

No.: 2142/QĐ-BTNMT

Hanoi, 02 August 2024

**DECISION**

**Approval the appraisal results of Environmental Impact Assessment  
Report**

**for the Vung Ang II BOT Thermal Power Plant Project**

**THE MINISTER OF NATURAL RESOURCES AND ENVIRONMENT**

*Pursuant to the Law on Environmental Protection dated 17 November 2020;*

*Pursuant to Decree No. 08/2022/ND-CP dated 10 January 2022 of the Government detailing a number of articles of the Law on Environmental Protection;*

*Pursuant to Decree No. 68/2022/ND-CP dated 22 September 2022 of the Government on the functions, tasks, powers, and organizational structure of the Ministry of Natural Resources and Environment;*

*Pursuant to Circular No. 02/2022/TT-BTNMT dated 10 January 2022 of the Minister of Natural Resources and Environment detailing the implementation of several provisions of the Law on Environmental Protection;*

*Considering the request for approval of the environmental impact assessment report for the Vung Ang II BOT Thermal Power Plant Project by Vung Ang II Thermal Power Company Limited in Document No. VAPCO/MONRE/01807 dated 17 July 2024, and the accompanying documents;*

*Considering the proposal of the Director of the Department of Environment.*

**DECIDES:**

**Article 1.** Approve the appraisal results of the environmental impact assessment for the Vung Ang II BOT Thermal Power Plant Project (hereinafter referred to as the Project) by Vung Ang II Thermal Power Limited Liability Company (hereinafter referred to as the Project Owner) implemented in Ky Loi Commune, Ky Trinh Ward, and Ky Long Ward, Ky Anh Town, Ha Tinh Province, with the environmental protection contents and requirements attached to this Decision.

**Article 2.** The Project Owner is responsible for complying with the provisions of Article 37 of the Law on Environmental Protection and Article 27 of Decree No. 08/2022/ND-CP dated 10 January 2022 of the Government detailing a number of articles of the Law on Environmental Protection.

**Article 3.** This Decision takes effect from the date of signing./.

*Recipients:*

**PP. MINISTER  
VICE MINISTER**

- Vung Ang II Thermal Power Limited Liability Company;
- Minister (for reporting);
- Vice Minister Le Minh Ngan;
- Ha Tinh People's Committee;
- Environmental Pollution Control Department;
- Vietnam Sea and Islands Department;
- Ha Tinh Department of Natural Resources and Environment;
- Filing: VT, VPMC, MT.LTH.

*(Signed & Stamped)*

**Lê Công Thành**

# CONTENTS AND REQUIREMENTS FOR ENVIRONMENTAL PROTECTION OF VUNG ANG II BOT THERMAL POWER PLANT PROJECT

*((Attached to Decision No. 2142/QĐ-BTNMT dated 02 August 2024 of the Minister of Natural Resources and Environment))*

## 1. Information about the Project

### 1.1. General information

- Project name: Vung Ang II BOT Thermal Power Plant.
- Project Owner: Vung Ang II Thermal Power Limited Liability Company (VAPCO); contact address: Room 3011, 30th floor, West Tower - Lotte Center, No. 54 Lieu Giai, Cong Vi Ward, Ba Dinh District, Hanoi.
- Project location: Ky Loi Commune, Ky Trinh Ward, and Ky Long Ward, Ky Anh Town, Ha Tinh Province.

### 1.2. Scope, scale, and capacity

Construction of the Vung Ang II BOT Thermal Power Plant with a total capacity of 1,330 MW (gross capacity: 2 x 665 MW, net capacity: 2 x 600 MW) on a total land area, water surface area, and sea area of approximately 407.61 hectares, including:

- Land area onshore of about 100.18 hectares including:
  - + The main plant area with an area of approximately 36.3 hectares; the coordinates are shown in Table 1:

Table 1. Coordinates of the main plant area boundary points

Point	VN 2000 Coordinate System, meridian 105°30', projection zone 3°	
	X(m)	Y(m)
1	2001538.223	593290.186
2	2002088.827	593492.233
3	2001802.905	594271.195
4	2001447.564	594140.770
5	2001646.886	593555.910
6	2001464.199	593493.564

- + The ash slurry disposal area with a total area of approximately 49.4 hectares (site No. 1 with an area of about 15 hectares and site No. 2 with an area of about 34.4 hectares); the coordinates are shown in Tables 2 and 3:

Table 2. Boundary coordinates of the ash slurry disposal site No. 1.

Point	VN 2000 Coordinate System, meridian 105°30', projection zone 3°	
	X(m)	Y(m)
BX1	2001802.905	594271.195
BX2	2001674.597	594619.852
BX3	2001309.960	594605.710

BX4	2001471.048	594149.390
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Table 3. Boundary coordinates of the ash slurry disposal site No. 2.

Point	VN 2000 Coordinate System, meridian 105°30', projection zone 3°	
	X(m)	Y(m)
A	1999919.496	590155.854
1	2000005.707	590139.546
2	2000404.988	590002.383
3	2000582.054	590252.493
4	2000632.610	590605.330
10	2000102.122	590713.818
V1	2000084.066	590658.653
V2	2000094.486	590690.488
V3	1999740.269	590787.491
V4	1999731.430	590755.226

+ The area for the cooling water system, pumping station, and onshore wharf with an area of approximately 6.02 hectares; the coordinates are shown in Table 4:

Table 4. Boundary coordinates of the cooling water system, pumping station, and onshore wharf

Point	VN 2000 Coordinate System, meridian 105°30', projection zone 3°	
	X(m)	Y(m)
I4	2002546.603	593104.535
I5	2002563.238	593073.700
C1	2002538.740	593076.428
C1a	2002426.647	593129.278
C1b	2002438.919	593155.307
C2	2002413.922	593102.289
C3	2002454.822	593189.036
C4	2002305.645	593259.371
C5	2002265.059	593245.473
C6	2002258.850	593175.404
C7	2002140.334	593588.153
C8	2002316.984	593654.041
C9	2002308.600	593682.109
C10	2002129.670	593616.283
C11	2002110.425	593668.595
C12	2002291.604	593734.290
C13	2002280.586	593766.982
C14	2002022.463	593673.046
C15	2002063.863	593560.257
C16	2002112.051	593577.853
CR1	2002123.714	593397.160
CR2	2002171.555	593414.720
CR3	2002212.883	593301.418

CR4	2002202.815	593297.710
CR5	2002195.906	593316.583
CR6	2002158.503	593302.376
CR7	2002249.006	593171.795
CR8	2002218.327	593255.462
CR9	2002228.309	593259.127

+ The ash pipeline area is approximately 5.4 ha; the boundary coordinates are shown in Table 5:

Table 5. Boundary coordinates of the ash pipeline area

Point	VN 2000 Coordinate System, meridian 105°30', projection zone 3°		Điểm	VN 2000 Coordinate System, meridian 105°30', projection zone 3°	
	X(m)	Y(m)		X(m)	Y(m)
1	2001538.223	593290.186	O5	2002284.623	593755.021
2	2002088.827	593492.233	O6	2002298.150	593714.853
3	2001802.905	594271.195	O7	2003410.475	594122.774
4	2001447.564	594140.770	O8	2003444.056	594151.448
5	2001646.886	593555.910	P1	2001473.173	593487.108
6	2001464.199	593493.564	P2	2001446.180	593475.656
I4	2002546.603	593104.535	P3	2001436.822	593471.686
I5	2002563.238	593073.700	P4	2001428.529	593468.205
C1	2002538.740	593076.428	P5	2001429.942	593464.408
C1a	2002426.647	593129.278	P6	2001417.700	593461.642
C1b	2002438.919	593155.307	P7	2001363.537	593437.539
C2	2002413.922	593102.289	P8	2001303.444	593401.215
C3	2002454.822	593189.036	P9	2001301.471	593395.486
C4	2002305.645	593259.371	P10	2001312.247	593234.444
C5	2002265.059	593245.473	P11	2001294.578	593174.732
C6	2002258.850	593175.404	P12	2001307.438	593120.852
C7	2002140.334	593588.153	P13	2001345.664	593033.956
C8	2002316.984	593654.041	P14	2001348.208	593032.346
C9	2002308.600	593682.109	P15	2001378.630	593025.846
C10	2002129.670	593616.283	P16	2001401.339	593003.152
C11	2002110.425	593668.595	P17	2001416.832	592960.743
C12	2002291.604	593734.290	P18	2001423.977	592736.415
C13	2002280.586	593766.982	P19	2001415.187	592703.646
C14	2002022.463	593673.046	P20	2001400.003	592694.625
C15	2002063.863	593560.257	P21	2001277.718	592694.116
C16	2002112.051	593577.853	P22	2001249.104	592690.287
CR1	2002123.714	593397.160	P23	2001107.207	592653.215
CR2	2002171.555	593414.720	P24	2001063.677	592638.903
CR3	2002212.883	593301.418	P25	2000840.751	592530.161
CR4	2002202.815	593297.710	P26	2000529.855	592159.046
CR5	2002195.906	593316.583	P27	2000529.180	592096.040
CR6	2002158.503	593302.376	P28	2000522.106	591976.616

CR7	2002249.006	593171.795	P29	2000615.533	591670.572
CR8	2002218.327.	593255.462	P30	2000626.612	591594.653
CR9	2002228.309	593259.127	P31	2000772.502	591201.916
R1P	2001481.682	595095.397	P32	2000777.614	591125.637
R1T	2001468.118	595101.803	P33	2000760.976	590976.108
R2P1	2001307.482	594726.512	P34	2000702.154	590783.726
R2P	2001300.698	594677.019	P35	2000681.047	590686.504
R2P2	2001302.506	594626.834	P36	2000646.897	593539.695
R2T	2001268.301	594678.670	T1	2001472.002	593489.869
R3P	2001496.672	594076.797	T2	2001445.199	593478.499
R3T	2001482.528	594071.803	T3	2001435.661	593474.452
CV1	2003672.031	594179.645	T4	2001425.371	593469.957
CV2	2003680.346	594157.131	T5	2001339.922	593442.134
CV3	2002316.355	593656.146	T6	2001308.371	593426.427
CV4	2002309.473	593679.186	T7	2001293.325	593401.413
B1	2003694.085	594163.586	T8	2001300.965	593233.531
B2	2003685.879	594185.606	T9	2001278.478	593178.451
B3	2003976.364	594293.858	T10	2001300.956	593098.604
B4	2003984.570	594271.837	T11	2001341.272	593025.913
C8	2003985.072	594270.060	T12	2001374.896	593018.969
CV2	2003680.346	594157.131	T13	2001392.483	592995.244
KC14	2003623.509	594311.024	T14	2001407.885	592959.648
KC13	2003909.468	594546.991	T15	2001399.557	592737.906
KC12	2004152.919	594747.882	T16	2001395.605	592708.514
KC11	2004696.220	594575.022	T17	2001356.513	592708.444
KC15	2005491.458	594319.614	T18	2001316.914	592702.150
KC10	2004758.582	594406.170	T19	2001276.690	592700.565
KC9	2004057.155	594147.112	T20	2001106.399	592656.258
I4	2002546.603	593104.535	T21	2001062.542	592641.687
I5	2002563.238	593073.700	T22	2000829.662	592528.090
I7	2002594.879	593069.897	T23	2000819.465	592521.542
I8	2002938.973	593081.215	T24	2000520.007	592162.854
I9	2003400.765	592984.643	T25	2000515.190	592096.720
I10	2003461.982	592938.492	T26	2000512.042	591975.332
I11	2003472.456	593031.877	T27	2000605.778	591668.166
I12	2003406.521	593013.577	T28	2000616.864	591592.199
I13	2002941.543	593110.815	T29	2000741.706	591248.964
I14	2002590.435	593099.267	T30	2000758.628	591204.769
O1	2003633.433	594558.888	T31	2000741.990	591178.050
O2	2003595.012	594576.804	T31a	2000649.490	590641.605
O3	2003418.698	594198.700	T32a	2000632.600	590605.300
O4	2003372.526	594156.211	T32	2000623.810	590544.012

+ The housing&M Accommodation area is approximately 3.06 ha; the boundary coordinates are shown in Table 6:

Table 6. Boundary coordinates of the worker housing area

Point	VN 2000 Coordinate System, meridian 105°30', projection zone 3°	
	X(m)	Y(m)
A	1993273.790	593725.980
B	1993207.850	593877.100
C	1993391.280	593929.920
D	1993438.250	593766.110
E	1993283.320	593721.500

- The sea area is approximately 307.43 ha, including:

+ The area for the construction and operation of the jetty bridge which is approximately 3.51 ha; the boundary coordinates are shown in Table 7:

Table 7. Boundary coordinates of the aqueduct area

Point	VN 2000 Coordinate System, meridian 105°30', projection zone 3°	
	X(m)	Y(m)
CV1	2003672.00	594180.00
CV2	2003680.00	594157.00
CV3	2002316.00	593656.00
CV4	2002309.00	593679.00

+ The area for the construction and operation of the jetty, the water area in front of the jetty, and the turning basin, which is approximately 41.69 ha; the boundary coordinates are shown in Table 8:

Table 8. Boundary coordinates of the jetty area, the water area in front of the jetty, and the turning basin

Point	VN 2000 Coordinate System, meridian 105°30', projection zone 3°	
	X(m)	Y(m)
NV1	2003649.28	594171.29
CV1	2003672.00	594180.00
CV2	2003680.00	594157.00
NV2	2003967.62	594263.61
NV3	2004047.81	594126.81
NV4	2004761.01	594397.08
NV9	2004696.75	594583.74
NV10	2004150.14	594759.60
NV11	2003593.14	594318.40

+ The area for the construction and operation of the water area for connecting the jetty, which is approximately 5.01 ha; the boundary coordinates are shown in Table 9:

Table 9. Boundary coordinates of the water area for connecting the jetty

Điểm	VN 2000 Coordinate System, meridian 105°30', projection zone 3°	
	X(m)	Y(m)
NV4	2004761.01	594397.08
NV5	2004946.94	594406.40
NV6	2005130.76	594393.53

Điểm	VN 2000 Coordinate System, meridian 105°30', projection zone 3°	
	X(m)	Y(m)
NV7	2005310.67	594362.66
NV8	2005489.51	594313.78
KC15	2005491.46	594319.61
NV9	2004696.75	594583.74

+ The area for the construction and operation of the cooling water intake system on the sea, which is approximately 2.92 ha; the boundary coordinates are shown in Table 10:

Table 10. Boundary coordinates of the cooling water intake system area

Point	VN 2000 Coordinate System, meridian 105°30', projection zone 3°	
	X (m)	Y (m)
I4	2002546.60	593104.54
I5	2002563.24	593073.70
I7	2002594.88	593069.90
I7a	2002795.25	593076.49
I8	2002938.97	593081.22
I8a	2003156.32	593035.76
I9	2003400.77	592984.64
I9a	2003431.57	592961.42
I10	2003461.98	592938.49
I11	2003472.46	593031.88
I12	2003406.52	593013.58
I13	2002941.54	593110.82
I14	2002590.44	593099.27

+ The area for the construction and operation of the cooling water discharge system on the sea, which is approximately 7.14 ha; the boundary coordinates are shown in Table 11:

Table 11. Boundary coordinates of the cooling water discharge system area

Point	VN 2000 Coordinate System, meridian 105°30', projection zone 3°	
	X(m)	Y(m)
O1	2003633.00	594559.00
O2	2003595.00	594577.00
O3	2003419.00	594199.00
O4	2003373.00	594156.00
O5	2002285.00	593755.00
O6	2002298.00	593715.00
O7	2003410.00	594123.00
O8	2003444.00	594151.00

(The above-mentioned components have been approved by the Minister of Natural Resources and Environment in the environmental impact assessment (EIA) report under Decision No. 3055/QĐ-BTNMT dated 08 October 2018 Decision No. 132/QĐ-BTNMT dated 15 January 2020 approving the adjustment



of the content of the EIA report approval decision for the Project, and the adjustment documents: Official Letter No. 6515/BTNMT-TCMT dated 28 November 2018 of the Ministry of Natural Resources and Environment approving the plan to upgrade the Project's steam conditions from ultra-supercritical to above ultra-supercritical, Official Letter No. 1721/BTNMT-TCMT dated 01 April 2020 of the Ministry of Natural Resources and Environment regarding the approval for the installation of closed coal storage and the addition of NO<sub>x</sub> treatment equipment in the Project's emission, Official Letter No. 3923/BTNMT-TCMT dated 15 July 2021 of the Ministry of Natural Resources and Environment approving the adjustment of the dredging and ground leveling plan for the Project, Official Letter No. 6636/BTNMT-TCMT dated 01 November 2021 of the Ministry of Natural Resources and Environment approving the adjustment of the water intake and discharge pipeline, the dredged material storage area, and the coal unloading equipment of the Project, Official Letter No. 4028/TCMT-TĐ dated 07 November 2022 of the General Department of Environment approving the change of the dredged material storage area and the ash storage area of the Project. The worker housing component has been approved by the People's Committee of Ha Tinh province in the EIA report under Decision No. 3934/QĐ-UBND dated 27 December 2018 and Environmental Permit No. 2761/GPMT dated 24 October 2023. The above-mentioned sea areas have been assigned by the Ministry of Natural Resources and Environment in Decision No. 691/QĐ-BTNMT dated 23 March 2023).

+ The common shipping channel area is approximately 47.16 ha (according to Official Letter No. 12823/BGTVT-KHĐT dated 13 November 2023 of the Ministry of Transport regarding the proposed project for the investment in dredging the maritime channel to the port of the Vung Ang II Thermal Power Plant project); the boundary coordinates are shown in Table 12:

Table 12. Boundary coordinates of the common channel area

Point	VN 2000 Coordinate System, meridian 105°30', projection zone 3°	
	X(m)	Y(m)
NV9	2004696.75	594583.74
BP1	2004737.59	594580.11
BP2	2004963.74	594590.34
BP3	2005181.80	594573.01
BP4	2005396.85	594532.99
BP5	2005601.65	594473.28
BP6	2005792.07	594412.12
BP7	2005982.49	594350.96
BP8	2006172.91	594289.81
BP9	2006363.33	594228.65
BP10	2006553.75	594167.49
BP11	2006744.17	594106.33

BP12	2006934.59	594045.18
BP13	2007125.01	593984.02
BP14	2007315.43	593922.86
BP15	2007527.53	593854.74
BT15	2007472.12	593683.48
BT14	2007260.39	593751.48
BT13	2007069.97	593812.64
BT12	2006879.55	593873.80
BT11	2006689.13	593934.96
BT10	2006498.71	593996.11
BT9	2006308.29	594057.27
BT8	2006117.87	594118.43
BT7	2005927.45	594179.59
BT6	2005737.03	594240.74
BT5	2005546.61	594301.90
KC15	2005491.46	594319.61

+ The sea area for offshore dumping dredged materials is approximately 200 ha; the boundary coordinates are shown in Table 13:

Table 13. Boundary coordinates of the dredged material dumping area

Point	VN 2000 Coordinate System, meridian 105°30', projection zone 3°	
	X(m)	Y(m)
P2.1	2023567.292	610735.865
P2.2	2022580.678	611749.074
P2.3	2021567.469	610762.460
P2.4	2022554.083	609749.250

(The boundary coordinates of the above-mentioned sea areas are reviewed and updated in detail in the sea allocation decision, the sea dumping permit.)

The scope of the Project's EIA report does not include: UXO clearance activities; regular maintenance dredging activities; transportation of materials and equipments outside the Project's scope for construction purposes; environmental impacts from the construction activities of the Project's constructed facilities, as detailed in Section 1.4.1 of this Decision.

### **1.3. Production technology**

- The electricity production process is as follows: Fuel (a mix of bituminous and sub-bituminous coal as the main fuel; LDO oil used as auxiliary fuel during start-up or shut-down) → boiler (ultra-supercritical technology) → high-pressure steam → turbine → generator → switchyard → national grid.

- The dredging and sea disposal process for dredged material is as follows: Clamshell dredgers scoop dredged material onto barges; trailing suction hopper

dredgers suction dredged material into the hopper → trailing suction hopper dredgers and barges transport dredged material to the disposal site → trailing suction hopper dredgers and barges dump dredged material into the seabed.

- The dredging and onshore disposal process for dredged material by truck is as follows: Clamshell dredgers scoop dredged material onto barges → barges transport dredged material to loading points → excavators transfer dredged material from barges onto trucks → transport to onshore disposal site → dredged material is dumped and leveled at the onshore disposal site.

- The dredging and onshore disposal process for dredged material by pumping station is as follows: Clamshell dredgers scoop dredged material onto barges → barges transport to pumping station → excavators transfer dredged material to the pumping station hopper, using a cutter to mix dredged material and seawater → pump the mixture of dredged material and seawater to the onshore disposal site.

#### ***1.4. Project components and activities***

##### **1.4.1. Constructed project components**

- The main plant area includes the following major components:

+ Turbine generator building, central control room, boiler area, selective catalytic reduction (SCR) system for NO<sub>x</sub> removal, electrostatic precipitator (ESP) for dust removal, seawater flue gas desulfurization (SWFGD) system, chimney, auxiliary boiler (using LDO).

+ Coal storage (1 enclosed coal storage).

+ 500 kV switchyard.

+ Technology water supply and treatment system, domestic wastewater treatment system (WWTS), central industrial wastewater treatment system (CIWWTS), fuel oil supply and storage system, coal conveyor system, mechanical repair workshop, fire prevention and fighting system (FPFS), hazardous waste storage (HWS) and other auxiliary components..

+ Office area, administrative building.

+ Technical infrastructure components (internal roads, stormwater drainage system, domestic wastewater drainage system, industrial wastewater drainage system, water supply system, lighting, greenery, and landscape).

(These components are part of the EIA report approved in Decision No. 3055/QĐ-BTNMT dated 08 October 2018 and the adjustment approval in Decision No. 132/QĐ-BTNMT dated 15 January 2020 by the Minister of Natural Resources and Environment; approximately 77.73% of the work has been completed.).

- The cooling water system, pump station, and jetty onshore area of 6.01 ha (these components are part of the EIA report approved in Decision No. 3055/QĐ-BTNMT dated 08 October 2018 and the adjustment approval in Decision No.

132/QĐ-BTNMT dated 15 January 2020 by the Minister of Natural Resources and Environment; approximately 90.53% of the work has been completed).

- The aqueduct and coal jetty for 100,000 DWT ships, part of the offshore construction (these components are part of the EIA report approved in Decision No. 3055/QĐ-BTNMT dated 08 October 2018 and the adjustment approval in Decision No. 132/QĐ-BTNMT dated 15 January 2020 by the Minister of Natural Resources and Environment; approximately 81.52% of the work has been completed).

- The housing & M Accommodation area of 3.05 ha (this component has been granted Environmental Permit No. 2716/GPMT dated 24 October 2023, by the Ha Tinh PC, and has been completed and put into operation).

- Environmental protection works: 13 container-type mobile toilets on the construction site; one domestic WWTS with a capacity of 60 m<sup>3</sup>/day at the construction site office area; one two-chamber sedimentation tank with a capacity of 8.0 m<sup>3</sup>; one three-chamber sedimentation tank with a capacity of 600 m<sup>3</sup> at the dredged material storage area No. 2 (area of 16.63 ha); one HWS of 90 m<sup>2</sup>.

- Dredging of the cooling water intake system, cooling water discharge system, turning basin, and the water area in front of the jetty and bringing ashore about 623,234 m<sup>3</sup> of dredged material, reaching about 20% of the total dredging volume needed.

#### 1.4.2. Ongoing construction components

##### 1.4.2.1. Main construction components

- Components in the main plant area, coal storage, office area, and administrative building.

- System of aqueduct and coal jetty for 100,000 DWT ships.

##### 1.4.2.2. Auxiliary construction components

- Access road to the plant.

- Cooling water system, pump station, and jetty onshore.

- Water area in front of the jetty, turning basin, and common access channel to the port.

- Construction and operation of the underwater cooling water intake and discharge system.

- Technology water supply and treatment system, domestic wastewater treatment system (WWTS), central industrial wastewater treatment system (IWWTS), fuel oil supply and storage system, coal conveyor system, mechanical repair workshop, fire prevention and fighting system (FPFS), hazardous waste storage (HWS), and other auxiliary components.

- Dredging of the jetty area, access channel, turning basin, cooling water intake system, and cooling water discharge system with an additional dredging

volume (as of the approval date of the EIA report appraisal results) of approximately 2,425,083 m<sup>3</sup>.

- Transporting dredged material for sea disposal with a volume of approximately 1,761,232 m<sup>3</sup>; transporting dredged material to onshore disposal sites with a volume of approximately 663,851 m<sup>3</sup>.

#### *1.4.2.3. Environmental protection construction components*

Environmental protection construction components during the operational phase include:

- Rainwater collection and drainage system, including: rainwater collection and drainage system for the main plant area; rainwater collection and drainage system for the port area; rainwater drainage system for ash storage area No. 1; rainwater drainage system for ash storage area No. 2; rainwater collection system for the worker housing area.

- Wastewater collection and drainage system: domestic wastewater collection and drainage system for the main plant area; industrial wastewater collection and drainage system for the main plant area; domestic wastewater collection and drainage system for the worker housing area.

- Wastewater treatment system: one domestic WWTS with a capacity of 150 m<sup>3</sup>/day (at the worker housing area); one domestic WWTS with a capacity of 150 m<sup>3</sup>/day (at the main plant area); one central IWWTS with a capacity of 200 m<sup>3</sup>/hour (4,800 m<sup>3</sup>/day).

- Air emission treatment system: one air emission treatment system for boiler of power generation unit No. 1 with a capacity of 3,100,000 m<sup>3</sup>/hour; one air emission treatment system for boiler of power generation unit No. 2 with a capacity of 3,100,000 m<sup>3</sup>/hour.

- Industrial solid waste (ISW) collection and storage system:

+ Two ash storage areas: ash storage area No. 1 with an area of 15 ha and ash storage area No. 2 with an area of 34.4 ha.

+ Fly ash collection system (for both units): three silos, each with a capacity of 1,301 m<sup>3</sup>.

+ Bottom ash and pyrite collection system for unit No. 1: one bottom ash silo with a capacity of 384 m<sup>3</sup>; one pyrite waste silo with a capacity of 30 m<sup>3</sup>.

+ Bottom ash and pyrite collection system for unit No. 2: one bottom ash silo with a capacity of 384 m<sup>3</sup>; one pyrite waste silo with a capacity of 30 m<sup>3</sup>.

+ Ash slurry transportation pipeline system: one system for ash storage area No. 1; one system for ash storage area No. 2.

- Embankment and sedimentation pit system at onshore dredged material storage areas.

One temporary hazardous waste storage facility in the main plant area with an area of 200 m<sup>2</sup>; two temporary hazardous waste storage facilities in the worker housing area, each with an area of 6.0 m<sup>2</sup>.

#### 1.4.3. Components serving construction activities

- Laydown area No. 1, with an area of approximately 2.15 ha, was approved by the Management Board of the Ha Tinh Economic Zone in Document No. 110/QĐ-KKT dated 22 September 2021; the boundary coordinates are shown in Table 14:

Table 14. Boundary coordinates of Laydown area No. 1

Point	VN 2000 Coordinate System, meridian 105°30', projection zone 3°	
	X(m)	Y(m)
1	2001969.39	593969.81
2	2001873.08	594297.01
3	2001802.90	594271.19
4	2001920.17	593951.74
5	2001969.39	593969.81

- Laydown area No. 2, with an area of approximately 23.74 ha, was approved by the Management Board of the Ha Tinh Economic Zone in Document No. 148/QĐ-KKT dated 24 November 2021; the boundary coordinates are shown in Table 15:

Table 15. Boundary coordinates of Laydown area No. 2

Point	VN 2000 Coordinate System, meridian 105°30', projection zone 3°	
	X(m)	Y(m)
1	2000694.88	595351.60
2	2000627.01	595333.33
3	2000426.17	595237.32
4	2000385.71	595291.83
5	2000364.68	595271.66
6	2000317.57	595301.12
7	2000543.52	595554.98
8	2000563.38	595684.59
9	2000429.13	596061.31
10	2000414.72	596200.76
11	2000694.89	596251.61
12	2000735.42	596432.86
13	2000745.37	596409.27
14	2000682.94	596118.58
15	2000694.44	596046.84
16	2000721.84	595939.95
17	2000723.96	595902.23

18	2000710.16	595713.79
19	2000722.11	595652.53
20	2000745.60	595672.31
21	2000750.73	595654.84
22	2000728.46	595636.54
23	2000743.41	595598.90
24	2000786.16	595439.35
25	2000780.48	595408.30
26	2000772.28	595397.99
27	2000757.54	595386.87
28	2000691.59	595370.78

- Access Road to the main plant site, with an area of approximately 1.62 ha, was approved by the Management Board of the Ha Tinh Economic Zone in Document No. 98/QĐ-KKT dated 31 August 2021; the boundary coordinates are shown in Table 16:

Table 16. Boundary coordinates of the access road to the main plant site

Point	VN 2000 Coordinate System, meridian 105°30', projection zone 3°	
	X(m)	Y(m)
R1P	2001481.682	595095.397
R1T	2001468.118	595101.803
R2P1	2001307.482	594726.512
R2P	2001300.698	594677.019
R2P2	2001302.506	594626.834
R2T	2001268.301	594678.670
R3P	2001496.672	594076.797
R3T	2001482.528	594071.803

- Topsoil disposal area, with an area of approximately 8.31 ha, was approved by the Management Board of the Ha Tinh Economic Zone in Document No. 40/QĐ-KKT dated 21 March 2019; the boundary coordinates are shown in Table 17:

Table 17. Boundary coordinates of the topsoil disposal area

Point	VN 2000 Coordinate System, meridian 105°30', projection zone 3°	
	X(m)	Y(m)
1	1997686.970	590176.110
2	1997741.500	590159.590
3	1997785.590	590243.880
4	1997880.860	590328.230
5	1997868.830	590450.580
6	1997929.430	590487.560

7	1998013.960	590569.500
8	1998055.610	590755.390
9	1997906.740	590807.240

- Dredged material storage area No. 1, with an area of approximately 38.33 ha, was approved by the Management Board of the Ha Tinh Economic Zone in Document No. 278/KKT-QHXD dated 2 May 2019, with supplementary and adjusted approvals in Documents No. 749/KKT-QHXD dated 30 July 2021, No. 1307/KKT-QHXD dated 16 November 2021, and No. 1144/KKT-QLĐT dated 27 September 2022; the boundary coordinates are shown in Table 18:

Table 18. Boundary coordinates of dredged material storage area No. 1

Point	VN 2000 Coordinate System, meridian 105°30', projection zone 3°	
	X(m)	Y(m)
1	1998409.170	597889.940
2	1998509.440	597835.460
3	1998717.310	597730.770
4	1998635.330	597527.730
5	1998475.570	597455.780
6	1998343.630	597478.000
7	1998317.160	597431.390
8	1998199.680	596827.030
9	1997907.340	596638.500
10	1997760.080	596685.780
11	1997615.150	596416.080
12	1997539.740	596459.260
13	1997822.420	596982.720
14	1997923.150	596928.300
15	1998137.980	597325.990
16	1998129.960	597370.650

- Dredged material storage area No. 2, with an area of approximately 16.63 ha, was approved by the Management Board of the Ha Tinh Economic Zone in Document No. 1307/KKT-QHXD dated 16 November 2021, and was handed over on-site as per the handover minutes dated May 23, 2022; the boundary coordinates are shown in Table 19:

Table 19. Boundary coordinates of dredged material storage area No. 2

Point	VN 2000 Coordinate System, meridian 105°30', projection zone 3°	
	X(m)	Y(m)
1	1998471.310	597922.660
2	1998545.540	598135.040
3	1998576.580	598184.710
4	1998690.630	598092.890
5	1998818.220	598028.800
6	1999120.000	597821.000



7	1999085.000	597595.000
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### ***1.5. Environmental sensitivity factors***

Based on Point c, Clause 1, Article 28 of the Law on Environmental Protection, and Clause 4, Article 24 of Decree No. 08/2022/NĐ-CP dated 10 January 2022 detailing some provisions of the Law on Environmental Protection, the project does not have environmental sensitivity factors (abbreviated as Decree No. 08/2022/NĐ-CP).

## **2. Construction components and activities of the investment project that may adversely affect the environment**

### ***2.1. Construction phase***

- Construction worker activities generate domestic solid waste and wastewater, affecting the aesthetic of the project area.
- The transportation of construction materials, machinery, and equipment affects the air quality of the project area and its surroundings.
- Construction activities generate dust, exhaust gases, wastewater, waste soil, construction solid waste, hazardous waste, noise, and vibrations, affecting the air quality, water environment, and aesthetics of the project area and its surroundings.
- Pipeline and steam system flushing activities before test operation generate wastewater and sludge, potentially adversely affecting the wastewater receiving area.
- The operation of dredging and dumping vehicles, and the transportation of dredged material to onshore storage sites generates noise, dust, and exhaust gases, impacting the air quality of the area.
- Dredging and offshore dumping activities increase turbidity and spread Total Suspended Solids (TSS), affecting the sea water quality in the dredging and dumping areas.

### ***2.2. Operation phase***

- Worker activities at the main plant and worker housing generate domestic solid waste and wastewater, affecting the aesthetics of the project area.
- Electricity production activities of the two generating units, coal transportation system, and ash slurry transportation generate dust, exhaust gases, industrial wastewater, domestic solid waste, general industrial solid waste, and hazardous waste, affecting the air quality, water environment, aquatic ecosystems, and aesthetics of the project area and its surroundings.

## **3. Main environmental impact predictions and waste generated during the project phases**

### ***3.1. Wastewater and exhaust emissions***

### 3.1.1. Sources, scale, and characteristics of wastewater

#### 3.1.1.1. Construction phase

- Domestic wastewater from worker activities with a volume of approximately 167.72 m<sup>3</sup>/day. Characteristic pollutants include: BOD<sub>5</sub>, COD, Total Suspended Solids (TSS), Nitrate (as N), Phosphate (as P), Ammonium (NH<sub>4</sub><sup>+</sup>), and Total Coliforms.

- Wastewater from vehicle and machinery washing activities with a volume of approximately 23.8 m<sup>3</sup>/day. Characteristic pollutants include: Total Suspended Solids (TSS) and total mineral oil and grease.

- Bilge water from construction marine vehicles with a volume of approximately 0.256 m<sup>3</sup>/day. Characteristic pollutants include: Total Suspended Solids (TSS) and mineral oil and grease.

- Leachate from the process of pumping dredged material to storage area No. 2 (16.63 ha) with a volume of approximately 549.5 m<sup>3</sup>/hour. Characteristic pollutants include: Total Suspended Solids (TSS).

- Wastewater from pipeline flushing with a volume of approximately 12,000 m<sup>3</sup> per event. Characteristic pollutants include: Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Iron (Fe), and Copper (Cu).

#### 3.1.1.2. Operation phase

- Domestic wastewater from worker activities at the main plant with a volume of approximately 104.4 m<sup>3</sup>/day. Characteristic pollutants include: Total Suspended Solids (TSS), BOD<sub>5</sub>, COD, Nitrogen (N), Phosphorus (P), and Coliform.

- Domestic wastewater from worker housing with a volume of approximately 140 m<sup>3</sup>/day. Characteristic pollutants include: Total Suspended Solids (TSS), BOD<sub>5</sub>, COD, Nitrogen (N), Phosphorus (P), and Coliform.

- Cooling water from the operation of two generating units with a volume of approximately 4,971,148 m<sup>3</sup>/day (of which approximately 796,800 m<sup>3</sup>/day is used for the seawater flue gas desulfurization system (SWFGD)). Characteristic pollutants include: temperature and residual chlorine.

- Wastewater from the seawater flue gas desulfurization system (SWFGD) with a volume of approximately 796,800 m<sup>3</sup>/day. Characteristic pollutants include: temperature, total sulfite ions (HSO<sub>3</sub><sup>-</sup>, SO<sub>3</sub><sup>2-</sup>), pH, TSS, and COD.

- Industrial wastewater (including chemically contaminated wastewater and oil-contaminated wastewater) with a volume of approximately 165 m<sup>3</sup>/hour. Characteristic pollutants include: COD, Total Suspended Solids (TSS), and oil and grease.

### 3.1.2. Sources, scale, and characteristics of dust and emissions

#### 3.1.2.1. Construction phase

- Dust generated from the ground leveling process at the ash storage areas (phase 1 and planned phase 2).

- Dust and emissions from the transportation of construction materials for plant components. Key pollutants include: Suspended dust, SO<sub>2</sub>, NO<sub>x</sub>, CO.
- Dust and emissions from the operation of construction machinery and equipment. Key pollutants include: Suspended dust, SO<sub>2</sub>, NO<sub>x</sub>, CO.
- Dust and emissions from the construction process at sea and the dumping of dredged materials. Key pollutants include: Suspended dust, SO<sub>2</sub>, NO<sub>x</sub>, CO.
- Dust and emissions from the dredging process and transporting dredged materials to onshore storage areas. Key pollutants include: Suspended dust, SO<sub>2</sub>, NO<sub>x</sub>, CO.

#### *3.1.2.2. Operation phase*

- Dust generated from the loading and transportation of coal.
- Dust and emissions from the coal-burning activities of the two generating units, with an emission volume of approximately 3,100,000 m<sup>3</sup>/hour per unit. Key pollutants include: Total dust, NO<sub>x</sub>, SO<sub>2</sub>.
- Dust generated from the transportation of ash slurry by road.
- Odor from the drainage system and domestic waste storage equipment, and the temporary domestic waste collection area before being transferred to specialized vehicles.
- Boiler emissions from the auxiliary LDO oil-fired boiler with an emission volume of approximately 55,560 m<sup>3</sup>/hour. Key pollutants include: Total dust, NO<sub>x</sub>, SO<sub>2</sub>.

### **3.2. Solid waste and hazardous waste**

#### 3.2.1. Sources and scale of domestic solid waste and general solid waste

##### *3.2.1.1. Construction phase*

- Domestic solid waste from worker activities, generating approximately 1,500 kg/day. Main components include: cans, newspapers, packaging, bottles, food containers.
- Weak soil removed during the ground leveling process, generating approximately 97,250 m<sup>3</sup>.
- Solid waste from basic construction activities, generating approximately 4,660 kg/day. Main components include: soil, sand, construction steel, broken bricks, cement bags.

##### *3.2.1.2. Operation phase*

- Domestic solid waste generated with a volume of approximately 1,024 kg/day (main plant area: 464 kg/day, worker housing area: 560 kg/day). Main components include: cans, pallets, newspapers, packaging, bottles, food containers, leftover food.
- Sludge generated from the domestic wastewater treatment system with a volume of approximately 1.08 tons/month for biological sludge (main plant area: 0.54 tons/month, worker housing area: 0.54 tons/month).
- Ash slurry from coal-fired boilers, generating approximately 1,438 tons/day.

- Sludge generated from septic tanks. Main components include: sludge with high organic content and high microbial content.

### 3.2.2. Sources and scale of hazardous waste

#### 3.2.2.1. *Construction phase*

Hazardous waste generated from construction activities, with a volume of approximately 246.94 kg/day. Main components include: waste DO oil, batteries, waste lead-acid batteries, waste fluorescent bulbs, SOS oil filter fabric, bilge water.

#### 3.2.2.2. *Operation phase*

- Hazardous waste generated from the operation of the main plant, with a volume of approximately 130.7 tons/year. Main components include: waste oil and grease from machine and equipment maintenance, oil and grease-soaked rags used in machine and equipment cleaning.

- Sludge from the chemical and physical treatment process at the industrial wastewater treatment system, with a volume of approximately 20.73 tons/month (classified as industrial solid waste requiring control by the project owner).

- Hazardous waste from worker housing activities, with a volume of approximately 20-30 kg/month. Main components include: batteries, waste lead-acid batteries, waste fluorescent bulbs.

### **3.3. Noise and vibration**

#### 3.3.1. Construction phase

Noise and vibration arise from the transportation of raw materials, equipment, and machinery; from the construction equipment and machinery for project components and works.

#### 3.3.2. Operation phase

Noise and vibration arise from the activities of vehicles transporting raw materials, fuels, and products; noise generated from the operation of machinery and production equipment.

### **3.4. Other impacts**

#### 3.4.1. Construction phase

- Runoff rainwater with a total generated flow rate of approximately 6.87 m<sup>3</sup>/s. Characteristic pollutants: Total Suspended Solids (TSS).

- Spread of dredged materials; negative impact on the water quality of the dredging area and the area where dredged materials are dumped; impact on the aquatic ecosystem in the area.

- Environmental risks and incidents such as oil spills; fire and explosion incidents; landslide incidents; breaches of containment embankments at dredged material storage sites; leakage incidents from dredged material storage sites into the surrounding environment; pipeline rupture incidents in the dredged material pumping system; incidents caused by natural disasters and extreme weather.

### 3.4.2. Operation phase

- Runoff rainwater in the main plant area, ash slurry storage area, and wharf area with a total generated flow rate of approximately 5.08 m<sup>3</sup>/s. Characteristic pollutants: Total Suspended Solids (TSS).

- Environmental risks and incidents such as oil spills; fire and explosion incidents; incidents with the domestic wastewater treatment system and industrial wastewater treatment system; incidents with the exhaust gas treatment system; incidents related to ash slurry storage sites; flood incidents; ammonia (NH<sub>3</sub>) leakage incidents.

## **4. Environmental protection works and measures for the investment project**

### ***4.1. Works and measures for collecting and treating wastewater and exhaust gas***

#### 4.1.1. For collecting and treating wastewater

##### *4.1.1.1. Construction phase*

- Domestic wastewater:

- + Continue operating 13 mobile toilets on the construction site with waste storage tanks of about 6.0 m<sup>3</sup>/tank; periodically transfer to a licensed unit for collection, transportation, and treatment according to regulations.

- + Continue operating the domestic wastewater treatment system for the construction office area with a capacity of 60 m<sup>3</sup>/day-night; the treatment process is as follows:

- + Wastewater → collection tank → equalization tank → anoxic tank → aerobic tank → sedimentation tank → intermediate tank → MBR tank → disinfection tank → treated wastewater meets QCVN 14:2008/BTNMT (column B, coefficient K = 1.2) → surface drainage system in the area before discharging into the sea (Discharge point coordinates: X(m) = 2001791.710 and Y(m) = 594248.650).

- + Arrange sufficient storage tanks and toilets on watercraft serving dredging and dumping activities.

- Vehicle washing wastewater in the main plant area: construct one sedimentation tank with a capacity of 8.0 m<sup>3</sup> to settle sand and filter oil and grease. The sedimentation tank has two compartments (one for settling and one for water storage), with SOS fabric to filter oil and grease. The SOS fabric containing oil and grease is collected and treated as hazardous waste. Treated water is recycled for road spraying, dust suppression, and vehicle washing, without discharging into the environment.

- Bilge water from construction vessels: equip storage devices and periodically transfer to a licensed unit for collection, transportation, and treatment according to the regulations of Circular No. 41/2017/TT-BGTVT dated November 14, 2017, by the Minister of Transport on the management of waste collection and treatment from ships in seaport waters, and Circular No.

02/2022/TT-BTNMT dated January 10, 2022, by the Minister of Natural Resources and Environment detailing the implementation of some provisions of the Environmental Protection Law (referred to as Circular No. 02/2022/TT-BTNMT).

- Wastewater from pipe cleaning, hydrostatic testing, and steam system testing is collected and transferred to a licensed unit for collection, transportation, and treatment according to regulations.

- Leachate from dredged materials at the dredged material storage area is collected into a three-compartment sedimentation tank (600 m<sup>3</sup> capacity) located in the southeast of the 16.63 ha dredged material storage area to settle suspended solids before flowing into the sea.

#### *4.1.1.2. Operation phase*

- Domestic wastewater in the worker housing area: construct and operate one domestic wastewater treatment system with a capacity of 150 m<sup>3</sup>/day-night; the treatment process is as follows:

Domestic wastewater → septic tank/grease trap → collection tank → equalization tank → anoxic tank → aerobic tank → biological sedimentation tank → disinfection tank → treated wastewater ensures QCVN 14:2008/BTNMT (column A, coefficient K = 1.0) → Da Hat Stream (discharge point coordinates: X(m) = 1993232; Y(m) = 593800).

- Domestic wastewater in the main plant area: construct one domestic wastewater treatment system with a capacity of 150 m<sup>3</sup>/day-night; the treatment process is as follows:

Domestic wastewater → septic tank/grease trap → trash screen → equalization tank → anoxic tank → aerobic tank → biological sedimentation tank → disinfection tank → treated water storage tank → treated wastewater is pumped to the primary holding tank of the industrial wastewater treatment system for further treatment.

- Oil-contaminated wastewater: construct one preliminary oil-contaminated wastewater treatment system with a capacity of 25 m<sup>3</sup>/hour. The treatment process is as follows:

Oil-contaminated water → oil-contaminated wastewater storage tank → oil separation device → final pH adjustment tank of the industrial wastewater treatment system.

- Industrial wastewater: construct one industrial wastewater treatment system with a capacity of 200 m<sup>3</sup>/hour; the treatment process is as follows:

Industrial wastewater → primary holding tank → pH adjustment tank → coagulation tank → flocculation tank → sedimentation tank → intermediate tank → pressure filter tank → activated carbon filter tank → final pH adjustment tank → treated wastewater holding tank → treated wastewater ensures QCVN 40:2011/BTNMT (column B, coefficient K<sub>q</sub> = 1.3 and K<sub>f</sub> = 0.9) → discharge into the cooling water discharge system (discharge point coordinates: X(m) = 2003603; Y(m) = 594666, located after the automatic continuous monitoring point of the cooling water discharge system).

#### 4.1.1.3. *Environmental protection requirements*

- Collect and treat wastewater generated during the implementation of the Project to ensure safety and environmental sanitation requirements according to the provisions of the Law on Environmental Protection, Decree No. 08/2022/ND-CP, and Circular No. 02/2022/TT-BTNMT.

- Install one (01) automatic, continuous wastewater monitoring system for treated wastewater from the industrial wastewater treatment system, equipped with surveillance cameras, automatic wastewater sampling devices, and data transmission directly to the Ha Tinh Department of Natural Resources and Environment as required. The automatically and continuously monitored wastewater parameters include: Flow rate (inlet and outlet), temperature, pH, Total Suspended Solids (TSS), COD, Ammonium (NH<sub>4</sub><sup>+</sup>). The automatic, continuous wastewater monitoring system must be tested, inspected, and calibrated according to current regulations on science and technology, standards, measurement, and quality.

#### 4.1.2. For collecting and treating dust and exhaust gas

##### 4.1.2.1. *Construction phase*

- Develop an appropriate construction plan and schedule; organize dedicated teams to clean up spilled materials around the construction site and adjacent areas.

- Use vehicles that are inspected and registered according to regulations; road transport vehicles for raw materials must carry loads within the designated capacity and cover the cargo during transportation; register transport vehicles and transportation times with state management agencies as required.

- Install AIS navigation systems and monitor the load capacity of watercraft on the waterway transporting dredged materials for dumping at sea.

- Clean transportation vehicles before leaving the construction site; regularly maintain vehicles, machinery, and construction equipment to ensure technical safety and environmental protection conditions.

- Provide adequate personal protective equipment for workers on the construction site as required.

- Comply with the dredging and transportation plan for dumping dredged materials, which has been developed and approved by the competent authorities, ensuring safety and environmental sanitation conditions as required.

##### 4.1.2.2. *Operation phase*

- Install two (02) exhaust gas treatment systems for boilers with a capacity of 3,100,000 m<sup>3</sup>/hour/system; the technological process is as follows:

Boiler exhaust gas → Selective Catalytic Reduction (SCR) for NO<sub>x</sub> removal → Electrostatic Precipitator (ESP) (02 units/1 boiler, each unit has 04 fields) → Seawater Flue Gas Desulfurization (SWFGD) tower → chimney, ensuring compliance with QCVN 22:2009/BTNMT (column B, coefficient K<sub>p</sub> = 0.7 and K<sub>v</sub> = 1.0) - National Technical Regulation on Industrial Emissions for Thermal Power Plants and QCVN 19:2009/BTNMT (column B, coefficient K<sub>p</sub> = 0.8 and

$K_v = 1.0$ ) - National Technical Regulation on Industrial Emissions for Dust and Inorganic Substances, with specific parameters Total Dust  $\leq 50$  mg/Nm<sup>3</sup>, SO<sub>2</sub>  $\leq 200$  mg/Nm<sup>3</sup>, NO<sub>x</sub>  $\leq 300$  mg/Nm<sup>3</sup> as committed by the Project Owner.

- Exhaust gas from auxiliary boilers using LDO fuel is discharged into the environment through a 50 m high chimney.

- Regularly spray water using equipped water pump and sprinkler systems in project areas (internal roads, green landscape areas) on hot and dry days. The frequency is 1-2 times/day (excluding rainy days), increasing the frequency during the dry season.

- Plant greenery in the main plant area to reduce dust and noise pollution, ensuring the environmental landscape of the project area and minimizing pollution.

#### *4.1.2.3. Environmental protection requirements*

- Collect and treat dust and exhaust gas generated during the implementation of the Project to ensure safety and environmental sanitation requirements; the generated dust and exhaust gas must comply with QCVN 22:2009/BTNMT - National Technical Regulation on Industrial Emissions for Thermal Power Plants and QCVN 19:2009/BTNMT - National Technical Regulation on Industrial Emissions for Dust and Inorganic Substances (specific parameters Total Dust  $\leq 50$  mg/Nm<sup>3</sup>, SO<sub>2</sub>  $\leq 200$  mg/Nm<sup>3</sup>, NO<sub>x</sub>  $\leq 300$  mg/Nm<sup>3</sup> as committed by the Project Owner) and other related regulations and standards.

Install two (02) automatic, continuous exhaust gas monitoring systems for treated exhaust gas at the chimney of each exhaust gas treatment system (01 system/01 exhaust gas chimney), equipped with surveillance cameras and data transmission directly to the Ha Tinh Department of Natural Resources and Environment as required. The automatically and continuously monitored exhaust gas parameters include: Flow rate, pressure, temperature, O<sub>2</sub>, Total Dust, SO<sub>2</sub>, NO<sub>x</sub> (calculated as NO<sub>2</sub>), CO. The automatic, continuous exhaust gas monitoring system must be tested, inspected, and calibrated according to regulations on science and technology, standards, measurement, and quality.

## ***4.2. Solid and hazardous waste management works and measures***

### ***4.2.1. Works and measures for collecting, storing, managing, and treating general solid waste***

#### ***4.2.1.1. Construction phase***

- Household solid waste generated will be sorted at the source. Equip specialized bins with a capacity of 100-120 liters at the construction site and the contractor's office area to collect household solid waste.

- Arrange one general household solid waste storage warehouse on the construction site, with an area of approximately 24.0 m<sup>2</sup>, for temporary storage of household waste; periodically transfer it to a functional unit for collection, transportation, and treatment as required.

- Sort construction solid waste based on usage value, utilize soil, rock, and



broken concrete components for leveling roads within the Project area, and transfer recyclable components such as surplus steel to a functional recycling unit.

- Collect and transport topsoil to a topsoil storage site with an area of 83,061 m<sup>2</sup> in Ky Trinh Ward, Ky Anh Town, Ha Tinh Province (according to the on-site land handover record dated May 18, 2021, between the Ha Tinh Economic Zone Management Board and the Project Owner); spread the soil immediately upon dumping, and design temporary soil rainwater collection ditches around the storage area (dimensions W x H = 0.8 m x 0.6 m) to collect rainwater runoff.

- Dredged materials transported ashore are stored at two onshore dredged material storage sites with a volume of approximately 663,851 m<sup>3</sup>; ensure correct technical dumping of dredged materials to avoid spilling into the environment, affecting the surrounding area.

- Transport dredged materials for sea disposal with a volume of approximately 1,761,232 m<sup>3</sup> at an area of about 200 ha (located in the sea area within the Ky Anh Town jurisdiction, Ha Tinh Province, about 22 km northeast of the dredging area, with a sea depth of 39 m - 42 m).

#### *4.2.1.2. Operation phase*

- Arrange household waste bins with lids, with a capacity of 20 - 200 liters, in office areas, workshops, dining rooms, along roads, and worker accommodation areas for temporary storage of household waste; periodically transfer to a functional unit for collection, transportation, and treatment as required.

- Research solutions for reusing ash slurry according to Directive No. 08/CT-TTg dated March 26, 2021, of the Prime Minister on promoting the treatment and use of ash, slag, and gypsum from thermal power plants, chemicals, and fertilizers as raw materials for building materials production and construction projects.

- Design two ash slurry storage sites: ash slurry storage site No. 1 (15 ha) adjacent to the main plant and ash slurry storage site No. 2 (34.4 ha) in Ky Trinh Ward, Ky Anh Town, Ha Tinh Province, as follows:

- + Ash slurry storage site No. 1: top of the embankment width from 5.0 m - 7.0 m, compacted earth structure; the highest embankment top height is +23 m, outer embankment slope of 1:2 planted with grass for slope protection, inner embankment slope of 1:1.75 with layers of geotextile and HDPE impermeable membrane.

- + Ash slurry storage site No. 2: top of the embankment width from 3.0 m - 8.0 m, compacted earth structure; the highest embankment top height is +32 m, outer embankment slope of 1:2 planted with grass for slope protection, inner embankment slope of 1:1.75 with layers of geotextile and HDPE impermeable membrane.

- + Ash slurry disposal method: usable ash slurry are transported by purchased trucks directly at the silo; for ash slurry discharged into the storage site: ash slurry are cooled, mixed with water inside the plant → pumped through pipelines →

discharged into the ash slurry storage site.

+ Rainwater drainage system outside the ash slurry storage site: design a reinforced concrete drainage system (RC) (dimensions  $W \times H = 0.3 \text{ m} \times 0.3 \text{ m}$ ) to collect rainwater generated on the embankment top → main ditches at the foot of the ash slurry storage embankment (RC ditches, various dimensions  $W \times H = 2.5 \text{ m} \times (1.8 \text{ m} - 2.0 \text{ m})$ ) → discharge into the environment.

+ Recovered water drainage system for water runoff from the ash slurry storage site: arrange a pump station to collect runoff water (through water pipes) → reuse for the ash slurry transportation process, not discharged into the environment.

#### *4.2.1.3. Environmental protection requirements*

Collect and treat general solid waste generated during the Project implementation to ensure safety and environmental sanitation requirements according to the provisions of the Law on Environmental Protection, Decree No. 08/2022/ND-CP, and Circular No. 02/2022/TT-BTNMT.

4.2.2. Works and measures for collecting, storing, managing, and treating hazardous waste

##### *4.2.2.1. Construction phase*

Arrange one hazardous waste storage warehouse with an area of 90 m<sup>2</sup> at the construction site; periodically transfer it to a functional unit for collection, transportation, and treatment as required.

##### *4.2.2.2. Operation phase*

Arrange one hazardous waste storage warehouse with an area of 200 m<sup>2</sup> at the main plant area and two hazardous waste storage warehouses at the worker accommodation area, with an area of 6.0 m<sup>2</sup>/warehouse; periodically transfer to a functional unit for collection, transportation, and treatment as required.

##### *4.2.2.3. Environmental protection requirements*

Classify, sort, collect, and manage hazardous waste generated during the Project implementation to ensure safety and environmental sanitation requirements according to the provisions of the Law on Environmental Protection, Decree No. 08/2022/ND-CP, and Circular No. 02/2022/TT-BTNMT.

### ***4.3. Works and measures to mitigate noise and vibration impacts***

#### *4.3.1. Construction phase*

- Use construction vehicles and equipment that are registered and certified to ensure technical safety and compliance with environmental standards as required.

- Regularly maintain and replace equipment with high movement frequency and susceptibility to wear, strictly adhere to standards and maintenance schedules to reduce air pollution.

#### 4.3.2. Operation phase

- Noise-generating machinery of the plant (turbines, steam pipelines) will be placed in shielded workshops to reduce noise, preventing impacts on surrounding areas; install noise reduction devices and soundproof padding for high-noise machinery.

- Machinery and equipment will be periodically maintained; install noise reduction devices at steam exhaust outlets.

- Control and operation rooms in the production area will be built with soundproof walls and roofs.

- Install low-noise equipment, silencers, and soundproof materials where necessary (around turbine and boiler areas).

- Plant trees in the Project area to meet the legal requirements for construction.

#### 4.3.3. Environmental protection requirements

Implement full measures to minimize noise and vibration impacts during all Project phase, ensuring compliance with QCVN 26:2010/BTNMT - National Technical Regulation on Noise, QCVN 27:2010/BTNMT - National Technical Regulation on Vibration, and other relevant current environmental standards.

### ***4.4. Other environmental protection works and measures***

4.4.1. Minimizing the spread and negative impact of dredged materials on sea water quality during construction phase includes:

- Use the correct number, type, capacity, and load of cable excavators, self-propelled suction dredgers, and bottom-opening barges according to design documents; dredge within the approved boundaries; do not dredge beyond the boundaries or exceed the approved volume.

- Do not fill the dredged material to the top of the barge and self-propelled dredger hopper; the top of the dredged material should be at least 30 cm below the overflow edge. All transport vehicles for dredged material must be equipped with settling compartments. The water drained from the dredged material must pass through these compartments to allow suspended solids to settle before being released, ensuring that the TSS (Total Suspended Solids) concentration does not increase compared to the ambient seawater quality.

- The grab bucket of the cable excavator should be positioned close to the barge to minimize the swing angle of the grab arm.

- Monitor the position, journey, and volume of dredging and dumping vehicles. Install AIS (Automatic Identification System), cameras, and cameras on transport vessels to directly monitor the journey and accurately locate the dumping site, ensuring proper control of the dredged material disposal position and volume. Continuously monitor each dredging and dumping trip. Coordinate with Ha Tinh Maritime Administration to monitor the journey of dumping vessels through the automatic identification system.

- Install filters at the overflow openings of self-propelled suction dredgers and bottom-opening barges to prevent leakage and spread of dredged materials during transportation; regularly check to ensure the filter's efficiency.

- Perform the sea dumping process at the specified location. To ensure the material layer is evenly spread over the entire permitted area, sequentially dump in four grid cells at the dumping area (200 ha), each grid cell with an area of 50 ha/grid cell. Upon completion, the Project Owner will survey the depth of the dumping area and report to the competent state management agency.

- Execute dredging and dumping operations according to the approved plan; do not transport and dump dredged materials on rough sea days with strong winds and heavy storms.

- When discharging dredged materials into the permitted sea area, accurately determine the position, confirm the volume of dredged materials transported, and set a reasonable discharge rate to reduce the spread of suspended materials.

- Record a log of the dredged material dumping process; the Project Owner is fully responsible for improper positioning and loss of dredged materials during transportation, affecting surrounding entities.

- Monitor sea water quality according to the approved program to promptly detect abnormal signs.

- Environmental protection requirements: Conduct sea dumping in accordance with the Marine and Island Resources and Environment Law and other related regulations; apply technical and management measures for dredged materials during construction, transportation, and dumping, meeting the requirements of Circular No. 28/2019/TT-BTNMT dated December 31, 2019, by the Minister of Natural Resources and Environment on technical regulations for assessing dredged materials and identifying dumping areas in Vietnamese seas, and Circular No. 23/2022/TT-BTNMT dated December 26, 2022, by the Minister of Natural Resources and Environment amending and supplementing several articles of Circular No. 28/2019/TT-BTNMT dated December 31, 2019, on technical regulations for assessing dredged materials and identifying dumping areas in Vietnamese seas.

#### 4.4.2. Measures to mitigate the impact of stormwater runoff

- During construction phase: stormwater runoff will be collected into temporary drainage ditches on the construction site (main plant area, construction yard, and topsoil disposal area) with dimensions  $B \times H = 0.6 \text{ m} \times 0.8 \text{ m}$ , including sedimentation manholes (dimensions  $0.8 \text{ m} \times 0.8 \text{ m}$ ) along the route. The average distance between manholes is 30 - 40 meters, ensuring effective sedimentation and water drainage.

- During operation phase:

- + Main plant area: stormwater runoff will be collected through a system of reinforced concrete circular pipes (dimensions D200 - D1800) and reinforced

concrete drainage channels (dimensions B300 - B5000) before being discharged into the sea.

+ Worker housing area: stormwater runoff will be collected through a system of covered reinforced concrete drainage channels (dimensions B400 - B1000) before being released into the common drainage system along the area's roads.

#### 4.4.3. Environmental incident prevention and response plan

##### 4.4.3.1. Construction phase

###### a) Fire and explosion prevention and response measures:

- Equip with adequate firefighting equipment placed in easily visible locations. Establish fire safety regulations and warnings on construction vehicles. Fuel tanks on ships should be kept away from electrical sources or other ignition sources.

- Store fuel (gasoline, oil, grease) in separate warehouses according to current fire safety regulations. Establish strict guidelines for tasks involving fire or heat sources.

- Use materials that do not generate sparks and have no potential for explosion when impacted or subjected to friction. Employ explosion-proof devices and protective equipment to quickly cut off electrical sources that could trigger explosions.

- Organize training on fire safety regulations and firefighting techniques for workers. Prohibit smoking and other activities that could generate sparks in areas containing fuel or other flammable materials.

###### b) Oil spill prevention and response measures:

- Comply with the maritime safety plan approved by the Ha Tinh Port Authority during project construction.

- Ensure construction vehicles have sufficient capacity to respond to oil spills as per Decision No. 133/QĐ-TTg dated January 17, 2020, by the Prime Minister on the National Plan for Oil Spill Response. Equip vehicles with oil containment booms around tanks, machinery, equipment, and maintenance areas that use or generate oil.

- Provide sufficient minimum response equipment for oil spills, including an oil pollution prevention system for each construction vehicle as per QCVN 26:2018/BGTVT - National Technical Regulation on Marine Pollution Prevention Systems for Ships. Equip with oil-absorbing materials to limit oil spills as required by Decision No. 12/2021/QĐ-TTg dated March 24, 2021, by the Prime Minister on Oil Spill Response Regulations.

- Construction vehicles must be inspected and licensed by the appropriate authorities, equipped with adequate infrastructure and technical capabilities, and have a plan to prevent and minimize the risk of oil spills. Be prepared to respond to oil spills if they occur.

- Adhere to regulations in Circular No. 35/2019/TT-BGTVT dated September 9, 2019, by the Minister of Transport on dredging activities in maritime zones, and Circular No. 27/2021/TT-BGTVT dated November 30, 2021, amending and supplementing several articles of Circular No. 35/2019/TT-BGTVT dated September 9, 2019, by the Minister of Transport on dredging activities in maritime zones, and Circular No. 42/2019/TT-BGTVT dated October 30, 2019, by the Minister of Transport on criteria, inspection, supervision, evaluation, and acceptance of maritime safety service quality.

c) Measures for preventing and responding to embankment failure at dredged material containment sites:

- Construct and inspect the embankment system of containment sites according to the design. Build embankments up to an elevation of +3.0 m to +3.5 m using in situ soil, with the embankment covered with impermeable plastic to ensure safety and durability when receiving dredged materials. Prevent leakage of liquid mud into the surrounding environment.

- Regularly inspect and monitor the embankment condition and water levels within the containment site, ensuring water levels remain lower than the embankment height. Implement appropriate and timely reinforcement measures to minimize runoff and prevent embankment failure.

- Suspend dredged material spraying and dumping activities if there are signs of embankment cracking, erosion, or runoff. Quickly reinforce the embankment with piles, geotextile, and sandbags, ensuring safety before resuming construction. Retrieve any spilled dredged material back into the containment site and develop compensation and remediation plans if environmental damage or harm to nearby residents occurs.

#### *4.4.3.2. Operation phase*

a) Measures for fire and explosion prevention and response

Install and operate the fire prevention and fighting system in accordance with the law on fire prevention and fighting (FPPF); develop an on-site FPPF plan to promptly respond when fire and explosion incidents occur. In cases where fire and explosion incidents exceed the local response capability, cooperate with the Fire and Rescue Police Department, Ha Tinh Provincial Police, and other relevant units for timely firefighting, rescue, and emergency response.

b) Measures for oil spill prevention and response

- Develop an oil spill prevention and response plan and submit it for approval to the competent authority as per regulations.

- The machinery and equipment used in the Project must be regularly inspected and maintained periodically to ensure they meet the technical safety and environmental hygiene conditions to prevent incidents.

- Issue regulations to ensure safety in port operations to prevent accidents that may lead to ship sinking and oil leakage incidents.

- Maintain a standing force, equipment, and vehicles ready to organize, command, and respond promptly and effectively to any potential oil spill incidents.

- If the oil spill incident exceeds the Project Owner's response capability, report immediately to the authorities for guidance and response as per regulations.

c) Measures for flue gas treatment system incident prevention and response

- Equip protection systems for boilers, turbines, and generators. The protection systems must have high reliability and avoid false tripping by using redundant signals.

- Equip an integrated measurement, control, and monitoring system for the main and auxiliary equipment of the plant according to the approved design, ensuring the safe and efficient operation of the units.

- Install an automatic and continuous emission monitoring system to promptly detect incidents related to the effectiveness of the flue gas treatment system.

- Develop safe technical operation procedures, ensure that system operators are trained in technology transfer as required, and assign dedicated staff to inspect the operation of the flue gas treatment system (with daily logs), ensuring the system always operates according to the transferred technology process.

- Regularly maintain machinery and equipment to detect potential technical errors during the operation process.

d) Measures for Sea Water Flue Gas Desulfurization (SWFGD) System Incident Prevention and Response

- Install backup pumps and aeration devices in the seawater flue gas desulfurization systems.

- Install two (02) automatic and continuous monitoring systems (one at the end of each aeration tank) with parameters: Flow, temperature, pH, Total Suspended Solids (TSS), Dissolved Oxygen (DO), Chemical Oxygen Demand (COD), Total Sulfite ions ( $\text{HSO}_3^-$  and  $\text{SO}_3^{2-}$ ).

- In the event of an incident, temporarily halt the plant's operation, inspect the seawater flue gas desulfurization system (SWFGD) to address the incident. Technical staff should promptly check and repair the system.

e) Measures for wastewater treatment system incident prevention and response

- Regularly monitor and conduct periodic maintenance of machinery and equipment in the wastewater treatment system; prepare pumps, aeration devices, and other spare equipment to replace damaged equipment immediately.

- Assign staff to manage and operate the wastewater treatment system, monitor daily operations, and strictly comply with the established operation and maintenance program for the Project's wastewater treatment system.

- In case of an incident: temporarily halt the wastewater treatment system's operation to inspect and address the incident. Technical staff should quickly check and repair the system. Temporarily store untreated wastewater in the system's storage tanks; after resolving the incident, gradually pump the wastewater back into the treatment system to meet standards.

g) Measures for ash slurry storage incident prevention and response

- Comply with the design and operational procedures for ash slurry storage areas according to the plan approved by the authorities, ensuring environmental safety.

- Regularly inspect the drainage system in the ash slurry storage areas, especially during the rainy season; promptly address any abnormal phenomena affecting the safety of the ash slurry storage areas.

h) Measures for Ammonia (NH<sub>3</sub>) leak prevention and response

- Regularly inspect ammonia storage equipment, valves, nozzles, and ammonia distribution pipes; promptly address and replace damaged parts to ensure the normal operation of the ammonia storage and distribution system as per the design.

- Install an ammonia leak detection system, a water spray system, and an ammonia treatment system. In the event of an ammonia leak (exceeding regulations), the system will automatically trigger the water spray system, supplied by the service water source, to mitigate the incident. The wastewater will be transferred to the ammonia waste dilution tank, where it will disperse into the water and settle. Ammonia will be discharged through submerged pumps into the irregular wastewater storage tank.

## **5. Environmental management and monitoring program by the Project Owner**

The project owner proposes and commits to implementing the following environmental management and monitoring program:

### ***5.1. Monitoring program during construction phase***

#### **5.1.1. Monitoring the main plant area**

##### ***5.1.1.1. For wastewater***

###### **a) Domestic wastewater**

- Monitoring Location: 01 position (at the outlet of the domestic wastewater treatment system with a capacity of 60 m<sup>3</sup>/day-night).

- Monitoring Parameters: Flow rate, pH, Total Suspended Solids (TSS), Total Dissolved Solids (TDS), BOD<sub>5</sub>, Ammonium (NH<sub>4</sub><sup>+</sup>), Sulfide (H<sub>2</sub>S), Nitrate (NO<sub>3</sub><sup>-</sup>), Phosphate (PO<sub>4</sub><sup>3-</sup>), Animal and Vegetable Oils, Total Surfactants, Total Coliforms.

- Monitoring Frequency: Once every 3 months.



- Comparison Standard: QCVN 14:2008/BTNMT - National Technical Regulation on Domestic Wastewater (column B, coefficient K = 1.2).

b) Wastewater from construction activities

- Monitoring Locations: 02 positions, specifically:

- + NT1: Construction wastewater at the main plant.

- + NT2: Construction wastewater at construction area number 2 near the Quyen River.

- Monitoring Parameters: pH, Suspended Solids (SS), BOD5, COD, Ammonium (NH<sub>4</sub><sup>+</sup>), Nitrate (NO<sub>3</sub><sup>-</sup>), Phosphate (PO<sub>4</sub><sup>3-</sup>), Total Nitrogen (N), Total Phosphorus (P), Total Mineral Oils, Total Coliforms, Arsenic (As), Lead (Pb), Iron (Fe), Copper (Cu).

- Monitoring Frequency: Once every 3 months.

- Comparison Standard: QCVN 40:2011/BTNMT (column B) - National Technical Regulation on Industrial Wastewater.

*5.1.1.2. For air quality, vibration, and noise*

- Monitoring Locations: 07 positions, specifically:

- + K1: Construction site area of the main plant.

- + K2: At the residential area of Hai Phong village.

- + K3: Area near the Tay Yen intersection on the transportation route.

- + K4: Construction area number 2.

- + K5: Construction area of the ash and slag storage.

- + K6: Area near the storage of dredged materials during dredging operations.

- + K7: Residential area of Dong Yen village.

- Monitoring Parameters: Total Suspended Particles (TSP), PM<sub>10</sub> Dust, SO<sub>2</sub>, NO<sub>2</sub>, CO, Noise, Vibration.

- Monitoring Frequency: Once every 3 months.

- Comparison Standards:

- + QCVN 05:2023/BTNMT - National Technical Regulation on Ambient Air Quality.

- + QCVN 26:2010/BTNMT - National Technical Regulation on Noise.

- + QCVN 27:2010/BTNMT - National Technical Regulation on Vibration.

*5.1.1.3. For surface water quality*

- Monitoring Locations: 05 positions, specifically:

- + NM1: Quyen River water upstream near construction area number 2.

- + NM2: Quyen River water downstream near construction area number 2.

- + NM3: Quyen River water upstream near the organic soil storage area.
- + NM4: Quyen River water downstream near the organic soil storage area.
- + NM5: Quyen River water near the dredged material storage areas.

- Monitoring Parameters: pH, BOD5, Total Organic Carbon (TOC), Total Suspended Solids (TSS), Dissolved Oxygen (DO), Total Phosphorus (P), Total Nitrogen (N), Total Coliforms, Total Oil and Grease.

- Monitoring Frequency: Once every 3 months.

- Comparison Standard: QCVN 08:2023/BTNMT - National Technical Regulation on Surface Water Quality.

### 5.1.2. Monitoring for dredging and dumping activities

#### 5.1.2.1. For sediment quality

- Monitoring Locations: Randomly take samples from 03 positions within the dredging construction area.

- Monitoring Frequency: Once a week.

- Monitoring Parameters: Arsenic (As), Cadmium (Cd), Lead (Pb), Zinc (Zn), Mercury (Hg), Total Chromium (Cr), Copper (Cu), Total Hydrocarbons, Chlordane, DDD, DDE, DDT, Dieldrin, Endrin, Heptachlor Epoxide, Lindane, Total Polychlorinated Biphenyls (PCBs), Polycyclic Aromatic Hydrocarbons (PAHs), Iron (Fe), Phenol, Cyanide (CN), Dioxins and Furans, Total Oil and Grease, Total Alpha and Beta Radioactivity, Tributyltin.

- Comparison Standard: QCVN 43:2017/BTNMT – National Technical Regulation on Sediment Quality and Appendix 01 of Circular No. 28/2019/TT-BTNMT dated December 31, 2019, by the Minister of Natural Resources and Environment on technical regulations for evaluating dredged materials and determining dumping sites for dredged materials in Vietnamese marine areas.

- Monitoring Period: From the start of construction activities until one week after construction completion.

#### 5.1.2.2. For coastal water quality

- Monitoring Locations: 08 positions (04 positions at the dredged material pumping stations; 03 positions at 03 excavation points; 01 position at sea at the water discharge point from the ash and slag storage area).

- Number of Samples: 04 samples per location (at 02 water layers: surface layer (1m below the sea surface) and bottom layer (1m above the seabed) at 02 times: high tide and low tide).

- Monitoring Frequency: Once a week until one month after dredging completion.

- Monitoring Parameters: pH, Dissolved Oxygen (DO), Total Suspended Solids (TSS), Mineral Oil, with mineral oil parameters only taken from the surface layer, 01 sample per location.

- Comparison Standard: QCVN 10:2023/BTNMT: National Technical Regulation on Marine Water Quality.

*5.1.2.3. For seawater quality in dredging and dumping areas*

- Monitoring locations: 12 positions; coordinates are shown in Table 20:

Table 20. Coordinates of seawater quality monitoring positions in dredging and dumping areas

Symbol	VN 2000 Coordinate System, meridian 105°30', projection zone 3°		Description
	X(m)	Y(m)	
NB01	2016591,484	617094,146	Monitoring and supervision of seawater quality at dumping sites according to prevailing wind directions.
NB02	2026934,216	606353,850	
NB03	2014164,937	606679,921	Monitoring, supervising seawater quality, and assessing the impact of dumping activities on the ecosystem around Hon Son Duong and Hon Con Chim islands.
NB04	2005718,624	602704,495	
NB05	2019264,375	600267,289	Monitoring, supervising seawater quality, and assessing the impact of dumping activities on the protected fisheries resources area along the Ha Tinh coastal region from Cam Linh commune to Ky Xuan commune according to the Fisheries Resources Protection and Exploitation Plan for the period 2021-2030, with a vision to 2050.
NB06	2015636,281	588616,893	
NB07	2005190,390	598116,791	Monitoring the impact of dredging activities on adjacent areas: Mui Ron, Vung Ang Port, Hai Phong Beach, Ky Ninh Beach.
NB08	2005012,838	595805,245	
NB09	2002916,286	595050,849	
NB10	2004616,078	592019,231	
NB11	2006615,483	588654,330	
NB12	2011144,572	594007,274	

- Monitoring Parameters::

+ For nearshore points (NB01, NB02, NB03, NB05): monitor parameters pH, Total Suspended Solids (TSS), Arsenic (As), Cadmium (Cd), Lead (Pb), Total Chromium (Cr), Copper (Cu), Zinc (Zn), Mercury (Hg), Cyanide (CN-), Aldrin, Lindane, Dieldrin, Total DDT, Heptachlor & Heptachlorepoxyde, Diazinon, Parathion, Malathion, Total Phenol, Oil, and Mineral Oil.

+ For coastal points (NB04, NB06, NB07 to NB12): monitor parameters pH, Dissolved Oxygen (DO), Total Suspended Solids (TSS), Total Hydrocarbon, Total Coliforms, Ammonium (NH<sub>4</sub><sup>+</sup>), Phosphate (PO<sub>4</sub><sup>3-</sup>), Arsenic (As), Cadmium (Cd), Lead (Pb), Mercury (Hg), Copper (Cu), Zinc (Zn), Manganese (Mn), Chromium VI (Cr<sup>6+</sup>), Cyanide (CN-), Fluoride (F-), Iron (Fe), Total Phenol, Oil, and Mineral Oil, Aldrin, Lindane, Dieldrin, Total DDT, Heptachlor & Heptachlorepoxyde, Polychlorinated Biphenyl (PCB), Diazinon, Parathion, Malathion, 1-1-1 Trichloroethane, Tetrachloroethylene (PCE), Trichloroethylene, Dichloromethane, Benzene, Anionic Surfactants.

- Number of samples:

+ For nearshore points (NB01, NB02, NB03, NB05): at each monitoring point, take 03 samples at 3 water layers: surface layer (1m below the sea surface), middle layer (midway between the sea surface and seabed), and bottom layer (1m above the seabed), with oil and mineral oil parameters only taken from the surface layer, with 01 sample per location.

+ For coastal points (NB04, NB06, NB07 to NB11): at each monitoring point, take 04 samples at 02 water layers: surface layer (1m below the sea surface) and bottom layer (1m above the seabed) at 02 times: high tide and low tide, with oil and mineral oil parameters only taken from the surface layer, with 01 sample per location.

- Monitoring Period: 07 days before the start of dredging and dumping activities, during construction, and 07 days after construction completion.

- Monitoring Frequency: Once a day for pH, Dissolved Oxygen (DO), and Total Suspended Solids (TSS) parameters, and once a week for other parameters.

- Applicable Standards: QCVN 10:2023/BTNMT - National Technical Regulation on Marine Water Quality.

#### 5.1.2.4. Biodiversity Monitoring

- Monitoring Locations: 04 positions (SH01, SH02, SH03, and SH04), coordinates are shown in Table 21:

Table 21. Coordinates of Biological Monitoring Positions

No.	Symbol	VN 2000 Coordinate System, meridian 105°30', projection zone 3°		Description
		X (m)	Y (m)	
1	SH01	2002885.643	600876.266	

2	SH02	2005300.219	596842.147	Monitoring of plankton and benthos in the areas of Son Duong Island, Mui Dung, Quyen River Estuary, and the protected fisheries resources area
3	SH03	2002835.155	590609.655	
4	SH04	2016481.535	585907.432	

- Number of Samples: 01 sample per location.
- Monitoring Content: Benthos, zooplankton, phytoplankton.
- Frequency: Once a week.
- Monitoring Period: Collect samples once within 07 days before construction, during construction, and once within 07 days after the completion of dredging and dumping activities.

#### 5.1.4. Monitoring of solid and hazardous waste

Implement classification and collection of domestic solid waste, general solid waste, and hazardous waste according to Decree No. 08/2022/ND-CP and Circular No. 02/2022/TT-BTNMT; transfer to a licensed unit for transportation and treatment as per regulations.

#### 5.1.5. Other monitoring

- Monitor the transportation routes of dredged material using trucks to onshore storage sites; monitor the pipeline route for pumping dredged material from the pumping station to onshore storage sites; monitor the embankment system at onshore storage sites.
- Monitor and coordinate with construction units to implement measures to mitigate risks and incidents: oil spills, fire and explosion incidents, landslides, breaches of dykes at dredged material storage sites, breaches of dredged material transport pipelines from the pumping system, traffic accidents, labor accidents, incidents due to natural disasters and extreme weather, in accordance with the preventive measures and incident plans already established.

### ***5.2. Monitoring program during the operation phase***

#### 5.2.1. Regular monitoring program

##### *5.2.1.1. Monitoring of industrial wastewater*

- Monitoring Location: 01 location where treated industrial wastewater is discharged into the cooling water discharge system.
- Monitoring Parameters: Flow rate, temperature, pH, color, BOD5, COD, Suspended Solids (SS), Residual chlorine, Total nitrogen, Total phosphorus (as P), Arsenic (As), Mercury (Hg), Lead (Pb), Cadmium (Cd), Copper (Cu), Zinc (Zn), Manganese (Mn), Iron (Fe), Total mineral oil, Fluoride (F-), Sulfide, Ammonium (as N), Coliform.
- Monitoring Frequency: Once every 03 months.

- Applicable Standard: QCVN 40:2011/BTNMT (Column B,  $K_q = 1.3$ ,  $K_f = 0.9$ ) - National technical regulation on industrial wastewater.

#### *5.2.1.2. Monitoring of boiler emissions from generator units*

- Monitoring Location: 02 locations corresponding to the chimneys of 02 generator units.

- Monitoring Frequency: Once every 03 months.

- Monitoring Parameters: Flow rate, pressure, temperature, O<sub>2</sub>, Total dust, SO<sub>2</sub>, NO<sub>x</sub> (as NO<sub>2</sub>), CO.

- Applicable Standard: QCVN 22:2009/BTNMT (Column B,  $K_p = 0.7$ ;  $K_v = 1.0$ ) - National technical regulation on industrial emissions for thermal power plants (specifically: Total dust  $\leq 50$  mg/Nm<sup>3</sup>; SO<sub>2</sub>  $\leq 200$  mg/Nm<sup>3</sup>; NO<sub>x</sub>  $\leq 300$  mg/Nm<sup>3</sup>) and QCVN 19:2009/BTNMT (Column B,  $K_p = 0.8$ ;  $K_v = 1.0$ ) - National technical regulation on industrial emissions for dust and inorganic substances.

#### *5.2.1.3. Monitoring of ambient air quality*

- Monitoring Locations: 09 locations as follows:

- + K1: Area at the intersection in Tay Yen hamlet.

- + K2: Area at the intersection near Quyen River.

- + K3: Area in Tay Yen hamlet.

- + K4: Area south of the 15 ha ash and slag storage site.

- + K5-K9: 05 points in the residential area of Hai Phong hamlet north of the ash slurry storage site.

- Monitoring Frequency: Once every 03 months.

- Monitoring Parameters: Total Suspended Particulates (TSP), PM<sub>10</sub>, NO<sub>2</sub>, SO<sub>2</sub>, CO, noise, vibration.

- Applicable Standards: QCVN 05:2023/BTNMT - National technical regulation on ambient air quality; QCVN 26:2010/BTNMT - National technical regulation on noise; QCVN 27:2010/BTNMT - National technical regulation on vibration.

#### *5.2.1.4. Monitoring of surface water environment*

- Monitoring Locations: 02 locations along the drainage river near the 15 ha ash storage site.

- Monitoring Parameters: pH, BOD<sub>5</sub>, COD, Dissolved Oxygen (DO), Total Suspended Solids (TSS), Total Nitrogen (Total N), Total Phosphorus (Total P), Total Coliform.

- Monitoring Frequency: Once every 03 months.

- Applicable Standard: QCVN 08:2023/BTNMT - National technical regulation

on surface water quality.

*5.2.1.5. Groundwater environment monitoring*

- Location: 01 well near the area of ash storage site No. 1 (15 ha).

- Monitoring Frequency: Once every 06 months.

- Monitoring Parameters: pH, Total Coliform, Nitrate (NO<sub>3</sub><sup>-</sup> as Nitrogen), Ammonium (NH<sub>4</sub><sup>+</sup> as Nitrogen), Permanganate index, Total Dissolved Solids (TDS), Hardness (as CaCO<sub>3</sub>), Arsenic (As), Chloride (Cl<sup>-</sup>), Lead (Pb), Mercury (Hg), Iron (Fe), Copper (Cu).

- Applicable Standard: QCVN 09:2023/BTNMT - National technical regulation on groundwater quality.

*5.2.1.6. Monitoring of river sediment quality*

- Monitoring Locations: 02 locations along the drainage river near the 15 ha ash storage site.

- Monitoring Parameters: Arsenic (As), Cadmium (Cd), Lead (Pb), Zinc (Zn), Mercury (Hg), Total Chromium (Cr), Copper (Cu), Total Hydrocarbon.

- Monitoring Frequency: Once every 03 months.

- Applicable Standard: QCVN 43:2017/BTNMT - National technical regulation on sediment quality.

*5.2.1.7. Solid Waste Management for Domestic, Industrial, and Hazardous Waste*

Implement classification and collection of domestic solid waste, general industrial solid waste, and hazardous waste according to Decree No. 08/2022/ND-CP and Circular No. 02/2022/TT-BTNMT; transfer to a licensed unit for transportation and treatment as per regulations.

*5.2.2. Automated and continuous monitoring program*

*5.2.2.1. For wastewater and cooling water*

a) Industrial wastewater

- Monitoring Location: 01 location for industrial wastewater after treatment before discharge into the cooling water discharge system.

- Monitoring Frequency: Automated, continuous.

- Monitoring Parameters: Flow rate (inflow and outflow), temperature, pH, Total Suspended Solids (TSS), COD, Ammonium (NH<sub>4</sub><sup>+</sup>).

- Applicable Standard: QCVN 40:2011/BTNMT (Column B, K<sub>q</sub> = 1.3; K<sub>f</sub> = 0.9) - National technical regulation on industrial wastewater.

b) Wastewater from seawater flue gas desulfurization system (SWFGD)

- Monitoring Locations: 02 locations at the end of the aeration tank for each unit, before discharge into the cooling water discharge system.

- Monitoring Frequency: Automated, continuous.

- Monitoring Parameters: Flow rate, temperature, pH, Total Suspended Solids (TSS), Dissolved Oxygen (DO), COD, Total Sulfite Ions ( $\text{HSO}_3^-$  and  $\text{SO}_3^{2-}$ ).

- Applicable Standard: QCVN 40:2011/BTNMT (Column B,  $K_q = 1.3$  and  $K_f = 0.9$ ) - National technical regulation on industrial wastewater. Specific parameters: Total Sulfite Ions  $\leq 1.0$  mg/l, Dissolved Oxygen (DO)  $\geq 2$ , and pH  $\geq 6$  as committed by the project owner.

c) Cooling water from condensers

- Monitoring Location: 01 location at the cooling water discharge system.

- Monitoring Frequency: Automated, continuous.

- Monitoring Parameters: Flow rate, temperature, pH, Residual chlorine.

- Applicable Standard: QCVN 40:2011/BTNMT (Column B,  $K_q = 1.3$  and  $K_f = 0.9$ ) - National technical regulation on industrial wastewater, with specific parameters: Residual chlorine  $\leq 0.2$  mg/l and pH  $\geq 6$  as committed by the project owner.

- The automated and continuous wastewater monitoring system must include surveillance cameras, automatic wastewater sampling devices, and data transmission to the Ha Tinh Department of Natural Resources and Environment according to regulations. The automated and continuous wastewater monitoring system must be tested, verified, and calibrated in accordance with current legal regulations on science and technology, standards, measurement, and quality.

#### 5.2.2.2. For emissions

- Monitoring Locations: 02 locations corresponding to the chimneys of 2 generator units.

- Monitoring Frequency: Automated, continuous.

- Monitoring Parameters: Flow rate, pressure, temperature, O<sub>2</sub>, Total dust, SO<sub>2</sub>, NO<sub>x</sub> (as NO<sub>2</sub>), CO.

- Applicable Standards: QCVN 22:2009/BTNMT (Column B,  $K_p = 0.7$  and  $K_v = 1.0$ ) - National technical regulation on industrial emissions for thermal power plants and QCVN 19:2009/BTNMT (Column B,  $K_p = 0.8$  and  $K_v = 1.0$ ) - National technical regulation on industrial emissions for dust and inorganic substances, with specific parameters: Total dust  $\leq 50$  mg/Nm<sup>3</sup>; SO<sub>2</sub>  $\leq 200$  mg/Nm<sup>3</sup>; NO<sub>x</sub>  $\leq 300$  mg/Nm<sup>3</sup> as committed by the project owner.

- The automated and continuous emissions monitoring system must include surveillance cameras and data transmission to the Ha Tinh Department of Natural Resources and Environment according to regulations. The automated and continuous emissions monitoring system must be tested, verified, and calibrated in accordance with current legal regulations on science and technology, standards, measurement, and quality.



## **6. Other environmental protection requirements**

The Project Owner is responsible for implementing the following additional environmental protection requirements:

### ***6.1. During the dredging construction process***

- Fully comply with legal procedures on managing dredging activities in seaport waters and inland waterways according to current regulations.

- Only permitted to carry out dredging at the exact location, area, and design specifications approved by the competent authority and strictly adhere to safety requirements in the design approved by the competent authorities.

- Provide guidance and disseminate environmental protection efforts to all workers and staff participating in the Project.

- Only use construction equipment authorized for circulation according to the law.

- Comply with the regulations of Decree No. 57/2024/ND-CP dated 20 May 2024 by the Government on managing dredging activities in seaport waters and inland waterways. Develop a safety plan for maritime navigation for the Project according to Decree No. 58/2017/ND-CP dated 10 May 2017 by the Government detailing certain articles of the Vietnam Maritime Code on maritime management, submit it to the Ha Tinh Maritime Administration for approval before commencing the Project; install warning and instruction signs at the dredging area and coordinate with relevant agencies to notify waterway transport operators using the channel during the Project's activities. Comply with regulations on dredging activities in seaport waters.

- Apply appropriate technical, management, and construction organization measures to minimize adverse impacts on the ecosystem, landscape, environment, and other socio-economic activities in the Project area during construction.

- Develop a detailed and specific plan and strictly implement management and technical measures to prevent and respond to labor accidents, fires, explosions, and other environmental risks and incidents during construction.

- Implement the environmental monitoring program and other environmental protection measures as proposed; update and retain monitoring data for inspection by state environmental protection management agencies when necessary.

### ***6.2. During the sea dumping of dredged materials***

- Implement the environmental management and monitoring program for marine disposal activities, ensuring that disposal activities do not negatively impact the surface water and marine water quality in and around the dredging and disposal areas of the Project.

- Use appropriate marine disposal equipment and techniques, ensuring that disposed materials do not adversely affect marine water quality and ecosystems.

- Sea disposal vessels must be equipped with automatic identification

systems (AIS) and surveillance cameras to allow state agencies to manage, monitor, and support the supervision of dredged material transportation and disposal activities according to regulations.

- Develop a monitoring plan to closely supervise the disposal process, marine water quality at and around the disposal area, and submit it to the competent state authority for approval in the application for a marine disposal permit and sea area allocation. Ensure the following principles: The Project Owner is responsible for 24/24 hour monitoring of each vessel involved in the contractor's dredged material disposal; coordinate with state management agencies to monitor the journey through AIS and surveillance cameras during dredging, transportation, and disposal of dredged materials.

- If any unusual signs are detected during dredging or disposal of dredged materials, operations must be checked, stopped, and promptly reported to relevant management agencies for consideration and resolution.

### ***6.3. Other environmental protection requirements***

- The Project can only be implemented after completing land procedures according to current legal regulations; publicly inform local authorities and the community about the project's construction activities; set up signage, demarcate construction areas, and notify the relevant local authorities before commencing construction.

- Comply with the regulations of the Law on Natural Resources, Marine and Island Environment, the Law on Fisheries, the Law on Biodiversity, the Law on Water Resources, the Law on Chemicals, the Law on Minerals, and other related regulations during the project implementation.

- Proactively coordinate with relevant authorities, localities, and other project investors to prevent and address environmental issues arising during the project's operation.

- Adhere to construction laws to ensure compliance with construction standards and regulations. Regularly monitor and supervise sedimentation, erosion, and landslides in the project area. In case of abnormal erosion or landslides, report to the authorities for timely inspection and resolution to minimize environmental impact and ensure safety for construction works and traffic in the area.

- Implement appropriate technical, management, and construction measures to minimize adverse effects on the landscape and environment during project execution, meeting environmental protection requirements as per QCVN 19:2009/BTNMT (Column B) - National Technical Regulation on Industrial Emissions of Dust and Inorganic Substances, QCVN 22:2009/BTNMT - National Technical Regulation on Industrial Emissions from Thermal Power Plants, QCVN 40:2011/BTNMT - National Technical Regulation on Industrial Wastewater, QCVN 05:2023/BTNMT - National Technical Regulation on Air Quality, QCVN 26:2010/BTNMT - National Technical Regulation on Noise, QCVN 27:2010/BTNMT - National Technical Regulation on Vibration, and other

relevant regulations and standards.

- Implement comprehensive management measures and solutions to clear drainage for stormwater collection and drainage during construction, building, and project operation, ensuring water drainage and preventing localized flooding in the project area and surrounding areas.

- Marine equipments involved in construction must have sanitary facilities in accordance with QCVN 17:2011/BGTVT/SĐ 2:2016 - National Technical Regulation on Prevention of Pollution from Inland Waterway Vessels. Collect and store all wastewater generated from construction vessels during the project period; transfer it to a designated waste collection unit for proper treatment.

- Strictly manage and inspect waste from ships entering and leaving ports. Comply with regulations on safety, order, hygiene, fire and explosion prevention, pollution prevention, and implement Circular No. 41/2017/TT-BGTVT dated 14 November 2017 of the Minister of Transport on Waste Collection and Treatment from Ships in Port Waters and Circular No. 34/2020/TT-BGTVT dated 23 December 2020 of the Minister of Transport amending some provisions of Circulars regarding periodic reporting in the maritime sector.

- Implement an oil spill response plan approved by the competent authority. Invest in necessary equipment and coordinate closely with relevant authorities and port operators in the area to prevent, respond to, and mitigate oil spills, fires, explosions, and other environmental incidents throughout the project's activities.

- Implement environmental management and monitoring programs and environmental protection measures; retain data for inspection by environmental protection authorities as needed; ensure funding for environmental protection activities and monitoring programs.

- During dredging and offshore dumping of dredged material, based on actual construction conditions, the Project Owner is encouraged to continue researching technical solutions to enhance the onshore disposal of dredged material.

- Promote and educate on environmental protection awareness among project staff and workers to ensure the preservation of the project's and surrounding area's landscape and ecosystem.

- Take full responsibility for the information and data presented in the project's Environmental Impact Assessment report.

- Proactively propose adjustments to environmental protection measures and structures if they fail to ensure effective environmental protection during project implementation according to legal regulations. Assume responsibility and commit to compensation and remediation for pollution and environmental incidents caused by the project's implementation./.