosene type) according to related laws such as the 「Enforcement Decree of the Petroleum and Alternative Fuel Business Act」, or the 「Waste Control Act」, etc, refined fuel oil regenerated by high-temperature pyrolysis or vacuum distillation can be used.	
<b>b. Heavy oil</b>	
1) Areas for supply and use of heavy oil (including LSWR) with a sulfur content of 0.3% or less.	
<b>By city and province</b>	<b>Supply and use area</b>
Metropolitan city	Seoul, Busan, Daegu, Incheon, <b>Ulsan</b> , Gwangju, Daejeon
Note) 1. In addition to heavy oil (including LSWR) with a sulfur content of 0.3% or less, by-product fuel oil No. 2 (medium type) under related laws such as the 「Enforcement Decree of the Petroleum and Alternative Fuel Business Act」 may be used.	
2. Seogwipo-si Namjeju thermal power plant must use heavy oil with a sulfur content of 0.5% or less until 2013 and heavy oil with a sulfur content of 0.3% or less from January 1, 2014.	

Source: Enforcement Decree of 「Clean Air Conservation Act」 [Attachment Table 10-2], Ministry of Environment

**4.3.21 Areas for Application of Discharging Standards (Wastewater)**

- Among the facilities subject to this project, Onsan-eup in Ulju-gun where the land transmission line and the onshore substation are located were found to be falling under “B” area according to the ‘regional designation status for the application of discharging standards (wastewater)’.

**Table 4.3-25 Regional designation status for the application of discharging standards (wastewater)**

Region		Clean area	A	B
Administrative district				
Ulsan	Jung-gu	-	-	All areas
	Ulju -gun	Dudong-myeon, Duseo-myeon, Ungchon-myeon (Tongcheon-ri), Cheongnyang-myeon (Jung-ri), Sangbuk-myeon (Icheon-ri)	Samnam-myeon, Samdong-myeon, Onyang-myeon, Seosaeng-myeon, Eonyang-eup, Ungchon-myeon (excluding Tongcheon-ri), Cheongnyang-myeon (excluding Ulsan Petrochemical Complex among Jung-ri and Sangnam-ri), Sangbuk-myeon (excluding Icheon-ri)	All areas except "Clean" areas and "A" areas

Note) The standards for allowing water pollutants to be discharged are divided into clean, "A" and "B" areas depending on the region.

- Clean area: Areas that are recognized as requiring conservation of water quality of the very good (Ia) level of environmental standards of water quality and aquatic ecosystems
- ‘A’ area: Areas affecting the water quality of water bodies that are considered as having to conserve water quality of good (Ib) and slightly good (II) grades of environmental standards for water quality and aquatic ecosystem
- ‘B’ area: Areas that may affect the water quality of water bodies that are recognized as having to conserve water quality of normal (III), slightly poor (IV), and poor (V) grades of environmental standards of water quality and aquatic ecosystem

Source: Regional regulations designated for the application of discharge standards (wastewater), Ministry of Environment Notice No. 2007-107

**4.3.22 Special Countermeasure Area**

- It was investigated that Ulsan Metropolitan City, adjacent to the project site, was designated as a special countermeasure area for atmospheric preservation pursuant to Article 38 of the 「Framework Act on Environmental Policy」. Meanwhile, it was investigated that the special countermeasure area for atmospheric conservation was located about 45.7km to west of the project site.

**Table 4.3-26 Designation status of areas for special measures to conserve air quality**

Category	Countermeasure area	Separation distance(km)
Ulsan	Ulsan, Mipo, and Onsan National Industrial Complexes	About 45.7km to west of the project site

Source: 1. Designation of areas to take special measures for air conservation and comprehensive measures notification for air pollution reduction in the same Area, Ministry of Environment Notice No.2018-23, 2018  
 2. Environmental Spatial Information Service (<http://egis.me.go.kr/map>) /map.do?type=envi



#### 4.3.23 Coastal Total Pollutant Control Area

- It was investigated that Ulsan Metropolitan City, adjacent to the project site, has been designated as "Ulsan coastal special control area for total pollutant management" in accordance with Article 15 of the 「Marine Environment Management Act」 and the Ministry of Oceans and Fisheries Directive No. 404.
- Meanwhile, it was investigated that the "coastal special control area for total pollutant management" is located about 54.1km to the west of the project site.

**Table 4.3-27 Designation status of total coastal pollution control zone in Ulsan coastal special management waters**

Sea Area Control	Among the waters of the Ulsan Coastal Special Management Area announced pursuant to Article 15-1-2 of the 「Marine Environment Management Act」, it is a sea area surrounded by the line connecting the ending point of sunkyung sea wall of Ulsan New Port(129°22 ' 22.0646 " , 35°27 ' 4.5063 " ) located in Sunam-dong, Namgu of Ulsan and the right upper ending point located in 938, samam-li, Onsan-eup(129°22 ' 24.3107 " , 35°26 ' 50.1569 " ) and Ulsan coastline.	
Basin control	Nam-gu	Part of Gosa-dong, Duwang-dong, part of Bugok-dong, part of Sanggae-dong, part of Seonam-dong, Seongam-dong, and Sinjeong
	Ulju-gun	Onsan-eup Bangdo-ri, part of Sanam-ri, Cheoyong-ri, part of Haknam-ri, part of Hwasan-ri, part of Gaegok-ri of Cheongnyang-myeon, part of Deokha-ri, Sangnam-ri, Yongam-r

Data: Coastal pollution load management zone (Basic policy for the management of coastal pollution load in special management waters) [Attachment 1], the Ministry of Oceans and Fisheries Directive No. 404.

#### 4.3.24 Air Control Zone

- It was investigated that the entire Ulsan Metropolitan City where the project site is located was designated as an air management area in accordance with Article 1 of the 「Special act on the improvement of air control in air control zone」 and Article 2 of the Enforcement Decree of the same Act.

**Table 4.3-28 Designation status of air control area**

Zone	Classified region	Regional range
Southeast area	Busan	whole area
	Daegu	whole area
	<b>Ulsan</b>	<b>whole area</b>
	Gyeongsangbuk-do	Pohang-si, Gyeongju-si, Gumi-si, Yecheon-si, Gyeongsan-si, Chilgok-gun
	Gyeongsangnam-do	Changwon-si, Jinju-si, Gimhae-si, Yangsan-si, Goseong-gun, Hadong-gun

Data: Special act on the improvement of air control in air control zone[Attachment 1]

#### 4.3.25 Malodor Control Area

- In Ulsan Metropolitan City, which is adjacent to the project site, it was investigated that 4 odor management areas were designated and managed in accordance with Article 6 of the 「Malodor Prevention Act」 .

**Table 4.3-29 Designation status of malodor control areas**

Category		Designation Date	Region designated	Area (1,000m <sup>2</sup> )	Remarks
Ulsan	Nam-gu, Buk-gu, Dong-gu, Ulju-gun	'05.03.17	Ulsan Mipo National Industrial Complex	46,271	strict standards
	Ulju-gun		Onsan National Industrial Complex	24,659	strict standards
			'09.09.02	San 405-3, 1476-1, Hajam-ri, Samdong-myeon, Ulju-gun	10
		'14.02.06	ilwon, Joil-ri, Samdong-myeon, Ulju-gun (11 lots)	20	-

Source: Status of malodor control areas, 2021, Ministry of Environment

#### 4.3.26 Total Water Pollution Load Management

- In Ulsan Metropolitan City, which is adjacent to the project site, part of Sangbuk-myeon, Ulju-gun, is found to fall under section A of Miryang according to Article 4 of the 「Water Environment Conservation Act」 and Article 9 of the 「Act on Water Management and Resident Support in the Nakdong River basin」 .
- Meanwhile, it was investigated that the project site was located on the public waters, so it did not fall under the total water pollution management basin.

**Table 4.3-30 Administrative districts by Nakdonggang River water system unit basin (Ulsan Metropolitan City)**

Unit basin	Location
Milyang A	Icheon-ri, Sangbuk-myeon, Ulju-gun, Ulsan.
Milyang B	Soho-ri, Sangbuk-myeon, Ulju-gun, Ulsan.

Source: Status of administrative districts by Nakdonggang River water system basin, 2007.07, Ministry of Environment

**Table 4.3-31 Current status of water pollution control basin**

Unit basin	Target water quality	Basin area(km <sup>2</sup> )	Number of sub-basin	Load allocation (kg/day)
Milyang A	1.4	883.75	21	6,175
Milyang B	2.0	530.47	9	6,347

Source: Status of administrative districts by Nakdonggang River water system basin, 2007.07, Ministry of Environment

#### 4.3.27 Training Zone

- It was investigated that the "R-119" naval training area was designated in Ulsan Metropolitan City adjacent to the project site in accordance with Article 12 of the 「Act on Marine Spatial Planning and Management」 .
- Meanwhile, it was investigated that part of the project site violates the 'R-119' naval training area.

**Table 4.3-32 Designation status of training zone**

Category	Name of a training zone	Remarks
Navy training zone	R-119 zone (offshore Ulsan, East Sea)	Altitude less than 2,500ft

Data: 2020 Yearbook of notice to mariners, 2021, National Oceanographic Research Institute

### 4.4 Environmental Standard

#### 4.4.1 Marine Environment Standard

- According to Article 13 of the 「Marine Environment Conservation and Utilization Act」, “Ministry of Oceans and Fisheries Notice No. 2018-10 (Jan. 23, 2018)” and Article 12 of the 「Framework Act on Environmental Policy」 and Article 2 of the Enforcement Decree of the same Act [Attachment 1], the marine environment standards are as follows.

#### A. Environmental Standards for Seawater Quality

##### 1) Living environment standards

**Table 4.4-1 Standards for living environment in the sea area**

Item	Hydrogen ion concentration(pH)	Total coliform group (Total coliform count 100mL)	Solvent extraction oil (mg/L)
Standard	6.5 - 8.5	Less than 1,000	Less than 0.01

##### 2) Ecology-based seawater quality standard

**Table 4.4-2 Water quality index.**

Grade	Water Quality Index
I (Very good)	Less than 23
II (Good)	24 - 33
III (Normal)	34 - 46
IV (Poor)	47 - 59
V (Very poor)	More than 60

**Table 4.4-3 Water quality index**

**(calculation by using scores for each item of the water quality index)**

<p>WQI(Water Quality Index)</p> $= 10 \times [\text{Low-rise oxygen saturation(DO)}]$ $+ 6 \times [(\text{Phytoplankton concentration(Chl-a)} + \text{Transparency(SD)})/2]$ $+ 4 \times [(\text{Dissolved inorganic nitrogen concentration(DIN)} + \text{Dissolved inorganic phosphorous concentration(DIP)})/2]$
--

**Table 4.4-4 Score for each item of the water quality index**

Score per item	Item	
	Chl-a(μg/L), DIN(μg/L), DIP(μg/L)	DO(Saturation,%), Transparency(m)
1	Less than reference value	More than reference value
2	<reference value+0.10×reference value	>reference value-0.10×reference value
3	<reference value+ 0.25×reference value	>reference value- 0.25×reference value
4	<reference value+ 0.50×reference value	>reference value- 0.50×reference value
5	≥reference value + 0.50×reference value	≤reference value- 0.50×reference value

Note) As for the reference value for each item, the reference value for each sea area of the water quality index item is applied.

**Table 4.4-5 Reference value of the water quality index by each sea area**

Ecological zone \ Target item	Chl-a (μg/L)	Bottom layer DO (Saturation,%)	Surface DIN (μg/L)	Surface DIP (μg/L)	Transparency(m)
East Sea	2.1	90	140	20	8.5
Korea Strait	6.3		220	35	2.5
Southwest sea area	3.7		230	25	0.5
Central West Sea	2.2		425	30	1.0
Jeju	1.6		165	15	8.0

Note) Bottom layer water: Water layer up to 1m from the bottom of the sea floor

### 3) Marine ecosystem protection standards

**Table 4.4-6 Marine ecosystem protection standards (unit: μg/L)**

Heavy metals	Copper	Lead	Zinc	Arsenic	Cadmium	Hexavalent chromium (Cr <sup>6+</sup> )	Mercury	Nickel
Short-term standard*	3.0	7.6	34.0	9.4	19.0	200.0	1.8	11
Long-term standards**	1.2	1.6	11.0	3.4	2.2	2.8	1.0	1.8

Note 1) \* Short-term standard: Application by comparing with the one-time observational value

2) \*\* Long-term standard: Application by comparing with the annual average value (data surveyed for minimum 4 seasons)

3) Mercury and nickel are not included in the marine ecosystem protection standards according to Article 12-2 of the 「Framework Act on Environmental Policy」 and Article 2[Annex 1] of the Enforcement Decree of the same Act.

### 4) Human health protection standards

**Table 4.4-7 Human health protection standards**

Grade	Item	Standard (mg/L)	Item	Standard (mg/L)
All sea areas	Hexavalent chromium (Cr <sup>6+</sup> )	0.05	Diazinon	0.02
	Arsenic (As)	0.05	Parathion	0.06
	Cadmium (Cd)	0.01	Malathion	0.25
	Lead (Pb)	0.05	1.1.1 Trichloroethane	0.1
	Zinc (Zn)	0.1	Tetrachlorethylene	0.01
	Copper (Cu)	0.02	Trichlorethylene	0.03
	Cyan (CN)	0.01	Dichloromethane	0.02
	Mercury (Hg)	0.0005	Nenzene	0.01
	Polyoclinated Biphenyl (PCB)	0.0005	Phenol	0.005
				Anionic surfactant (ABS)

**Table 4.4-8 Seabed sediment standards among marine environmental standards (unit: mg/kg)**

Marine environment standards	Arsenic	Cadmium	Chrome	Copper	Mercury	Nickel	Lead	Zinc
Threshold Effects Level(TEL)	14.5	0.75	116	20.6	0.11	47.2	44.0	68.4
Probable Effects Level(PEL)	75.5	2.72	181	64.4	0.62	80.5	119	157

Note) 1. Threshold Effects Level(TEL): Concentration predicted to have little negative effect

2. Probable Effects Level(PEL): Concentration with a very high probability of developing negative ecological effects

## Firefly Floating Offshore Wind Power Project

### 3. Application method

- For As, Cd, Cr, Hg, Ni, Pb, directly compares the sample and each reference concentration
- Cu and Zn are compared to the reference concentration after Li corrects the measured concentration by the particle size

### 4. How to correct with Li

- Cu concentration with correction by Li =  $((\text{Cu concentration of the sample}-4.10) \times 11.9)+4.10$

Li concentration of the sample-21.2

- Zn concentration with the correction on the particle size= $((\text{Zn concentration of the sample}-30.4) \times 11.9)+30.4$

Li concentration of the sample-21.2

- If the Li concentration of the sample is 33.1 ppm or less and if the particle size correction concentration shows a negative value, direct comparison with the caution criteria and the control criteria without a separate particle size correction

## B. Marine Environment Standards by Sea Area (Sea water quality)

- The water quality goals to be achieved by each sea area by 2026 are as follows, and the sea area management agency must implement necessary measures to achieve the water quality goals by sea area

**Table 4.4-9 Marine environment standards by sea area**

Target water quality (WQI)	Applicable sea area	Remarks
Grade I	Hampyeongman Bay, Doamman Bay, Deukryangman Bay, Gamakman Bay, Seomjingang River Estuary, Nakdonggang River Estuary, Taehwagang River Estuary, Open Sea of Central West Sea, Southwest Coastal Sea Area, Open sea of Southwest Waters, Jeju Coast, Jeju Open Sea, Korean Strait Coast, Korean Strait Open Sea, Eastern Coast, Eastern Open Sea	16
Grade II	Han River Estuary, Garorim Bay, Cheonsu Bay, Geum River Estuary, Yeongsan River Estuary, Yeoja Bay, Jinhae Bay, Jinhae Bay, Yeongil Bay, Yeongdeok Osipcheon Estuary, Wangpicheon Estuary, Samcheok Osipcheon Estuary, Gangneung Namdaecheon Estuary, Yangyang Namdaecheon Estuary, West Sea Central Coast	15
Grade III	-	
Grade IV	-	
Grade V	-	

### 4.4.2 Air Quality Standard

- According to Article 12-2 of the 「Framework Act on Environmental Policy」 and Article 2 [Attachment 1] of the Enforcement Decree of the same Act, below is the national air environment standard.

**Table 4.4-10 Air quality standard**

Item	Standard	National standard	Method
Sulfurous acid gas (SO <sub>2</sub> )	Annual average 24hour average 1hour average	Less than 0.02ppm Less than 0.05ppm Less than 0.15ppm	Pulse U.V. Fluorescence Method
Carbon monoxide (CO)	8hour average 1hour average	Less than 9ppm Less than 25ppm	Non-Dispersive Infrared Method
Nitrogen dioxide (NO <sub>2</sub> )	Annual average 24hour average 1hour average	Less than 0.03ppm Less than 0.06ppm Less than 0.10ppm	Chemiluminescent Method
Fine dust (PM-10)	Annual average 24hour average	Less than 50 $\mu\text{g}/\text{m}^3$ Less than 100 $\mu\text{g}/\text{m}^3$	$\beta$ Ray Absorption Method
Fine dust (PM-2.5)	Annual average 24hour average	Less than 15 $\mu\text{g}/\text{m}^3$ Less than 35 $\mu\text{g}/\text{m}^3$	Weight concentration method or equivalent automatic measurement method
O <sub>3</sub>	8hour average 1hour average	Less than 0.06ppm Less than 0.1ppm	U.V. Photometric Method
Pb	Annual average	Less than 0.5 $\mu\text{g}/\text{m}^3$	Atomic Absorption Spectrophotometry
Benzen	Annual average	Less than 5 $\mu\text{g}/\text{m}^3$	Gas Chromatography

Note) 1. For the 1-hour average, the 999th percentile value must not exceed the standard, and the 8-hour and 24-hour average values must not exceed the 99th percentile value.

2. Fine dust (PM-10) refers to dust with a particle size of 10 $\mu\text{m}$  or less.

3. Fine dust (PM-2.5) refers to dust with a particle size of 2.5 $\mu\text{m}$  or less.

Source: Article 12-2 of the 「Environmental Policy Framework Act」 and Article 2 of the Enforcement Decree of the same Act [Attachment 1]

#### 4.4.3 Noise Environment Standards

- In accordance with Article 12 of the 「Framework Act on Environmental Policy」 and the Enforcement Decree of the same Act [Annex 1], below is the environmental standard regarding noise.

**Table 4.4-11 Noise environment standards**

Region	Applicable target area	Noise environment standards(Leq dB(A))	
		Day(06:00~22:00)	Night(22:00~06:00)
General area	“A” area	50	40
	“B” area	55	45
	“C”area	65	55
	“D”area	70	65
Roadside area	“A” and “B” area	65	55
	“C”area	70	60
	“D”area	75	70

Remarks)

1. Classification of applicable areas by regional classification is as follows.

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- A. "A" area
- 1) Green areas under Article 36 (1) -1- (d) of the 「National Land Planning and Utilization Act」
  - 2) Conservation management area under Article 36- (1)- 2- (a) of the 「National Land Planning and Utilization Act」
  - 3) Agricultural areas and natural environment conservation areas under Article 36- (1)- 3 and 4 of the 「National Land Planning and Utilization Act」
  - 4) Dedicated residential area under Article 30-1-(a) of the 「Enforcement Decree of the National Land Planning and Utilization Act」
  - 5) An area within 50 meters from the site boundary of a general hospital under Article 3-(2)-3 -(e) of the 「Medical Act」
  - 6) Areas within 50 meters of the school site boundary under Article 2 of the 「Elementary and Secondary Education Act」 and Article 2 of the 「Higher Education Act」
  - 7) An area within 50 meters from the site boundary of a public library under Article 2-4 of the 「Library Act」
- B. "B" area
- 1) Production management area under Article 36-(1)-2-(b) of the 「National Land Planning and Utilization Act」
  - 2) General and quasi-residential areas under Article 30-1- (b) and (c) of the 「Enforcement Decree of the National Land Planning and Utilization Act」
- C. "C" area
- 1) Commercial areas under Article 36-(1)-1-(b) of the 「National Land Planning and Utilization Act」 and planned management areas under 2-(c) of the same paragraph
  - 2) Semi-industrial areas under Article 30-3-(c) of the 「Enforcement Decree of the National Land Planning and Utilization Act」
- D. "D" area
1. Exclusive industrial zones and general industrial zones under Article 30-3-(a) and (b) of the Enforcement Decree of the 「National Land Planning and Utilization Act」
  2. "Road" means a road with two or more lanes of a certain width necessary for the safe and smooth driving of automobiles (excluding two-wheeled vehicles) in one line.
  3. This noise environment standard does not apply to aircraft noise, railway noise and construction work noise.

Source: 「Environmental Policy Framework Act」 Article 12 and Enforcement Decree of the same Act [Attachment 1]

### 4.4.4 Vibration Regulation Standards

- According to Article 21-(2) of the 「Noise and Vibration Control Act」 and [Annex 8] of the enforcement regulations of the same law, it is presented in Table 4.4-12.

**Table 4.4-12 Regulation standards for vibration**

By time slot Target area	Vibration environment standard (dB(V))	
	Day time (06:00~22:00)	Night Time (22:00~06:00)
A. Schools, general hospitals, and public libraries located in community zones, residential development promotion districts, tourism and recreation development promotion districts, natural environment conservation areas, and other areas among residential areas, green areas, and management areas	Less than 65	Less than 60
B. other areas	Less than 70	Less than 65

Remarks) 1. Vibration measurement and evaluation standards are in accordance with the environmental pollution process test standards for fields falling under Article 6-1-2 of the 「Environmental Testing and Inspection Act」

2. Classification of target areas is in accordance with the 「National Land Planning and Utilization Act」 .

3. The regulatory standards are applied based on the target area affected by the daily life vibrations.

4. The vibration regulation standard of a construction site is corrected to the regulatory standard of +10 dB when the working time for using machines and equipment subject to pre-reporting for a specific construction is less than 2 hours a day and +5 dB when it exceeds 2 hours and less than 4 hours.

5. In case of blasting vibration, +10dB is corrected to the regulatory standard only during the daytime.

Source: 「Noise and Vibration Control Act」 Article 21-2 and enforcement regulations of the same act [Attachment 8]

### 4.5 Status of Facilities that Cause Environmental Damage

**4.5.1 Environmental Pollutant Discharge Facility**

- In Ulsan Metropolitan City, adjacent to the project site, a total of 2,590 environmental pollutant emission facilities are located, with 1,171 for air quality, 1,184 for water quality, and 235 for noise and vibration.

**Table 4.5-1 Current status of environmental pollutant discharge facilities (unit: location)**

Category	Total	Air quality					Water quality					Noise & Vibration		
		Subtotal	Type1	Type2	Type3	Type4	Type5	Subtotal	Type1	Type2	Type3		Type4	Type5
Ulsan	2,590	1,171	102	50	65	413	541	1,184	44	22	55	70	993	235

Source: 2020 Ulsan Metropolitan City Statistical Yearbook, 2021, Ulsan Metropolitan City Hall

**4.5.2 Road**

- The total roads of Ulsan Metropolitan City adjacent to the project site are 2,415.01 km (pavement rate 98.90%), 1,594.14 km of Gu/gundo (pavement rate 98.40%), 547.38 km of special metropolitan cities (100.00% pavement rate), and 162.42 km of general national roads (100.00% pavement rate). ), highway 93.81km (pavement rate 100.00%), and provincial roads 17.26km (pavement rate 100.00%) according to the survey.

**Table 4.5-2 Road status**

Category		Total	Highway	National highway	Special metropolitan city road	Local road	Gu/Gun road
Ulsan	Open(km)	2,259.39	93.81	157.26	487.03	17.26	1,504.03
	Paved(km)	2,235.53	93.81	157.26	487.03	17.26	1,480.16
	Pavement rate(%)	98.90	100.00	100.00	100.00	100.00	98.40
	Non-paved(km)	23.864	-	-	-	-	23.86
	Non-opened(km)	155.619	-	5.16	60.34	-	90.12
	Total(km)	2,415.01	93.81	162.42	547.38	17.26	1,594.14

Source: Road Status by City/Province, 2021, National Statistical Portal

**4.5.3 Industrial Complex**

- In Ulsan Metropolitan City, which is adjacent to the project site, a total of 30 locations were found: 2 national industrial complexes, 24 general industrial complexes, and 4 agricultural industrial complexes.

**Table 4.5-3 Status of industrial and agricultural industrial complexes**



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Category		Name of the complex	Designated area (1,000m <sup>2</sup> )	Managing area(1,000m <sup>2</sup> )	Operating company	Status
Ulsan	Nation	Ulsan & Mipo	48,777	45,595	645	Under construction
		Onsan	25,939	20,513	263	Under construction
	General	Maegok	556	556	55	Completed
		Modulization	863	863	27	Completed
		Ehwa	694	694	-	Under construction
		Jungsan	128	128	18	Completed
		Gilcheon	1,516	1,513	81	Under construction
		Shin	2,423	2,404	100	Completed
		Shin	1,585	1,585	67	Completed
		Ulsan (Free Trade)	838	819	33	Completed
		Waji	126	125	26	Completed
		Ulsan High Tech Valley	1,939	1,939	6	Under construction
		Bongye	255	255	7	Completed
		KCC Ulsan	1,165	1,135	18	Under construction
		Jeon-eup	72	72	2	Completed
		Bancheon	1,373	1,373	49	Completed
		Jakdong	150	150	-	Under construction
		Zhongshan 2nd	364	364	36	Completed
		Maegok 2	77	77	9	Completed
		Maegok 3	158	158	18	Completed
		Ulsan Techno	1,287	1,287	10	Completed
		GW	450	448	-	undeveloped
		Mobile Tech Valley	314	314	-	undeveloped
		Energy fusion	1,017	1,017	3	Completed
		Bangki	136	136	-	undeveloped
	Cheongyang	201	200	-	undeveloped	
	Agriculture and industry	Dalcheon	260	260	91	Completed
Dudong		70	70	4	Completed	
Duseo		123	123	14	Completed	
Sangbuk		139	139	12	Completed	

Source: Statistical Status of National Industrial Complex(Q1 of 2021), 2021, Korea Industrial Complex Corporation

### 4.6 Current Status of Major Facilities Subject to Protection

#### 4.6.1 Water Intake Station

- It was investigated that there is one water intake station in Ulsan Metropolitan City, which is adjacent to the project site.

**Table 4.6-1 Current status of water intake station**

Category	Name	Capacity(m <sup>3</sup> /day)	Average daily water intake(m <sup>3</sup> /day)	Source	Supply water purification plant
Ulsan	Hoeya Dam	270,000	187,318	Hoeyaho(including Nakdonggang River)	Hoeya water purification plant

Source: 2019 Water Supply Statistics, 2021, Ministry of Environment

#### 4.6.2 Water Purification Plant

- It was investigated that there are two water purification plants in Ulsan Metropolitan City, which is adjacent to the project site.

**Table 4.6-2 Status of water purification plants**

Category	Name	Capacity of designed facility (m <sup>3</sup> /day)	Application method of water purification	Water supply area
Ulsan	Chunsang	280,000	Activated carbon filtration	Jung-gu, Buk-gu and parts of Ulju-gun
	Hoeya	270,000	Activated carbon filtration	Nam-gu, Dong-gu, Buk-gu and parts of Ulju-gun

Source: 2019 Water Supply Statistics, 2021, Ministry of Environment

#### 4.6.3 Cultural Heritage

- In Ulsan Metropolitan City, which is adjacent to the project site, a total of 150 cultural heritages were identified, including 123 locally-designated cultural assets and 27 nationally-designated cultural assets.

**Table 4.6-3 Status of nationally designated cultural properties (Unit: Piece)**

Category	Subtotal	National treasure	Treasure	Historical and scenic spots	Natural monument	National intangible cultural property	National folklore	Nationally registered cultural property
Ulsan	27	2	8	6	3	-	2	6

Source: Our local cultural heritage, 2021, Cultural Heritage Administration

**Table 4.6-4 Status of locally designated cultural heritage and cultural heritage data (Unit: Piece)**

Category	Subtotal	Tangible cultural properties of cities & provinces.	Intangible cultural properties of cities & provinces	Monument of cities & provinces	Folklore of cities & provinces	Cultural Heritage registered in the city & provinces	Cultural property data
Ulsan	123	37	6	46	1	-	33

Source: Our local cultural heritage, 2021, Cultural Heritage Administration

#### 4.7 Current Status of Facilities Environmental Consideration Required

#### 4.7.1 Educational Facilities

- It was found that 452 educational facilities are located in Ulsan Metropolitan City, which is adjacent to the project site.

**Table 4.7-1 Status of educational facilities (Unit: Location)**

Category		Total	Kindergarten	Elementary School	Middle School	High school	Special school	Junior college	University	Graduate school	Etc
Ulsan	Number of schools	452(1)	198	120(1)	64	58	4	3	2	2	1
	Number of classes	6,903	936	2,946	1,265	1,369	156	37	45	143	6

Note) ( ) is the number of branch schools, not included in the total number

Source: 2020 Ulsan Metropolitan City Statistical Yearbook, 2021, Ulsan Metropolitan City Hall

#### 4.7.2 Medical Facilities

- It was found that 1,368 medical facilities are located in Ulsan Metropolitan City where the project site is located.

**Table 4.7-2 Status of medical facilities (Unit: Location)**

Category		Total	General Hospital	Hospital	Clinic	Special hospital	Nursing hospital	Dental hospital	Oriental medicine Hospital	Oriental medicine clinic	Maternity hospital	Affiliated clinic	Public Health Center	Health Center Branch	Health clinic
Ulsan	No. of hospitals	1,368	8	42	602	-	42	388	3	274	-	9	5	8	11
	No. of beds	15,109	3,043	3,886	952	-	7,023	13	169	23	-	-			

Note) Medical facilities with smaller sizes than health centers are excluded. In hospitals, military hospitals were excluded. And mental hospitals, tuberculosis hospitals and leprosy hospitals are included in special hospitals.

Data : 2020 Ulsan Metropolitan City Statistical Yearbook, 2021, Ulsan Metropolitan City Hall

#### 4.8 Status of Environmental Basic Facilities

##### 4.8.1 Public Sewage Treatment Facilities

- It was found that 16 public sewage treatment facilities are located in Ulsan Metropolitan City, which is adjacent to the project site.

**Table 4.8-1 Status of public sewage treatment facilities**

Category	Name	Location	Capacity (m <sup>3</sup> /day)	Discharge amount (m <sup>3</sup> /day)	Treatment
Ulsan	Yongyeon	360 Yongyeon-ro, Nam-gu (600-4 Hwangseong-dong)	250,000.0	232,929.1	Others, standard activated sludge method DeNiPho
	Bangeogin	3-7 Mipo-dong, Dong-gu	100,000.0	90,889.3	MLE
	Nongso	190, Shirye Saeteo-gil, Buk-gu	100,000.0	89,856.9	MSBR
	Kangdong	615-1 Sanha-dong, Buk-gu	5,000.0	4,268.4	SBR

Table 4.8-1 Continue

Category	Name	Location	Capacity (m <sup>3</sup> /day)	Discharge amount (m <sup>3</sup> /day)	Treatment
Ulsan	Onsan	229-1, Dangwol-ri, Onsan-eup, Ulju-gun	120,000.0	107,597.8	DeNiPho
	Eonyang	43-66 Gusu-gil, Ulju-gun	60,000.0	34,287.3	DNR
	Gulhwa	16-1, Gulhwa-ri, Beomseo-eup, Ulju-gun	47,000.0	39,515.9	MSBR
	Hoeya	808, Daedae-ri, Ungchon-myeon, Ulju-gun	32,000.0	30,278.4	Others, standard activated sludge method Symbio
	Sinam	501 Sinam-ri, Seosaeng-myeon, Ulju-gun	460.0	408.6	KSBNR
	Bonggye	1358-3, Bonggye-ri, Dudong-myeon, Ulju-gun	400.0	370.2	KSMBR
	Nasa	72 Nasa-ri, Seosaeng-myeon, Ulju-gun	290.0	258.7	KSBNR
	Ongok town	610-1, Myeongsan-ri, Seosaeng-myeon, Ulju-gun	290.0	0.0	ESSA
	Nasaiju	459 Nasa-ri, Seosaeng-myeon, Ulju-gun	250.0	221.8	KSBNR
	Cheokgwa	1157-66, Cheokgwa-ri, Beomseo-eup, Ulju-gun	230.0	204.4	SNR
	Silli	739-4 Sinam-ri, Seosaeng-myeon, Ulju-gun	200.0	190.1	KSBNR
Soho	249-1 Sohori, Sangbuk-myeon, Ulju-gun	100.0	92.9	SNR	

Source: 2019 Sewerage Statistics, 2020, Ministry of Environment

#### 4.8.2 Excreta Treatment Facility.

- In Ulsan Metropolitan City, which is adjacent to the project site, it was investigated that there is one excreta treatment facility with a capacity of 380.0 m<sup>3</sup>/day and a throughput of 244.4 m<sup>3</sup>/day.

**Table 4.8-2 Status of excreta treatment facilities**

Category	Name	Location	Capacity (m <sup>3</sup> /day)	Through put (m <sup>3</sup> /day)	Method	Operation starting date
Ulsan	Onsan Water Quality Improvement Office (Excretion treatment facility)	118, Dangwol-ro, Onsan-eup, Ulju-gun	380.0	244.4	DeNiPho	2014.04.17

Source: 2019 Sewerage Statistics, 2020, Ministry of Environment

#### 4.8.3 Waste Treatment Facilities

##### A. Reclamation Facility

- In Ulsan Metropolitan City where the project site is located, a total of 3 reclamation facilities were identified: 1 public and 2 private facilities.

**Table 4.8-3 Status of Landfill Facilities.**

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Category		Location	Total landfill area (m <sup>2</sup> )	Total landfill capacity (m <sup>3</sup> )	Residual landfill capacity (m <sup>3</sup> )	period of use	Plan for use after landfill
Ulsan	Public landfill	521, Cheoyong-ro (extended)	158,500	2,615,000	1,632,724	2012 - At the end of the landfill	Green area, etc
	Private landfill	2, Sinnyecheon-ro (Gosa-dong)	13,850	87,931	3,899	1991 - At the end of the landfill	-
		55, Wonbong-ro, Onsan-eup	34,410	317,265	27,386	2000 - at the end of the landfill	-

Source: 2019 National Waste Generation and Treatment Status, 2020, Ministry of Environment

### B. Incineration Facility

- In Ulsan Metropolitan City where the project site is located, it was investigated that there are two incineration facilities: one public incineration facility and one self-incineration facility.

**Table 4.8-4 Status of incineration facilities**

Category		Location	Target waste	Capacity (ton/day)	Way of incineration	Way of operation	2019 Throughput (ton/day)
Ulsan	Public incineration	524, Cheoyong-ro	Domestic waste	650	High temperature incineration	Continuous	175,884
			General industrial waste	300	General incineration	Continuous	100,281
	Private incineration	140, Bangeojinsunhwando-ro	used oil, used paper, waste wood, waste synthetic resin, waste synthetic rubber, waste synthetic fiber	400	General incineration	Continuous	47,390

Source: 2019 National Waste Generation and Treatment Status, 2020, Ministry of Environment

### C. Other Waste Treatment Facilities

- In Ulsan Metropolitan City where the project site is located, a total of 11 other waste treatment facilities were identified, including 3 public treatment facilities and 8 private treatment facilities.

**Table 4.8-5 Status of other waste disposal facilities**

Category		Location	Name of facility(Company)	Waste to be treated	Capability (ton/day)	Throughput in 2019 (ton/year)
Ulsan	Public facilities for other wastes	360 Yongyeon-ro	Food recycling facility (Anaerobic digestion)	Daily waste	40	2,162
					180	23,644
		118, Dangwol-ro, Onsan-eup	Food recycling facility (Anaerobic digestion)	Daily waste	150	45,163
					113-11, Hwasan-ro, Onsan-eup	Screening facility. (Transshipment, compression, crushing, volume reduction facilities, etc.)
	10	2,142				
	1	21				
	Private facilities for other wastes	83, Jangsaengpo-ro (Yecheon-dong)	Songwon Industrial Co., Ltd.	Sewage sludge	16	2,815
					322-9 Sangan-dong	Homeplus Stores Co., Ltd. Ulsan Bukgu branch.
		54B 1L Jinjang-dong	Megamart Shinseondowon Mall	Waste paper		
					700 Yeompo-ro	Hyundai Motor Co., Ltd.
		706 Yeompo-ro	Hyundai Steel Co., Ltd.	Waste paper		
					64 Jinjang Distribution Road	Lotte Shopping Co., Ltd. Jinjang branch of Lotte Mart.
		78-12 Jinjang Distribution Road	Costco Korea Co., Ltd.	Waste paper		
					36 Chaekgol-gil	Shinyoung Co., Ltd.

Source: 2019 National Waste Generation and Treatment Status, 2020, Ministry of Environment

#### 4.9 Status of Fishing Rights

- According to the survey on the status of fishing rights, no fishing rights exist near the project site. And based on the investigation of fishing rights in Ulju-gun of Ulsan near the shore crossing, a total of 61 fishing rights exist: 29 cases of aquaculture, 8 cases of village fishing, and 24 cases of zoning fishing.

Table 4.9-1 Status of fishing rights in Ulju-gun

Category	Type of fishery	License No.	Area(ha)	Period	Kind
Licensed fishery	Seaweed aquaculture	Ulju-gun No. 57	6.00	2015.12.14.~2025.12.13.	Seaweed, etc.
		Ulju-gun No. 47	2.10	2011.11.04.~2021.11.03.	Seaweed, etc.
		Ulju-gun No. 18	5.00	2012.12.28.~2022.12.27.	Kelp, etc.
		Ulju-gun No. 62	16.89	2017.11.17.~2027.11.16.	Seaweed, etc.
		Ulju-gun No. 42	1.71	2013.06.14.~2023.06.13.	Seaweed, etc.
		Ulju-gun No. 43	19.99	2017.12.23.~2027.12.22.	Seaweed, etc.
		Ulju-gun No. 49	10.00	2013.12.17.~2023.12.16.	Seaweed, etc.
	Shellfish aquaculture	Ulju-gun No. 50	19.80	2013.12.30.~2023.12.29.	Abalone, oysters, mussels, etc.
		Ulju-gun No. 30	5.00	2016.12.26.~2026.12.25.	Abalone, etc.
		Ulju-gun No. 64	6.00	2018.10.01.~2028.09.30.	Abalone, conch, other shellfish
Aquaculture including fish	Ulju-gun No. 19	5.00	2012.12.29.~2022.12.27.	Fish	
	Ulju-gun No. 65	2.00	2018.10.01.~2028.09.30.	Fish	

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Table 4.9-1 Continue

Category	Type of fishery	License No.	Area(ha)	Period	Kind
Licensed fishery	Complex aquaculture	Ulju-gun No. 48	5.00	2012.01.18.~2022.01.17.	Seaweed, kelp, etc.
		Ulju-gun No. 15	7.00	2012.02.19.~2022.02.18.	Seaweed, abalone, etc.
		Ulju-gun No. 17	3.00	2012.07.25.~2022.07.24.	Seaweed, abalone, etc.
		Ulju-gun No. 28	5.04	2016.06.16.~2026.06.15.	Seaweed, kelp, etc.
		Ulju-gun No. 36	7.80	2017.09.11.~2027.09.10.	Seaweed, kelp, etc.
		Ulju-gun No. 37	6.00	2017.10.17.~2027.10.16.	Seaweed, kelp, etc.
		Ulju-gun No. 39	6.00	2015.12.14.~2025.12.13.	Seaweed, kelp, etc.
		Ulju-gun No. 41	6.00	2014.11.17.~2024.11.16.	Seaweed, kelp, etc.
		Ulju-gun No. 63	3.00	2017.07.25.~2027.07.24.	Seaweed, abalone, etc.
		Ulju-gun No. 66	3.00	2018.10.01.~2028.09.30.	Seaweed, roar, etc.
		Ulju-gun No. 67	5.00	2018.10.01.~2028.09.30.	Seaweed, roar, etc.
		Ulju-gun No. 68	16.72	2021.02.20.~2031.02.19.	Seaweed, abalone, etc.
		Ulju-gun No. 69	6.00	2021.03.02.~2031.03.01.	Seaweed, kelp, etc.
		Ulju-gun No. 70	4.80	2021.05.22.~2031.05.21.	Seaweed, kelp, etc.
		Ulju-gun No. 71	5.55	2021.06.15.~2031.06.14.	Seaweed, abalone, etc.
	Cooperative aquaculture	Ulju-gun No. 59	9.45	2018.01.21.~2028.01.20.	Abalone, etc.
		Ulju-gun No. 54 (Limited)	9.60	2020.01.07.~2021.08.06.	Abalone, sea cucumber, etc.
	Village aquaculture	Ulju-gun No. 58	95.66	2018.01.21.~2028.01.20.	-
		Ulju-gun No. 60	9.29	2018.01.21.~2028.01.20.	-
		Ulju-gun No. 61	17.80	2018.01.21.~2028.01.20.	-
		Ulju-gun No. 51	25.01	2014.02.07.~2024.02.26.	-
		Ulju-gun No. 52	4.00	2014.05.02.~2024.05.01.	-
		Ulju-gun No. 56	19.00	2014.11.03.~2024.11.02.	-
Ulju-gun No. 55		12.70	2014.11.13.~2024.11.12.	-	
Ulju-gun No. 53(Limited)	23.80	2020.01.07.~2021.08.06.	-		
Prmi-tted fishery	Stationary net fishery (Zoning fishery)	No. 2019-00001	5.00	2019.01.01.~2023.12.31.	-
		No. 2019-00002	5.00	2019.01.01.~2023.12.31.	-
		No. 2019-00003	5.00	2019.01.01.~2023.12.31.	-
		No. 2019-00004	5.00	2019.01.01.~2023.12.31.	-
		No. 2019-00005	5.00	2019.01.01.~2023.12.31.	-
		No. 2019-00006	5.00	2019.01.01.~2023.12.31.	-
		No. 2019-00007	5.00	2019.01.01.~2023.12.31.	-
		No. 2019-00008	5.00	2019.01.01.~2023.12.31.	-
		No. 2019-00009	5.00	2019.01.01.~2023.12.31.	-
		No. 2019-00010	5.00	2019.01.01.~2023.12.31.	-
		No. 2019-00011	5.00	2019.01.01.~2023.12.31.	-
		No. 2019-00012	5.00	2020.04.03.~2023.12.31	-

Table 4.9-1 Continue

Category	Type of fishery	License No.	Area(ha)	Period	Kind
Permitted fishery	Net fishing (Zoning fishing)	No. 2019-00013	5.00	2019.01.01.~2023.12.31.	-
		No. 2019-00014	2.50	2020.04.01.~2023.12.31.	-
		No. 2019-00015	5.00	2019.01.01.~2023.12.31.	-
		No. 2019-00016	2.50	2019.01.01.~2023.12.31.	-
		No. 2019-00017	5.00	2019.01.01.~2023.12.31.	-
		No. 2019-00018	5.00	2019.01.01.~2023.12.31.	-
		No. 2019-00019	5.00	2019.01.01.~2023.12.31.	-
		No. 2019-00020	5.00	2019.01.01.~2023.12.31.	-
		No. 2019-00021	5.00	2019.01.01.~2023.12.31.	-
		No. 2019-00022	2.50	2019.01.01.~2023.12.31.	-
		No. 2019-00023	5.00	2019.01.01.~2023.12.31.	-
		Beach seine fishing (Zoning fishing)	No. 2019-00001	104.00	2019.01.01.~2023.12.31.

Source: Ulju-gun Fishing Zone Status, 2021, Ulju-gun Office

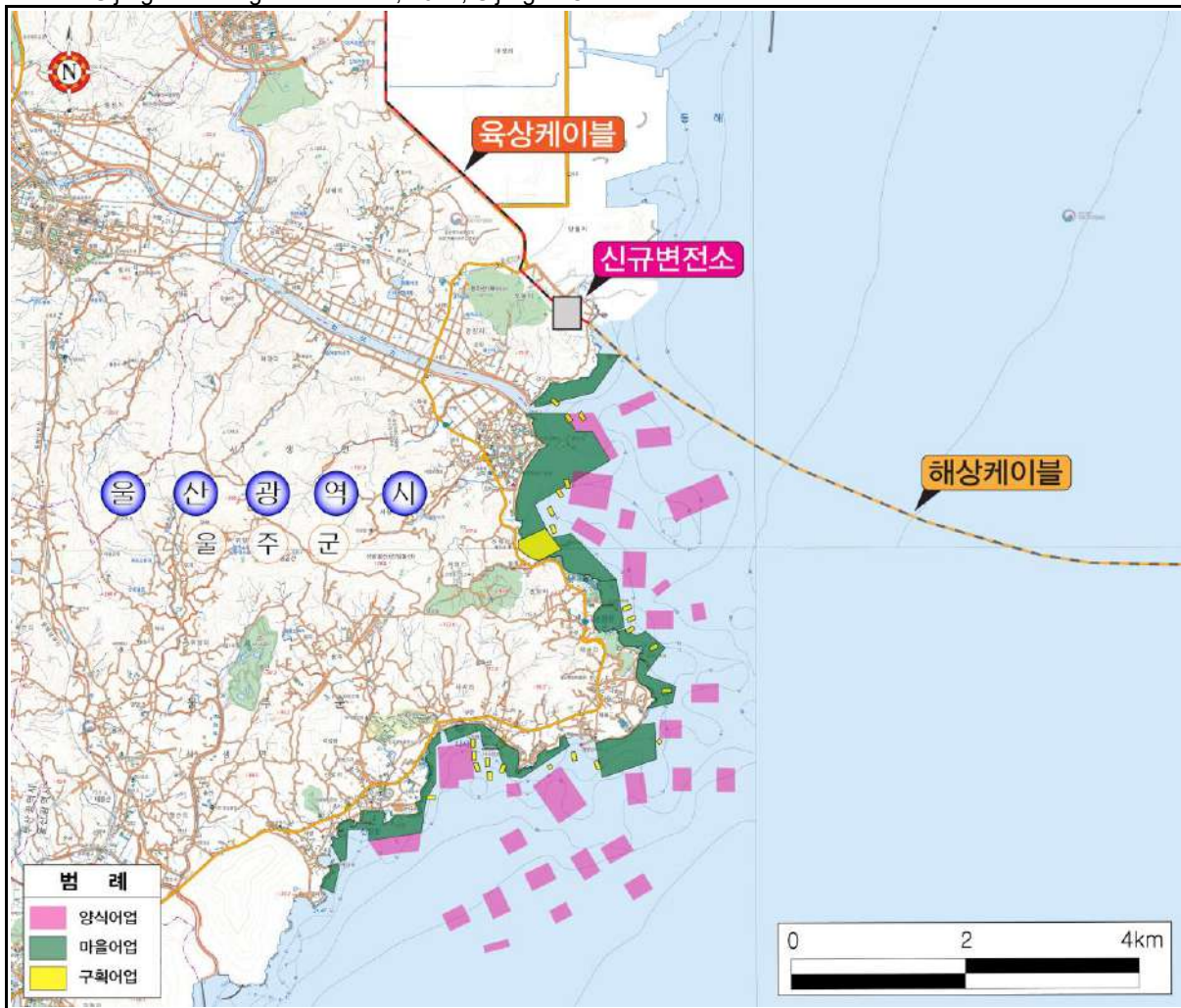
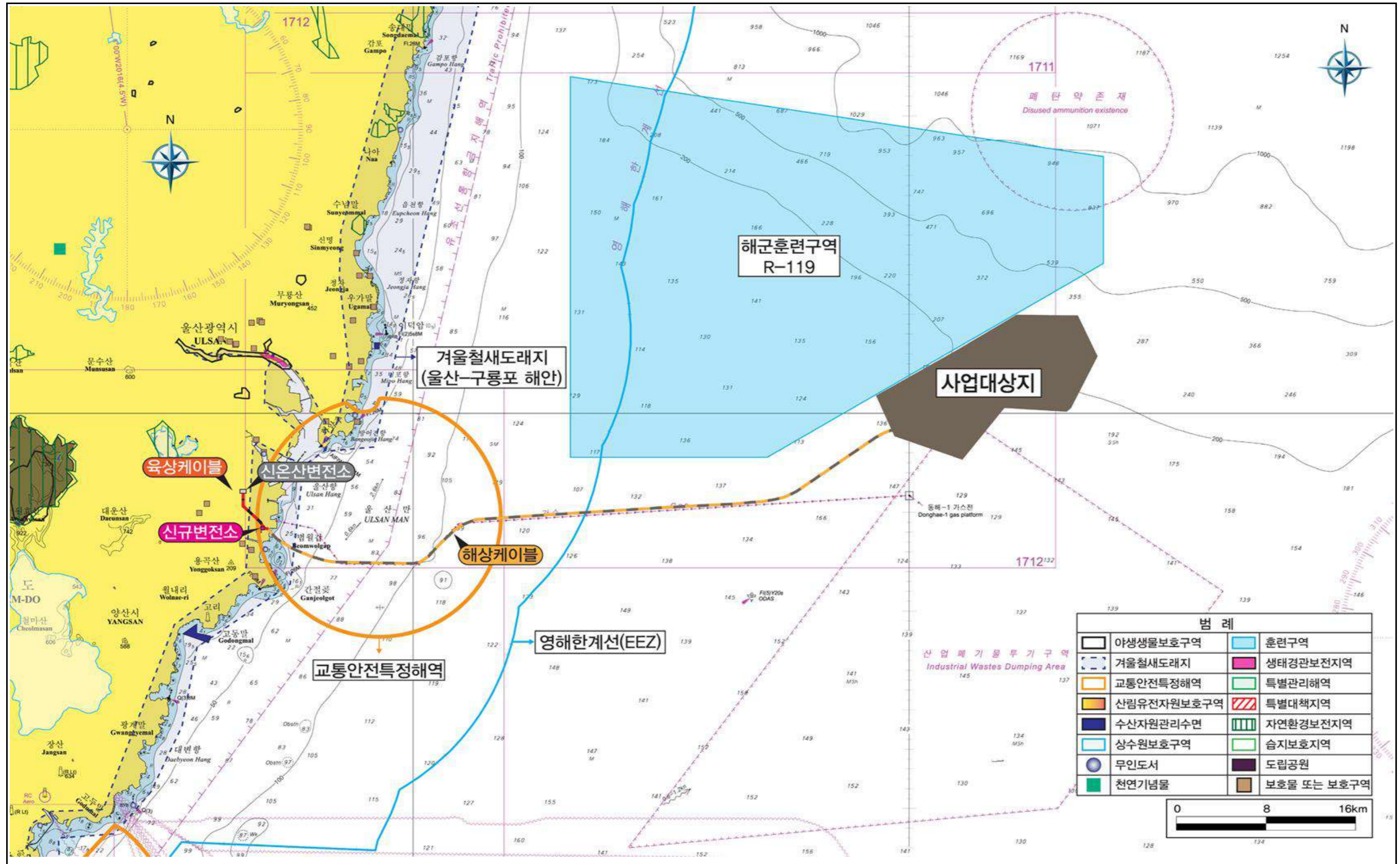


Figure 4.9-1 Status of Fishing Right







Picture 4-10 Map on the Overall Status of the Region

## **Ch. 5**

# **Setting of Evaluation Items & Scope**

- 5.1 Extraction of factors  
environmentally influencing**
- 5.2 Designation of evaluation items**
- 5.3 Establishment of evaluation scope & method  
for each evaluation item**
- 5.4 Environmental status survey & planning**



## Chapter 5. Setting of Evaluation Items and Scope

### 5.1 Extraction of Factors Environmentally Influencing

- Environmental influencing factors were established in consideration of items expected to affect the natural ecological environment, atmospheric environment, water environment, land environment, living environment, and social and economic environment at each stage of the project process, especially under construction or operation.
- Environmental impact factors consider the characteristics of the then project and target area, and 「Study on the Environmental Impact Assessment Methods for Tidal and Offshore Wind Power Projects: II. Offshore Wind Power Project, 2012, Korea Environmental Policy and Evaluation Institute」 and 「Study on Strategic Environmental Evaluation Methods for Offshore Energy Development: I. Focusing on Site Estimation of Offshore Wind Power Projects, 2014, Korea Environmental Policy and Evaluation Institute」 Therefore, important factors were extracted among the long-term and short-term environmental factors.

**Table 5.1-1 Extraction of environmental impact factors**

Category	Confinal	Environmental influencing factors
Construction phase (during construction)	<ul style="list-style-type: none"> <li>◦ Wind power generator</li> <li>◦ Transmission line</li> <li>◦ Substation</li> <li>◦ Field office</li> </ul>	<ul style="list-style-type: none"> <li>◦ Occurrence of the suspended sediment due to the offshore construction</li> <li>◦ Occurrence of scattering dust, exhaust gas, waste oil, noise &amp; vibration, etc. due to the operation of construction equipment</li> <li>◦ Generation of sewage and waste due to the input of construction manpower</li> </ul>
Operational phase (during operation)	<ul style="list-style-type: none"> <li>◦ Wind power generator operation</li> </ul>	<ul style="list-style-type: none"> <li>◦ Changes in seawater flow due to the suspended sediments arising out of offshore wind power</li> <li>◦ Changes in the movement of algae due to offshore structures</li> <li>◦ Generation of underwater noise &amp; electromagnetic fields due to generator operation</li> </ul>

### 5.2 Designation of Evaluation Items

- The evaluation items for this project are set by referring to the 「Regulations on the preparation of environmental impact assessment, etc. (Ministry of Environment Notification No. 2020-289), December 12, 2020, Ministry of Environment」 and environmental impact assessment reports of similar projects(offshore wind power).
- Key evaluation items: 9 items, general evaluation items: 8 items, excluded items: 6 items

## Firefly Floating Offshore Wind Power Project

**Table 5.2-1 Setting results of evaluation items**

Category	Evaluation Item
Key item(9)	◦ Terrestrial fauna & flora, marine fauna & flora, natural environment assets, air quality, greenhouse gases, marine environment, topography & geology, noise & vibration, radio wave interference
General item(7)	◦ Meteorology, water quality, land use, soil, eco-friendly resource circulation, landscape, industry
Excluded item(7)	◦ Bad odor, repair/slucice gates, amusement, sanitation/public health, sunlight disturbance, population, housing

**Table 5.2-2 Designation results & reasons for detailed evaluation items**

Evaluation item		Reason for selection	Item setting
Natural ecology environment	Terrestrial flora & fauna	◦ Review the impact of project implementation on terrestrial ecosystems (including birds)	●
	Marine flora & fauna	◦ Review of the impact on marine animals and plants due to the spread of floating soil during offshore construction	●
	Natural environment assets	◦ Review the impact on natural environment assets around the project district	●
Atmospheric environment	Weather	◦ Use of atmospheric modeling basic data, etc.	○
	Air quality	◦ Air pollutants generated by using equipment during the construction	●
	Bad odor	◦ No impact on bad odor due to the nature of the business	-
	Greenhouse gas	◦ Changes in GHG emissions due to the operation of construction equipment and wind power generators	●
Aquatic environment	Water quality	◦ Contaminants generated by earth works during construction	○
	Hydrogeology	◦ Change in the exclusion system	○
	Marine environment	◦ The spread of suspended sediment due to maritime construction ◦ Changes in seawater flow due to the installation of offshore wind floating structure	●
Land environment	Land use	◦ Changes in the use of land and marine space due to the project.	○
	Soil	◦ The operation of construction equipment causes soil pollution factors	○
	Topography & Geology	◦ Changes in submarine topography occurred due to the installation of structures	●
Living environment	Eco-friendlv. Resource circulation	◦ Sewage and household waste generated according to hiring personnel durina construction. ◦ Waste oil caused by the operation of construction equipment.	○
	Noise & vibration	◦ Effect of noise and vibration from the input of construction equipment during the construction. ◦ The effect of (underwater) noise caused by wind turbines during operation.	●
	Recreation	◦ There is no effect on entertainment accordina to the business characteristics and the project location (EEZ sea area)	-
	Landscape	◦ Changes in the ocean landscape according to the wind power generator structure.	○
	Hygiene & public health	◦ There is no effect on hygiene and public health due to the nature of the project.	-
	Radio wave interruption	◦ Effect of electromagnetic waves on the operation of power generation facilities during operation.	●
	Interference on the sunlight	◦ Due to the nature of the business, there is no interference on sunlight	-
Society & Economy & Environment	Population	◦ No impact on the population due to the nature of the business.	-
	Housing	◦ There is no effect on housing due to the nature of the project.	-
	Industry	◦ Changes in industrial activities such as reduction of fishing area due to the project.	○

Note) Key evaluation items:●, General evaluation item: ○

5.3 Establishment of Evaluation Scope and Method for Each Evaluation Item

- The scope of evaluation and evaluation method for each evaluation item selected during the environmental impact assessment according to the implementation of this project are as follows

Table 5.3-1 Evaluation scope and evaluation method for each environmental impact assessment item

Evaluation items		Scope of evaluation	Evaluation method	
			Current status survey	Prediction & evaluation
Natural ecology environment	Terrestrial flora & fauna	Project site and surrounding areas(Bird) (within 0.5km radius of the land area)	<ul style="list-style-type: none"> <li>◦ Survey contents: Survey on the current status of the terrestrial ecosystem                             <ul style="list-style-type: none"> <li>- Flora, vegetation, fauna, inland water organism)</li> <li>- Bird status survey (Migratory birds, legally protected species, etc.)</li> </ul> </li> <li>◦ Survey method: Field survey</li> </ul>	<ul style="list-style-type: none"> <li>◦ Survey on the status of the terrestrial ecosystem</li> <li>◦ Review of bird movement and habitats changes due to the installation of structures</li> </ul>
	Marine flora & fauna	Project site and surrounding areas (within a 5km radius of the sea area)	<ul style="list-style-type: none"> <li>◦ Survey Contents: Survey on the current status of the marine ecosystem                             <ul style="list-style-type: none"> <li>- Animal and phytoplankton, fish roe and fingerling, sub-tidal benthic animals, intertidal benthic animals, fish and aquatic resources, marine mammals, etc.</li> </ul> </li> <li>◦ Survey period: Four-season survey</li> <li>◦ Survey method: Field survey</li> </ul>	<ul style="list-style-type: none"> <li>◦ Identify the habitats environment of marine animals and plants, and quantitatively predict the impact and extent of the impact on the ecosystem due to the spread of suspended sediment during the project</li> </ul>
	Natural environment Asset	Project site and surrounding areas	<ul style="list-style-type: none"> <li>◦ Survey content: Current status of natural environment assets</li> <li>◦ Survey method: Field research and literature research</li> </ul>	<ul style="list-style-type: none"> <li>◦ Prediction of distribution and impact of natural environment assets through the existing data and field research</li> </ul>
Atmospheric environment	Weather	Weather station near the project site	<ul style="list-style-type: none"> <li>◦ Survey content: Meteorological conditions in the project district</li> <li>◦ Survey method: Data analysis from nearby meteorological stations</li> </ul>	<ul style="list-style-type: none"> <li>◦ Analysis of meteorological data for the past 10 years at the weather station near the project district</li> </ul>
	Air quality	Project site and surrounding areas	<ul style="list-style-type: none"> <li>◦ Survey contents: Air quality survey</li> <li>◦ Survey period: Four-season survey</li> <li>◦ Survey method: Field survey</li> </ul>	<ul style="list-style-type: none"> <li>◦ Current survey results and the prediction &amp; analysis of the impact on the air quality of nearby temperature facilities following the air pollutants generated under construction(AERMOD)</li> </ul>
	Greenhouse gas	Project site and surrounding areas	<ul style="list-style-type: none"> <li>◦ Survey content: Greenhouse gas emission status, status survey per the emission source</li> <li>◦ Survey method: Analysis on the statistical data</li> </ul>	<ul style="list-style-type: none"> <li>◦ Making methods to predict the increase and decrease of greenhouse gases &amp; how to reduce</li> </ul>
Water environment	Water quality	Project site & Surrounding water system	<ul style="list-style-type: none"> <li>◦ Survey content: Source emitting pollutants &amp; the status of water system</li> <li>◦ Survey method: Field research and literature research</li> </ul>	<ul style="list-style-type: none"> <li>◦ Prediction &amp; evaluation of the impact on the surrounding water system</li> <li>◦ Analysis of the amount of soil loss and sewage generation by the operation of the field office during construction.</li> </ul>

## Firefly Floating Offshore Wind Power Project

Table 5.3-1 Table Continue

Evaluation items		Assessment scope	Assessment method	
			Field survey	Prediction/Assessment
Water quality	Marine environment	Project site and surrounding area (within a 5km radius of the sea area)	<ul style="list-style-type: none"> <li>◦ Content: Survey on the current status of sea water quality, sea bottom quality, and marine physics (Tide, wave, continuous tidal current, continuous suspended sediment, distribution of spatial suspended sediment, marine bottom material survey)</li> <li>◦ Survey period: Four-season survey</li> <li>◦ Survey method: Field survey</li> </ul>	<ul style="list-style-type: none"> <li>◦ Review the results of analysis on the current status of the marine environment in the waters surrounding the project district</li> <li>◦ Predicting the impact on the marine environment through numerical model experiments</li> <li>◦ Seawater flow, sediment movement, suspended sediment spread, wave deformation experiments, etc.</li> </ul>
Land environment	Land use	Project site and surrounding areas	<ul style="list-style-type: none"> <li>◦ Content: Land use status by usage and category</li> <li>◦ Survey method: business plan analysis, literature data analysis</li> </ul>	<ul style="list-style-type: none"> <li>◦ Review of compatibility with higher-level plans (coastal management area plan, basic electricity supply &amp; demand plan, etc.)</li> </ul>
	Soil	Project site and surrounding areas	<ul style="list-style-type: none"> <li>◦ Content: Identify the status of soil contamination</li> <li>◦ Period: Four-season survey</li> <li>◦ Method: Field survey &amp; literature research</li> </ul>	<ul style="list-style-type: none"> <li>◦ Identification of the possibility of soil pollution caused by the project implementation and establishment of reduction measures</li> </ul>
	Topography, geology	Project site and surrounding areas	<ul style="list-style-type: none"> <li>◦ Content: Topography &amp; geology conditions, soil properties, ground safety, status of conservation areas</li> <li>◦ Method: Field survey</li> </ul>	<ul style="list-style-type: none"> <li>◦ Prediction of topographical changes according to project implementation</li> <li>◦ Estimation construction volume and establishing a supply &amp; demand plan for materials.</li> </ul>
Living environment	Environment-friendly resource circulation	Site subject to the project	<ul style="list-style-type: none"> <li>◦ Contents: Amount of waste generated and status of treatment</li> <li>◦ Method: Field survey &amp; literature research</li> </ul>	<ul style="list-style-type: none"> <li>◦ Estimating the amount of waste generated during construction and operation by characteristics</li> <li>◦ Prediction of sewage and waste oil occurring during construction</li> </ul>
	Noise & Vibration	Project site and surrounding areas (within a 5km radius of the sea area)	<ul style="list-style-type: none"> <li>◦ Contents: Survey on the sources of noise &amp; vibration, survey on the status of noise &amp; vibration, survey on the status of underwater noise</li> <li>◦ Period: Four-season survey - Underwater noise: Four-season survey</li> <li>◦ Method: Field survey</li> </ul>	<ul style="list-style-type: none"> <li>◦ Predicting the impact of operation of construction equipment during construction</li> <li>◦ Predicting the impact of operation of power generation facilities during operation</li> <li>◦ Composite noise calculation formula and point sound source distance attenuation formula applied</li> </ul>
	Landscape	Project site and surrounding areas	<ul style="list-style-type: none"> <li>◦ Content: Survey on the current situation of the landscape</li> <li>◦ Method: Field survey and landscape simulation prediction</li> </ul>	<ul style="list-style-type: none"> <li>◦ Identification of landscape elements in the project area and surrounding areas</li> <li>◦ Prediction of landscape changes due to project implementation</li> </ul>
	Radio wave interference	Project site and surrounding areas (Areas around the transmission line)	<ul style="list-style-type: none"> <li>◦ Content: Survey on the cases of damage due to radio waves occurred from similar projects</li> <li>◦ Method: Literature review and business plan analysis</li> </ul>	<ul style="list-style-type: none"> <li>◦ Prediction and review of the effects of electromagnetic fields due to the operation of power generation facilities</li> </ul>
Social economic environment	Industry	Project site and surrounding areas	<ul style="list-style-type: none"> <li>◦ Content: Identify fishing practices in the project district and surrounding areas</li> <li>◦ Method: Literature data analysis</li> </ul>	<ul style="list-style-type: none"> <li>◦ Review the impact of fishing practices</li> </ul>



5.4 Environmental Status Survey and Planning

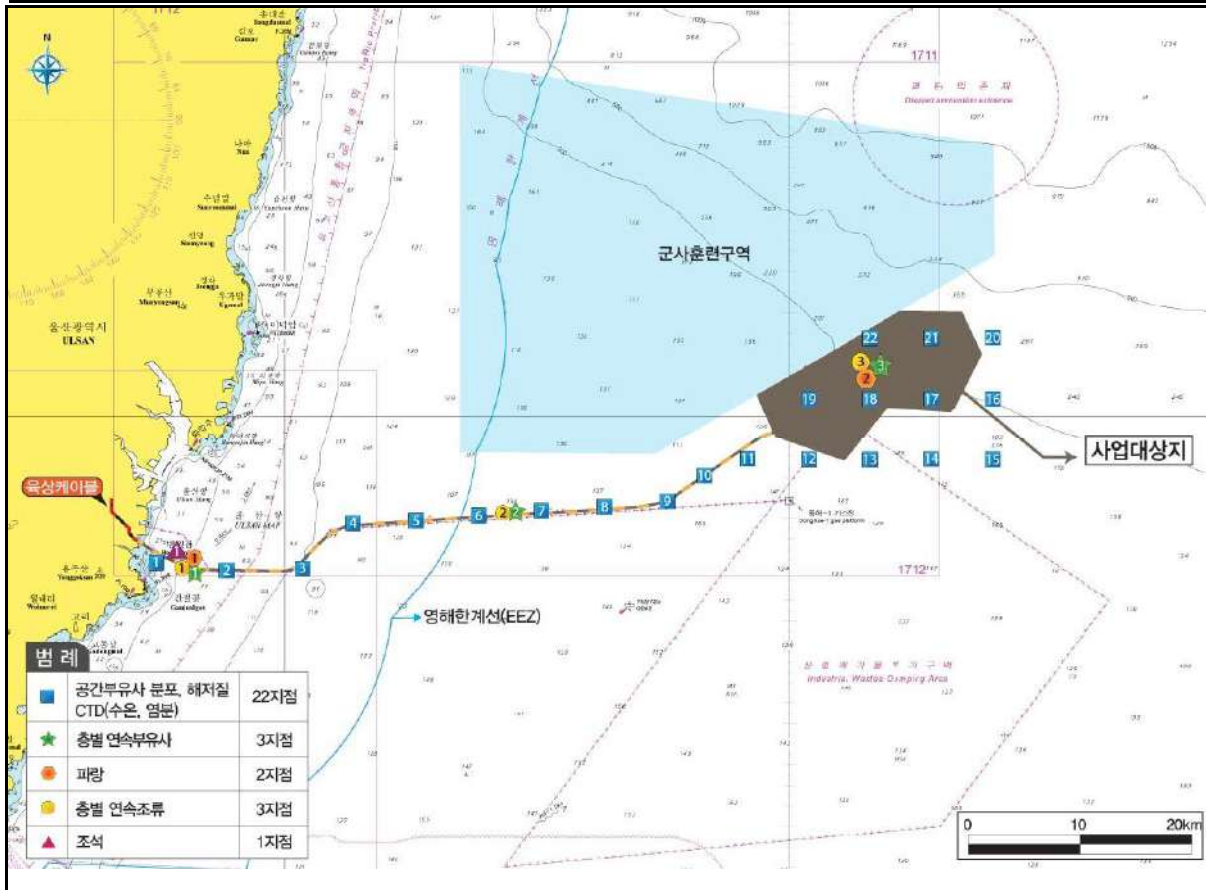
- The environmental status survey of the project site and neighboring areas will be conducted by establishing a detailed on-site survey plan within the scope of impact.
- As described above, the detailed survey status and plans for each evaluation item to understand the environmental status of the project site and surrounding areas are as follows.
- ※ As the survey on the north part is difficult to be conducted because it is very close to the military exercise zone (R-119), that area is excluded from survey points.
- ※ During winter survey

Table 5.4-1 Preliminary survey items, locations and periods

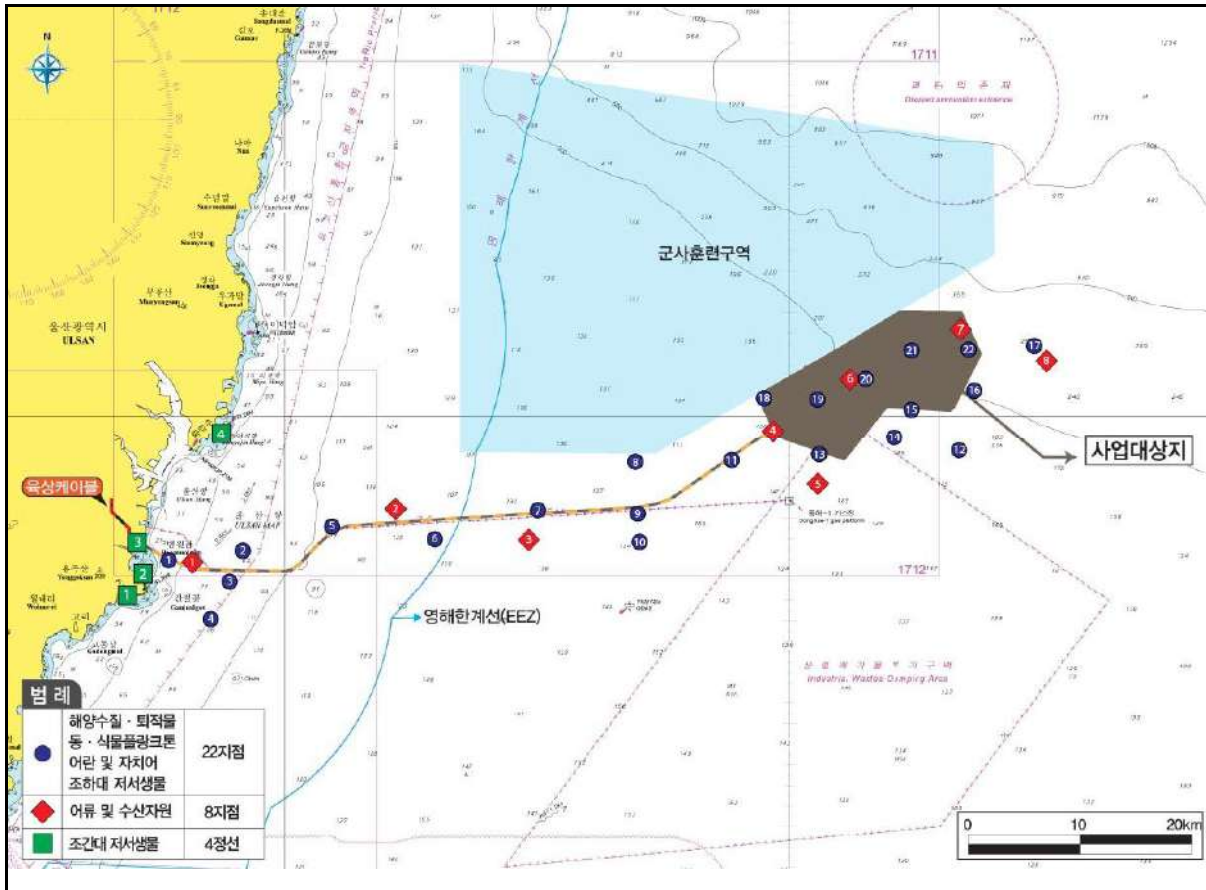
Category		Survey subject	Survey point	survey period & plan
Natural eco-environment field	Terrestrial flora & fauna	◦ The distribution and habitats status of terrestrial animals & plants ◦ Natural monuments and legally protected species	Land transmission line within a radius of 0.5 km	4 times
		◦ Sea bird (resident and migratory birds, legally protected species, etc.)	Waters nearby power generation complex and cable corridors	More than 4 times
	Marine flora & fauna	◦ Phytoplankton (Top, middle and low layers) ◦ Zooplankton (Top layer, middle/low layer) ◦ Sub-tidal benthic animals ◦ Fish and aquatic resources ◦ Roe and fingerling ◦ Intertidal benthic lives (including algae) ◦ Marine protected species (Sea grass, etc.)	22 survey points 22 survey points 22 survey points 8 survey points 22 survey points 4 survey points Nearby shore crossing points	4 times
		◦ Marine Mammals	Power generation complex & sea areas nearby cabler corridors	More than 4 times
Atmospheric environment	Air quality	◦ PM-10, PM-2.5, SO <sub>2</sub> , NO <sub>2</sub> , CO, O <sub>3</sub> , Pb, Benzene (8 items)	3 points	4 times
Water environment	Marine physics	◦ Tide ◦ Wave ◦ Continuouse current by layer ◦ Continuous suspended sediment by layer	1 survey point 2 survey points 3 survey points 3 survey points	4 times
		◦ Suspended sediment spatial distribution, CTD (water temperature, salinity)	22 survey points (Top, middle, low)	
		◦ Sea bed survey	22 survey points	1 time
Water environment	Sea water quality	◦ Water temperature, salinity, pH, COD, DOC, TOC, DO, SPM, total number of coliform, TSS, T-N, T-P, DIN, DIP, Cr6+, As, Cd, Pb, Zn, Cu, Al, Hg, Ni, Fe, Mn, CN, phenol, Chl-a, solvent-extracted oil, transparency, low-layer DO saturation (31 items)	22 points (Top, middle, low)	4 times
	Marine sediment	◦ Particle size, moisture content, ignition loss, AVS(Acid-volatile sulfides), COD, TOC, As, Cd, Cr, Cu, Fe, Hg, Ni, Pb, Zn, Li, CN, Al, TPHs, PAHs (20 items)	22 points	
Land environment	Soil	◦ Cd, Cu, As, Hg, Pb, Cr <sup>6+</sup> , Zn, Ni, F, Organic phosphorus compounds, PCB, CN, Phenols, Benzene, Toluene, Xylene, PCE, Ethylbenzene, TPH, TCE, Benzo(a)pyrene,	3 points	4 times

# Firefly Floating Offshore Wind Power Project

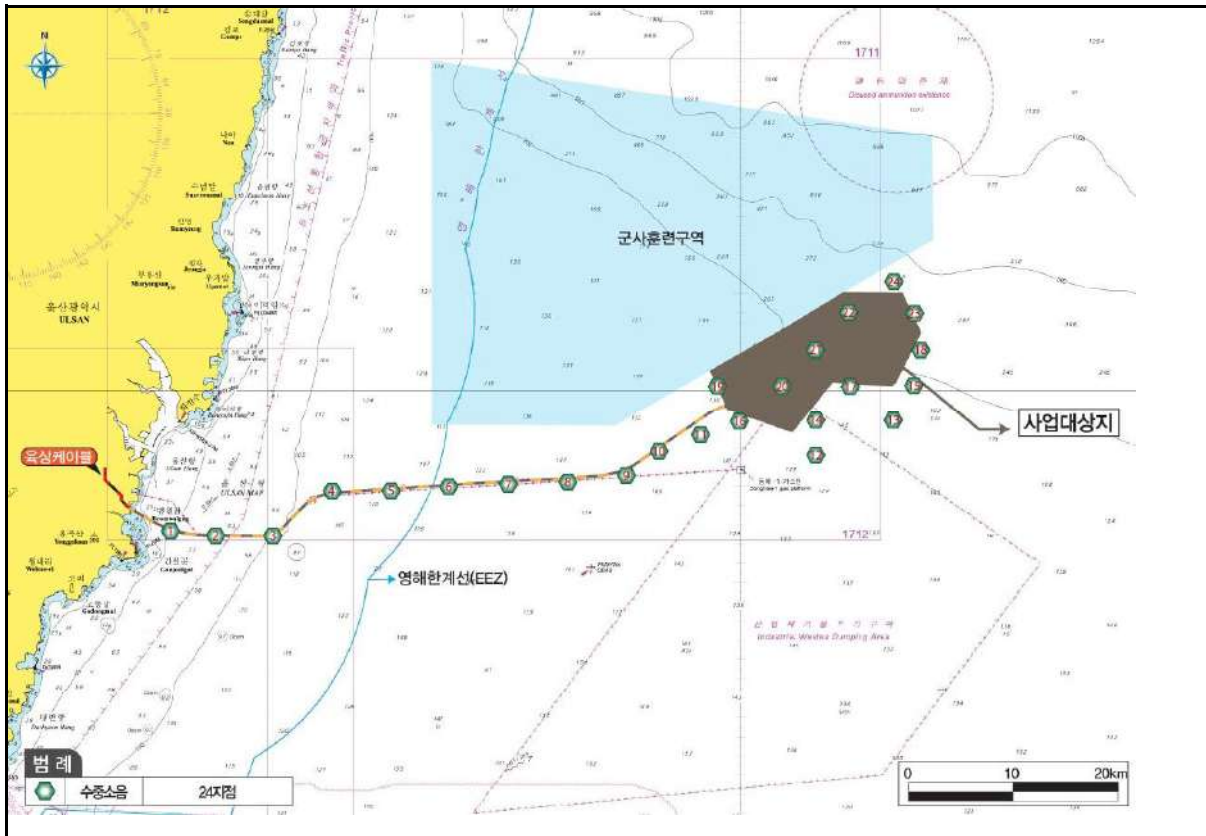
		1,2-Dichloroethane (22 items)		
Living environment	Noise /Vibration	◦Day/Night Noise Level & Vibration Level	3 points	4 times
	Underwater noise	◦Underwater noise monitoring	24 points	



Picture 5.4-1 Survey Point Location for Physical Oceanography

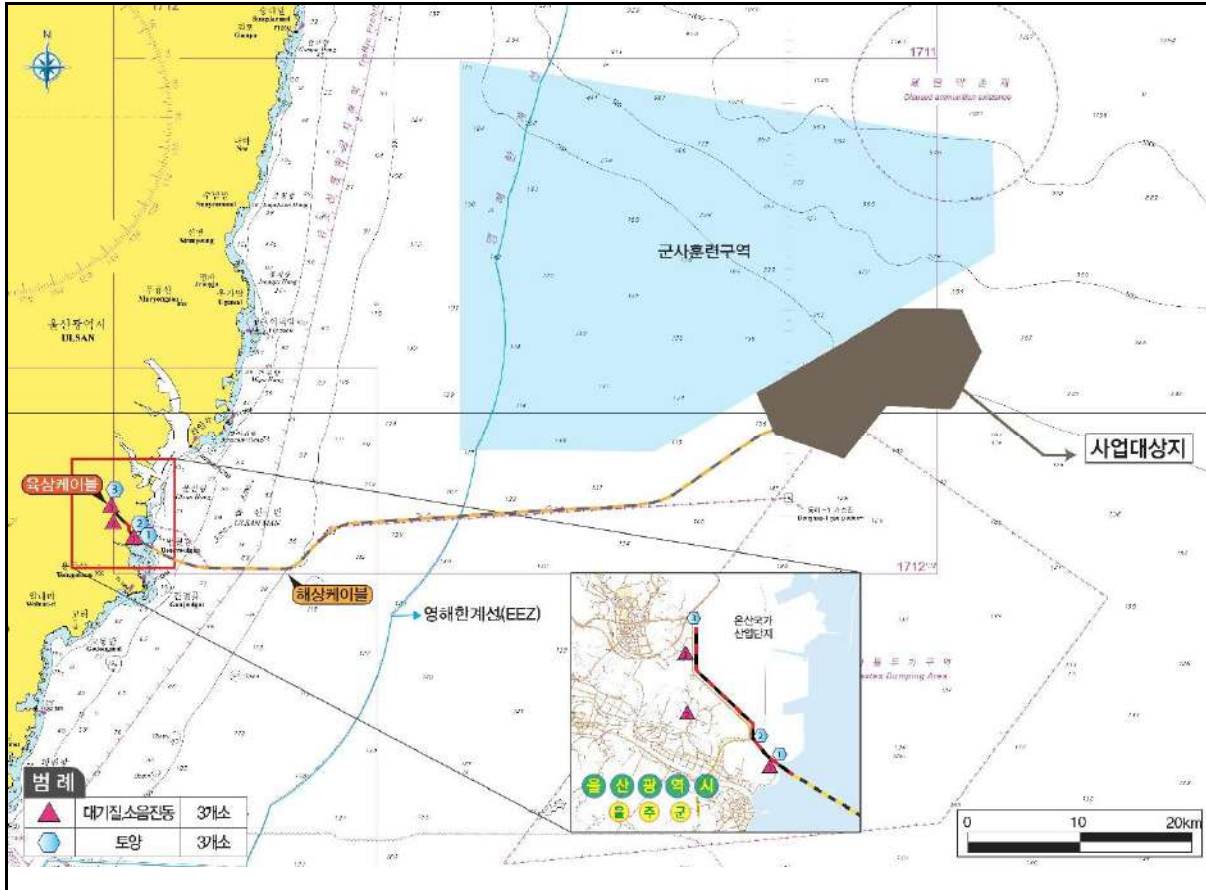


Picture 5.4-2 Survey Point Location for Offshore Fauna & Flora and Sediment & Water Quality

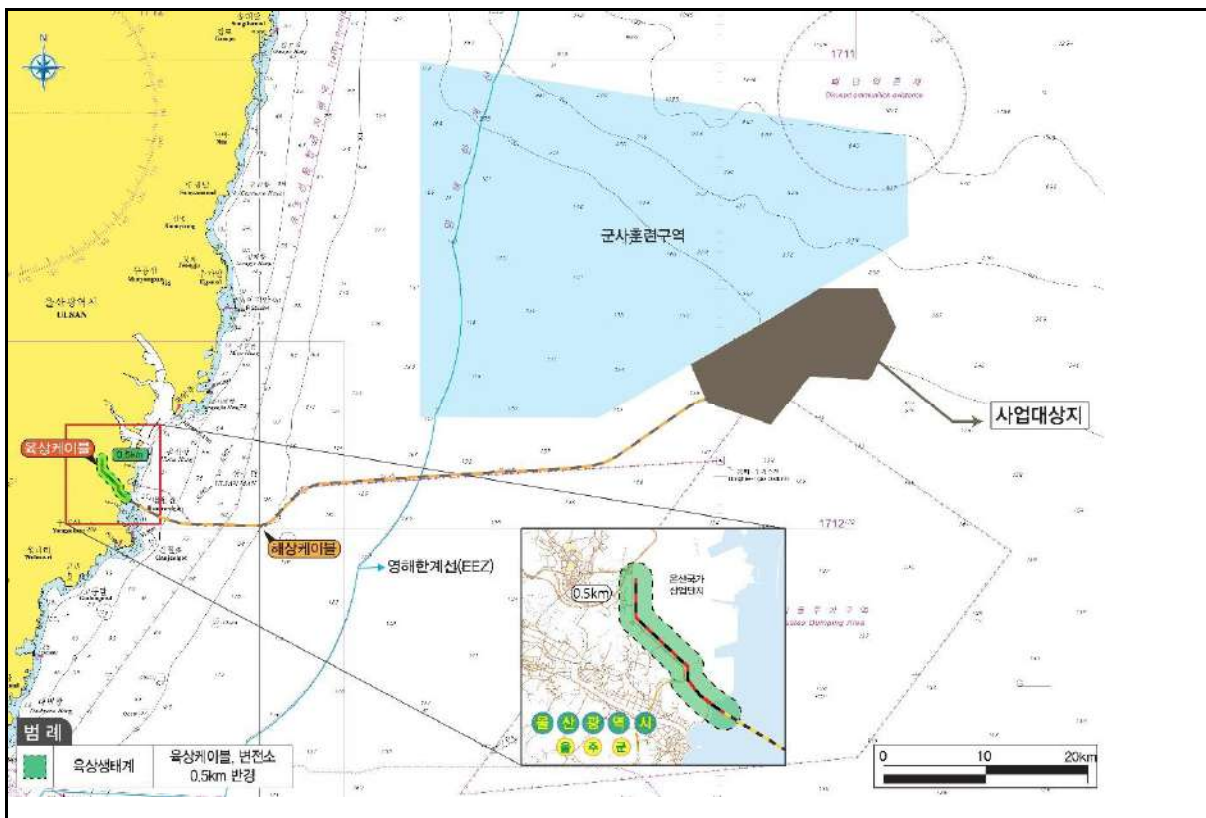


Picture 5.4-3 Survey Point Location for Underwater Noise

# Firefly Floating Offshore Wind Power Project

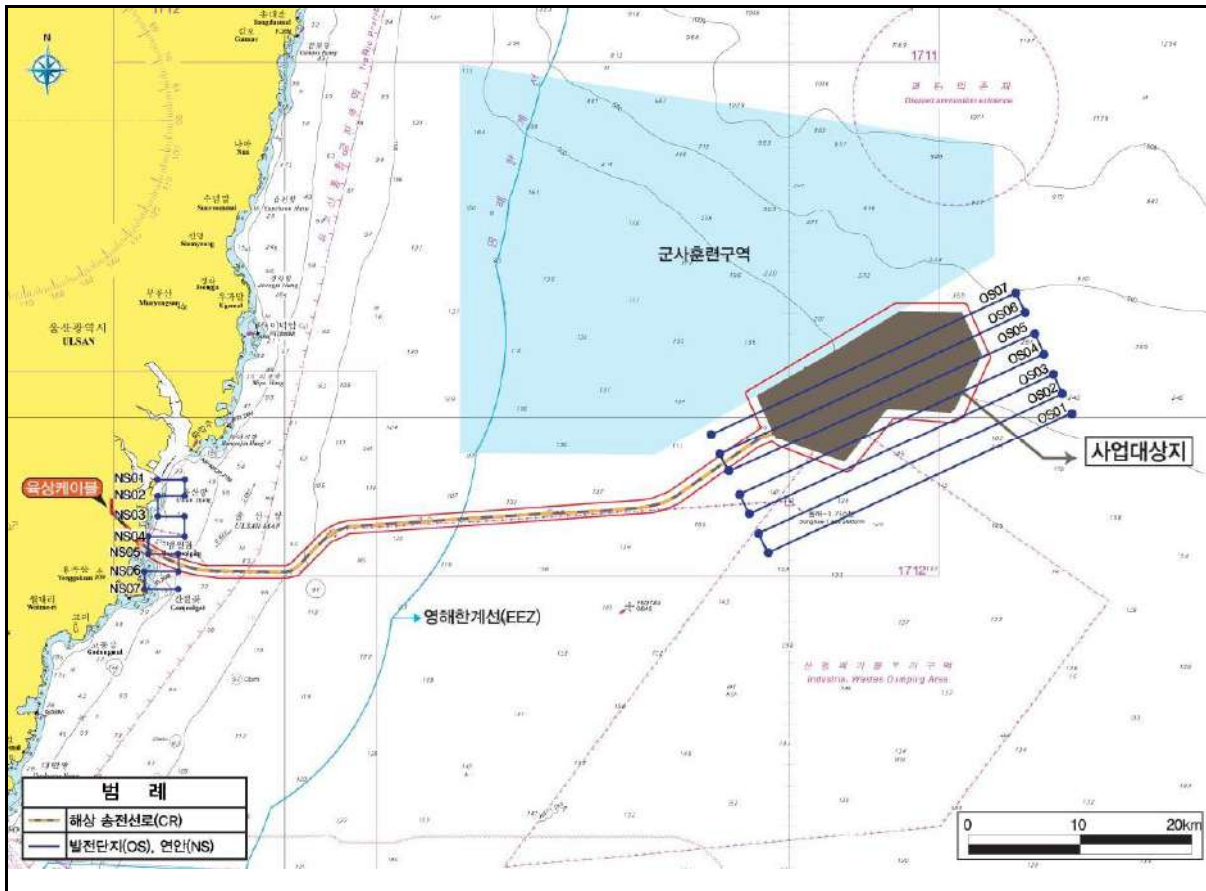


Picture 5.4-4 Survey Point Location for Environmental Quality (air quality, soil, noise/vibration)





Picture 5.4-5 Survey Point Location for Onshore Ecosystem



Picture 5.4-6 Survey Point Location for Sea Birds and Marine Mammals

**Ch. 6**

**Application for Simplified  
Evaluation Procedure**



## Chapter 6. Review on Summary Process

- The total power generation capacity of this project is 810 MW (15 MW × 54 units), which is 810 percent of the minimum size subject to environmental impact assessment (100 MW). It does not fall within the scope of special summary procedures for environmental impact assessment under Article 51 of the Environmental Impact Assessment Act and Article 64 of the Enforcement Decree of the Act.

**Table 6-1 Review of Application for Summary Evaluation Procedures**

Corresponding Project	Applicability
1. A project in which the size of it is less than 200% of the minimum EIA scale according to [Attachment 3] and has little impact on the environment.	<b>It is 810% of the minimum scale (100MW) and does not fall under the summary evaluation procedure.</b> ※ Size: 810MW/100MW = 8.10 times
2. A project that does not include any of the following areas with high environmental and ecological preservation value in the project area.	Areas with high environmental and ecological conservation value not included
A. Ecological and natural first-class areas under Article 34 of the 「Natural Environment Conservation Act」	N/A
B. Wetland protection areas and management areas around wetlands under Article 8 of the 「Wetlands Conservation Act」	N/A
C. Natural parks pursuant to Article 2 - 1 of the 「Natural Parks Act」	N/A
D. Special wildlife protection zones and wildlife protection zones under Articles 27 and 33 of the 「Wildlife Protection and Management Act」 .	N/A
E. A protected area pursuant to Article 2-5 of the 「Cultural Heritage Protection Act」 .	N/A
F. Waterfront zones pursuant to Article 4 of the 「Act on Water Management & Resident Support in the Geum River Basin」 .	N/A
G. Waterfront areas pursuant to Article 4 of the 「Act on Water Management & Residents Support in the Nakdong River Basin」 .	N/A
H. Waterfront areas pursuant to Article 4 of the 「Act on the Management of Water and Support for Residents in the Yeongsan & Seomjin River Basins」	N/A
I. Waterfront areas pursuant to Article 4 of the 「Act on the Improvement of Water Quality & Support for Residents of the Riverhead of the Han River System」	N/A
J. Water source conservation areas pursuant to Article 7 of the 「Sewerage Act」	N/A

Data: Article 64 of the 「Enforcement Decree of the Environmental Impact Assessment Act」 ,Ministry of Environment



**Ch. 7**

**Plan for Collecting  
Opinions from Residents**

**7.1 Overview of collecting opinions from  
residents**

**7.2 A plan to collect opinions**



## Chapter 7 Plan for Collecting Opinions from Residents

### 7.1 Briefing on Gathering Residents' Opinions

- According to the process of opinion collection prescribed in 「Environment Impact Assessment」, the project will be implemented as gathering opinions actively from residents and agencies with possibilities of being affected directly or indirectly.

### 7.2 Plan to Gather Consensus

#### 7.2.1 A Plan to Collect Opinions from Residents on Decisions such as Environmental Impact Assessment Items, etc.

- This evaluation preparation report was prepared and submitted to determine the EIA items and scope. According to Article 24 of the 「Environmental Impact Assessment Act」 and Article 33 of the Enforcement Decree of the same Act, residents' opinions on EIA items will be collected by disclosing the contents decided by EIA review to the host organization (Ulju-gun) or the approval organization (Ministry of Trade, Industry and Energy) information communication network and the EIA information and communication network (EIASS) for more than 14 days.

#### 7.2.2 A Plan for Collecting Opinions from Residents, etc. on the draft EIA report

##### A. Plan to Gather Consensus from Related Agencies

- The opinions of related agencies on the draft EIA report on this project will be drafted in accordance with Article 25 of the 「Environmental Impact Assessment Act」 and Article 35 of the Enforcement Decree of the same Act, and submitted to the relevant administrative agency to collect opinions.

**Table 7.2-1 Institutions the EIA report will be submitted**

Category	Submit to	Remarks
Host City/Gun/Gu	Ulju-gun Office (Ulsan Metropolitan City)	10 copies
Related City/Gun/Gu	Dong-gu Office (Ulsan Metropolitan City)	5 copies
Approving agency	Ministry of Trade, Industry and Energy	5 copies
Consulting agency	Ministry of Environment	20 copies
Local Environmental Office	Nakdong River Basin Environmental Office	3 copies
Mayor/governor of jurisdiction	Ulsan Metropolitan City Hall	3 copies

### B. A plan to gather opinions from residents

- In accordance with Article 25 of the 「Environmental Impact Assessment Act」 and Article 36 of the enforcement decree of the same act, collected opinions from the residents will be announced in the information & communication network of the host agency(Ulju-gun Office), newspaper(central daily newspapers, local daily newspapers) and environmental impact assessment support system(EIASS) within 10 days of the draft receipt. After consultation with the organizer (Ulju-gun Office) and related organizations (Dong-gu Office), a draft environmental impact assessment will be put in places where residents can easily access, such as the competent department of each institution and the local community center.
- In addition, the organizing agency (Ulju-gun Office) plans to disclose a summary of the draft environmental impact assessment report to help residents understand.
- The residents' briefing session will be held during the disclosure period of the draft environmental impact assessment pursuant to Article 39 of the Enforcement Decree of the 「Environmental Impact Assessment Act」, including a plan to hold a briefing session when the draft is announced. And the venue will be selected through consultation with the organizer (Ulju-gun Office).
- Meanwhile, in accordance with Article 40 of the Enforcement Decree of the 「Environmental Impact Assessment Act」, a separate public hearing will be held if the opinions of residents submitted within seven days of completion of the public hearing meet the requirements to hold a hearing.

**Table 7.2-2 Detailed plan for collecting residents' opinions on the draft environmental impact assessment report.**

Category	Detailed plan for collecting opinions from residents	Remarks
Public exhibition&Hearing	<ul style="list-style-type: none"> <li>◦Announcement period: within 10 days after receiving the draft</li> <li>◦Announcement method</li> <li>- Newspaper: 1 time each in daily newspapers &amp; local newspapers</li> <li>- Information &amp; communication network posting: Ulju-gun Office: Environmental Impact Assessment Information Support System (EIASS)</li> <li>◦Public exhibition &amp; hearing period: 20 days (within 60 days, excluding public holidays and Saturdays)</li> <li>◦Venue: Ulju-gun Office, Dong-gu Office, Ulsan Metropolitan City</li> </ul>	-
Presentation	<ul style="list-style-type: none"> <li>◦Notice: Notice included in the draft of the public exhibition</li> <li>◦Date: 7 days after the beginning of the public exhibition on the draft</li> <li>◦Location: Decide after the consultation with the host agency(Ulju-gun Office)</li> </ul>	-
Public hearing	<ul style="list-style-type: none"> <li>◦Requirement: Residents requesting the hearing should be more than 30 or 5 people, accounting for 50% of the residents who submitted opinions.</li> </ul>	-

### C. Disclosure of opinion gathering results

- After completion of the procedure to gather opinions stipulated in Article 25 of the 「Environmental Impact Assessment Act」, the results and whether the business plan will be reflected shall be determined with the information and communication network of the competent authority (Ulju-gun Office) or approval agency (Ministry of Trade, Industry and Energy) prior to request for consultation on the environmental impact assessment report. It is planned to be posted on the Environmental Impact Assessment Information Support System (EIASS) for more than 14 days.

**Ch. 8**

**The Strategic EIA  
Consultation  
& its Reflection**



## Chapter 8. The Strategic EIA Consultation & its Reflection

- This project is to build an offshore wind farm with the entire capacity of 810 MW EEZ public water, 60~70 km away from the eastern Ulsan Port in Ulsan Metropolitan City, which is electric facilities as prescribed in Article 2 (16) of 「 Electric Utility Act 」.
- Meanwhile, this project is not based on 「 Electric Power Source Development Promotion Act 」 and not included in prearranged area for electric power resource development business. So, it is not subject to a master development plan for strategic environmental impact assessment.
- In addition, as implemented with the permission to use public waters following 「 Public Waters Management and Reclamation Act 」, this project is not subject to a strategic environmental impact assessment.

**Table 8-1 Master Development Plan for Strategic EIA**

Category	Type of Master Development Plan	When to request consultation	Remark
C. Energy Development	According to Article 11 of 「 Electric Power Source Development Promotion Act 」 , <b><u>designated place as a prearranged area for electric power resource development business</u></b>	According to Article 11 (3) of 「 Electric Power Source Development Promotion Act 」 , when the Ministry of Trade, Industry and Energy consult with the head of the related administrative agency.	N/A

Reference: [Table 2] of 「 Enforcement Decree of the Environmental Impact Assessment Act 」 , Ministry of Environment

Ch 9

Appendix

9.1 Document about Generation  
Business Permission





## Chapter 9 Appendix

## 9.1 Document about Generation Business Permission

제2021-120호

## 발전사업 허가증


1. 성명(대표자) : Jacques Etienne Michel / 생년월일 : 1969. 10. 19.
2. 상호 : 피어플라이플로팅오프쇼어윈드(주) / 법인번호 : 230111-0350139
3. 소재지 : 울산광역시 남구 변영로 124번길 21, 207-5호(달동)  
(전화 : 010-6660-5480)
4. 사업의 내용 : 울산 반딧불 부유식 해상풍력 발전사업
  - 사업장소 : 울산 동측 60km 앞 공유수면  
(사업구역 좌표 : 다음 페이지 기재)
5. 사업규모
  - 원동력의 종류 : 풍력(해상)
  - 설비용량 : 804MW, 공급전압 : 345kV, 주파수 : 60Hz
6. 사업준비기간 : 2025년 10월 까지
7. 허가조건 : 원활한 제통 접속을 위해 「인근 해상풍력 발전사업자간 공동접속설비를 통한 연계 필요」

※ 주의사항 : 전기사업법 제9조전기설비의 설치 및 사업의 개시의무, 제10조(사업의 양수 및 법인의 분할·합병 등)를 위반할 경우 제12조(사업허가의 취소 등)에 따라 처리

전기사업법 제7조 및 같은 법 시행규칙 제6조에 따라  
위와 같이 발전사업을 허가합니다.

2021년 11월 30일

산업통상자원부장관



210mm x 297mm(백상시 120g/m<sup>2</sup>)

Footnote) The project implementer is Equinor South Korea and the permission for generation businesses gets approved in the name of SPC including the project implementer

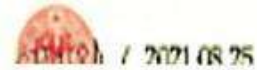


## 사업구역 좌표

### ○ 사업구역 좌표(유효범위內):

H0.01 (35°35'5.91"N, 130° 5'18.79"E) H0.02 (35°35'5.93"N, 130°10'32.50"E)  
 H0.03 (35°33'47.19"N, 130°11'15.66"E) H0.04 (35°33'7.10"N, 130°11'24.15"E)  
 H0.05 (35°31'22.31"N, 130°10'8.45"E) H0.06 (35°30'39.53"N, 130° 8'59.62"E)  
 H0.07 (35°30'36.05"N, 130° 6'42.24"E) H0.08 (35°30'57.97"N, 130° 5'51.40"E)  
 H0.09 (35°29'41.78"N, 130° 4'53.50"E) H0.10 (35°28'42.42"N, 130° 2'12.01"E)  
 H0.11 (35°29'5.33"N, 130° 0'11.44"E) H0.12 (35°31'22.76"N, 129°58'27.95"E)  
 H0.13 (35°32'22.76"N, 129°57'54.88"E)

○사업주체: 피이어플라이플로딩오프쇼어윈드 주식회사



Ministry of Trade,  
Industry and Energy

210mm×297mm(백상지 120g/㎡)

윤성환 / 사무국 / 2021-11-30 15:28:03

