Environmental and Social Impact Assessment Report (ESIA) – Part 10

Project Number: 51112-001
August 2018

INO: Jawa-1 LNG to Power Project

Prepared by ERM for PT Jawa Satu Power (JSP)

3. *RESULTS AND DISCUSSIONS*

Figure 3.1 and **Figure 3.2** illustrate the electric and magnetic fields with distance from the line, respectively. The maximum magnetic and electric fields are 14.86 µT and 3.21 kV/m, respectively for the proposed 500kV tower configuration directly below the line (at 1 meter above the ground surface) and reduce rapidly with distance from the lines. The calculated values are well below the "Occupational" and "Public" reference limits indicated in **Table 2.1**.

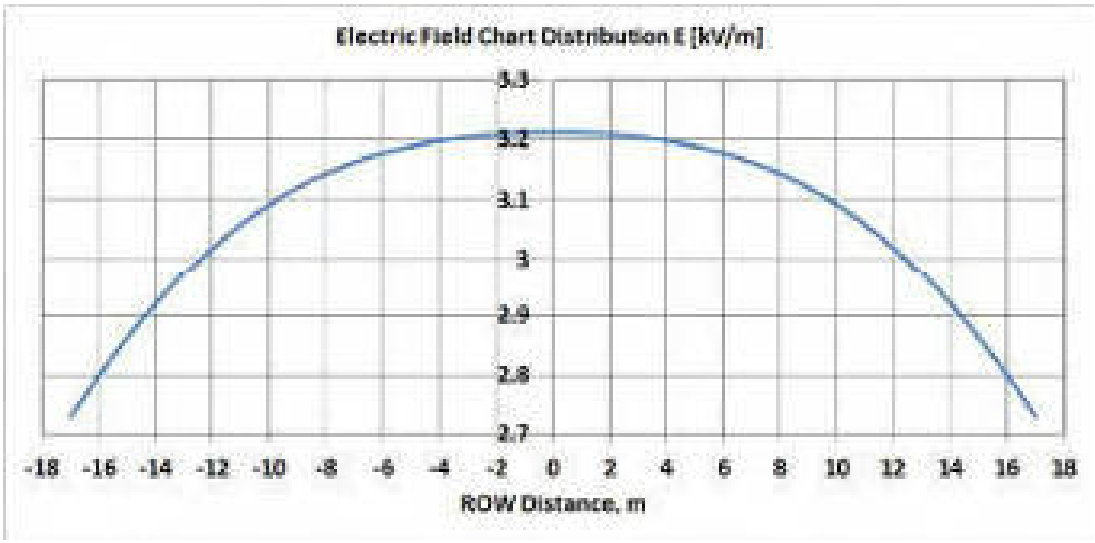

Figure 3.1 Electric Field Distribution for the Proposed Transmission Tower

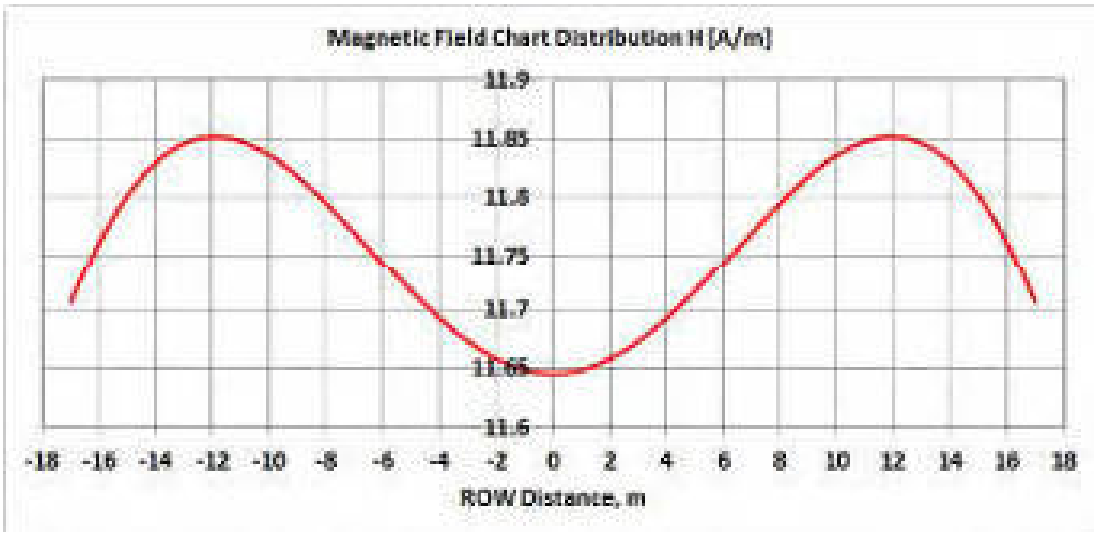

Figure 3.2 Magnetic Field Distribution for the Proposed Transmission Tower

PLTGU Jawa 1 Independent Power Project

ANNEX L
FLOOD STUDY ANALYSIS

Prepared for:

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EXECUTIVE SUMMARY

ERM referred to a flood risk assessment report titled 'Cilamaya Flood Report and associated Appendices completed by Pöyry Energy GmbH for the proposed Cilamaya Combined Cycle Gas Power Plant in West Java, Indonesia. The objective of the study was to determine 100-year flood water levels for the design of the flood dike around the proposed Project site. The approach comprised of hydrological analyses that included flow regionalisation approaches and rainfall-runoff modelling which were used to compute 100-year flood hydrographs for the Irrigation Canal (729 m^3/sec – peak flow) and the Cilamaya River (600 m^3/sec – peak flow).

A 2D-hydraulic model was built from LiDAR-based Digital Terrain Model (DTM), cross-sectional surveys and sea bed elevations, after ground-truthing and modifying some of the input-data. In order to account for the uncertainties in the data input, a set of conservative model assumptions were made. Model simulation was run for Project state (site area was excluded from active discharge domain), to understand the changes in flow direction due to the flood dike.

The maximum flood inundation depth in most regions in the immediate vicinity of the Project site ranges from 0.1 to 0.5 m, with few small local spots with higher inundation depths ranging between 1.5 to 2m. Also, model simulation was run for current state scenario (site area was included in the modeling domain). The increase in water levels compared to Project state in most areas in the immediate vicinity of the Project site were in the range of 0.01 to 0.2 m. Also, there are few local spots in south and north-west direction of site area where the water level increase was up to 1 m.

Due to the uncertainties in the input data, sensitivity analyses were performed for the several scenarios, the simulated water levels at the Project site were found to be insensitive to the variation of a number of input parameters.

A swale adjoining the flood dike was recommended to mitigate the increase of water levels in the areas surrounding the Project site. Finally, the hydraulic model was run to re-define the dike heights and dimensions of the swale/flood flow paths around the site as well as to demonstrate that the sensitive areas near the Project site would not be subjected to increased flood levels

The flood modeling study results clearly shows that the implementation of the proposed dike along with the swale around the Project site will not increase the flood risks (unchanged or decrease in flood inundation levels compared to the current state) in the sensitive neighboring assets that includes schools and residential areas for the combined 100-yr inland flooding and extreme coastal flooding events. However, agriculture regions in the vicinity of the Project site can exhibit some level of water logging that may not still pose any level of flood risk for the same combined flood event.

The backfilling of the Project site within the dike does not pose any flood risk to the neighboring communities. However, an internal drainage system must be designed in such a way that there are no backflow effects on the Site or any waterlogging in the neighboring areas.

The Project is located near the town of Cilamaya, close to West Java's north coast about 100 km east of Jakarta. The site is situated between the Cilamaya Main River and Cilamaya Irrigation Canal. The Cilamaya Irrigation Canal receives flood flows from the upstream catchment Via the Ciherang River which are diverted at the Barugbug weir.

Figure 1.1 ***Project Site with River and Canal Network (blue) and Main Flood Flow Paths labelled, Barugbug weir and the Preliminary Hydraulic Model Domain (yellow)***

Prior to this study, it was not clear if the main flood risk to the Project site originates from Cilamaya Irrigation Canal or from Cilamaya Main River. In addition, tidal storm surges may significantly influence the flood situation in combination with backwater effects. In the study area, several other larger and smaller irrigation canals are operated. Their discharge capacities seem to be limited in terms of cross-sections and by structures as bridges and inverted syphons. Thus, these other canals were not considered as relevant factors of flood risk to the Project site and were not studied in detail. Hence, a major focus of the study is to evaluate the riverine flood risk associated with Cilamaya Main River and Cilamaya Irrigation Canal at Projects site, and tidal flood risk associated with tides, storm surge and sea level rise impact at the Project site.

In terms of climate change, under extreme storm tide conditions applied to the downstream boundary, the following phenomena were considered:

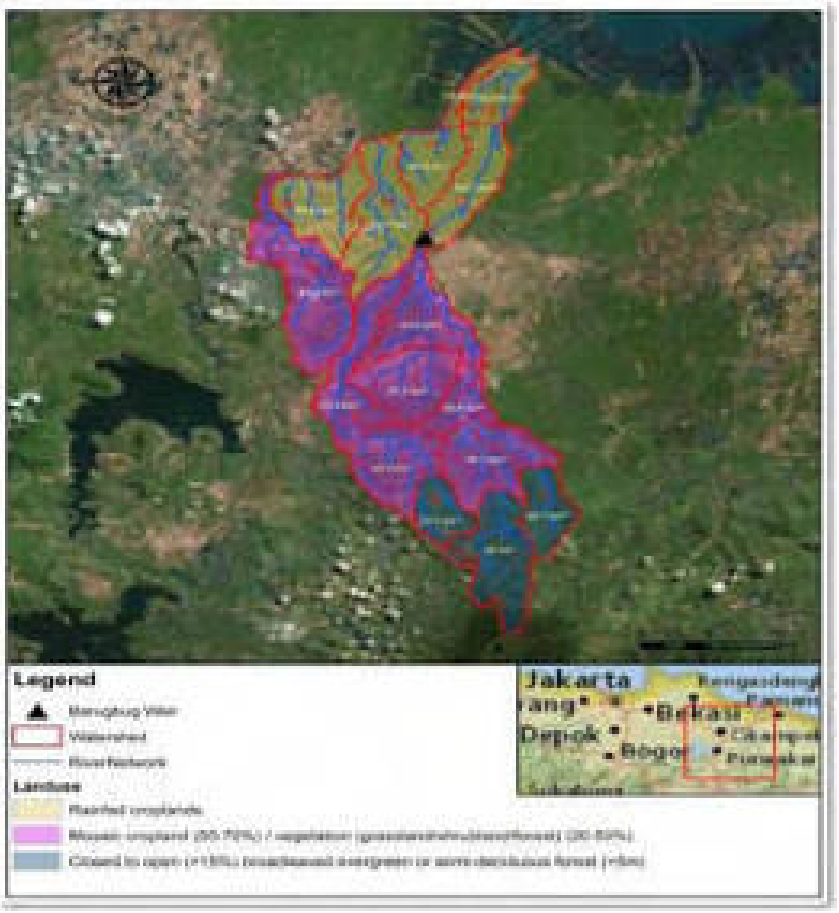
- Astronomic Tides (+2.02 m);
- Atmospheric Forcing (+0.38 m surge, +0.02 m wind and pressure);
- Sea level rise (+0.5 to 1.0 m);
- Significant wave height (+0.75 m); and
- Total: MSL +2.02 m.

The objective of this study was to determine 100-year flood water levels for the design of the flood dike around the proposed Cilamaya Combined Cycle Gas Power Plant. For that purpose, hydrological analyses were carried out using rainfall–runoff modeling in order to obtain the 100-year design flood hydrograph. This hydrologic analysis was supported with flood regionalisation approaches.

Details of hydrologic analysis are summarised below in subsequent sections. Hydrologic analysis needs catchment delineation of the Cilamaya River and the Cilamaya Irrigation Canal, which contributes flow at Project site. Catchment and sub catchment/sub basins were delineated using Digital Elevation Model (DEM) in GIS. The DEM data was provided by the Japanese Earth observing satellite program, especially the Advanced Land Observing Satellite (ALOS). Each Sub basins has associated Stream/River in the Catchment.

Figure 2.1 presents the catchment of the Project area and gives an overview of the determined sub-basins. Major land uses and area values of each sub basin are highlighted.

Figure 2.1 GIS-Analysis Map of the Cilamaya Basin



2.1 *RAINFALL RUN-OFF MODELLING*

Hydrologic Modeling System (HEC-HMS) software by USACE-HEC was used to obtain the design flood hydrograph at Project site. HEC-HMS is designed to simulate the complete hydrologic processes of event-based scenarios. The software includes many traditional hydrologic analysis procedures such as event infiltration, unit hydrographs, and hydrologic routing.

This study used Soil Conservation Service (SCS; presently known as USDA Natural Resources Conservation Service) based hydrologic analysis procedure.

Figure 2.2 shows the setup of the HEC-HMS model. It consists of a basin model (catchment) and a meteorological model (precipitation). The basin model converts atmospheric conditions (precipitation) into streamflow at the sub-basin outlets. These outlets are connected by river reaches which account for flood routing.

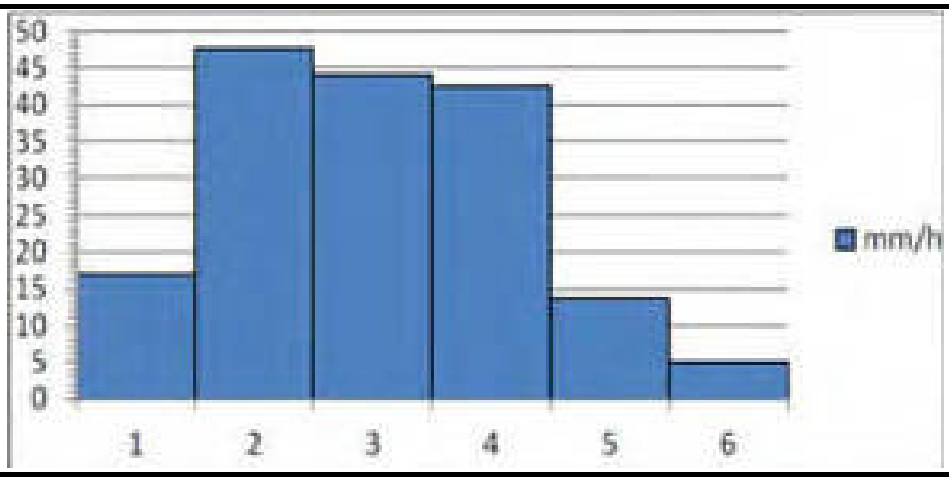
The basin model consists of sub-basins (SBasin), river reaches (R), junctions (J) and the diversion at Barugbug weir. Barugbug weir is located approximately 20 km upstream the Project site and it consists of two spillways for diverting

floods into the Cilamaya main river (J7) and via the Ciherang River into the Cilamaya Irrigation Canal (J10).

Figure 2.2 Overview of the HEC-HMS Model

Design storm rainfall input for the HMS meteorological model was obtained by a combination of 100-yr point precipitation estimate, areal reduction, and consideration of IDF curves, critical storm duration and temporal storm pattern. Design storm hyetograph with a total accumulative precipitation of 170 mm was given as input to HMS model and shown below in **Figure 2.3**.

Figure 2.3 100-yr Design Storm Hyetograph Input



The rainfall-runoff HMS model was roughly evaluated with the flood of January 18, 2013 before estimating the 100-yr design flood at Project site. Limited rainfall and spillway data documented in the Barugbug weir's operator notebook was used to evaluate the model.

Result of the 100-yr design flood simulation is shown below in **Figure 2.4**. It is based on the above described model and an aerial precipitation of 170 mm/6 hr. The simulation using curve number (CN-SCS1 parameter) values from the GIS-analysis was considered representative for the current situation (Cilamaya catchment covered by vegetation and no soil degradation), resulting in a peak flow of 1095 m^3/sec (total flow at the Project site). A more conservative projection is to increase the CN-values by 10%.

For the design of a power plant, such conservatism seems reasonable as in the absence of calibration data, the curve number and other estimates are subject to considerable uncertainty.

Figure 2.4 100-yr Peak Flows at Project Site from Rainfall-Runoff Modelling in m/s

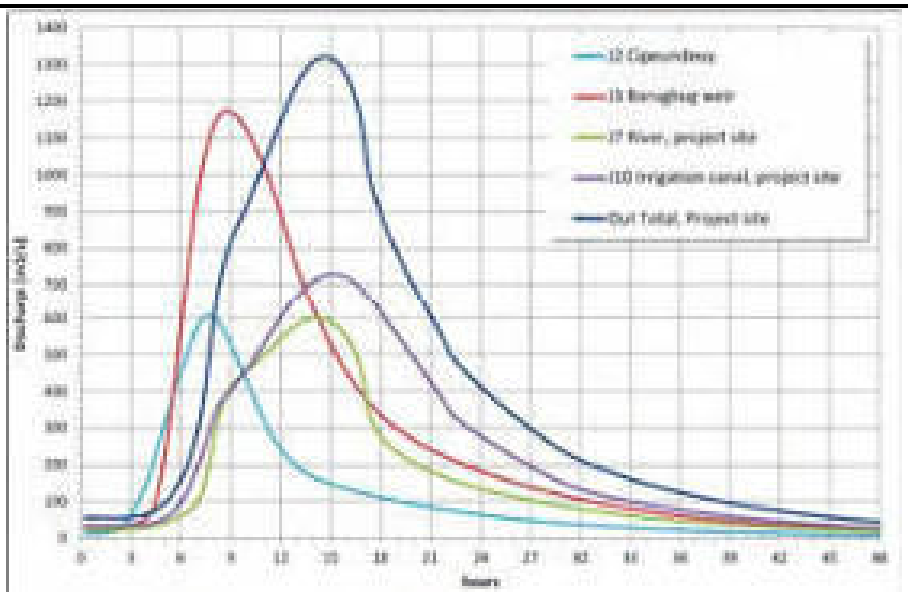
Scenario	CN	CN +10 % (used in hydraulic analysis)
Total	1095	1322
Irrigation Canal	602	729
Cilamaya River	502	600

[1] CN refers to runoff curve number which is an empirical parameter used in hydrology from predicting direct runoff or infiltration from rainfall excess. The curve number method was developed by USDA Natural Resources Conservation Service, which was formerly called Soil Conservation Service (SCS).

Figure 2.5 shows the 100-yr design flood hydrographs for the conservative scenario (CN +10%). The total outflow is composed of flows at junction J10 (Irrigation Canal) and junction J7 (Cilamaya River).

In summary, for design purposes with hydraulic simulations of 100-year scenarios, a hydrograph with a total peak flow at the Project site of approx. 1320 m^3/sec is proposed. The suggested distribution into inflow from the Irrigation Canal and inflow from the Cilamaya River as well as the hydrograph is presented in **Figure 2.5**.

Figure 2.5 ***100-yr peak flows at Project area from the CN + 10% scenario***



Above proposed design peak flow is supported with flood regionalisation approach. Mean Annual Flood (MAF) has been used as a basic index for regionalisation of flood data and for the present study, MAF has been used together with growth factors according to IH 1983 as one means to estimate design floods at the Project site. These growth factors account for the return period and the catchment area.

Design floods estimates based on the IH 1983 method are given below in **Figure 2.6.** In addition to the design floods Q_T the IH 1983 approach provides uncertainty estimates quantified in terms of standard deviation. It was observed that the magnitude of the resulting discharge variability based on rainfall-runoff modelling is in line with the uncertainty in the flood regionalisation approach.

Figure 2.6 Design Flood Estimates for the Project Site Based on the IH 1983 Method

Return interval T [yrs.]	Q_T [m^3/s]	Q_T + std.dev.[m^3/s]
5	389	622
10	459	739
20	539	875
50	669	1104
100	787	1315
200	919	1558
500	1132	1960
1000	1321	2327

For analyzing design flood scenarios at the Cilamaya Project site, a two-dimensional hydraulic model was established from several survey datasets. Boundary conditions in terms of inflow hydrographs were taken from the hydrologic analysis and water level boundary conditions at the sea were derived from the tidal and storm surge analysis.

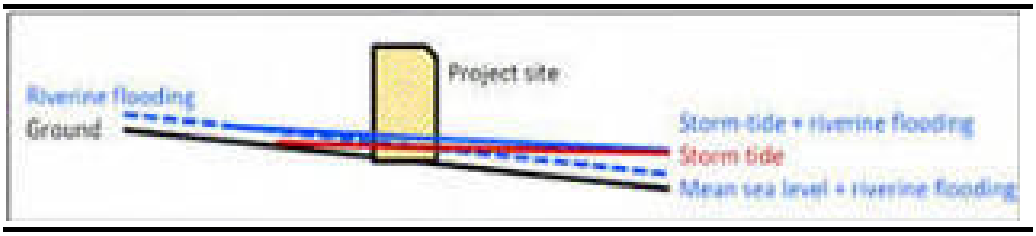
3.1 TIDE AND STORM SURGE ANALYSIS

Owing to the location of the Project site, it may be subject to inundation from:

- Riverine flooding (hydrologic analysis) – inland flooding;
- Extreme storm-tidal conditions combined with sea level rise - coastal flooding); and
- Combination of inland and coastal flooding.

Three (3) schematic flood scenarios are shown in the **Figure 3.1**.

Figure 3.1 Schematic of Flood Scenarios



In absence of data for extrapolating a 100-year sea level and specific model result of 100-year sea level highs, estimates of three relevant phenomena were analysed:

- Astronomic tides;
- Atmospheric forcing (increase from wind, air pressure, storm surge); and
- Sea level rise (possible land subsidence is not considered).

Astronomic Tides

According to the first report version by Kwarsa Hexagon, the highest measured sea level in a 16-day period (**Figure 3.2** - most likely without extreme levels) was 1 to 1.1 m above mean sea level (MSL) and a maximum

sea level of 2.02 m above MSL was forecasted for a 20-year period (refer to **Figure 3.3**).

Figure 3.2 ***Observed and Calculated Sea Level Data at Cilamaya (First Report by Kwarsa Hexagon, 2016)***

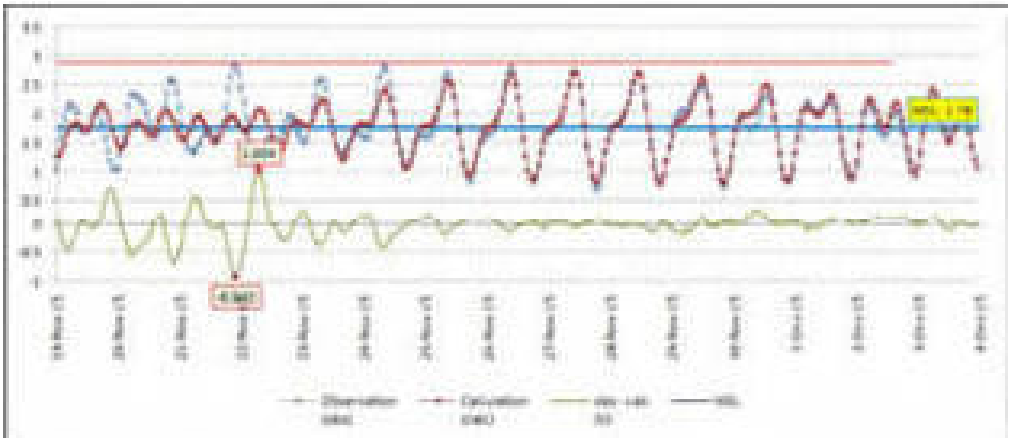


Figure 3.3 ***Water Levels in the 20-year forecast (First Kwarsa Hexagon Report, 2016)***

Water Level Reference	m +MSL
Highest High Water Level	2.02
Mean High Water Spring	0.70
Mean High Water Level	0.37
Mean Sea Level	0
Mean Low Water Level	-0.37
Mean Low Water Spring	0.07 (sic)
Lowest Low Water Level	-2.03

This observation-based analysis was double-checked with model studies by Ningsih et al. (2010) of the November 2007 cyclones which report of 0.49 m tidal sea level maxima at Cilamaya (without atmospheric forcing; approx. 0.54 m including wind and pressure).

The apparent difference of these model results to the observations and forecasts by Kwarsa Hexagon (2016) was discussed within the Project team and also with an external expert. Instead of continuing with the conservative value of 2.02 m, as it was suggested in the Pöyry's Draft Flood Study Report, Kwarsa Hexagon revised the tidal forecast in May 2016 by specifying the Highest Astronomical Tide with 0.59 m above MSL. This magnitude seems to be consistent with the published values as stated above.

Atmospheric Forcing (increase from wind, air pressure, storm surge)

Only few reports provide estimates of increased water levels due to atmospheric forcing in the greater study area are shown in **Figure 3.4**.

Figure 3.4 ***Reported Storm Surge Heights (cm) from Observation Data and Model Results***

Cyclone / Typhoon	Jakarta	Semarang	Surabaya	Cilamaya	Source (Analysis type)
Pelpah (Nov. 9 2007)	38	20	21		Ningsih et al. 2011
Haglin (19-27 Nov. 2007) and Mitag (20-27 Nov. 2007)	10	8	17		(Observation data analysis)
	12	13	15	14	Ningsih 2014 (Model analysis)

Sea Level Rise

The sea level rise near the Project site was estimated from projections for Jakarta, Pekalongan and from the most recent IPCC report as shown in **Figure 3.5.**

Figure 3.5 ***Selected Projections of Sea Level Rise***

Jakarta	
3 mm/yr	+5 cm within 18-19 years (i.e. between 1989, 2007 and 2025; Hongoo & Brinkman 2008) corresponding to 3 mm/year
5.1 mm/yr	Analysis 1993-2003 using Satellite Altimetry Fenoglio Marc (2011)
5.7 mm/yr	Firman et al. (2011) with reference to S. Hadi, n.d. ITB
Pekalongan	
6-10 mm/yr	Nashrulla et al. (2013) with reference to the Ministry of Marine Affairs and Fisheries-DKP).
Global and regional	
Roughly up to +1 m	Projection until 2100 for conservative scenario ("IPPC Report". Reference: Stocker et al. 2013)

The assumptions for extreme sea levels for hydraulic analysis are summarised in **Figure 3.6**.

Figure 3.6 ***Summary of Relevant Phenomena and Assumptions for Extreme Sea Levels***

Phenomenon	Assumptions (reference: MSL)	After revision by Kwarsa Hexa
1. Astronomic tides	*+2.02 m (before revision)*	+0.75 m
2. Atmospheric forcing	+0.38 m surge +0.02 m wind & pressure	
3. Sea level rise	+0.5 to 1.0 m	
4. Significant wave height	+0.75 m (roughly assumed)	
Total	*+3.7 to 4.2 m (rounded)*	+2.4 to 2.9 m (rounded)

For analysing the three (3) design flood scenarios at the Project site, a two-dimensional hydraulic model was established.

4.1 INPUT DATA

The data for the model set up was collected from various sources such as surveys and online databases. The summary of the data sources used in the model setup is shown in **Table 4.1.**

Table 4.1 Summary of Data Sources Used In Hydraulic Analysis

Data	Source	Geographical Coverage	Resolution
Digital Terrain Model	Airborne Laser Scanning (LiDAR)	40 km²	0.2 m
Cross-sections	Topographical survey	70 Cross-sections at Cilamaya River , 71 Cross-sections at Irrigation Canal	
Bathymetric Map	Kwarsa Hexagon, 2016	Small portions of the model area	
Web-Based satellite Imageries	Google Earth, Bing Maps, ArcGIS Online Imagery		
Flood Marks	Tigenco, 2016	Four (4) locations from floods in March 17, 2014	

THE DTM at the Project site and the corridor to the sea was found mostly within +/- 20 cm from the surveys points. However, the majority of the terristric/bathymetric cross-section surveys points were found to be significantly lower than the DTM (DTM minus survey: median +0.81 m).

4.2 MODEL SET-UP

The hydraulic simulations were carried out with 2-D hydrodynamic finite volume shallow-water model Hydro-as_2d V2.2, parallel version with a first order scheme for momentum advection.

Mesh Generation

A mesh of 397 thousand numbers to nodes comprises of triangular and quadrilateral elements of varying resolution were generated. Distinct point reduction methods were applied to various parts of the mesh as shown in **Figure 4.1**.

Figure 4.1 Mesh Parts, Basic Data and Typical Point Distances

Mesh part, area	Basic data used	Typical distance of mesh-nodes
River bed of Cilamaya river and Irrigation Canal	Cross-section survey (modified)	Approx. 10 m in main flow direction, 2 to 3.5 m across
Floodplains including agricultural areas, residential areas, roads, etc.	DTM (from LiDAR)	Data converted to a 10 m raster and thinned out with maintaining a 0.1 m accuracy
Topographic breaklines	DTM (from LiDAR)	10 m
Sea bed	Bathymetric survey	Approx. 20 - 200 m

Figure 4.2 Model Domain with Monitoring Elements

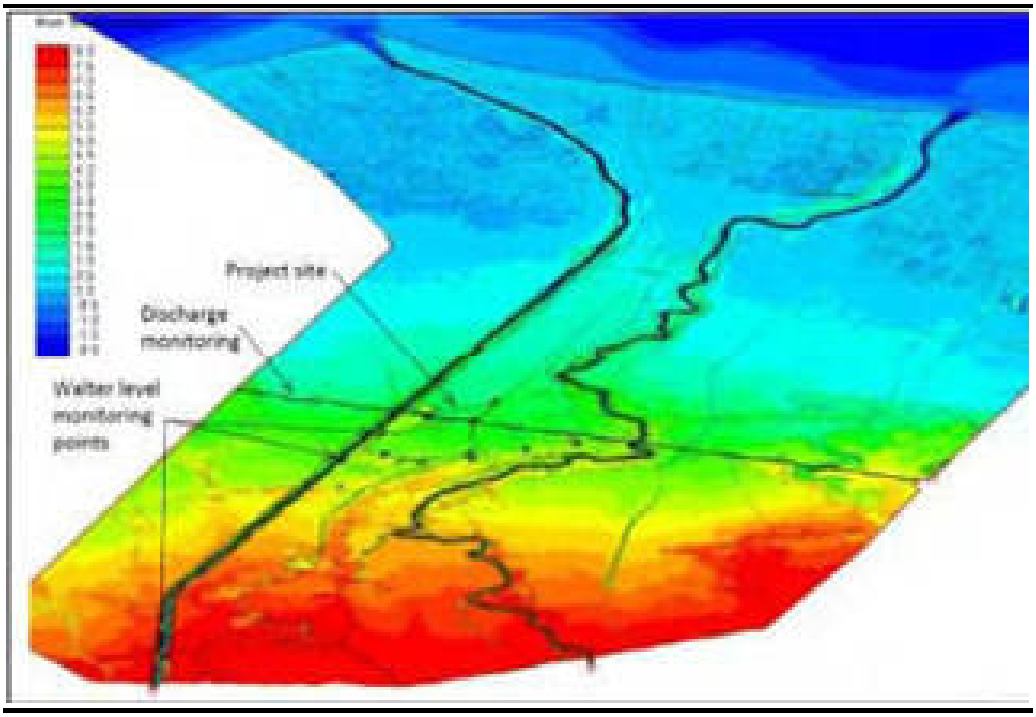
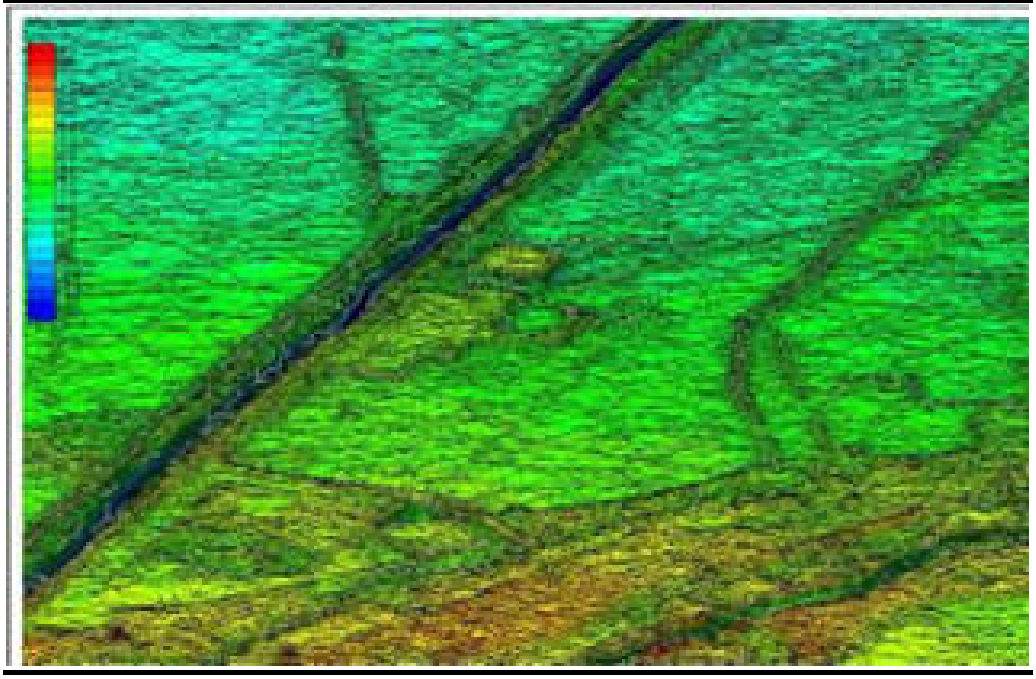


Figure 4.3 ***Details of Computational Mesh (Black) and Topographic Breaklines (Grey) At The Project Site***



Roughness Coefficients

The coefficients of surface roughness were varied between specific areas within the model domain as shown in the **Figure 4.4**.

Figure 4.4 ***Roughness Coefficients of Specific Areas***

Roughness coefficient according to	Strickler (KSt)	Manning (n)
Citamaya River bed and lower banks	25	0.04
Irrigation Canal bed and lower banks	25	0.04
Agricultural areas, roads, etc. (open areas)	15	0.067
Larger vegetation-covered areas, densely-built residential areas	8	0.125
Sea bed	50	0.02

The model was set up to simulate the flood that occurred in March 17, 2014. Flood marks at four locations were collected during a survey. However, the discharge observation for the flood event was not available, so two (2) steady discharge scenarios were estimated along with a mean sea level boundary condition.

The inundation was reportedly not caused by extreme basin-wide rainfall-runoff processes but by waterways being jammed by debris. As the depths

and water levels at the flood marks are relatively high in relation to the simulation results as shown in the **Figure 4.5**.

Nonetheless, there is also a slight chance that the hydraulic model underestimates the overland flow from Cilamaya River towards the Project site (refer to **Figure 4.6**). This possible underestimation only applies to the areas downstream of the existing road embankment. Upstream of this embankment, the simulated water levels were higher and considered as conservative.

Figure 4.5 ***Flood Marks (Italic: Measurements by Trigenco 2016) and simulated water levels for two scenarios, indicated as Irrigation Canal flow +Cilamaya River flow. Maximum simulated water levels nearby are added (in paranthesis).***

Site	X	Y	Ground level (I)	Depth (K)	Water level (J+K)	DTM near flood mark	Sim. W. level 300 + 300 m^3/s	Sim. W. level 720 + 600 m^3/s
R.1	286654	9308523	4.192	0.58	4.77	4.48	4.31 (max. 4.8)	4.51 (max. 4.8)
R.2	287030	9308584	4.287	0.65	4.84	4.5	4.50 (max. 4.6)	4.66 (max. 4.8)
R.3	287348	9308499	3.791	0.8	4.59	4.2	4.34 (max. 4.6)	4.47 (max. 4.6)
R.4	285978	9309040	3.45	0.83	4.28	4.1	4.55 (max. 5.0)	4.88 (max. 5.3)

Figure 4.6 ***Possible Model Underestimation of Flood Flows (Red Arrows, Schematic) Downstream (East) of The Existing Road Embankment (Green), Flood Marks R1 And R4 with Reported Depths and Existing Canal with Uncertain Hydraulic Performance (Yellow)***

4.3 RESULTS AND DISCUSSION

Simulation Results for 100-year flood at Mean Sea Level; Project State
In this scenario, the 100-year inflow hydrographs in Figure 3 5 were applied to the inflow boundaries of the Irrigation Canal and the Cilamaya River. A mean sea level was defined at the outflow boundary.

The Project site within the flood protection dike was excluded from the active flow domain so that the changed flow fields due to the flood dike were accounted for.

The following figures show maximum water levels, depths and velocities for the 100-year flood scenario. Water level details are presented in two (2) longitudinal sections of the floodplain and a perimeter section around the flood dike as well as selected water level hydrographs.

Figure 4.7 ***Maximum Water Levels (M). Detail with Longitudinal Sections and Perimeter Section (With Stations in White)***

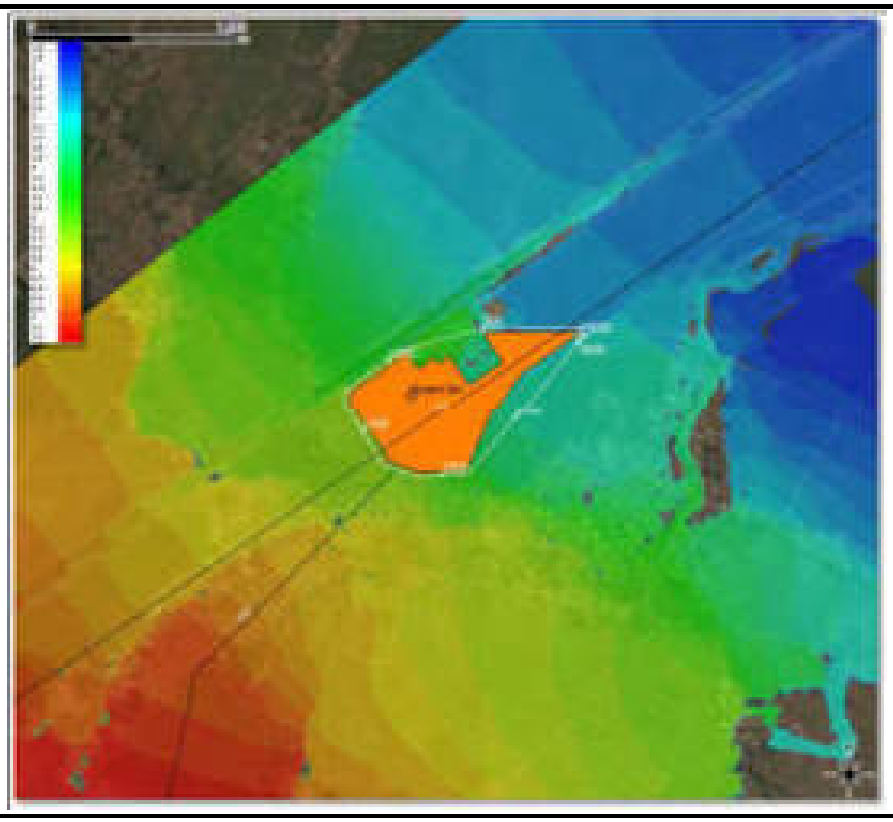


Figure 4.8 *Maximum depths (m). Detail with Longitudinal Sections and Perimeter Section (with station in white)*

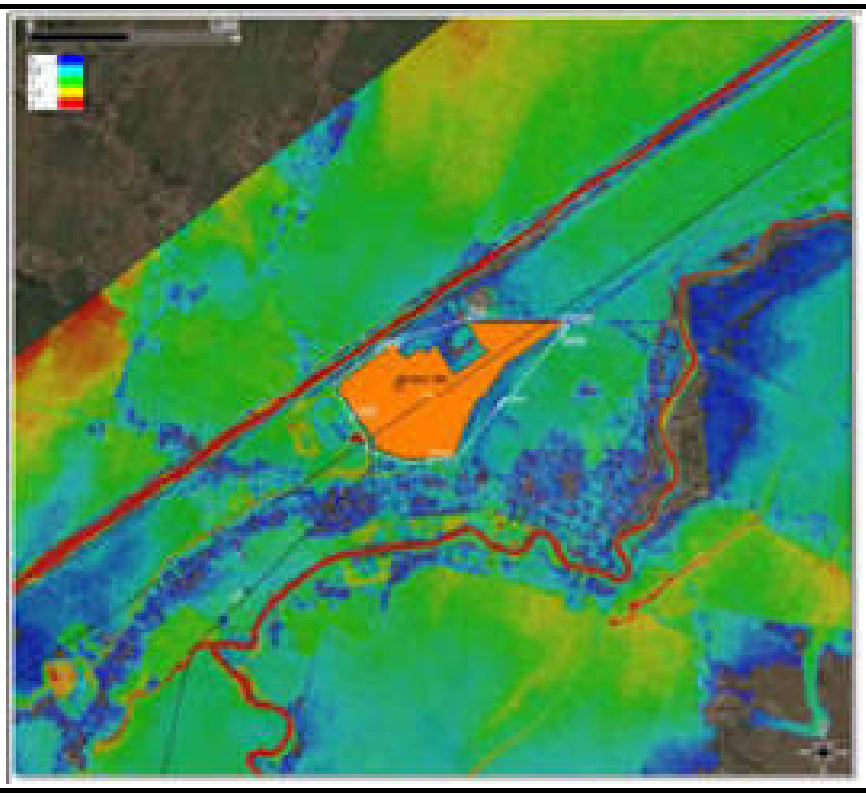
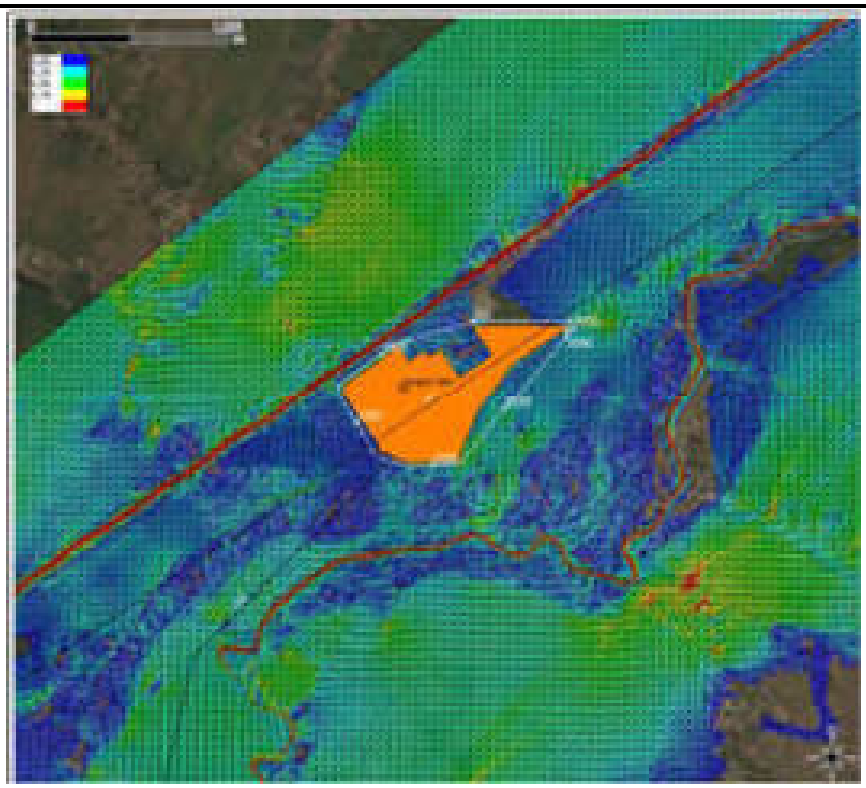


Figure 4.9 *Velocity of 16 hours simulation time (m/s). Detail with Longitudinal Sections and Perimeter Section (with station in white)*



The maximum water level at the upstream side of the flood dike (longitudinal and perimeter sections in **Figure 4.10** and **Figure 4.11**) reaches 5.4 m which is significantly higher than at the downstream side with 3.5 to 2.5 m.

For comparison purposes, these figures include the ground elevation of the hydraulic model and the DTM – which are very similar.

Figure 4.10 ***Longitudinal Sections LS1 and LS2 of Maximum Simulated Water Levels and Ground Elevations in the Hydraulic Model and DTM***

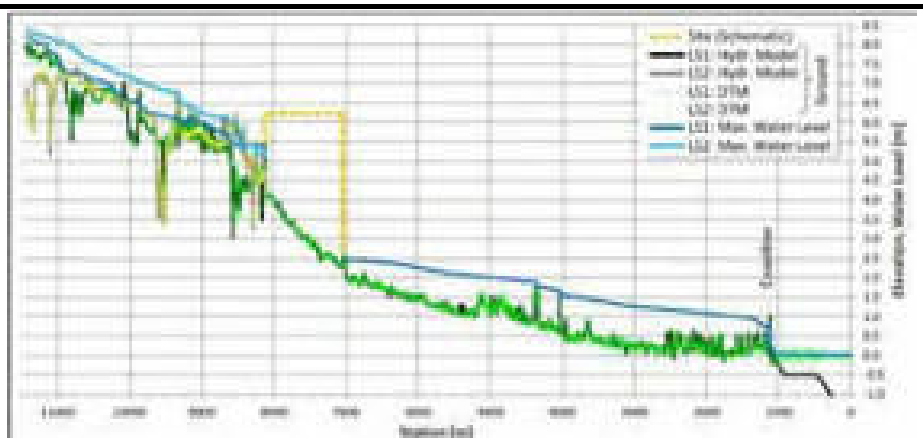
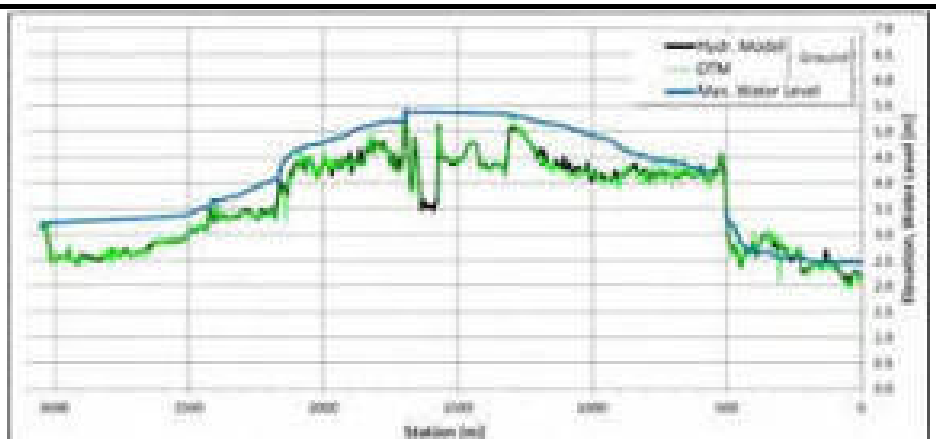
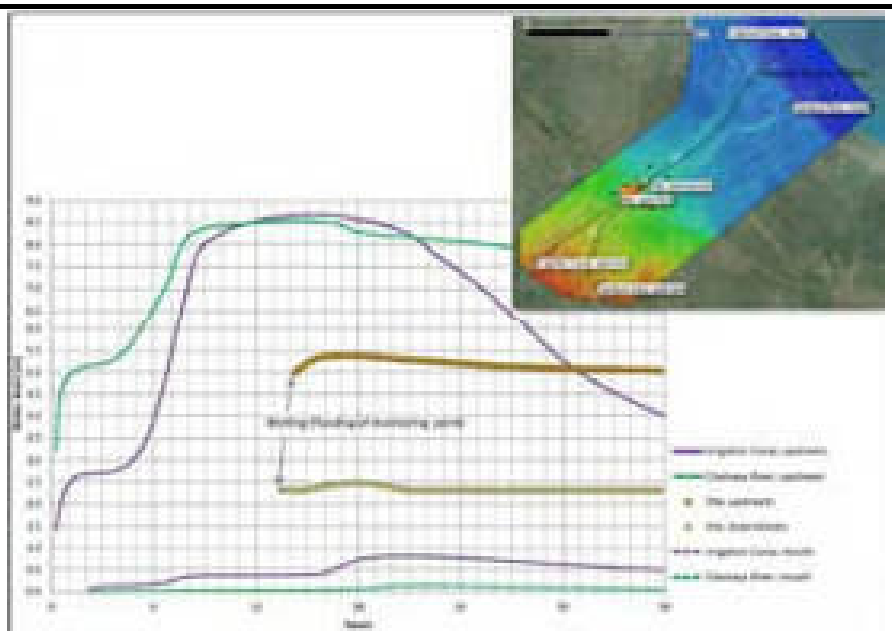


Figure 4.11 ***Perimeter Section of Maximum Simulated Water Levels and Ground Elevations in the Hydraulic Model and DTM***



The water level hydrographs in **Figure 4.12** indicate that the inundation around the Project site would persist for approximately six (6) to 18 hours.

Figure 4.12 Simulated Water Level Hydrographs at selected Monitoring Points (mapping white)



For quantifying the water level sensitivity on uncertainties associated with input data and model assumptions, additional sensitivity simulations were carried out.

Figure 5.1 Simulations and Assumptions for Sensitivity Analysis

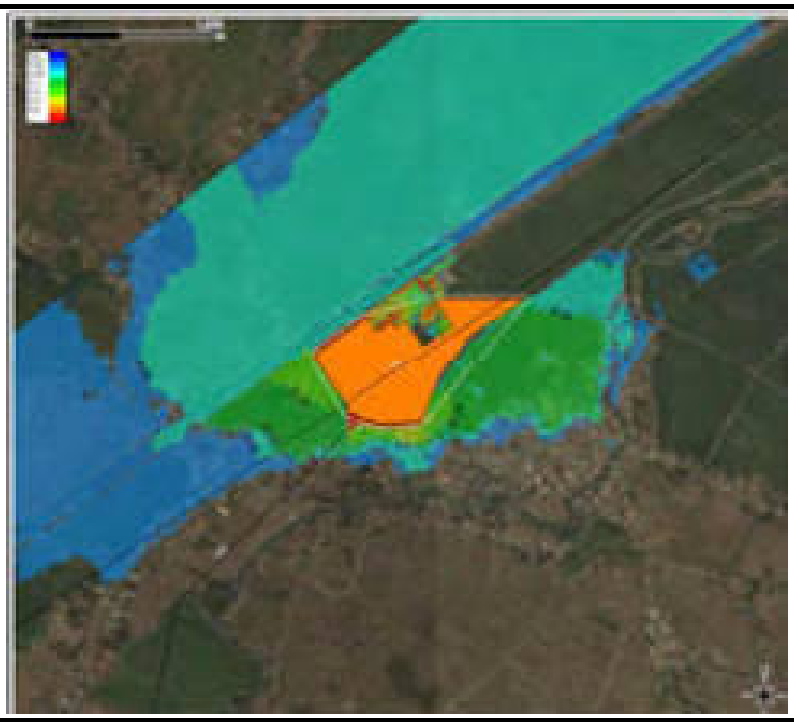
Nr	Simulation	Description
1	Reference	100 yr. flood, MSL+0 m, Project State (see 5.5.1)
2	Current State	As 1, but with project area as part of the active discharge pattern (see 5.5.3)
3	High Sea Level	As 1, but with sea level at MSL+2.02 m (highest high water level in 20-year forecast by Deltares Hexagon 2016 – before revision)
4	Additional model outflows to NW and SE	As 1, but assuming that the flood discharge would not be confined by the (artificial) model boundaries. For that, additional lateral outflows into plain areas outside the model domain were assumed with an energy grade of 0.5‰. This scenario was considered relevant because larger water depths at the model boundaries as presented in Figure 5-15 seem artificial and highly conservative.
5	Reduced Hydraulic Capacity	As 1, but hydraulic capacity of irrigation canal and Kamaya River reduced by 20% (i.e. Roughness coefficients of river beds reduced form k_{St} = 25 to k_{St} = 20) in order to account for uncertainty associated with the river bed elevation (possible sedimentation issues, uncertainty in survey data see chapter 5.3)
6	Flood discharge increased by 20%	As 1, but accounting for larger discharges. +20% would result in peak flows of 874 m^3/s (irrigation canal), 720 m^3/s (Kamaya River) and 1586 (Total) which approximately corresponds to a 200 yr. flood in Table 3-2, right column. The discharges of the inflow hydrographs were up-scaled by +20%, the time-axis remained unchanged.
7	Steady Flow: Current State	As 2 but assuming steady (constant) inflows at peak discharge instead of hydrograph inflows. This quantifies the theoretical maximum water levels assuming there was absolutely no retention.
8	Steady Flow: Project State	As 1 but assuming steady (constant) inflows at peak discharge instead of hydrograph inflows. Same concept as 7.

Project-induced changes; Comparison to current state

In order to determine Project-induced changes to the maximum water level, the scenario presented earlier as "Project state" was adopted and simulated for the current state, i.e. with the Project area as part of the active discharge domain (see Nr 2 in **Figure 5.1**).

Figure 5.2 highlights areas with increased flood levels and areas which were dry in the current state and are flooded by a certain depth in the Project state. Increase in the water levels due to the flood dike is of the order of 1.05 m near the Southern side of the flood dike and about 1.00 m near the North-west of the flood dike.

Figure 5.2 ***Increased 100-Year Water Levels due to The Project (M). Areas Without Changes And Decreased Water Levels Are Not Coloured.***



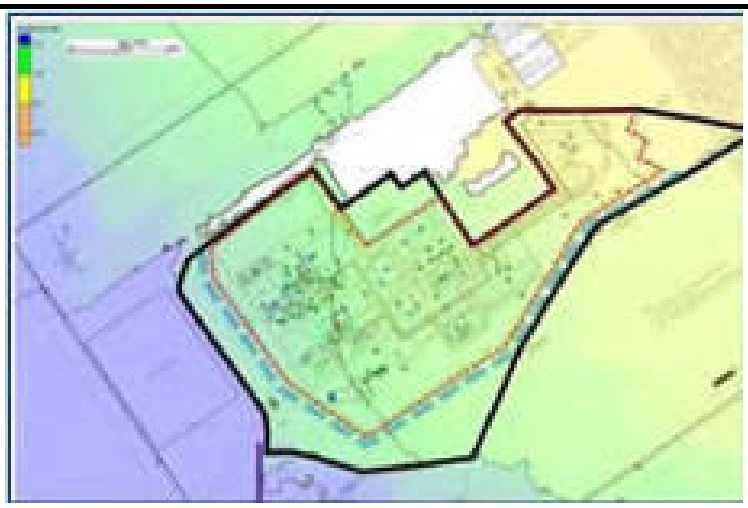
After evaluation of the Project-induced water level inundations, a revised flood dike design provided by the EPC-Contractor and the Owner's Engineer (August 21, 2016) was digitised, georeferenced (Figure 7 1) and used in final hydraulic modelling.

For the drainage canal / flood flow path, a trapezoidal typical cross-section was assumed using hydraulic standard procedures (normal-flow) and applied along with the new dike design to the hydraulic model. Simulations for the revised Project state were compared to the current state results.

The basic design parameters of trapezoidal flood flow path / swale are (**Figure 6.1**):

- Bed (base) width: 25 m;
- Side slope approx. 1V: 2H (assumed in modelling). In detailed design, slopes may be less steep if covered by grass wherever sufficient space is available;
- Strickler roughness coefficient: 20 (e.g. grass-covered bed and banks assumed);
- Bed level, upstream: 2.7 m;
- Bed level, downstream: 1.0 m;
- Continuous bed slope between bed levels 2.7 and 1.0 m;
- Base widths at narrow reach near cooling towers may be preferably 25 m (if possible for cooling tower design) or may be reduced locally to a minimum of approx. 13 m. In the latter case, the dike slope is rather steep and stabilisation measures should be considered (Rock, concrete); and
- Smooth transitions between bed and existing ground are suggested for both ends of the swale.

Figure 6.1 ***Revised Flood Dike Lines (Dashed Red) with Drainage Canal/Flood Flow Path (Dashed Blue) and Entire Project Site (Black Polygon)***



The effect of the proposed swale (**Figure 6.2**) is to intercept floodwaters along the flood dike and convey them downstream (**Figure 6.3)**. Thus, the design water levels in particular around the flood dike decrease (**Figure 6.4**) and the dike levels may be slightly reduced to values indicated in **Figure 6.2**. The downstream dike reach may be situated closer to the power plant (**Figure 6.2**) and also the downstream end of the swale may be rotated to the north towards the dike.

Figure 6.2 ***Proposed Flood Flow Path (Swale) Along the Revised Flood Dike (Red Line) with Dike Levels, Suggested Re-Alignment at the Downstream Dike Reach (Grey) and Ground Elevations (Coloured)***

Figure 6.3 ***Product of Velocity and Depth Indicating Interception and Conveyance of Floodwaters in the Swale (Coloured Green)***

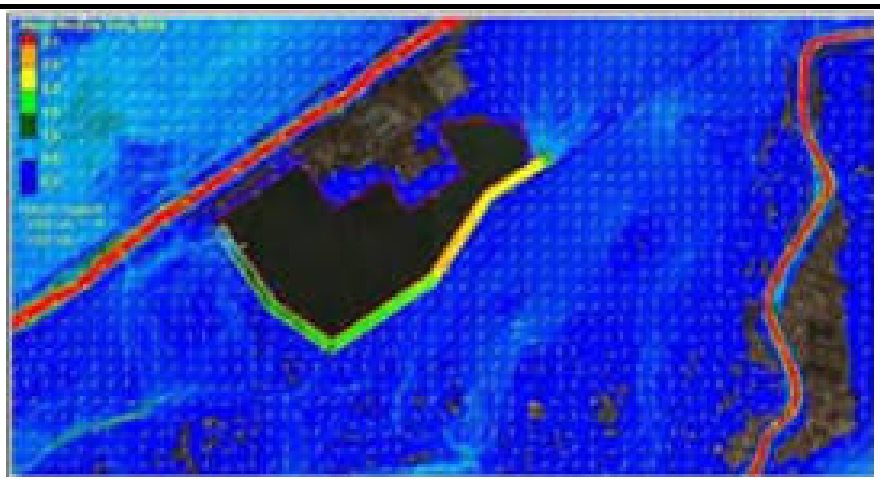
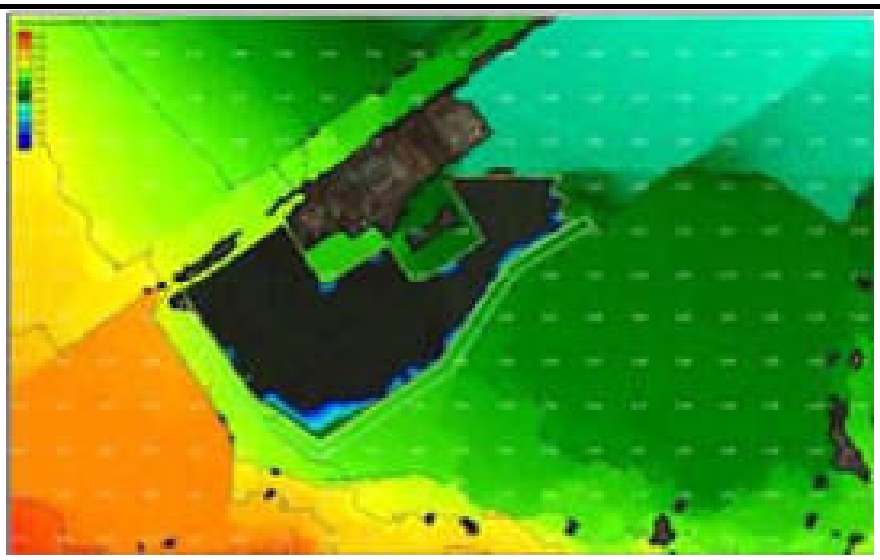
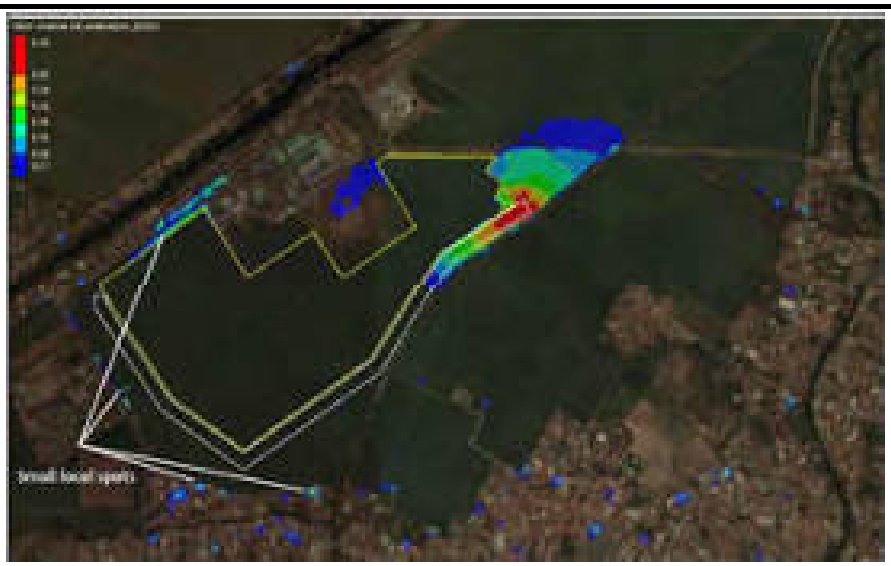


Figure 6.4 ***Maximum Simulated Water Levels (m)***



Areas where water levels are higher than the current state are reduced to a small region near the agricultural land (**Figure 6.5**) where water level increases may be accepted. In larger areas including sensitive use (residential, school etc.) the water levels remain unchanged or decrease slightly.

Figure 6.5 ***Coloured Areas Indicate Increased Water Levels, Non-Coloured Areas Indicate No Change or Slight Decrease. Small Local Spots are considered as Non-Representative or Artefacts***



ERM reviewed a flood risk assessment report titled 'Cilamaya Flood Report' completed by Pöyry Energy GmbH for the proposed Cilamaya Combined Cycle Gas Power Plant in West Java, Indonesia.

The objective of the study was to determine 100-year flood water levels for the design of the flood dikes around the proposed Project site. Following conclusions were made from the review of flood risk assessment report:

- Project site and neighbouring area has history of flooding owing to the proximity to Cilamaya River, Cilamaya Canal and Sea. In addition, there is one (1) minor canal located next to site area which also may prone to flooding risks;

- Flood dike around the periphery of Project site boundary area was designed based on 100-yr flood water level. The approach comprised of hydrologic and hydraulic analysis in order to predict the 100-year design flow hydrograph and flood water level respectively at the Project site area. Hydrologic analysis was performed using HEC- HMS (rainfall –runoff model) and flow regionalisation approach. Hydraulic analysis was performed using Hydro-as 2D model. Input data to hydraulic model includes LiDAR-based digital terrain model (DTM), cross-sectional surveys, sea bed elevations, upstream boundary conditions in terms of hydrologically derived flow hydrograph and downstream boundary conditions in terms of tidal derived water level. Model was roughly calibrated with limited data of flood event dated on March 17, 2014;

- Impact associated with the Project was quantified by comparing two hydraulic model scenarios: namely current state (no dike) and Project state. It was concluded that Project state increases the flood water level typically in the range of 0.01 to 0. 2 m in the site vicinity area. A trapezoidal drainage canal/swale system around the flood dike was proposed to compensate for the increased water level in site vicinity due to Project; and

- The flood dike and an adjoining trapezoidal drainage canal/swale system was suggested as flood mitigation measures to avoid the site area being getting inundated and compensated for Project impact, respectively. However, the hydraulic model simulation shows that flood inundation typically in the range of up to one (1) m could happen, which may cause obstruction to transportation to and from **the Project site area in case of extreme flooding event.**

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December 22, 2017
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PT. PERTAMINA (PERSERO) AND MARUBENI CORPORATION

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Appendix 2 to Cilamaya Flood Study:

Hydraulic Report on Flood Protection Design December 2017

PLTGU JAWA 1 IPP PROJECT, 1600 MW CCGT POWER PLANT, WEST JAVA, INDONESIA

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1 PROPOSED FLOOD PROTECTION DESIGN DECEMBER 2017

In December 2017, a revised site layout, with new flood dike lines and flood flow paths were provided by the EPC-Contractor and the Owner's Engineer. The drawing in pdf-format (s. Figure 1-1) was digitized, georeferenced and used in final hydraulic modelling[1].

Figure 1-1: Overview power block site design - December 2017

In the hydraulic model, a trapezoidal typical cross-section was considered along the flood flow path and the dike lines were revised. A free flow area under the new access road (Figure 1-3) allows flood release from the north area to the southern flood flow path. For that purpose, four concrete box culverts were situated below the access road (Figure 1-2).

As in the 2016 final report, simulations for the revised project state were compared to the current state results.

The basic design parameters of trapezoidal flood flow path (swale) including four culverts (s. Figure 1-4) as well as the dike crest are:

- Bed (base) width of swale: 25 m
- Side slope of swale approx. 1V : 2H (assumed in modelling). In detailed design, slopes may be less steep if covered by grass wherever sufficient space is available.
- Swale's Strickler roughness coefficient: 20 (e.g. grass-covered bed and banks)
- Bed levels: Upstream: 2.7 m, downstream: 1.0 m
- Continuous bed slope between bed levels 2.7 and 1.0 m

[1] Simulations in this appendix were performed by steady discharge modelling of 100-year peak flows for the project state and the present state. The steady flow approach was a consequence of the tight project time frame. As demonstrated in chapter 5.5.2 of the 2016 final report, steady flows result in only a few cm higher water levels than unsteady flows.

- Swale's base widths at narrow reach near cooling towers may be preferably 25 m (if possible for cooling tower design) or may be reduced locally to a minimum of approx. 13 m. In the latter case, the dike slope is rather steep and stabilisation measures should be considered (Rock, concrete…).
- Smooth transitions between wale's bed and existing ground are suggested for both ends of the swale.
- Dike crest levels may be reduced locally by up to 0.5 m. The proposed new levels are indicated in Figure 1-4.
- Four (2m x 2m) concrete box culverts in Figure 1-2 under the access road are recommended:

Figure 1-2: Box culverts under the access road with invert level 3.1 m from revised design drawings

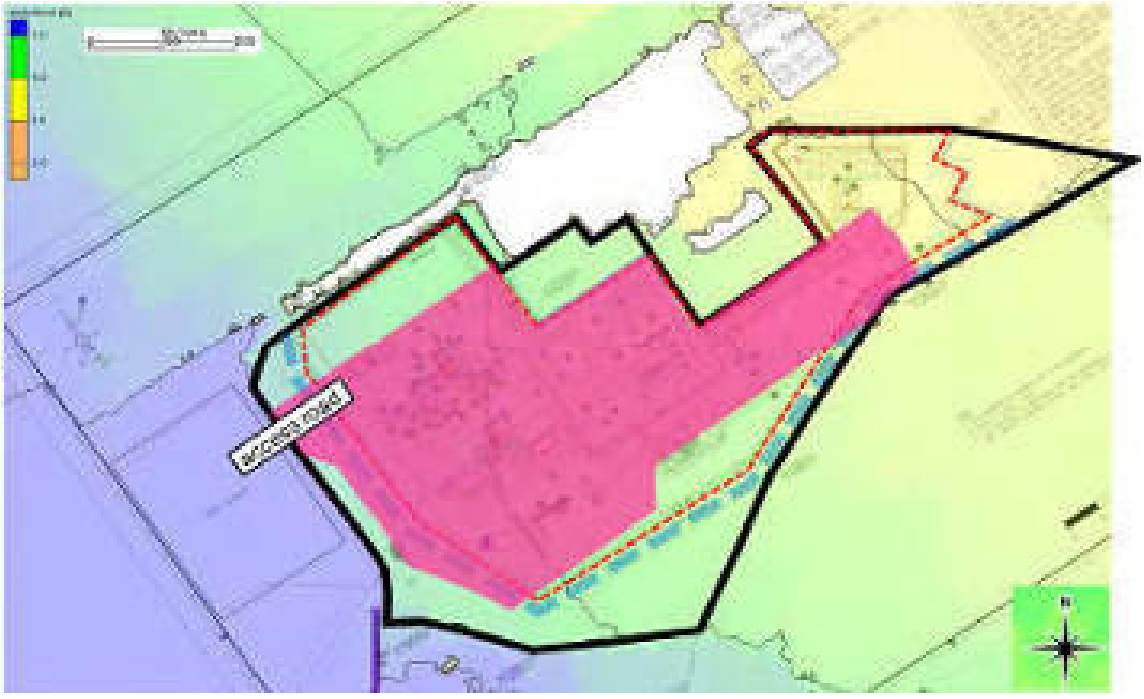

Figure 1-3: Overview of power block site layout December 2017 (magenta with new access road) with previous layouts. Planning state August 2016: Flood dike lines (dashed red) with drainage canal / flood flow path (dashed blue). The black polygon shows the entire project area (earliest dike line assumed), the coloured background indicates the inundation pattern in the current state.

Figure 1-4: Flood flow path in December 2017 layout (swale, poylgon colored by depth below current ground) along the revised green flood dike with proposed dike levels

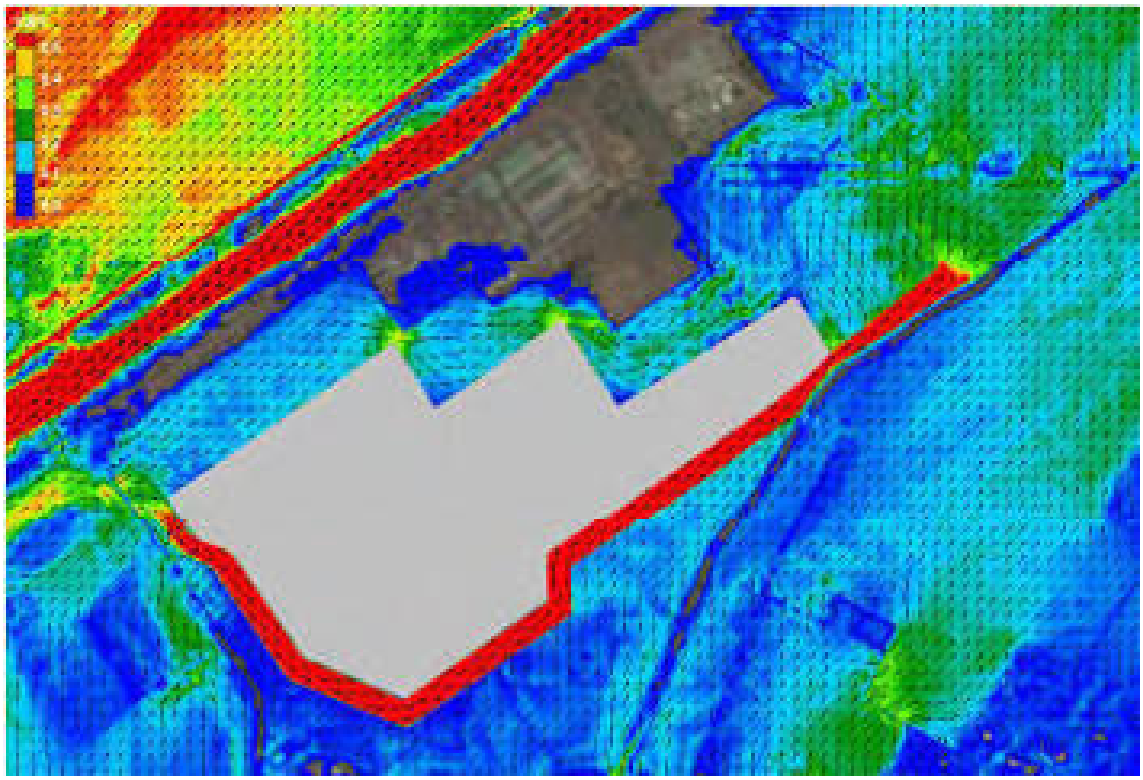

Figure 1-5: Product of velocity and depth indicating areas with highest flow concentration in orange and red. December 2017 layout

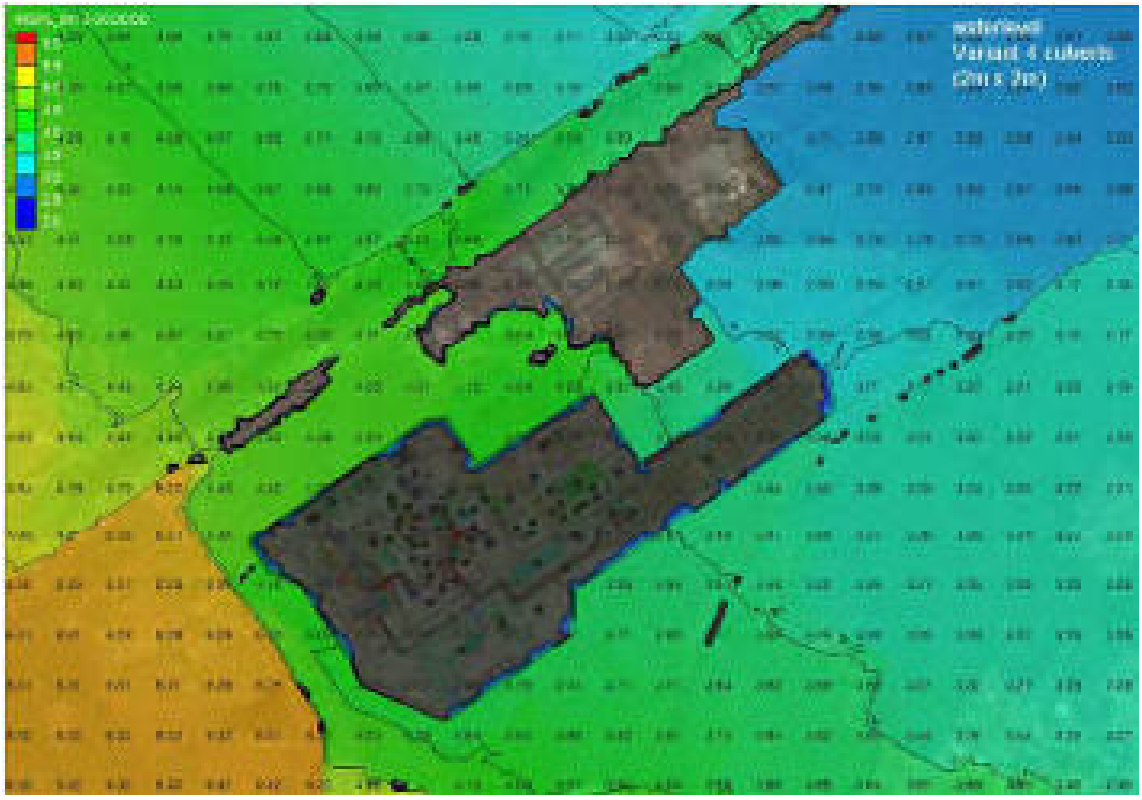

Figure 1-6: Maximum simulated water levels [m]. December 2017 layout

Figure 1-7 evaluates the simulated maximum water levels from the December 2017 layout against the present state levels. This evaluation shows increasing design water levels north-west of the site, also affecting areas that were not flooded under present conditions.

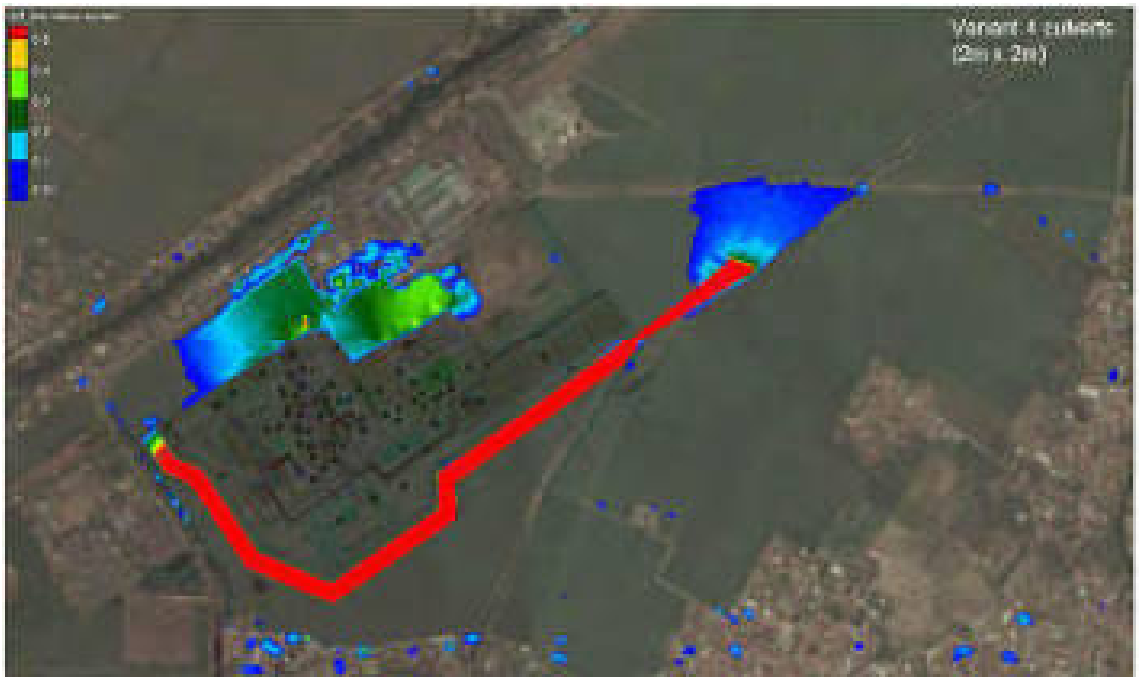

Figure 1-7: Coloured areas indicate increased water levels, non-coloured areas indicate no change or slight decrease (local spots are not relevant)

The overall changes in the maximum depths are presented in Figure 1-8. Sensitive areas with increased flooding north of the site are relatively small. In highly sensitive zones including residential areas, a school etc. depth remains unchanged or decrease slightly.

Figure 1-8: Overall changes in maximum depths. Semitransparent: No change (+/- 1 cm). Reduction of up to 5 cm in light green, reduction over 5 cm dark green. Increased depths in blue (local spots are not relevant).

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PT. PERTAMINA (PERSERO) AND MARUBENI CORPORATION

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Addendum to

Appendix 2 of Cilamaya Flood Study:

Hydraulic Report on Flood Protection Design December 2017

PLTGU JAWA 1 IPP PROJECT, 1600 MW CCGT POWER PLANT, WEST JAVA, INDONESIA

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1 INTRODUCTION

Figures 1-7 and 1-8 in Appendix 2 of the Cilamaya Flood Study[1] present changes in the maximum simulated 100-year flood depth caused by the project (planning state December 2017). These images contain some colored local spots which are basically artefacts and not relevant for interpreting the flood patterns.

For clarification these artefacts are now removed and the maximum simulated depths for both, the current state and the planning state are plotted herein as well as the project-induced differences.

1.1 Background

The presented 100-year flood scenarios for the current state and the project state were established from hydrological rainfall-runoff modelling resulting in discharge hydrographs followed by hydrodynamic modelling resulting in flood depths, water levels and flow velocities[2].

[1] Appendix 2 to Pöyry's Cilamaya Flood Study: Hydraulic Report on Flood Protection Design December 2017
[2] Methodology, data and details: Pöyry's Cilamaya Flood Study. Final Report, July 2016

2 MAXIMUM SIMULATED 100-YR. FLOOD DEPTHS

The current state model analysis (Figure 2-1, without project implemented) shows large inundated areas including residential zones south of the project site as well as areas in the north.

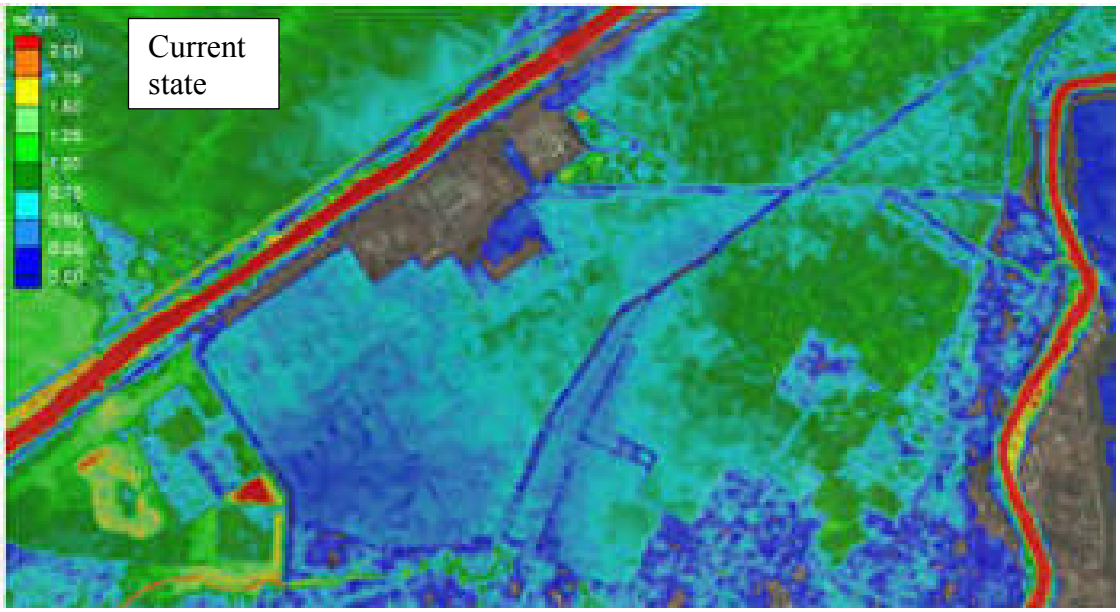

Figure 2-1: Simulated 100-yr flood depths in m for current state

The project state model analysis (Figure 2-2) reveals flooded areas similar to the current state. Some changes in the vicinity of the project site are analyzed further below.

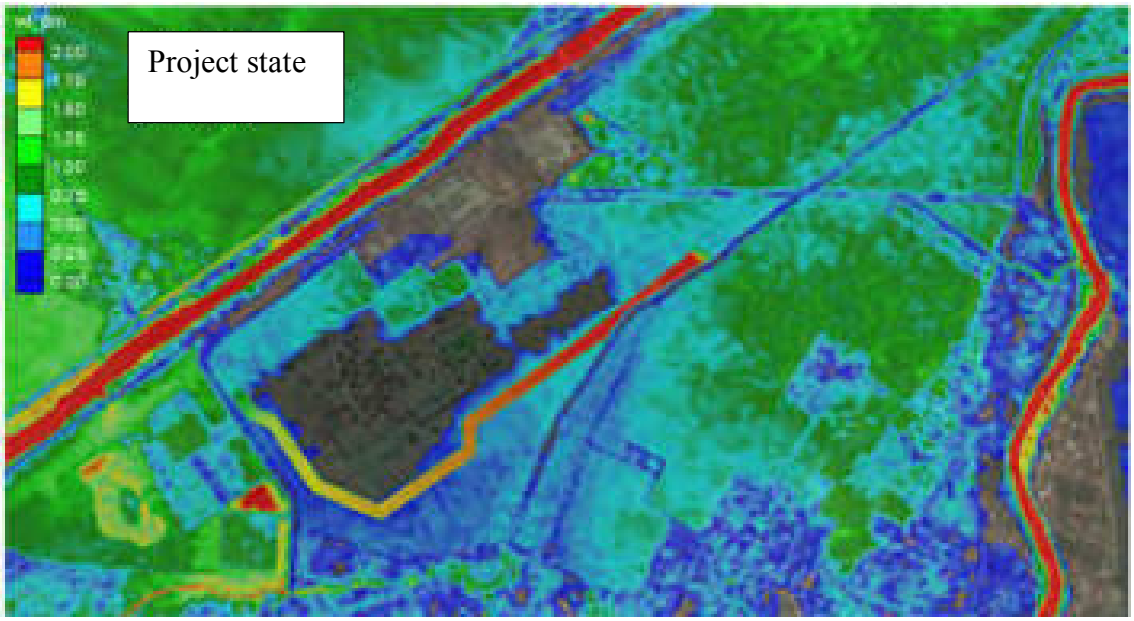

Figure 2-2: Simulated 100-yr flood depths in m for project state

3 PROJECT INDUCED CHANGES

The overall project-induced changes in terms of maximum depths at a 100-yr flood scenario are presented in Figure 3-1. Areas with reduced flood depth include among other residential zones south of the site. Areas with higher flood depth cover the swale itself (The swale's purpose is to bypass floods around the site and by that alleviate flooding) and areas north of the site which are mostly flooded in the current state up to approximately 0.5 m depth or more.

Figure 3-1: Project-induced overall changes in maximum depths in m. Semitransparent: No change (+/- 1 cm). Reduction in green, increased depths in blue.

PLTGU Jawa 1 Independent Power Project

ANNEX M: GREENHOUSE GAS ASSESSMENT (GHG)

Prepared for:

PT Jawa Satu Power (JSP)

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1 INTRODUCTION

1.1 OVERVIEW

The PLTGU Jawa-1 Project (hereafter referred to as 'the Project') involves the development of a 1,760 MW Combined Cycle Gas Turbine (CCGT) Power Plant, a Liquefied Natural Gas (LNG) Floating Storage and Regasification Unit (FSRU) and 500kV power transmission lines and a Substation.

This technical annexure provides an estimate of the Greenhouse Gas (GHG) emissions that are likely to be emitted by the Project, as related to the issue of climate change. GHGs are assessed to provide an indication of what the Project's GHG emissions will be, and to evaluate ways to minimise / mitigate them early on in the development process.

2 LEGAL FRAMEWORK AND GUIDANCE DOCUMENTATION

Indonesia participated at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro and signed the United Nations Framework Convention on Climate Change (UNFCCC) on 5 June 1992. This was subsequently ratified by the Indonesian government in August 1994, and came into force in November of the same year (*UNFCCC, 2018*).

2.1 INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

The Intergovernmental Panel on Climate Change (IPCC) is a panel established in 1988 by the World Meteorological Organisation (WMO) and the United Nations Environment Programme (UNEP) to provide independent scientific advice on climate change. The panel was originally asked to prepare a report, based on available scientific information, on all aspects relevant to climate change and its impacts and to formulate realistic response strategies. This first assessment report of the IPCC served as the basis for negotiating the UNFCCC.

The IPCC also produce a variety of guidance documents and recommended methodologies for GHG emissions inventories, including (for example):

- 2006 IPCC Guidelines for National GHG Inventories; and
- Good Practice Guidance and Uncertainty Management in National GHG Inventories (2000).

Since the UNFCCC entered into force in 1994, the IPCC remains the pivotal source for scientific and technical information relevant to GHG emissions and climate change science.

The IPCC operates under the following mandate: "to provide the decision-makers and others interested in climate change with an objective source of information about climate change". The IPCC does not conduct any research nor does it monitor climate-related data or parameters. Its role is to assess on a comprehensive, objective, open and transparent basis the latest scientific, technical and socio-economic literature produced worldwide, relevant to the understanding of the risk of human-induced climate change, its observed and projected impacts and options for adaptation and mitigation.

IPCC reports should be neutral with respect to policy, although they need to deal objectively with policy relevant scientific, technical and socio economic factors. (IPCC, 2018).

The stated aims of the IPCC are to assess scientific information relevant to:

- Human-induced climate change;
- The impacts of human-induced climate change; and

- Options for adaptation and mitigation.

IPCC reports are widely cited within international literature, and are generally regarded as authoritative.

2.1.1 United Nations Framework Convention on Climate Change

The UNFCCC sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. It recognises that the climate system is a shared resource, the stability of which can be affected by industrial and other emissions of CO_2 and other GHGs. The convention has near-universal membership, with 172 countries (parties) having ratified the treaty, the Kyoto Protocol.

Under the UNFCCC, governments:

- Gather and share information on GHG emissions, national policies and best practices;
- Launch national strategies for addressing GHG emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and
- Cooperate in preparing for adaptation to the impacts of climate change.

2.2 KYOTO PROTOCOL

The Kyoto Protocol entered into force on 16 February 2005. The Kyoto Protocol built upon the UNFCCC by committing to individual, legally binding targets to limit or reduce GHG emissions. Annex I Parties are countries that were members of the Organisation for Economic Co-operation and Development (OECD) in 1992, plus countries with economies in transition such as Russia. Given the above definition, Indonesia did not comprise an Annex 1 Party. The GHGs included in the Kyoto Protocol were:

- Carbon dioxide (CO_2);
- Methane (CH_4);
- Nitrous xide (N_2O);
- Hydrofluorocarbons (HFCs);
- Perfluorocarbons (PFCs); and
- Sulfur hexafluoride (SF_6).

Each of the above gases has a different effect on the earth's warming and this is a function of radiative efficiency and lifetime in the atmosphere for each individual gas. To account for these variables, each gas is given a 'global warming potential' (GWP) that is normalised to CO_2. For example, CH_4 has a

GWP of 28 over a 100 year lifetime (IPCC, 2014). This factor is multiplied by the total mass of gas to be released to provide a CO_2 equivalent mass, termed 'CO_2-equivalent', or CO_2-e.

The emission reduction targets were calculated based on a party's domestic GHG emission inventories (which included land use change and forestry clearing, transportation and stationary energy sectors). Domestic inventories required approval by the Kyoto Enforcement Branch. The Kyoto Protocol required developed countries to meet national targets for GHG emissions over a five year period between 2008 and 2012.

To achieve their targets, Annex I Parties had to implement domestic policies and measures. The Kyoto Protocol provided an indicative list of policies and measures that might help mitigate climate change and promote sustainable development.

Under the Kyoto Protocol, developed countries could use a number of flexible mechanisms to assist in meeting their targets. These market-based mechanisms include:

- Joint Implementation – where developed countries invest in GHG emission reduction projects in other developed countries; and
- Clean Development Mechanism – where developed countries invest in GHG emission reduction projects in developing countries.

Annex I countries that failed to meet their emissions reduction targets during the 2008-2012 period were liable for a 30 percent penalty (additional to the level of exceedance).

2.3 *PARIS AGREEMENT*

In 2015, a historic global climate agreement was reached under the UNFCCC at the 21st Conference of the Parties (COP21) in Paris (known as the Paris Agreement). The Paris Agreement sets in place a durable and dynamic framework for all countries to take action on climate change from 2020 (that is, after the Kyoto period), building on existing efforts in the period up to 2020. Key outcomes of the Paris Agreement include:

- A global goal to hold average temperature increase to well below 2°C and pursue efforts to keep warming below 1.5°C above pre-industrial levels;
- All countries to set mitigation targets from 2020 and review targets every five years to build ambition over time, informed by a global stocktake;
- Robust transparency and accountability rules to provide confidence in countries' actions and track progress towards targets;
- Promoting action to adapt and build resilience to climate change; and

- Financial, technological and capacity building support to help developing countries implement the Paris Agreement.

Indonesia signed the Paris Agreement on 22 April 2016. This was ratified by the Indonesian government in October 2016 and came into force on 30 November 2016.

In preparation for the Paris Agreement, Indonesia submitted its Intended Nationally Determined Contribution (INDC) in 2015. This document outlines the country's transition to a low carbon future by describing the enhanced actions and the necessary enabling environment during the 2015-2019 period that will lay the foundation for more ambitious goals beyond 2020 (*Republic of Indonesia, 2015*).

Indonesia has committed to reduce unconditionally 26% of its greenhouse gases against the business as usual scenario by the year 2020.

The above commitment will be implemented through effective land use and spatial planning, sustainable forest management, improved agriculture and fisheries productivity, energy conservation and the promotion of clean and renewable energy sources, and improved waste management.

Relevant to the energy sector, Indonesia has embarked on a mixed energy use policy, with at least 23% coming from new and renewable energy by 2025. Indonesia has also established the development of clean energy sources as a national policy directive. Collectively, these policies are intended to put Indonesia on the path to de-carbonisation.

2.4 INTERNATIONAL FINANCE CORPORATION PERFORMANCE STANDARDS

In recognition of the international efforts to mitigate greenhouse gas emissions summarised above, the International Finance Corporation (IFC) Performance Standards (IFC, 2012) explicitly require assessment of climate change risk and an understanding of greenhouse gas (GHG) emissions and energy use:

- IFC Performance Standard 1: The risks and impacts identification process will consider the emissions of greenhouse gases, the relevant risks associated with a changing climate and the adaptation opportunities, and potential transboundary effects, such as pollution of air, or use or pollution of international waterways;

- IFC Performance Standard 3 requires:

  - Consideration of alternatives and implementation of technically and financially feasible and cost-effective options to reduce project-related GHG emissions during the design and operation of the project. These options may include, but are not limited to, alternative project locations, adoption of renewable or low carbon energy sources, sustainable agricultural, forestry and livestock management practices,

the reduction of fugitive emissions and the reduction of gas flaring; and

- for projects > 25,000 t CO_2-e/year, quantification of direct greenhouse gas emissions within the physical project boundary and indirect emissions associated with off-site production of energy (i.e. purchased electricity). Quantification of GHG emissions will be conducted by the client annually in accordance with internationally recognised methodologies and good practice.

2.5 IFC EHS GUIDELINES FOR THERMAL POWER PLANTS, 2008

The *IFC EHS Guidelines for Thermal Power Plants* provides industry specific examples of good engineering practices to be used in conjunction with the *IFC General EHS Guidelines*. The *IFC EHS Guidelines for Thermal Power Plants* (hereafter, "*the TPP Guidelines"*) contain performance levels and measures that are applied to boilers, reciprocating engines, and combustion turbines in new and existing facilities at reasonable cost. Environmental issues in thermal power plant projects which the Guidelines provide requirements on include the following:

- Air emissions;
- Energy efficiency and Greenhouse Gas emissions;
- Water consumption and aquatic habitat alteration;
- Effluents;
- Solid wastes;
- Hazardous materials and oil; and
- Noise.

The TPP Guidelines provide the following recommendations to avoid, minimise, and offset emissions of carbon dioxide from new and existing thermal power plants:

- Use of less carbon intensive fossil fuels (i.e., less carbon containing fuel per unit of calorific value -- gas is less than oil and oil is less than coal) or co-firing with carbon neutral fuels (i.e., biomass);
- Use of combined heat and power plants (CHP) where feasible;
- Use of higher energy conversion efficiency technology of the same fuel type / power plant size than that of the country/region average. New facilities should be aimed to be in top quartile of the country/region average of the same fuel type and power plant size. Rehabilitation of existing facilities must achieve significant improvements in efficiency.

- Consider efficiency-relevant trade-offs between capital and operating costs involved in the use of different technologies. For example, supercritical plants may have a higher capital cost than subcritical plants for the same capacity, but lower operating costs. On the other hand, characteristics of existing and future size of the grid may impose limitations in plant size and hence technological choice. These trade-offs need to be fully examined in the EIA;

- Use of high performance monitoring and process control techniques, good design and maintenance of the combustion system so that initially designed efficiency performance can be maintained;

- Where feasible, arrangement of emissions offsets (including the Kyoto Protocol's flexible mechanisms and the voluntary carbon market), including reforestation, afforestation, or capture and storage of CO_2 or other currently experimental options;

- Where feasible, include transmission and distribution loss reduction and demand side measures. For example, an investment in peak load management could reduce cycling requirements of the generation facility thereby improving its operating efficiency. The feasibility of these types of off-set options may vary depending on whether the facility is part of a vertically integrated utility or an independent power producer; and

- Consider fuel cycle emissions and off-site factors (e.g., fuel supply, proximity to load centers, potential for off-site use of waste heat, or use of nearby waste gases (blast furnace gases or coal bed methane) as fuel. etc).

Table 4 within the TPP Guidelines provides typical CO_2 emissions performance of new thermal power plants, expressed as gCO_2/kWh (gross).

2.6 *IFC EHS GUIDELINES FOR AIR EMISSIONS AND AMBIENT AIR QUALITY, 2007*

The *IFC EHS Guidelines for Air Emissions and Ambient Air Quality, 2007* (hereafter, "*the Air Guidelines*") are applicable to facilities or projects that generate emissions to air at any stage of the project life-cycle. The guidelines complement the industry-specific emissions guidance (e.g. the *TPP Guidelines*) in the Industry Sector Environmental, Health, and Safety (EHS) Guidelines by providing information about common techniques for emissions management that may be applied to a range of industry sectors. This guideline provides an approach to the management of significant sources of emissions, including specific guidance for assessment and monitoring of impacts.

The Air Guidelines provide the following recommendations for reduction and control of greenhouse gases include:

- Carbon financing;

- Enhancement of energy efficiency;

- Protection and enhancement of sinks and reservoirs of greenhouse gases;
- Promotion of sustainable forms of agriculture and forestry;
- Promotion, development and increased use of renewable forms of energy;
- Carbon capture and storage technologies; and
- Limitation and / or reduction of methane emissions through recovery and use in waste management, as well as in the production, transport and distribution of energy (coal, oil, and gas).

2.7 OECD COMMON APPROACHES AND EQUATOR PRINCIPLES

The Organisation for Economic Co-operation and Development (OECD)'s Common Approaches and the Equator Principles III (Principle 2) reference the TPP Guidelines as the export credit conditions.

The Equator Principles III notes that for all Projects, in all locations, when combined Scope 1 (i.e. direct GHG emissions from facilities owned or controlled within the physical Project boundary) and Scope 2 (i.e. indirect GHG emissions associated with the off-site production of energy used by the Project) emissions are expected to exceed 100,000 tonnes of CO_2 equivalent (tCO_2-e) annually, an alternatives analysis will be conducted to evaluate less GHG intensive alternatives.

OECD's Common Approaches state in paragraphs 46 and 47 that:

(*Paragraph 46*) To facilitate the building of the body of experience and to give further consideration to climate change issues, Adherents shall:

- Report the estimated annual greenhouse gas emissions from all fossil-fuel power plant projects; and
- Report the estimated annual greenhouse gas emissions from other projects, where such emissions are projected exceed 25,000 tonnes CO_2-equivalent annually, and where the applicant or project sponsor has provided the Adherents with necessary information, e.g. via an ESIA report.

In this context, where relevant and feasible, Adherents shall try to obtain and report the estimated annual direct and indirect greenhouse gas emissions (Scope I and Scope II respectively) in CO_2-equivalent and/or the estimated annual direct greenhouse gas emissions (Scope 1) by carbon intensity (*e.g.* in g/kWh) for the six greenhouse gases (i.e. Carbon dioxide (CO_2); methane (CH_4); nitrous oxide (N_2O); hydrofluorocarbons (HFCs); perfluorocarbons (PFCs); and sulfur hexafluoride (SF_6)) to be generated during the operations phase of the project as provided during the environmental and social review.

(*Paragraph 47*) Adherents shall give further consideration to issues relating to support for thermal power plants and nuclear power plants, particularly the use of international standards and relevant sources of international guidance. This work should be based on:

- Reporting of any specific actions taken to avoid, minimise and/or offset CO_2 emissions, pursuant to the recommendations outlined in the EHS Guidelines for Thermal Power Plants, for all high carbon intensity fossil fuel power projects exceeding 700g/kWh, taking into account, where appropriate, the context of the low carbon growth framework of the country where the project is located, the use of best appropriate technology to reduce carbon emissions, and other recommended actions.

3 METHODOLOGY

Quantification of GHG emissions has been performed in accordance with the GHG Protocol (WRI & WBCSD, 2004) and IPCC GHG accounting / classification systems.

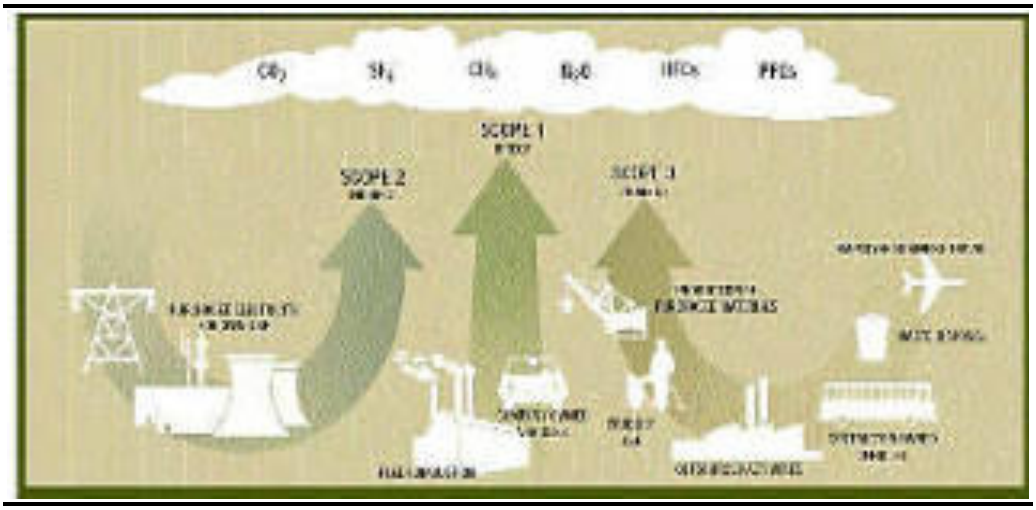
3.1 THE GHG PROTOCOL

The GHG Protocol establishes an international standard for accounting and reporting of GHG emissions. The GHG Protocol has been adopted by the International Organisation for Standardisation, endorsed by GHG initiatives (such as the Carbon Disclosure Project) and is compatible with existing GHG trading schemes.

Under this protocol, three "scopes" of emissions (Scope 1, Scope 2 and Scope 3) are defined for GHG accounting and reporting purposes. This terminology has been adopted in International GHG reporting and measurement methods and has been employed in this assessment.

The definitions for Scope 1, Scope 2 and Scope 3 emissions are provided in the following sections, with a visual representation provided in Figure 3.1.

Figure 3.1 Overview of Scopes and Emissions across a Reporting Entity



Source: WRI & WBCSD 2004

3.1.1 Scope 1: Direct Greenhouse Gas Emissions

Direct greenhouse gas emissions are defined as those emissions that occur from sources that are owned or controlled by the reporting entity. Direct greenhouse gas emissions are those emissions that are principally the result of the following types of activities undertaken by an entity:

- Generation of electricity, heat or steam. These emissions result from combustion of fuels in stationary sources, the principal source of greenhouse emissions associated with the operation of the proposed CCGT Power Plant;

- Physical or chemical processing. Most of these emissions result from manufacture or processing of chemicals and materials, e.g., the manufacture of cement, aluminium, etc.;

- Transportation of materials, products, waste and employees. These emissions result from the combustion of fuels in entity owned/controlled mobile combustion sources, e.g., trucks, trains, ships, aeroplanes, buses and cars; and

- Fugitive emissions. These emissions result from intentional or unintentional releases, e.g., equipment leaks from joints, seals, packing, and gaskets; methane emissions from coal mines and venting; HFC emissions during the use of refrigeration and air conditioning equipment; and methane leakages from gas transport. The fugitive release of LNG (predominantly CH_4) is likely to comprise a significant GHG emission pathway during the operational phase of the FSRU, CCGT Power Plant and associated pipelines. This is in part due to the GWP of CH_4.

3.1.2 Scope 2: Energy Product Use Indirect Greenhouse Gas Emissions

Scope 2 emissions are a category of indirect emissions that accounts for greenhouse gas emissions from the generation of purchased energy products (principally, electricity, steam/heat and reduction materials used for smelting) by the entity.

Scope 2 emissions are associated with the production of electricity that is purchased or otherwise brought into the organisational boundary of the entity. Scope 2 emissions physically occur at the facility where electricity is generated. Entities report the emissions from the generation of purchased electricity that is consumed in its owned or controlled equipment or operations as Scope 2.

In the context of this assessment, it is assumed that electricity required by auxiliary plant would be provided directly by the CCGT Power Plant during the operational phase. On this basis, Scope 2 emissions are confined to electricity that is imported at times when the plant is offline.

3.1.3 Scope 3: Other Indirect Greenhouse Gas Emissions

Scope 3 emissions are defined as those emissions that are a consequence of the activities of an entity, but which arise from sources not owned or controlled by that entity. Some examples of Scope 3 activities provided in the GHG Protocol are extraction and production of purchased materials, transportation of purchased fuels, and use of sold products and services. In the case of the Project, Scope 3 emissions will include emissions associated with fuel cycles. This includes the extraction, processing and shipping of LNG by third parties.

The GHG Protocol provides that reporting scope 3 emissions is optional. If an organisation believes that Scope 3 emissions are a significant component of the total emissions inventory, these can be reported along with Scope 1 and

Scope 2. However, the GHG Protocol notes that reporting Scope 3 emissions can result in double counting of emissions and can also make comparisons between organisations and/or products difficult because reporting is voluntary. Double counting needs to be avoided when compiling national (country) inventories. The GHG Protocol also recognises that compliance regimes are more likely to focus on the "point of release" of emissions (i.e. direct emissions) and/or indirect emissions from the purchase of electricity.

Under the IFC Performance Standards, facilities triggering greenhouse emission thresholds (> 25,000 t CO_2-e/year) are required to quantify Scope 1 and Scope 2, but not Scope 3.

4 EMISSION INVENTORY DEVELOPMENT

4.1 OVERVIEW

This section provides and overview of Project activities, processes and emissions as they relate to GHG emissions, for both the construction and operational phases of the Project.

For quantification of each distinct Project activity, has been used to estimate the emission in terms of CO_2-e for emissions of CO_2, CH_4 and N_2O. The individual gas types have then been summed to provide the total CO_2-e for each activity.

Figure 4.1 Greenhouse Gas Emission Estimation

$$E_{ij} = \frac{Q_i \times EF_{ijoexec}}{1000}$$

Where:
E_{ij} is the emissions of gas type j, (CO_2, CH_4 or N_2O) from gaseous fuel type (i) ($CO_{2\text{-}e}$ tonnes);
Q_i is the quantity of fuel type (i) in tonnes or GJ (depending on the emission factor type); and
$EF_{ijoexec}$ is the emission factor for each gas type (j) which includes the effect of an oxidation factor) for fuel type (i) (kilograms $CO_{2\text{-}e}$ per gigajoule or tonne of fuel type (i).

Activity data (i.e. fuel consumption) has been sourced from the proponent, or where data gaps exist, have been derived using professional judgement.

The emission factors referenced in **Figure 4.1**, are generally those documented within from IPCC Guidelines for National Greenhouse Gas Inventories (*IPCC, 2006*).

Key assumptions and data that have been used in developing the emission inventory for each activity are provided.

4.2 CONSTRUCTION EMISSION INVENTORY

During the construction phase of the Project there will be a requirement for mobile and non-mobile plant, including, for example, bulldozers, loaders, excavators, mobile cranes, pile machines, graders, scrappers, pile driver excavators, dump trucks, and generators, etc.

The detailed construction schedule including locations of individual sources in any given period of time is not known. GHG emissions associated with fuel consumption from onsite mobile and non-mobile plant will be intermittent (and spatially variable) throughout the construction phase period as different activities take precedence. Construction plant GHG emissions will be highly dependable on the operating time of individual mobile and non-mobile plant, which is currently not known to a high level of detail. On this basis it is recognised that the construction phase GHG emission inventories are, in general, difficult to define.

4.2.1 Combined Cycle Gas Turbine (CCGT) Power Plant Construction

Notwithstanding the above commentary around construction emissions uncertainty, the activity data for construction of the CCGT Power Plant is reasonably well defined.

Activity data currently available includes a proposed manpower schedule and detailed equipment operation schedule. Construction of CCGT Power Plant is anticipated to involve a maximum of 3,500 workers, and is thus anticipated to be the single largest construction emission.

Three principal activities have been identified in the CCGT Power Plant construction:

- Use of mobile and non-mobile plant (annual fuel consumption estimates provided by the proponent);
- Mobilisation of construction workers (activity data from manpower schedule combined with assumptions around worker transportation mode / average commute distance); and
- Mobilisation of construction equipment and materials (activity data from equipment operation schedule combined with assumptions around average distance travelled to deliver equipment to site)

4.2.2 Other Construction Activities / Locations

In view of the granularity of information available for CCGT Power Plant construction, other construction activities / locations have been scaled against the aggregated construction emission estimates, based on information available as to their proposed manpower and / or duration.

The other construction activities / locations that have been quantified in this manner are construction of:

- Transmission lines;
- Pipelines;
- Sub-station; and
- Jetty.

It is acknowledged that there will be other ancillary construction activities taking place (e.g. construction associated with FSRU, construction and access roads and the base camp). However, given the conservatism adopted in the above quantification exercises, it is anticipated that the GHG emissions from such ancillary activities will be accounted for within the total annual estimates.

4.2.3 Clearing of Land

The clearing of land needs to be considered in terms of the carbon sink lost in the year of removal of any existing vegetation.

However, information provided by the proponent, and validated from aerial photograph of the region, indicates that a significant proportion of the land clearing required for the Project will require the reclamation of existing paddy fields.

Paddy fields represent a GHG emission source in their own right (associated with CH_4 emissions during the rice growing process). For this assessment, it has been assumed that any GHG emission associated with the clearing of vegetated land would be negated by the GHG-positive activity of paddy field removal.

4.3 OPERATIONAL EMISSION INVENTORY

4.3.1 Floating Storage and LNG Regasification Unit (FSRU)

The FSRU will be equipped with a number of diesel generators for operation activities (No.1, No. 2 and No.4 Main Generator Engines).

The post-combustion emissions associated with operation of these diesel generators will be a source of GHG emissions, principally as CO_2.

Based on the Project information provided in **Table 4.1**, the estimated GHG emissions associated with operation of the FSRU Dual Fuel (DF) diesel generators is provided.

Table 4.1 FSRU Diesel Generator GHG Emission Estimates

Regas Capacity	**Air emission from main DF generator engines**
[mmscfd]	Typical CO_2 [kg/h]
50	1862.1
100	2174.6
150	2741.8
200	2881.8
250	3644.9
300	3823.8
350	4606.1
400	4752.6

Normal operating conditions are considered to be a regas capacity of 300 mmscfd, requiring three sets of main generator engines to be operating. For estimation purposes, under these conditions, the other fuel consumption equipment are not operating (e.g., auxiliary boilers, GCU). Rather, for estimation purposes, normal operating conditions are assumed to occur on a 24 hour basis for the entire year.

4.3.2 *Onshore Receiving facility (ORF)*

During the operation phase of the Project there will be a 70m high pressure cold gas vent located at the ORF. The purpose of the vent is to safely dispose of hydrocarbon to atmosphere under maintenance and emergency relief conditions. The composition of the vented gas is presented in **Table 4.2**. The gas is 'sweet' meaning it is largely free of acidic gases such as carbon dioxide (CO_2) and hydrogen sulphide (H_2S) and consists primarily of CH_4 (~96.66%).

Process design information for the Project details that the vent capacity is 24 mmscfd. Acknowledging that the vent is required for emergency / maintenance only and is expected to be operated infrequently and for short duration, it has been conservatively assumed that the vent is operational for up to a 24 hour period in aggregate annually.

Table 4.2 Feed Gas Composition

Component	Typical Value (% Mol)	Min/Max value (% Mol)
Oxygen	0.00	Max 0.2%
Nitrogen	0.35	Max 1%
Carbon Dioxide	0.00	Max 3%
Methane	96.66	Min 85%
Ethane	2.30	Max 8%
Propane	0.47	Max 4%
i-Butane	0.09	Max 2%
n-Butane	0.11	Max 2%
i-Pentane	0.02	Max 0.1%
n-Pentane	0.00	Max 0.2%
HHV (BTU/SCF)	1036	1000 to 1150

4.3.3 *Combined Cycle Gas Turbine (CCGT) Power Plant*

The combustion of natural gas in the 1,760 MW thermal power plant is anticipated to be the largest single source of GHG during either the construction or operation phase of the Project

The gas consumption by the power plant is estimated to be around 64,000,000 mmBTU/year (~67,523 TJ/year) based on a 60% capacity factor.

Greenhouse gas emissions from this source reference the emission factor contained in **Table 2.2** (Chapter 2. Stationary Combustion) of IPCC, 2006.

4.3.4 *Black Start Diesel Engine-Generators*

The Project will be equipped with thirteen 2 MWe (26 MWe total) diesel powered engine-generators required to start-up the main power plant (i.e. black start). It is understood that for a black start, all thirteen engines will be required at their full power output. Given the relatively small scale (~1% of the CCGT Power Plant) and limited use, their operation is not considered material in terms of the GHG assessment.

4.3.5 Emergency Power Diesel Engine - Generator

It is understood that one of the thirteen diesel powered engine-generators discussed in **Section 4.3.4** will be required in case of a station black out and/or emergency power for the safe shutdown of the power plant in the event of loss of mains supply. Per the discussion in **Section 4.3.4**, it is not considered that this will contribute materially to the operational GHG assessment, and this activity is accounted for within the assumptions used to estimate CCGT Power Plant emissions.

4.3.6 Fugitive Methane Emissions

Fugitive emissions of methane may occur from multiple sources within the Project boundary during operations, including transmission infrastructure leaks and during LNG transfer at the FSRU. In view of the GWP of methane, it is considered that fugitive emissions may be material in terms of the operational GHG emission inventory.

Based on estimates of GHG emissions specific to the LNG value chain (Worley Parsons, 2011), it has been estimated that fugitive methane may result in a CO_2-e emission of the order of 1.6% of that corresponding to CCGT Power Plant combustion activities (refer **Section 4.3.3** of this Annex**).**

In addition to the above, and acknowledging the potential for double-counting, an estimate of pipeline emissions has been made.

The onshore (7km) and offshore (14 km) pipeline lengths have been referenced within the emission factor provided within DEE, 2017 which provides the natural gas transmission emission factor for high pressure pipelines 0.4 tonnes CO_2-e/km pipeline length.

4.3.7 Mobilisation of workers

It has been assumed that all the operational personnel travel an average 10 km per day via gasoline light vehicle (i.e. motorbike). It has been conservatively assumed that up to 350 personnel are required to service the operational requirements of the Project.

4.3.8 Imported electricity consumption

Power is anticipated to be imported only when the CCGT Power Plant is completely shut down. It has been estimated that the FSRU will be shut down for an average of 10 days a year. Additionally, it is also assumed there will be four times a year when the power plant is shutdown/tripped. It is estimated that during a normal shutdown the average CCGT Power Plant load is 4 MW and during the FSRU dry dock outages, 3 MW.

The annual total electricity requirement from the grid is estimated to be 1,053 MWh.

An electricity grid emission factor corresponding to Java of 0.9 tCO_2-e /MWh has been adopted (*Institute for Global Environmental Strategies, 2017*).

4.3.9 Scope 3 Emissions

As noted in **Section 3.1.3** of this Annex, IFC Performance Standards require that facilities to quantify Scope 1 and Scope 2, but not Scope 3. However, there are material Scope 3 GHG emission sources associated with the Project, and these are discussed briefly below.

The production and transportation (shipping) of LNG to the FSRU is assumed to be under the operational control of a third party. These potentially significant emissions will be accounted for within the GHG emission inventories of the entities that complete these activities.

An additional, albeit less significant, Scope 3 emission source is associated with the CH_4 generation from the waste generation / management from both construction and operational phases of the Project.

As all waste is assumed to be handled by a third party, this again comprises a Scope 3 activity.

5 GREENHOUSE GAS EMISSION ESTIMATES

5.1 OVERVIEW

The outputs of the emission inventory calculations for the construction phase, the operation phase, and for the Project life cycle as a whole are discussed in this section.

5.2 CONSTRUCTION PHASE EMISSIONS

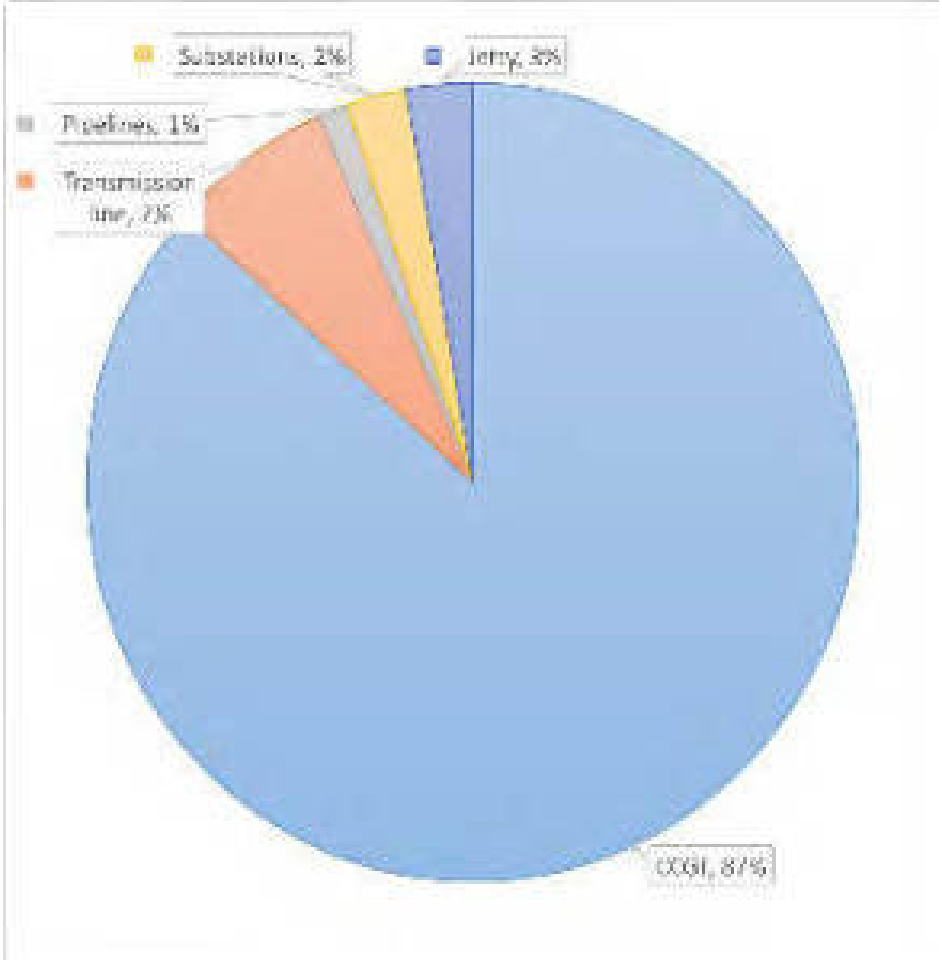
The estimated construction phase GHG emissions, calculated as described in **Section 4.2**, are shown by activity and anticipated year of emission within **Table 5.1**.

The anticipated total construction GHG emissions by facility are shown in **Figure 5.1**.

Table 5.1 Estimated Construction Greenhouse Gas Emissions by Activity and Year

Facility	Activity	Estimated GHG emission (t CO_2-e/year)			
		2018 (Year 1)	2019 (Year 2)	2020 (Year 3)	3 Year Total
CCGT Power Plant	Equipment fuel consumption	30,983	46,203	31,535	108,721
	Manpower mobilisation	3	18	7	28
	Equipment / materials mobilisation	18	96	37	151
	Total	31,004	46,316	31,579	108,899
Transmission line	Total Construction	2,713	5,790	n/a	8,502
Pipelines	Total Construction	n/a	n/a	1,579	1,579
Substation	Total Construction	n/a	n/a	3,158	3,158
Jetty	Total Construction	3,488	n/a	n/a	3,488
Grand Total		**37,205**	**52,106**	**36,315**	125,626

Figure 5.1 ***Contribution to Total Construction Phase Greenhouse Gas Emissions by Activity***



5.3 *OPERATION PHASE EMISSIONS*

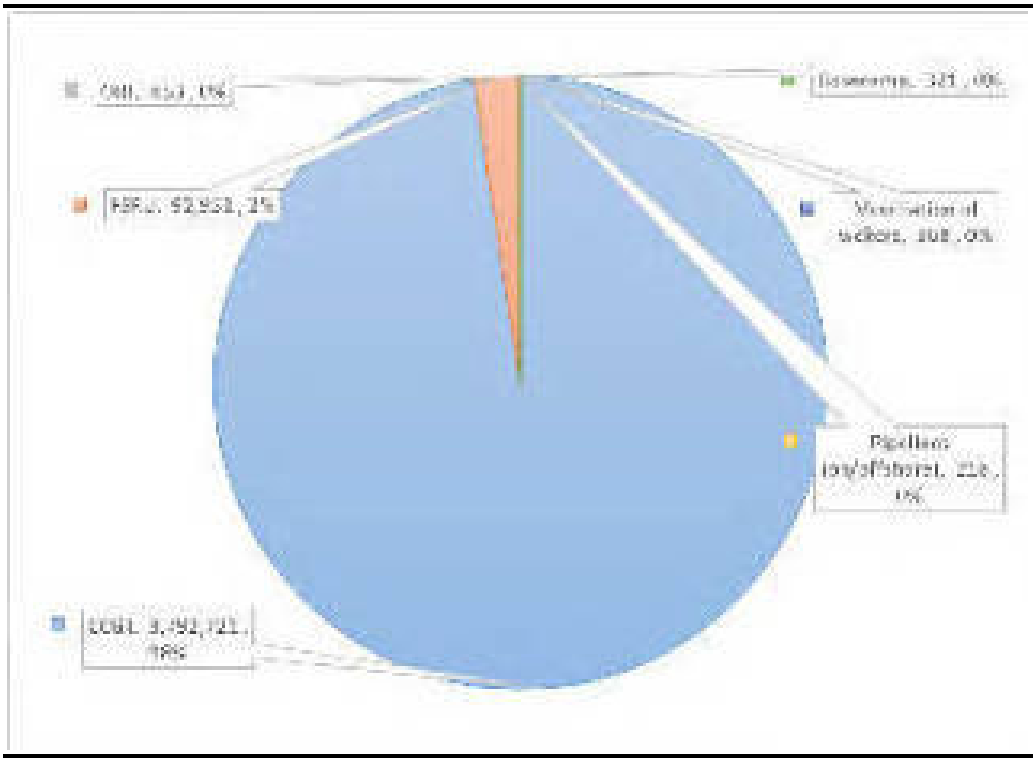
The estimated operation phase GHG emissions, calculated as described in **Section 4.3** of this Annex are shown by activity and anticipated year of emission within **Table 5.2**.

The anticipated total operation GHG emissions by activity / facility are shown in **Figure** 5.2.

Table 5.2 Estimated Operation Greenhouse Gas Emissions by Activity

Facility	Activity	Estimated GHG emission (t CO_2-e/year)	Percentage of total operational emissions
CCGT Power Plant	Gas consumption by gas turbines	3,791,773	96.42
	Electricity Purchased	948	0.02
FSRU	Diesel Generator	33,497	0.86
	Fugitive Emissions	59,454	1.53
ORF	Emergency/Maintenance release valve	453	0.01
Pipeline	Fugitive Emissions	218	0.01
Total Operations	Mobilisation of workers	368	0.01
Base Camp	Electricity purchased	321	0.01
Grand Total		**3,887,033**	**100**

Figure 5.2 Total operation phase greenhouse gas emissions by activity (t CO_2-e / year, %]



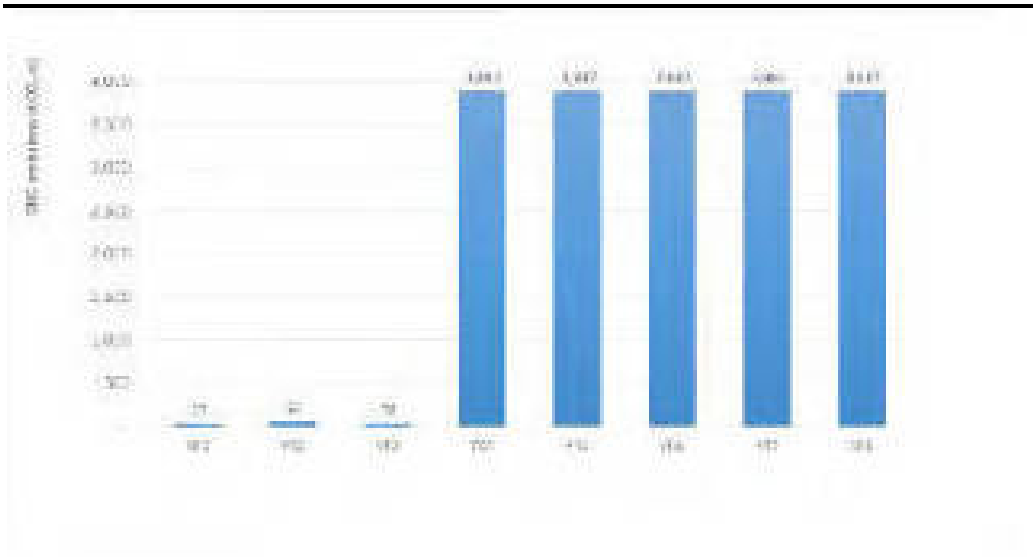
Inspection of **Table 5.2** and **Figure 5.2** indicates that combustion / fugitive emissions from the CCGT Power Plant and FSRU are anticipated to comprise 99.9% of GHG emissions during the operation phase.

5.4 PROJECT LIFE CYCLE EMISSIONS

The anticipated GHG emissions for the first eight years of the Project life cycle are shown in **Figure 5.3.**

It has been conservatively assumed that Year 4 onwards will comprise of full operation year.

Figure 5.3 ***Estimated Greenhouse Gas Emissions for the first eight (8) years of the Project Life Cycle (kt CO_2-e / year)***



Assuming a 20 year asset life from the start of operations, the Project as a whole is anticipated to comprise 77.7 Mt CO_2-e of (Scope 1 and 2) emissions during its total life cycle. Of these, 99.8% of emissions are anticipated to be related to (combustion and fugitive) emissions during the operational phase.

6 IMPACT ASSESSMENT, MITIGATION AND MANAGEMENT

6.1 OVERVIEW

This section seeks to evaluate the Project emissions in terms of their significance at both a National and International level.

The use of LNG within a CCGT Power Plant is benchmarked against other fossil fuel power generation, and appropriate GHG management measures are provided.

6.2 IMPACT ON NATIONAL AND GLOBAL GREENHOUSE GAS EMISSIONS

A traditional impact assessment is conducted by determining how proposed activities will affect the state of the environment compared with the status quo (i.e. baseline conditions).

In the case of GHG emissions, this process is complicated since GHG impacts from a single activity cannot be readily quantified within a defined space and time.

Anthropogenic climate change occurs on a global basis and the emissions of a single point source is irrelevant when considering the future impact on the climate. For example, CO_2 has a residence time in the atmosphere of approximately 100 years – during this period, the emission of a single facility/ Project will combine with other anthropogenic and natural climate forcing emissions and activities to precipitate a global outcome.

The global nature of the impacts of climate change such as temperature increases, sea level rise, ecological impacts, changes in crop productivity, disease distribution etc are well documented. Despite the potential severity of consequences at the national and global level, it is not meaningful to link emissions from single source to particular impacts at this scale.

This specialist study, therefore, looks at the impact of the project on Indonesia's National GHG Inventory, as well as global anthropogenic emissions, and the implications of this rather than the physical impacts of climate change.

In 2014, global emissions of greenhouse gases from anthropogenic activities excluding land use change and deforestation came to 36.14 giga tonnes (Gt) CO_2-e (*CDIAC, 2017*).

For the same year, Indonesia ranked the 14th highest in terms of national GHG emissions, with an estimated 126.6 Mt CO_2-e (*CDIAC, 2017*).

Consistent with the data presented in **Section 5** of this Annex, the annual operational emissions from the Project are anticipated to be of the order of 3.9 Mt CO_2-e.

The Project is therefore anticipated to contribute to 3% of Indonesia's national GHG emissions annually, and 0.01% of global anthropogenic emissions over the same period.

6.3 BENCHMARKING AGAINST OTHER THERMAL POWER PRODUCTION

Given that the Project is proposed to meet the future power needs of Java, it is instructive to compare the operation of CCGT Power Plant against other alternative power generation methods.

Given the scale of the Project (1,760MW), and the requirement for baseload power generation, it is appropriate to compare the Project with other thermal (fossil fuel) power generation alternatives.

A comparison of conventional (thermal) baseload electricity generation operations is provided in **Table 6.1.**

Table 6.1 Electricity Generation Greenhouse Gas Intensities (tCO_2-e/MWh)

Operation	Natural Gas		Black Coal		
	OCGT	**CCGT**	**Sub-critical**	**Super critical**	**Ultra super critical**
Assumed average efficiency (%)	39	53	33	41	43
Extraction and processing	0.14	0.1	0.03	0.02	0.02
Transport	0.02	0.01	0.03	0.03	0.03
Processing and Power Generation	0.59	0.43	0.97	0.78	0.74
Total	**0.75**	**0.55**	**1.03**	**0.83**	**0.79**
Min estimate	0.64	0.49	0.75	0.61	0.58
Max estimate	0.84	0.64	1.56	1.26	1.2

Source: Worley Parsons, 2011

Table 6.1 shows that, compared with other conventional fossil fuel baseload power generation, CCGT Power Plant is the least GHG-intensive option.

Table 4 within the IFC Thermal Power Plant Guidelines (*IFC, 2008*) provides typical CO_2 emissions performance of new thermal power plants. IFC, 2008 further supports that CCGT Power Plant is the least GHG-intensive of all fossil fuel baseload power generation options.

For new CCGT Power Plant facilities, the following CO_2 emissions performance is noted (Table 4 of IFC, 2008):

- 0.40 tCO_2/MWh (gross, LHV) – CCGT, 51% efficiency

The Project's GHG intensity can be estimated referencing a 1,760MW facility operating at a 60% capacity factor and producing 3.79 Mt CO_2-e from the gas combustion. This calculation leads to an estimate of 0.41 tCO_2/MWh, which is commensurate with both Worley Parsons, 2011 and IFC, 2008 estimates.

It is instructive to compare the estimated GHG intensity of Project (0.41 tCO_2-e/MWh for generation alone) with the electricity grid emission factor corresponding to Java of 0.9 tCO_2-e /MWh (*Institute for Global Environmental Strategies, 2017).*

This thus indicates that electricity generated via the Project's CCGT Power Plant has a GHG intensity of approximately 50% compared to the existing power generation mix for the region.

6.4 ASSESSMENT OF SIGNIFICANCE

As noted above, the Project is anticipated to contribute to 3% of Indonesia's national GHG emissions annually, and 0.01% of global anthropogenic emissions.

However, the Project is responding to additional power demands for the region. Therefore, it needs to be queried as to whether there are alternative, lower GHG intensive power generation options available. Discussions in **Section 6.3** of this Annex indicate that CCGT Power Plant is anticipated to have the lowest GHG-intensity compared with other (fossil fuel, baseload) candidate technologies.

To conclude whether this impact is deemed significant or not, a risk classification approach is used. The approach is derived from classic risk assessment nomenclature which involves the expression of risk as the consequence of the event multiplied by the probability of that event. The environmental assessment equivalent is the magnitude of the impact multiplied by the sensitivity/vulnerability/importance of the resource or receptor.

The impact magnitude of the Project, in terms of its contribution to GHG emission inventories, is thus considered to be **Medium** at a National (Indonesian) level, and **Small** in a global context.

The weight of evidence is that anthropogenic climate change will impact multiple resources, human activities and ecological systems on a global scale (i.e. multiple, geographically diverse receptors). The importance of the system subject to impacts is thus **High**.

Application of a conventional risk classification matrix to the Project thus indicates that at a national level, the significance is **Major**, while at a global level the significance is considered **Moderate**.

6.5 GREENHOUSE GAS MITIGATION

The key mitigation measures proposed to minimise GHG emissions associated with the Project include:

- Cold venting of gas directly to atmosphere will be avoided where possible. If significant quantities are emitted, the Project should consider flaring, as this converts the CH_4 to CO_2 and thereby reduces the net GHG emissions in terms of CO_2-e emissions; and
- Optimisation of construction schedule and placement of laydown areas/temporary camp sites to reduce overall traffic movements/distance travelled, thus reducing GHG emissions from transport.

Other opportunities exist to further reduce GHG emissions, and should be evaluated for feasibility as the Project progresses further along the Front End Engineering and Design (FEED) and Detailed Design (DD) stages:

- Actual land clearing/disturbance will be minimised to the greatest extent possible. Net GHG emissions could also be reduced by revegetation in many areas that will be cleared only for temporary activities such as laydown areas and temporary camps for construction.

Throughout the design process, assessment of GHG mitigation options should continue. The opportunity exists to continue to optimise energy consumption throughout the Project, where key Project decisions relating to equipment selection have not been made. Technical studies relating to equipment selection (e.g. Best Available Technology studies) will take into account GHG emissions and energy efficiency as factors for consideration.

For construction activities, it is recommended that the following measures be included in the construction management plans for the Project:

- The consideration of energy efficiency and reducing greenhouse gas emissions;
- Strategies to reduce the number of vehicle kilometres travelled as part of construction; and
- Procurement to consider the energy efficiency of all new mobile and fixed equipment.

6.6 GREENHOUSE GAS MANAGEMENT

Management, monitoring and auditing provisions should be incorporated in the Environmental Management Plan (EMP) for the Project. Management shall include measurement and recording of:

- Energy use;

- Greenhouse gas emissions;
- Transport activities; and
- Other relevant GHG generating activities (such as land clearance).

As noted in **Section 2.4** of this Annex, for projects > 25,000 t CO_2-e/year (current Project anticipated to comprise 3.9 Mt CO_2-e/year), quantification of direct greenhouse gas emissions is required to be conducted by the client annually.

It is also recommended that GHG management measures incorporate the following with the aim of minimising energy consumption and GHG emissions:

- Establish within the operational and maintenance management systems the controls required to monitor performance of equipment, control emissions and improve energy efficiency; and
- Develop a program to monitor, audit and report on GHG emissions from all relevant activities and the results of emissions mitigation programs.

6.7 RESIDUAL IMPACTS

The combustion of natural gas within the CCGT Power Plant comprises approximately 90% of the annual operational GHG emission, and this contribution will not change significantly under the proposed mitigation measures for the Project.

On this basis, the impact significance is not anticipated to change post-mitigation, as summarised in **Table 6.2**.

Table 6.2 Climate Change Residual Impact

	Impact Significance
Pre-mitigation	Major (Indonesia) Moderate (Global)
Post-mitigation	Major (Indonesia) Moderate (Global)

7 CONCLUSIONS

This GHG assessment investigated the sources of GHG emissions associated with the construction and operation of the PLTGU Jawa-1 Project. This involves the development of a 1,760 MW CCGT Power Plant, an LNG FSRU and 500kV power transmission lines and a Substation.

The GHG emissions cover the proposed three years of construction and a nominal 20 year operation period, quantified on an annual basis. Assuming a 20 year asset life from the start of operations, the Project as a whole is anticipated to comprise 77.7 Mt CO_2-e of (Scope 1 and 2) emissions during its total life cycle. Of these, 99.8% of emissions are anticipated to be related to (combustion and fugitive) emissions during the operation phase.

The Project is anticipated to contribute to 3% of Indonesia's national GHG emissions annually, and 0.01% of global anthropogenic emissions.

Given the Project is responding to additional power demands for the region, it is important to contextualise the Project in terms of how GHG intensive the power generation is compared to other options available. It is concluded that CCGT Power Plant is likely to have the lowest GHG-intensity compared with other (fossil fuel, baseload) candidate technologies.

Application of a conventional risk classification matrix to the Project indicates that at a national level, the significance (in the context of GHG emissions) is **Major**, while at a global level the significance is considered **Moderate**.

Mitigation measures to reduce GHG emissions over the life of the Project have been explored and measures have been developed relevant to the requirements of the Project. These measures include high efficiency and high reliability equipment, avoidance of venting where possible, as well as optimisation of construction period to reduce emissions from transport. In addition, mitigation, management and monitoring measures are proposed for consistency with IFC Performance Standards, and to ensure that GHG emissions are managed throughout the life of the Project.

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PLTGU Jawa 1 Independent Power Project

ANNEX N: SALINITY AND THERMAL DISPERSION MODEL

Prepared for:

PT Jawa Satu Power (JSP)

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N. INTRODUCTION

N.1 OVERVIEW

The PLTGU Jawa-1 Project (hereafter referred to as 'the Project') involves the development of a 1,760MW Combined Cycle Gas Turbine (CCGT) Power Plant, a Liquefied Natural Gas (LNG) Floating Storage and Regasification Unit (FSRU) and 500kV power transmission lines and a Substation.

The project involves the installation of the following components in the marine environment that require seabed works during construction:

- *Jetty* – A Jetty will be built to support delivery of heavy equipment and material during construction activities. After the construction is complete, the Jetty will remain to support emergency operations and CCGT Power Plant maintenance activities;

- *Seawater Water Intake and Wastewater Discharge Pipelines* – A submerged sea water intake of 1,882 m length will deliver seawater via gravity to a seawater pumping station located on the shore front and nearby the jetty. A water pipeline of length of 932 m will discharge wastewater from the CCGT Power Plant to a submerged wastewater outfall. The pipeline will be buried 2 m below the surface; and

- *Gas Delivery Pipelines* – A subsea gas pipeline of approximately 14 km will be required to deliver gas from the FSRU to the shore. The pipeline will be buried 2 m below the surface.

These are discussed in detail in the ESIA *Chapter 4, Project Description*.

ESIA Scoping identified that direct disturbance to seabed sediments during construction of the jetty and access channel, as well as burial of the subsea pipelines have the potential to impact marine habitats, notably through direct loss and degradation of water quality.

The seabed sediments at the nearshore locations of the proposed jetty, jetty approach and intake and outlet pipelines are characterised by very soft clay to firm sandy silt. The sediments along the gas pipeline route and at the FSRU become progressively dominated by soft clay and silty clay with some coarser sediment and rock outcrops. At the greatest depths, sediments comprise stiff clay and sand (refer ESIA *Chapter 7, Baseline Description*). Direct loss of benthic habitat will occur as a result of dredging activities and seabed disturbance will also occur as a result of pipeline trenching activities which have the potential to result in localised increases in suspended sediments, potential mobilisation of contaminated sediments and benthic smothering from deposition from settling of mobilised sediment on the seabed.

N.2 SEDIMENT DISPERSION MODELLING

Sediment dispersion modelling was conducted for the construction phase of the marine facilities to inform the assessment of these impacts from seabed and sediment disturbance. The sediment transport model used is the Community Sediment Transport Modelling System (CSTMS) package that was developed for ROMS. CSTMS was created by a group of sediment transport modellers lead by the USGS. The model was designed for realistic simulations of processes causing sediment transport in the coastal ocean (estuaries, nearshore regions, and the continental shelf)[1]. The model assesses two phases for the sediment; a floating phase and settling phase. The floating phase contributes to increased suspended sediment (TSS levels) and the settling phase refers to the deposition of the remobilised sediment when it falls out of suspension in the water column. From the characterisation of seabed sediment identified during the baseline surveys, a floating: settling ratio of 50:50 was considered representative. The model simulates sediment transport with main inputs of the result of hydrodynamic modelling, EPC program data and interpretation against the baseline conditions from TSS analysis.

N.2.1 *Applicable Standards*

Under Indonesian regulations *Decree of the Minister of Environment and Forestry No.51 Year 2004 Annex III Sea Water Quality Standards for Marine Biota* state TSS limits suitable for habitat types of 80mg/l for mangrove and 20mg/l for coral.

The IFC does not establish standards for surface water quality. The IFC EHS Guidelines for Ports, Harbors and Terminals, 2017 provides guidance on dredging and recommendations to avoid, minimise or control impacts from dredged materials, as part of a Dredging Management Plan. Similarly the OSPAR Guidelines for the Management of Dredged Material (1998-20)[2] and Revised OSPAR Guidelines for the Management of Dredged Material (2004-08)[3] are designed to assist Contracting Parties in the management of dredged material in ways that will prevent and eliminate pollution and protect marine species and habitats in accordance with the 1992 OSPAR Convention.

For sediment quality, neither the IFC nor Indonesian regulations establish any standards. For interpretation of marine sediment baseline sampling results, reference has been made to relevant international standards of Australian and New Zealand interim sediment quality guidelines (ANZECC/ARMANZ 2000[4]) and under the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (CCME, 2002[5]).

[1] https://woodshole.er.usgs.gov/project-pages/sediment-transport/

[2] https://dredging.org/documents/ceda/downloads/environment-ospar-dmguidelines.pdf

[3] https://dredging.org/documents/ceda/downloads/environ-ospar-revised-dredged-material-guidelines.pdf

[4] http://www.agriculture.gov.au/SiteCollectionDocuments/water/nwqms-guidelines-4-vol1.pdf

[5] http://ceqg-rcqe.ccme.ca/en/index.html#void

N.2.2 Baseline Environmental Sampling

Marine Sediment Sampling

Seawater suspended sediment (Total Suspended Sediments, TSS) and marine sediment sampling and analysis was conducted as part of the baseline investigations in 2018. The locations of sampling stations are illustrated in ***Figure N-1*** and ***Figure N-2***.

Figure N-1 Sampling Location of Environmental TSS Baseline Setting

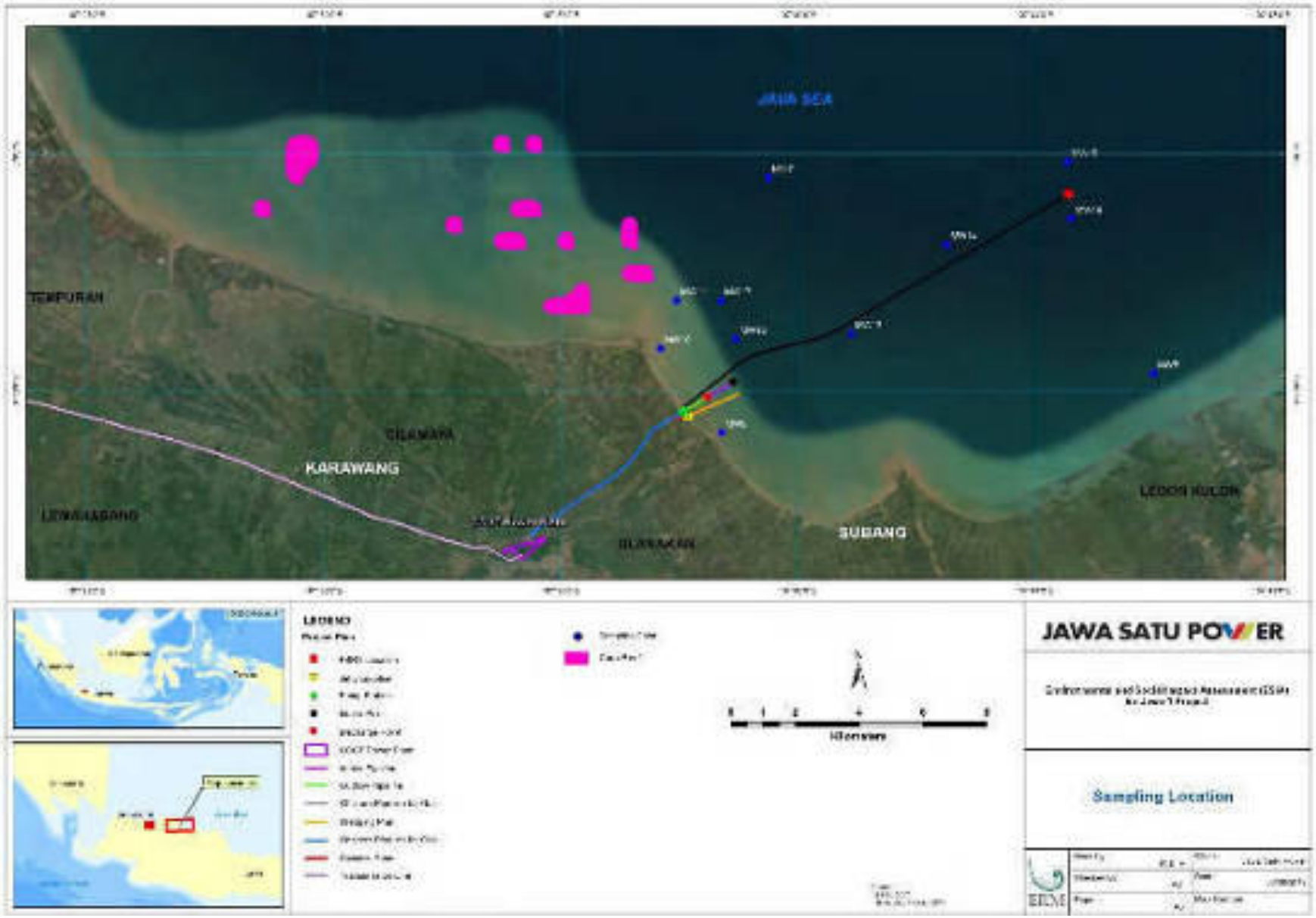
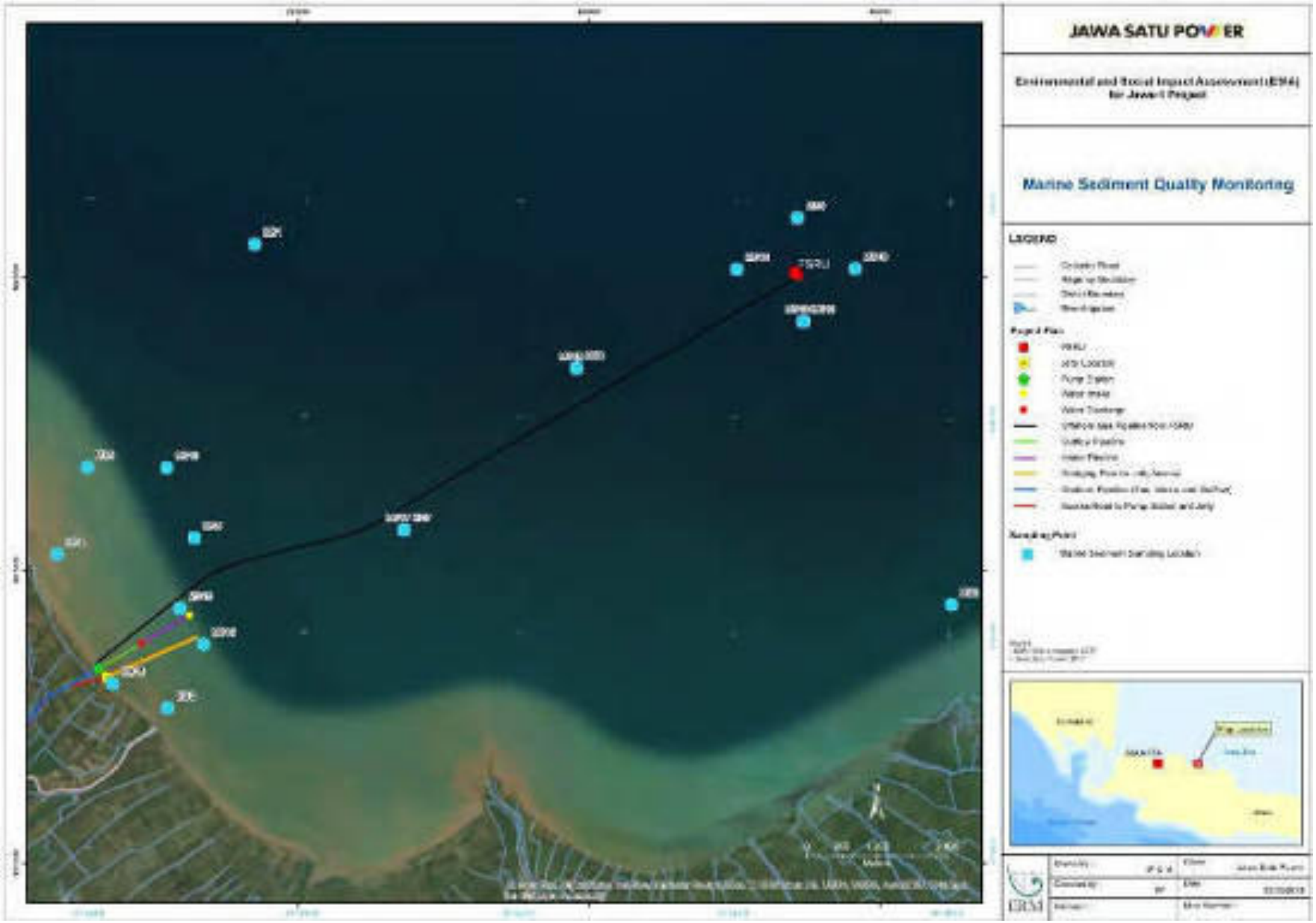


Figure N-2 Marine Sediment Baseline Sampling Locations (2017, 2018)



The baseline setting of TSS conditions around the dredging location described based on measurement data in 2017, is presented in ***Table N-1***. The TSS parameter around the river mouths ranges from <8 mg/l to 50 mg/L. For sites in the river mouths MW 9 and MW10, the values of TSS parameter have exceeded the regulated quality standard in the Decree of The Minister of Environment No. 51 of 2004 on the Quality Standards of Seawater for Marine Biota.

Table N-1 TSS Baseline Setting

Location	TSS Measurement (mg/l)	Standard Limit (mg/l)	
		Mangrove	Coral Reef
MW7 (6°8' 24.972" S 107°39' 31.039" E)	<8	80	20
MW8 (6°11' 43.114" S 107°46' 1.082" E)	<8	80	20
MW9 (6°12' 42.798" S 107°38' 43.760" E)	647*	80	20
MW10 (6°11' 17.579" S 107°37' 41.734" E)	142*	80	20
MW11 (6°10' 29.186" S 107°37' 58.171" E)	11	80	20
MW12 (6°11' 8.187" S 107°38' 58.241" E)	12	80	20
MW13 (6°11' 3.045" S 107°40' 55.203" E)	50*	80	20
MW17 (6°10' 29.291" S 107°38' 42.672" E)	11	80	20

Decree of the Minister of Environment and Forestry No.51 Year 2004 Annex III Sea Water Quality Standards for Marine Biota

****Exceedance against standards highlighted***

Table N-2 provides the sediment analysis results against the guideline standards.

Under the Australian and New Zealand Guidelines, the lower and upper Interim Sediment Quality Guideline (ISQG) is provided as a good basis for sediment quality assessment.

If the lower sediment quality guideline, the trigger value, for a particular contaminant is not exceeded, it is unlikely that it will result in any biological disturbance for organisms inhabiting that sediment. If the trigger value is exceeded, either management action is taken, or additional site-specific

studies are recommended to determine whether this exceedance poses a risk to the ecosystem. Cadmium, lead, nickel results exceed the ANZECC/ARMANZ 2000 ISQG low value for several sampling locations but are within the high limit. There is a decision tree for assessing sediment quality and contamination and it is stated that exceedance of a trigger value is acceptable if it is at or below the normal background concentration for a site. The results presented in the aforementioned table are for baseline (no project) levels of sediment parameters.

Under the Canadian Guidelines, ISQGs are the lower value, referred to as the threshold effect level (TEL) and represents the concentration below which adverse biological effects are expected to occur rarely occur (i.e., fewer than 25% adverse effects occur below the TEL). The upper value, referred to as the probable effect level (PEL), defines the level above which adverse effects are expected to occur frequently (i.e., more than 50% adverse effects occur above the PEL). Heavy metals content analysis of the seabed sediment shows that several sampling stations show exceedances against ISQG (cadmium, copper, lead and mercury) but all stations/parameters are within the PEL values.

Table N-2 Marine Sediment Monitoring (2017, 2018)

Parameter	Unit	MS3[a]	MS4	MS5	MS6	MS7	MS11	MS14[a]	MS15[a]	MS16[a]	MS17	ANZECC/ ARMANZ 2000		CCME 2002	
												ISQG – Low (Trigger Value)	ISQG - High	ISQG	PEL
Arsenic (As)	mg/kg	1.187	0.386	0.011	1.001	1.148	0.909	3.414	3.581	3.277	3.477	20	70	7.24	41.6
Cadmium (Cd)	mg/kg	0.33	1.30	1.20	2.90	2.60	1.75	3.68	3.22	0.64	3.85	1.5	10	0.7	4.2
Chromium (Cr)	mg/kg	<0.09	12.66	13.74	5.84	9.04	13.78	<0.09	<0.09	<0.09	<0.09	80	370	52.3	160
Copper (Cu)	mg/kg	6.51	16.76	22.01	19.72	20.53	17.40	22.27	26.76	31.94	14.88	65	270	18.7	108
Lead (Pb)	mg/kg	12.40	40.36	42.47	55.25	54.07	50.44	96.15	68.05	110.36	98.59	50	220	30.2	112
Mercury (Hg)	mg/kg	<0.004	0.030	0.023	<0.004	0.091	0.215	0.028	0.005	0.094	<0.004	0.15	1	0.13	0.7
Nickel (Ni)	mg/kg	22.33	25.49	31.24	50.54	34.58	26.90	29.95	39.53	5.87	36.82	21	52	-	-
Zinc (Zn)	mg/kg	61.74	95.2	101.59	93.29	96.03	85.04	149.69	102.34	112.26		200	410	124	271

Source: ERM. 2018b

[a] ***Stations in closest vicinity to jetty location***

Notes:

- Elevation against standards highlighted
- There are no local Indonesian standards or IFC standards for marine sediment quality.
- Australian and New Zealand interim sediment quality guidelines i.e. ANZECC/ARMANZ 2000.
- Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (CCME, 2002) normalised to mg/kg.

Coral Reef Survey

Secondary data indicated the presence of coral assemblages in the area (shown as purple areas in ***Figure N-1***. Coral reef observations were conducted in July 2017 and is presented in detail in **Annex P**. The observation was conducted to determine the presence of coral reefs in Cilamaya waters in the vicinity of the Project, near to the location of proposed submarine pipeline construction (effluent outflow pipe, seawater intake pipeline and gas pipeline). Based on the observation, there are no coral assemblages in the in the vicinity of these project facilities and this is supported by the sweater TSS sampling and analysis that shows high sedimentation in these waters. The locations of coral observations made during the survey are shown in ***Figure N-3*** and illustrated in ***Figure N-4***. No coral was observed at the other locations suggested by secondary data.

Based on the observation, from the total coral reefs coverage area of approximately 2,091.47 Ha, only 50.00 Ha or about 2% are considered in good conditions, with 42% considered moderate and 55% of coral reefs damaged. The Environmental Sensitivity Index of BP (2009) also shows that the coral reefs condition at the location is considered bad or poor due to water runoff effects from the land which causes high turbidity around the location. High concentration of sediment and nutrients draining from the land has caused disturbance of the coral habitat around the location. This is further discussed in **Annex P**.

Figure N-3 Coral Assemblage Survey, 2017

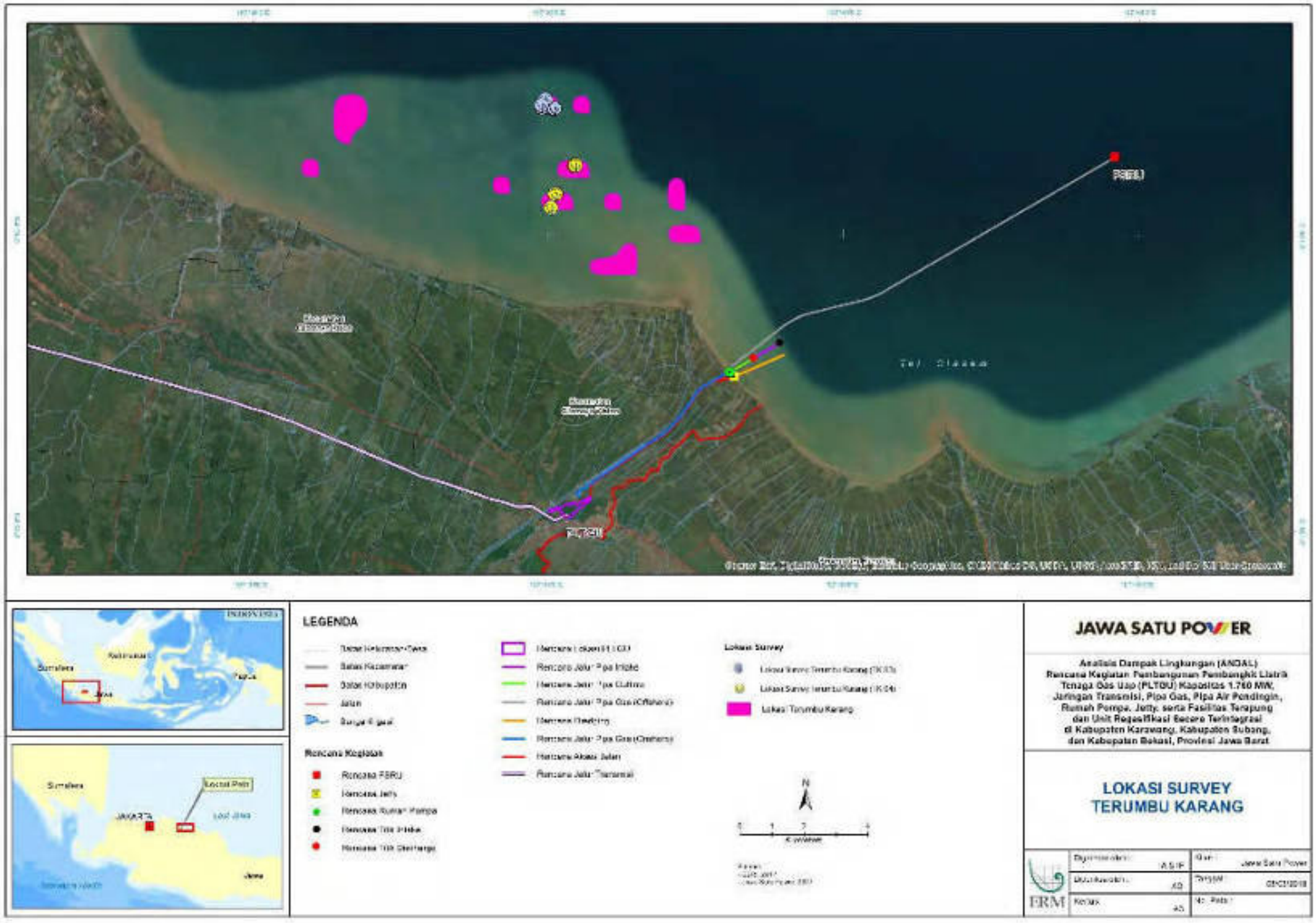
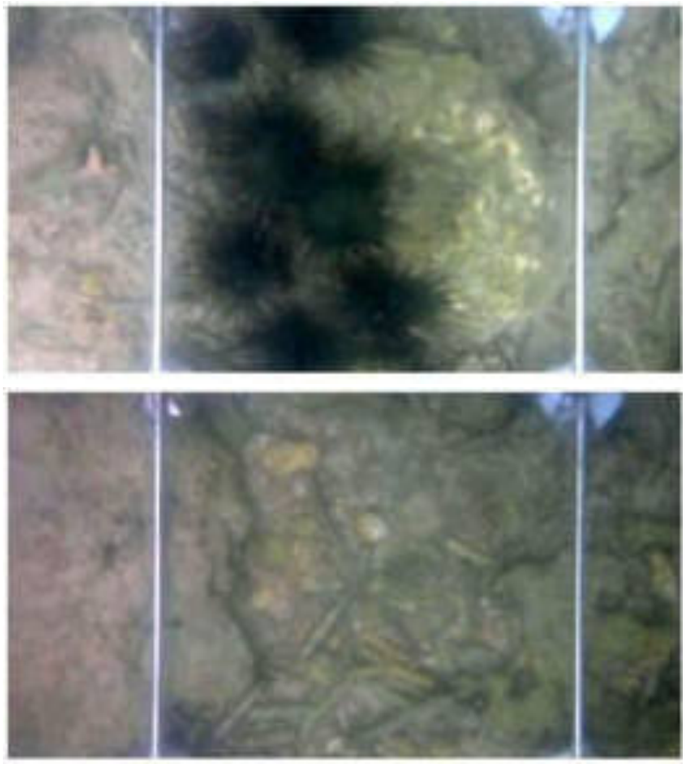
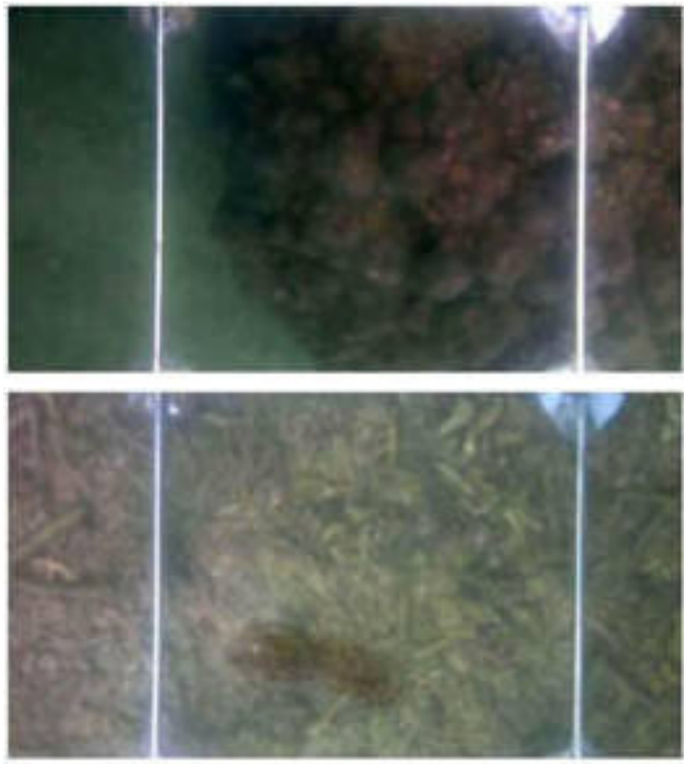


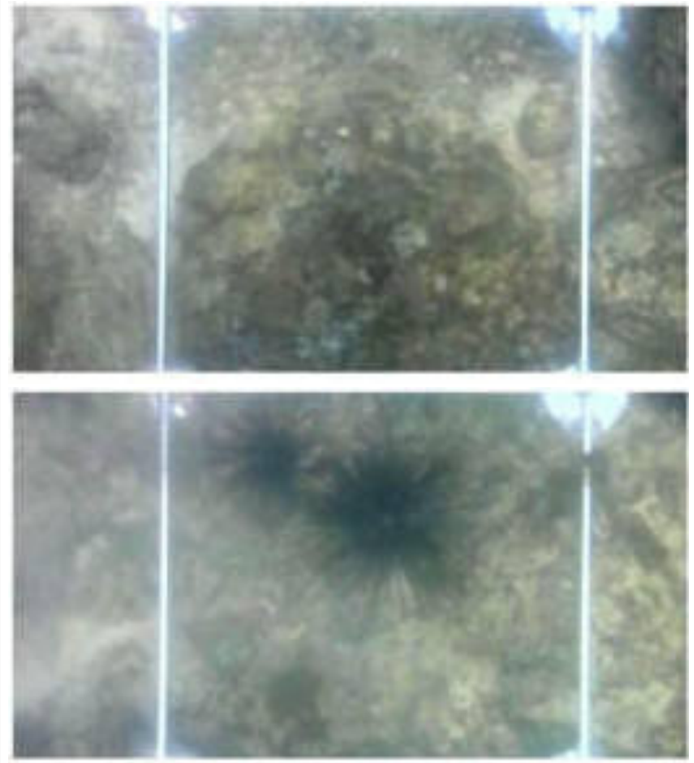
Figure N-4 *Coral Assemblage Observations, 2017*



CR03 Station 1: Urchins and damaged coral



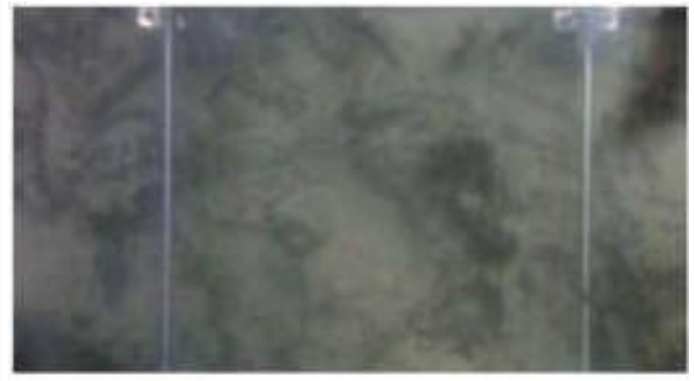
CR03 Station 2: Healthy coral patches with rubble



CR03 Station 4: Macro-algae and sea urchins

CR03 Station 5: Dead coral overgrown with algae

CR 04 Station 1: Sand and coral rubble



CR04 Station 2: Dead coral and algae

N.2.3 Jetty and Access Channel Dredging

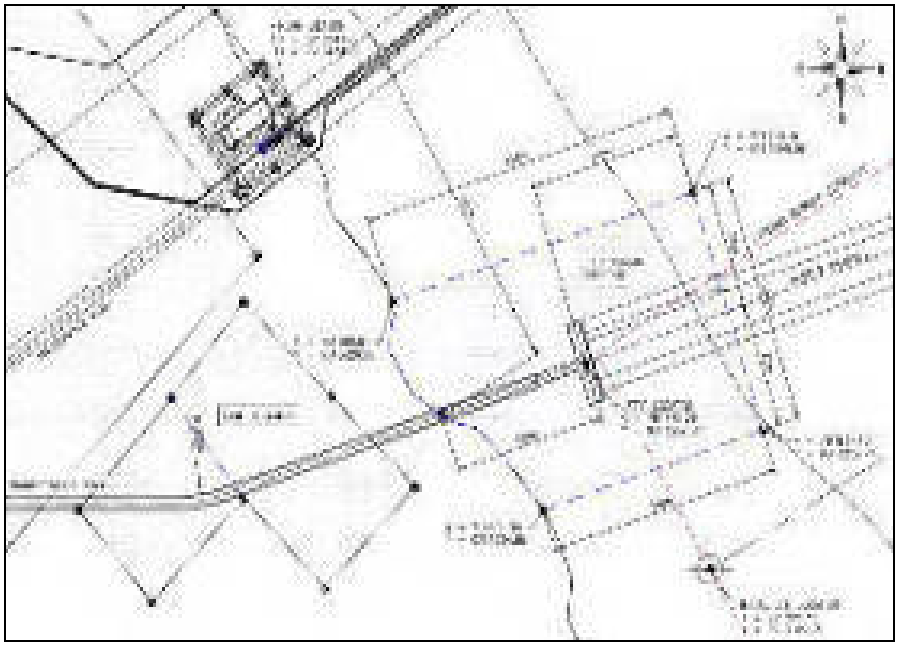
The jetty is required to support delivery of heavy equipment and material during construction activities. After the construction is complete the jetty will remain to support emergency operations and CCGT Power Plant maintenance activities. The jetty will be established on an area of 500 m^2. The concrete pile of 400 mm outer diameter will have a total length of 24 m embedded in the soil. The spacing of the piles will be 2 m x 2 m. On top of the piles at laid down area a concrete slab of about 30 cm thickness will be poured. The proposed schedule for the construction activities of the jetty will be in April - July 2020.

Dredging activities are required for the construction of the jetty and clearance of an access channel from the shoreline location. There are a number of options for dredging and the Project will adopt use of a floating barge and swamp back hoe, with the dredge material side-casted.

The original dredging plan was to achieve a 4 m water depth for the vessel draft. This resulted in an estimation of 80,000 m^3 of dredge material. The equipment mobilisation plan has been revised to reduce the amount of dredging required for the access channel by selecting a vessel with operating draft of 2.0-4.0 m and reducing the channel depth from the original plan of 4.0 m to 3.0 m at Lowest Astronomical Tide (LAT) conditions. Equipment offloading at the jetty is planned for Highest Astronomical Tide (HAT).

In addition, the original position of the jetty was adjacent to the shoreline. The jetty location has been moved 100 m seaward (***Figure N-5***) from this original location, further from the drainage channel and reducing the amount of dredging required around the structure. The amount of dredging required as a result of these changes is reduced to 45,981m^3 (57%).

Figure N-5 Construction Jetty Orientation



Material from the location of the jetty ±0.0m to a water depth of -1.0m (20,202 m^3) will be transported by Swamp Back Hoe to the nearshore jetty area. The remainder of dredged material from 1.00 to 3.00 m water depth (i.e. 989 m total length and 25,778 m^3 of material), will be side cast with a maximum height of 0.5 m, which will be maintained below sea level with a minimum of 1.50 m LAT (***Table N-3***). Material relocation by side casting involves the discharge of dredged material alongside the area of dredging by direct discharge of the dredger's grab. Side casting is commonly used for new works when the dredged formation is only temporary, such as in the case of the jetty and pipeline installation (GHG, 2006[1]).

Table N-3 ***Revised Dredging Plan - Volumes by Section***

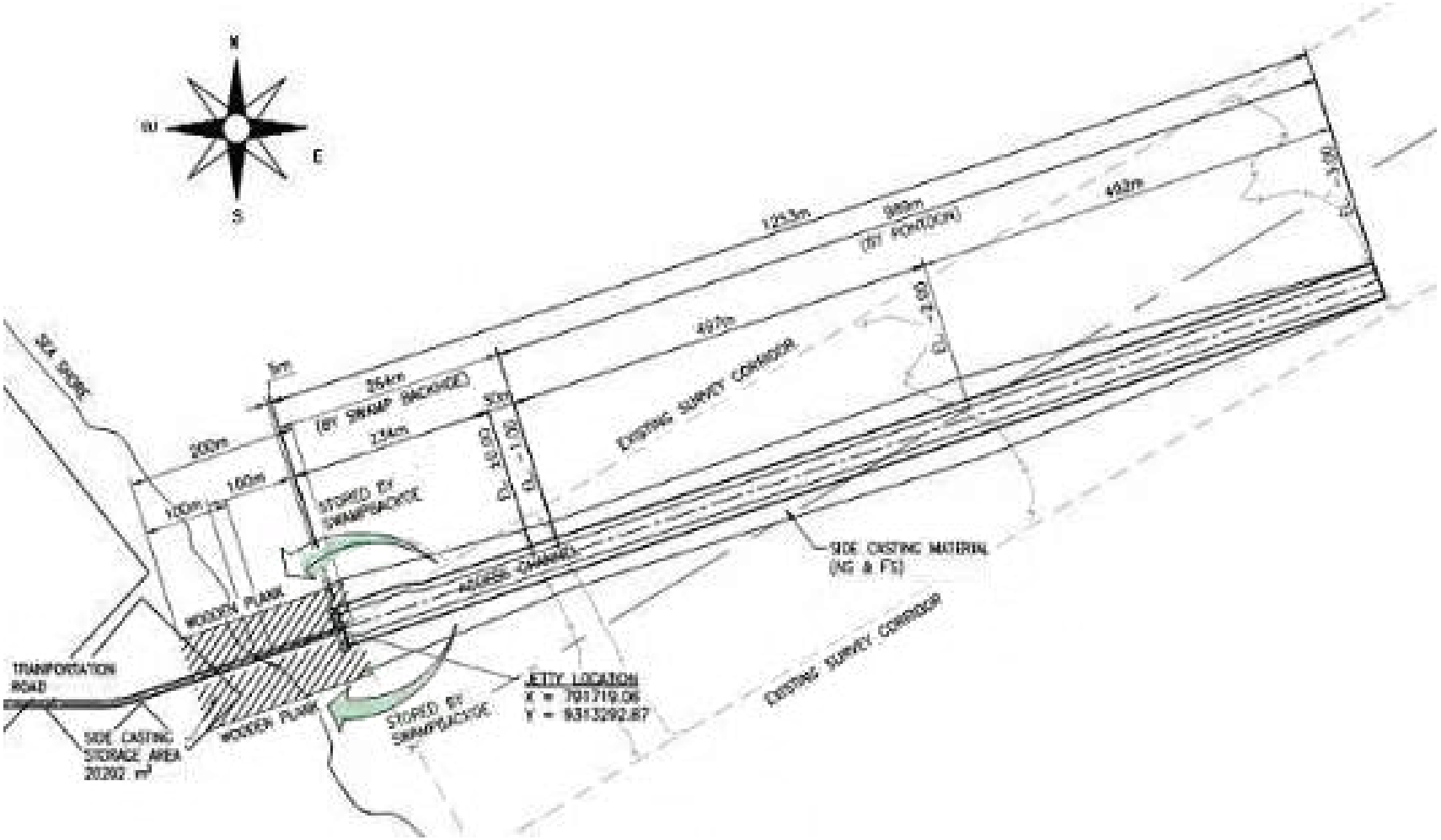
Section	Dimensions	Volume of Dredge Material (m^3)	Method
EL. ±0.0	78 m^2 x 234 m	18,252 m^3	Bring nearshore
EL. 1.0 to ±0.0	52 m^2 x 78 m	1,950 m^3	Bring nearshore
EL. -2.0 to -1.0	52 m^2 x 26 m	19,383 m^3	Side-cast
EL. -3.0 to -2.0	26 m^2 x 492 m	6,396 m^3	Side-cast
Total		**45,981m^3**	

The jetty installation and access channel trenching plan is illustrated in ***Figure*** N-6 and the dredging plan in ***Figure N-7***.

[1] GHD (2006). Report for Notional Seaway Project Dredge Management Strategy, Queensland Government.

http://www.broadwatermarineproject.com.au/documents/4.3/Appendices/Appendix%20E%20Dredge%20Managment%20Strategy.pdf

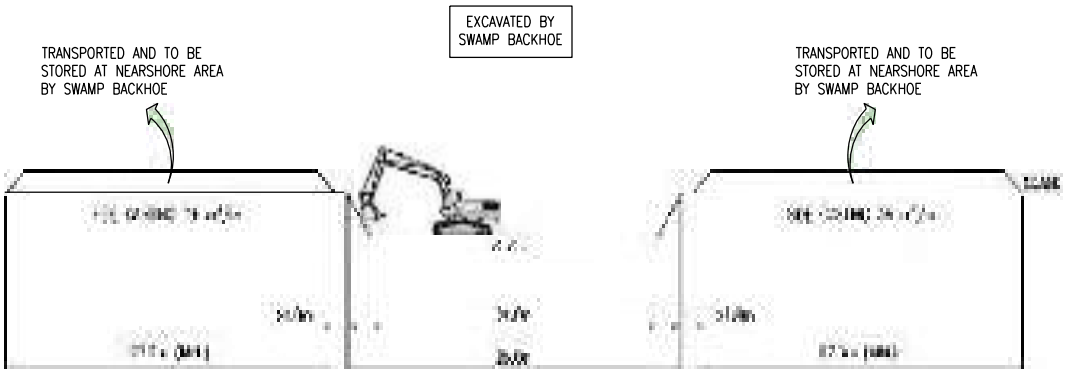
Figure N-6 Jetty and Access Channel Trenching Plan



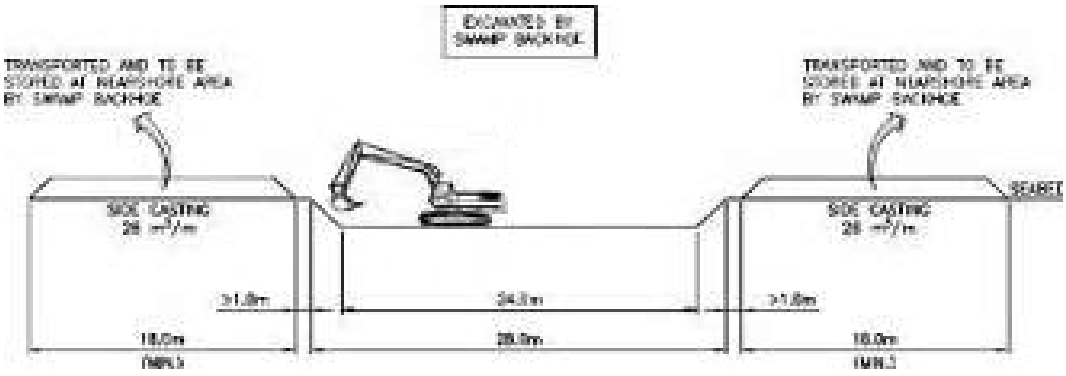
Abbreviations: FS: Far Side, HAT: Highest Astronomical Tide, LAT: Lowest Astronomical Tide, MSL: Mean Sea Level NS: Near Side

Figure N-7 Dredging Plan

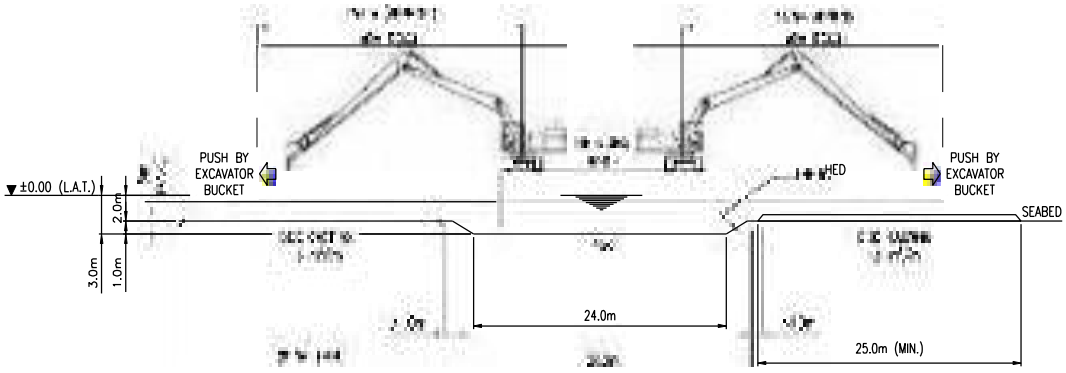
a) ***Elevation on EL. ±0.00***



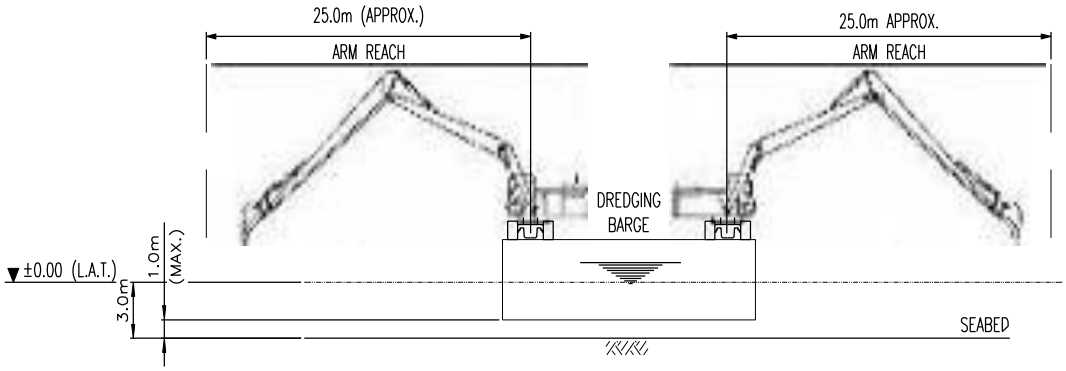
b) Elevation on EL. -1.00



c) Elevation on EL. -2.00



d) Elevation on EL. -3.00



Impact Evaluation and Significance

Sediment modelling was conducted for the original 80,000 m^3 dredge material and revised 45,981m^3.

Dispersion modelling was conducted for both the wet season and the dry season to estimate the magnitude and extent of the dredge plume (elevated TSS above background concentrations) and the amount of sediment deposited. In order to obtain magnitude of impact then performed a simulation changes the thickness of sediment by using a 2D module Mud model dispersion data input were as follows:

1. Hydrodynamics Model;
2. The thickness of sediment on the initial conditions = 0;
3. Scenario 1: Total dredging material of 80,000 m^3, assuming 3,000 m^3/day (300 m^3/hour of sediments excavated) over 10 hours a day and 27 days duration; and.
4. Revised jetty and dredging plan: Total dredging material of 45,981 m^3, assuming the dredging will be 1,800 m^3/day (bucket grab 15m^3/5 minutes) with dredging work 10 hours a day with a total dredging period of 26 days.

The modelling results for the for the 80,000 m^3 scenario, shows that the distribution of elevated TSS increases progressively during dredging activities to a reach maximum of 9.34 km^2 (dry season) from the dredge site at day 25 (***Table N-4).***

Based on the simulation of the impact of the dredging activity of 45,981 m^3 and placement of the dredge material, TSS distribution is dominant to the northwest and broader in the west (wet) season due to the intensity and frequency of rain being greater than during the east (dry) season. The distribution of TSS lasts for 26 days and after the input stops, by day 28th TSS is not recorded in the modelled area (***Figure N-8*** to ***Figure N-11***).

Maximum area of elevated TSS of 9 mg/l occurs over an area of 1.15 km^2 on day 1 in wet season and progressively decreases over the duration of the activity (***Table N-5***). Elevated TSS was recorded at one baseline sampling station, MW10. No other stations showed elevated TSS.

Figure N-8 Dredge plan 45,981m³: TSS Distribution at West (Wet) Season Day 1-12

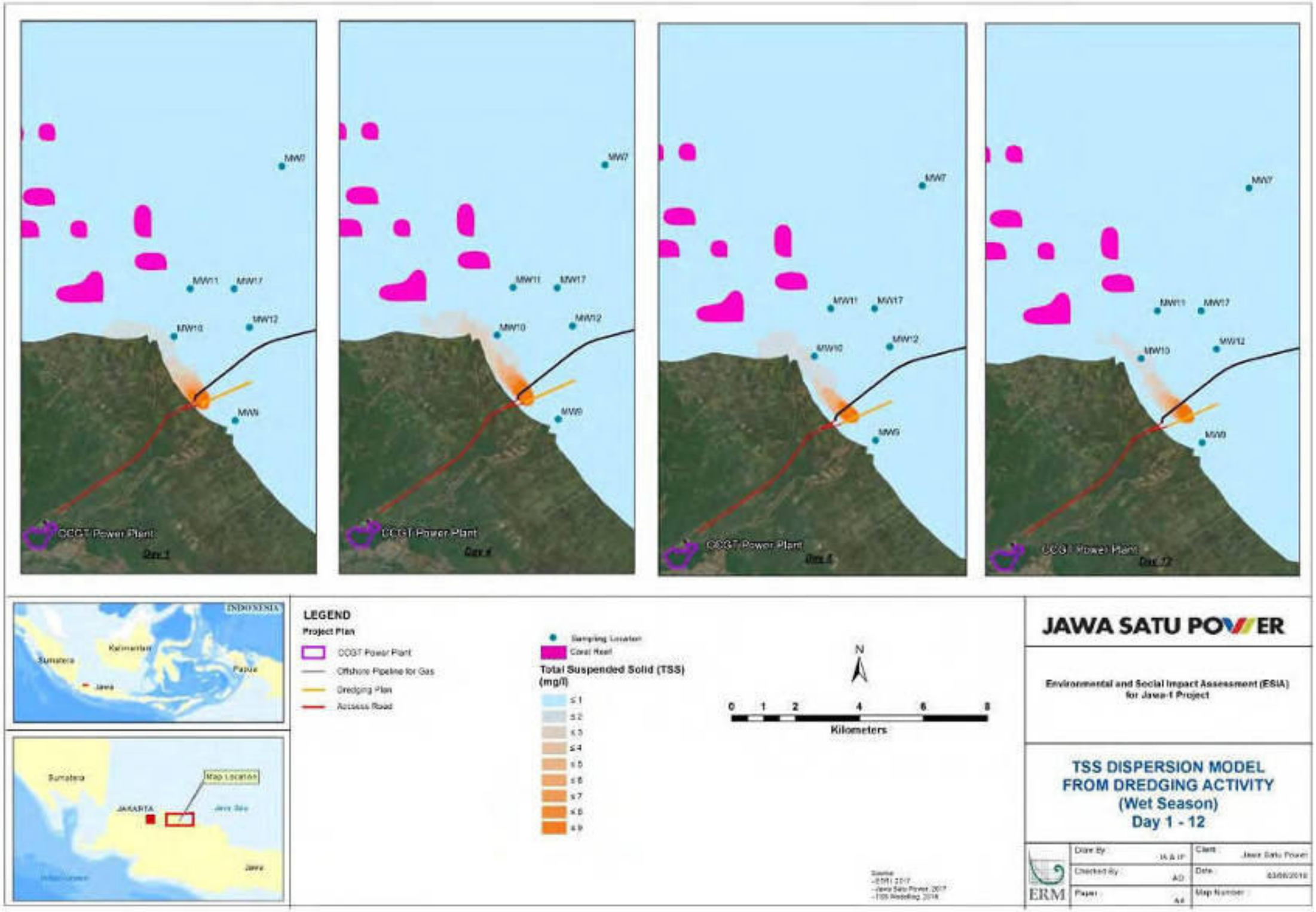


Figure N-9 Dredge plan 45,981m³: TSS Distribution at West (Wet) Season Day 16-28

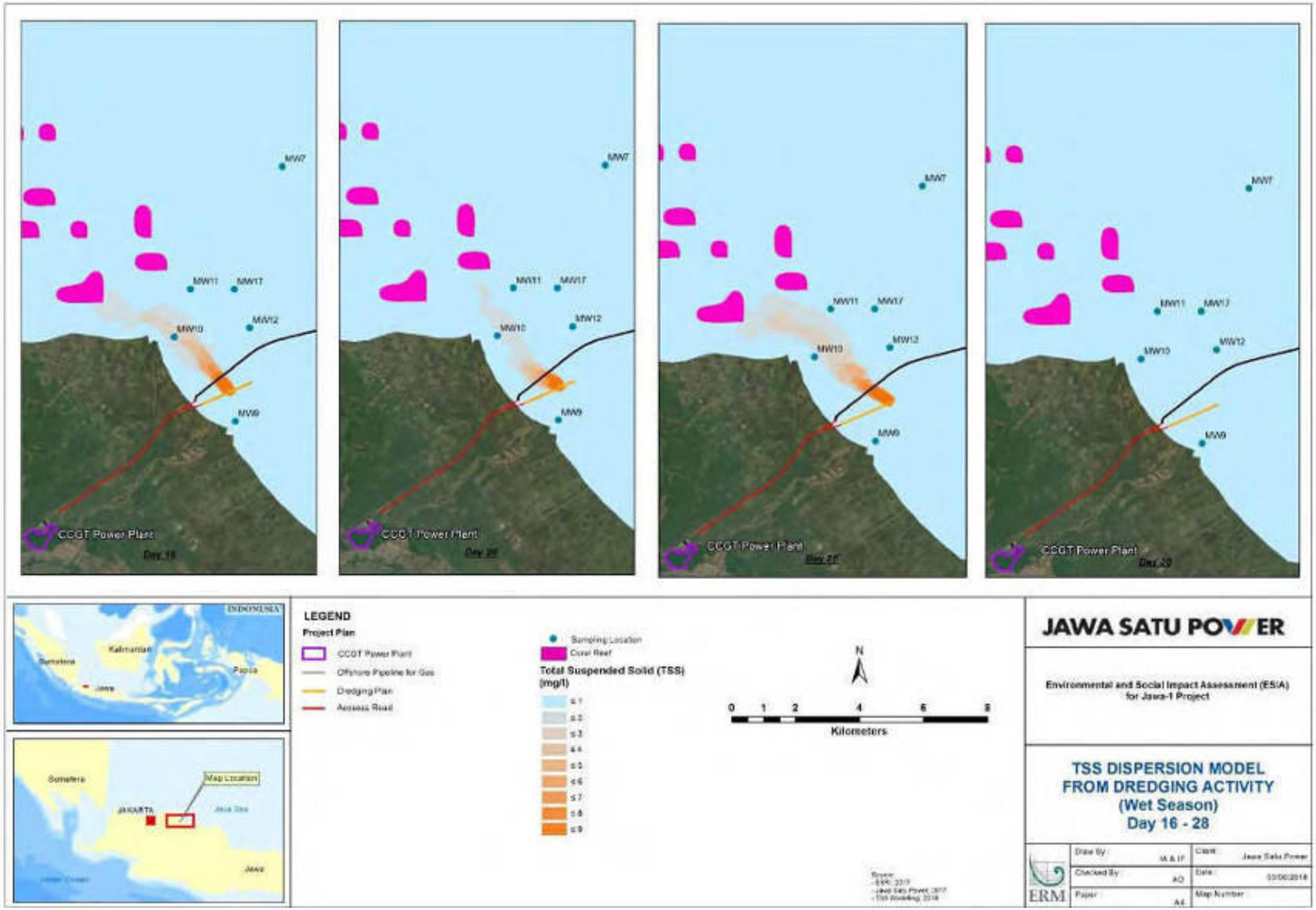


Figure N-10 Dredge plan 45,981m³: TSS Distribution at East (Dry) Season Day 1-12

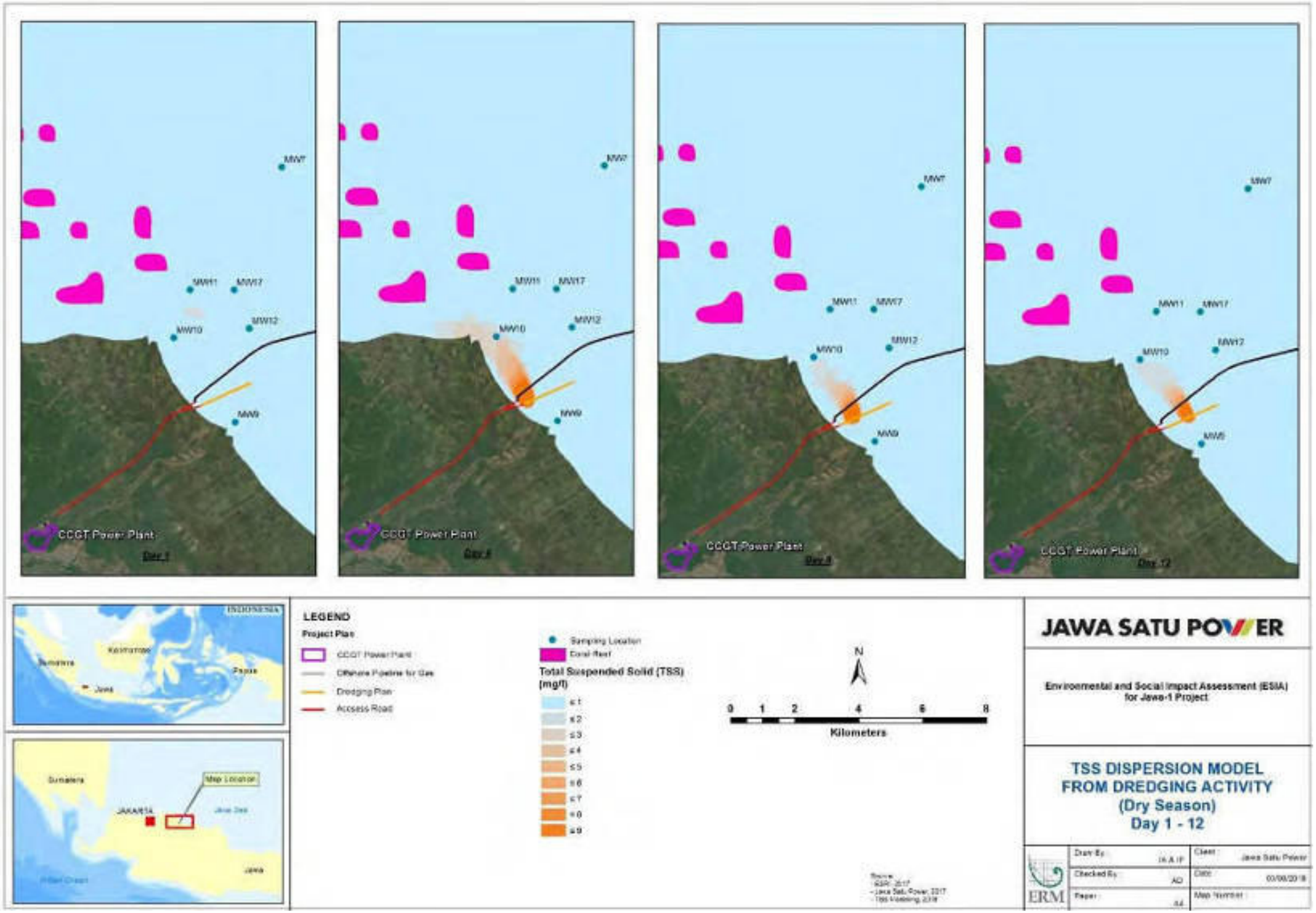


Figure N-11 Dredge plan 45,981m3: TSS Distribution at East (Dry) Season Day 16-28

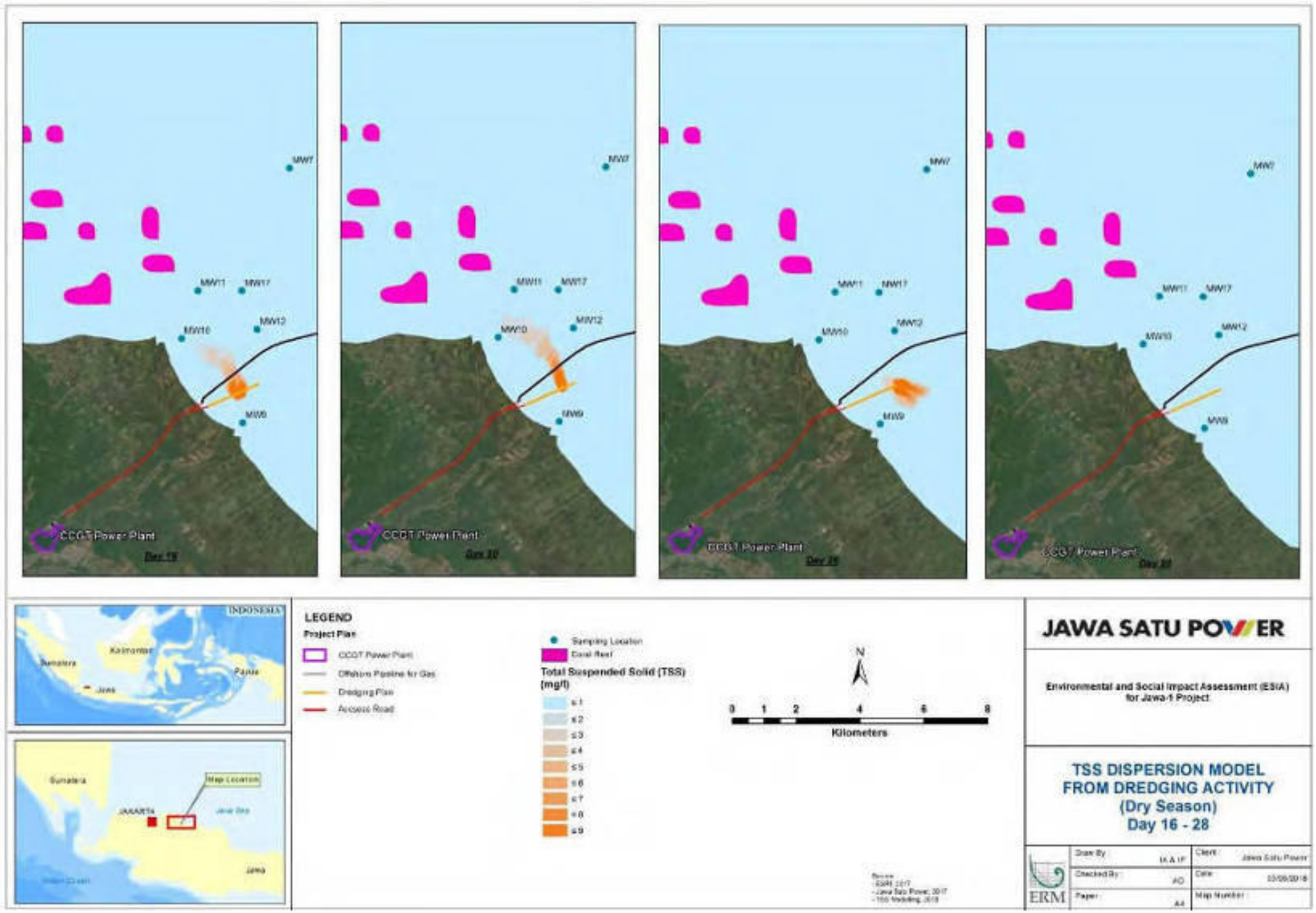


Table N-4 Area and Trajectory of Elevated TSS Distribution – Scenario 1: 80,000m³

Time	Wet Season (km²)	Dry Season (km²)
Day 1	4.49 around the shore	4.49 around the shore
Day 5	5.71 around the shore	5.26 around the shore
Day 10	8.25 to the northeast	7.19 to the northeast
Day 15	9.05 to the northeast	9.23 to the northeast
Day 20	9.1 to the northeast	9.21 to the northeast
Day 25	9.25 to the northeast	9.34 to the northeast
Day 30 (no activity)	4.12 around the shore	5.26 around the shore

Table N-5 Area and Trajectory of Elevated TSS Distribution – Dredge Plan: 45,981m³

Duration	Wet Season (Km²)	Dry Season (Km²)
Day 1	1.15 to the northeast	1.11 to the northeast
Day 4	0.97 to the northeast	0.91 to the northeast
Day 12	0.74 to the northeast	0.698 to the northeast
Day 16	0.67 to the northeast	0.61 to the northeast
Day 20	0.489 to the northeast	0.43 to the northeast
Day 24	0.32 to the northeast	0.25 to the northeast
Day 26 (end of dredging)	0.18 to the northeast	0.11 south east
Day 28	0 to the northeast	0

Based on the simulation result, magnitude of impact from the dredging activity is 3.2 mg/L at monitoring station MW10, which is the floating phase or TSS. However the fulfilment of the standard regulation limit is influenced by the ambient condition of the TSS concentration in the location of the project plan.

The sampling location of MW9 and MW10, at the estuary of the river, exceeded the standard regulation limit of the Minister of Environment Decree No. 51 of 2004 attachment III for marine biota since at baseline conditions without the project. All baseline sampling locations are unaffected by the dredging activity, with the exception of location MW10 where TSS is elevated by 3.2 mg/l (***Table N-6***).

Table N-6 ***Prediction Magnitude of Impact Average of TSS Parameters from the Dredging Activity – Dredge Plan: 45,981m³***

Location	TSS Concentration (mg/l)			Standard Limit (mg/l)*	
	Baseline Setting	Magnitude of Impact (TSS Increase)	Resultant Environmental Condition	Mangrove	Coral Reef
MW7	<8	0.0	<8	80	20
MW9	647	0.0	647	80	20
MW10	142	3.2	145.2	80	20
MW11	11	0	11	80	20
MW12	12	0	12	80	20
MW13	50	0	50	80	20
MW17	11	0	11	80	20

** MoEF Decree No.51 year 2004 Annex III for Marine Biota*
Exceedances highlighted
Locations refer to the sampling stations as illustrated in ***Figure N-8*** *to* ***Figure N-11*** *and described in Annex B Environmental Baseline Surveys Results*

The OSPAR Guidelines for the Management of Dredged Material state that for a retentive site, such as is proposed for the jetty and access channel, where the material deposited will remain within the vicinity of the site, the assessment should delineate the area that will be substantially altered by the presence of the deposited material and what the severity of these alterations might be. At the extreme, this may include an assumption that the immediate receiving area is entirely smothered.

Table N-7 presents sediment deposition estimates based on the 80,000m³ dredging plan averaging 0.42 m over an area of 0.46 km² and 0.64 km², in the wet and dry seasons respectively, based on the modelling.

The modelled results for thickness of sediment deposition for the revised dredge plan of 45,981m³ shows that the affected area in either the wet or the dry seasons lies around the jetty location, with an average thickness of 0.76 m and a maximum area of 0.77km² in the wet season (***Table N-8*** and ***Figure N-12***). This is an increase in the area of deposition due to the method of movement of material nearshore to reduce the suspension as TSS, as previously described.

Table N-7 Impact Magnitude Prediction of Sediment Settling - Dredge Plan: 80,000 m^3

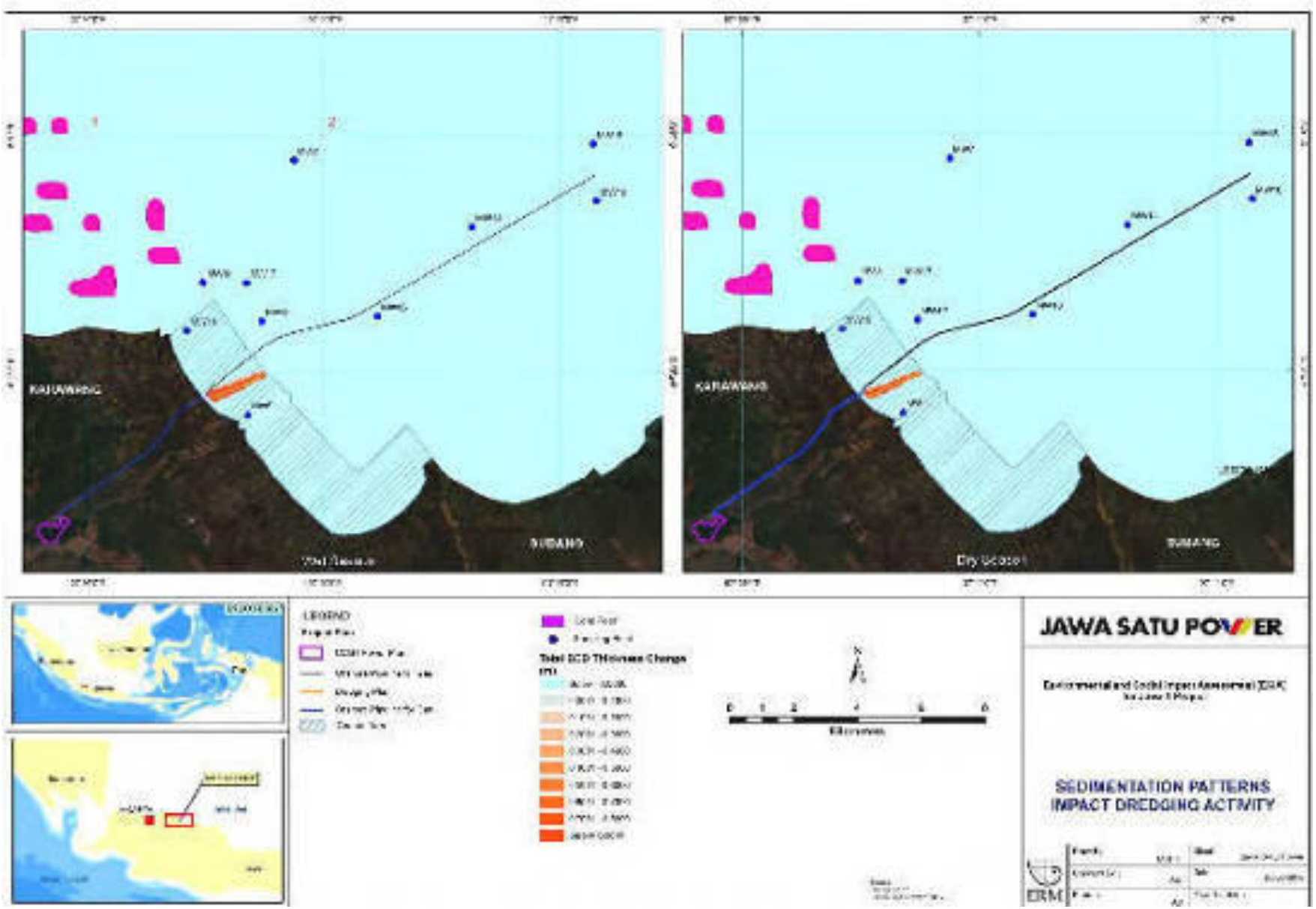
Season	Thickness (m)	Area of Sediment Settling (km^2)
Wet	0.4467	0.46
Dry	0.3933	0.64

Table N-8 Impact Magnitude Prediction of Sediment Settling - Dredge Plan: 45,981m^3

Season	Thickness (m)	Area of Sediment Settling (km^2)
Wet	0.798	0.77
Dry	0.721	0.63

For a conservative assessment it should therefore be assumed that mortality of the benthos occurs over the entire footprint of deposition. Mapping of the deposition area of 0.77 km^2 along the length of the jetty in relation to the total area between the headlands of 20 km^2 (shown as shaded in ***Figure N-12***), represents 3.85% of the total habitat.

Figure N-12 Changes in Thickness of Sediment at the Dredging Location



Environmental baseline results from the sampling program shows that the area is fairly homogeneous around the project location Benthic communities in the Project area and particularly the nearshore zone are deemed to be able to tolerate high levels of sedimentation due to the high TSS levels measured at locations around the discharge areas of drainage channel and rivers and depositional environment.

Overall, the magnitude of loss and disturbance of low sensitivity soft sediment benthic infauna and epifauna communities as a result of jetty construction and access channel dredging will affect a relatively small proportion (3.85%) of the widely occurring habitats and communities along this coastline, but has the potential to significantly reduce environmental quality due to the proposed side-casting trenching method. Due to the short duration of activity and shallow depth of sediment deposition (<0.8m) at the maximum modelled level, recovery of the benthos in the affected area is expected to occur following the end of the dredging activity and return to background levels over a reasonable timescale. This impact as additional to the physical removal of the benthos and associated sediment is not considered significant as it minimises disturbance to the area of activities.

Considering the elevated levels of some metal parameters in sampled sediments that exceed minimum guideline standards but do not exceed maximum or PEL levels, it is considered advisable to retain the dredged material at the disturbed location close to the point of origin (retentive site).

An alternative is to remove the dredged material and select a re-use or alternative site disposal option (dispersive site). This would potentially incur impacts at the re-use of disposal location. As described under OSPAR all dredged materials have an impact potential (physical, biological) at the point of disposal. This impact includes covering of the seabed, local increases in suspended solids levels as well as potential impacts on habitats and marine fauna (benthos, fish). Disposal of sediments with low levels of contamination is not devoid of environmental risk and requires consideration of the fate and effects of dredged material and its constituents (OSPAR, 1998-20). Such an alternative will require detailed assessment, as well as a licence under Indonesian regulations. It is also required to include consideration of cost in relation to the benefit from the management alternative. Considering the assessment of the proposed dredging plan, it is considered that the impacts from the selected option are not significant (refer below).

All baseline sampling locations are unaffected by TSS from the dredging activity, with the exception of location MW10 where TSS is elevated by 3.2 mg/l. MW10 is in proximity to coral communities and this, combined with the exceedances in TSS in the baseline sampling but recognising that the distribution of TSS from jetty dredging lasts for only 26 days is classed as **medium** sensitivity. The impact magnitude is considered to be **small** and therefore of **Minor** impact significance.

Table N-9 Assessment of Impacts from Loss and Degradation of Marine Habitats during Jetty Installation and Dredging

Evaluation of Significance		Sensitivity/Vulnerability/ Importance of Resource/Receptor		
		Low	**Medium**	**High**
Magnitude of Impact	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	**Minor**	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

Mitigation Measures

It is recommend that the following mitigation measures be applied in relation to marine habitat impacts during jetty installation and dredging:

- Project shall develop a development of a dredging and disposal risk assessment and Dredging Management Plan in accordance with IMO and OSPAR guidelines.

Additionally, the dredging disturbance by the Project should be reduced as far as practicable in order to reduce the direct disturbance to the seabed and indirect effects from turbidity plumes. This includes:

- Dredging vessels will be equipped with the appropriate Global Positioning System (GPS) equipment or other navigational aids to ensure dredging will occur at the specified dredge footprint and disposal at the designated soil disposal site;
- EPCs' dredgers will maintain adequate clearance between vessel hull and the seabed at all states of the tide and reduce vessel speed to ensure that excessive turbidity is not generated by turbulence from vessel movement or propeller wash.

Monitoring Measures

The following monitoring measures are recommended:

- Records are to be kept and regularly reviewed (weekly) for implementation of the Dredging Management Plan.
- Direct measurement of the TSS periodically at baseline sampling station locations MW9, MW10 and MW11 to establish actual recorded levels verses modelled.

Assessment of Residual Impact

In view of the current exceedances in baseline TSS measurements, the proximity of coral but recognising the short duration of disturbance; the residual impact to loss of habitat and seawater quality from jetty installation and dredging remains **Minor**.

N.2.4 Seawater Water Intake and Wastewater Discharge Pipelines

The seawater will be abstracted using one (1) offshore intake pipe connected to a submerged intake head located in a dredged pit located at -4.5 meters MSL. The offshore intake pipe is preliminary sized at 1.3 meter diameter. The approximate length of the intake pipe is 1,882 m.

The CCGT Power Plant process wastewater will be discharged using one (1) offshore discharge pipe connected to a submerged discharge diffuser located at -2.5m MSL. The offshore wastewater discharge pipe is preliminary sized at 0.9 meter diameter. The length of the discharge pipe is 932 m.

The seawater intake pipeline and wastewater discharge pipeline will be made of HDPE material. A common pre-trench of 2 km length will be dredged to install the seawater intake and discharge lines. It is envisaged to have about 1:00 am soil cover from top of the HDPE pipes all along the trench, except at the entrance of the pump station where the inlet is located at a water depth of about -7.00 m from MSL.

The equipment to be used for dredging activities consists of:

- Swamp back hoe until -1.00 m MSL; and
- Beyond -1.00 MSL, flat barge equipped with the long arm excavator or crawler cranes with clamp shell.

For a water depth of less than -3.00 MSL, the trench dimensions will be dictated by the width and the draft of the flat barge used to execute the work and therefore the bottom trench opening is assumed to be 18 m.

The trench dimensions beyond -3.00 MSL water depth will have an opening of 3.70 m and a top opening of 13.70 m and depth of 2.50 m to insert the intake line. The total volume of dredged materials is calculated at 57, 522 m^3, and dredged materials will be back filled to seabed level. The total volume of dredged material from the installation of the outfall and intake pipelines is presented in ***Table N-10 and Figures N-13 and N-14.***

Table N-10 Installation Plan - Volumes by Section

Section	Dimensions	Volume of Dredge Material (m^3)	Method
LAT. +1.0 to 0.0	30 m^2 x 320 m	9,600 m^3	Back filling
LAT. 0.0 to -1	122 m^2 x 21 m	2,562 m^3	Back filling
LAT. -1.0 to -1.5	43 m^2 x 240 m	10,320 m^3	Back filling
LAT. -1.5 to -2.0	40 m^2 x 250 m	10,000 m^3	Back filling
LAT. -2.0 to -2.5	33 m^2 x 230 m	7,590 m^3	Back filling
LAT. -2.5 to -3.0	29 m^2 x 230 m	6,670 m^3	Back filling
LAT. -3.0 to -4.0	22 m^2 x 490 m	10,780 m^3	Back filling
Total		**57,522 m^3**	

Figure N-13 Sequence of Intake and Discharge Pipeline Installations

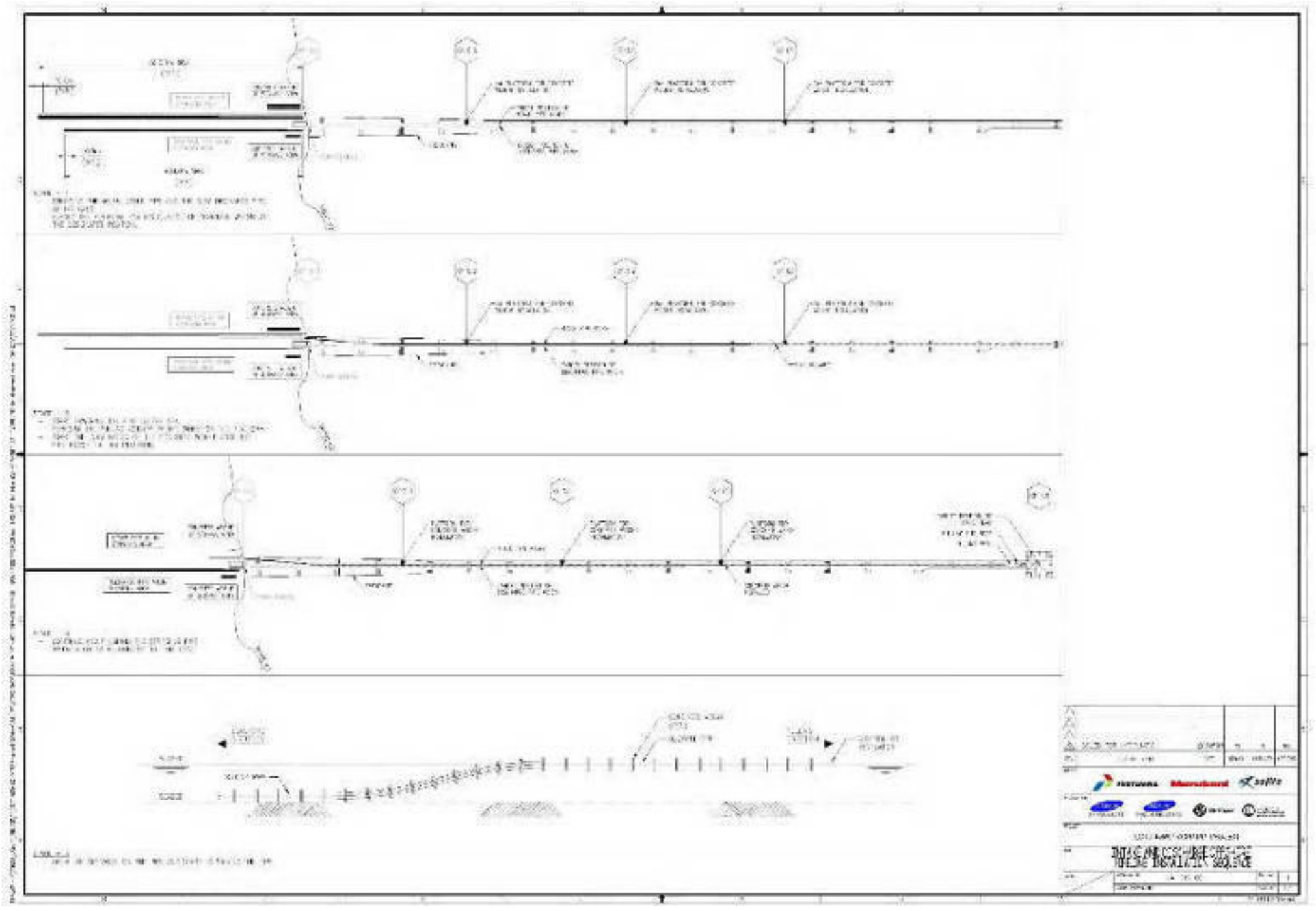
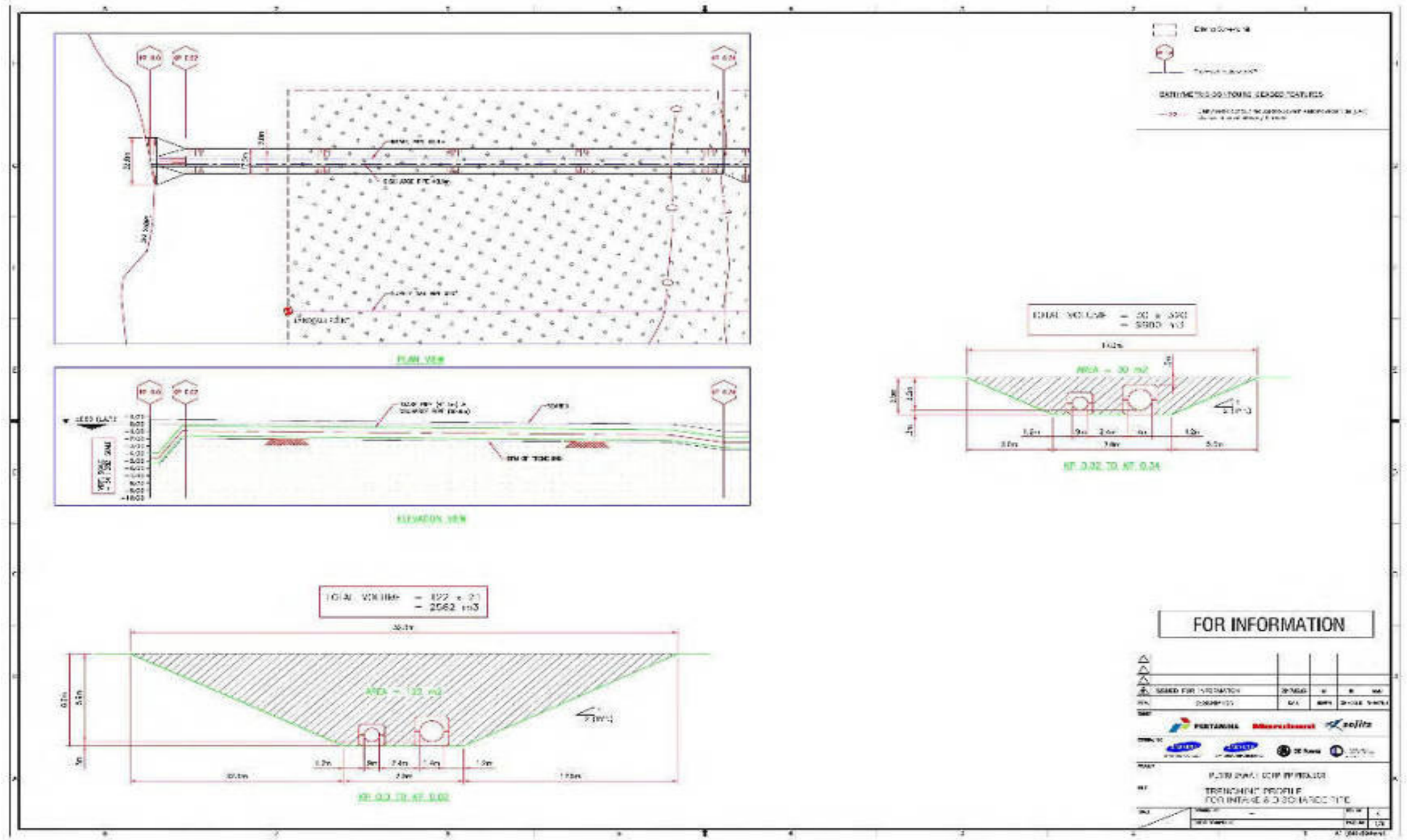
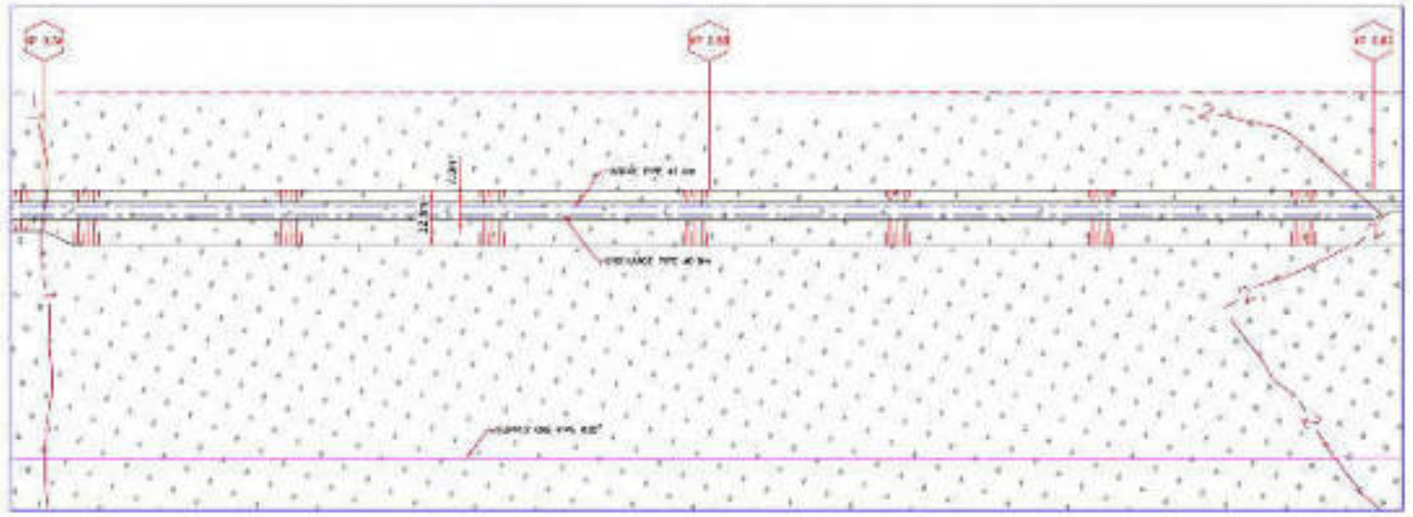
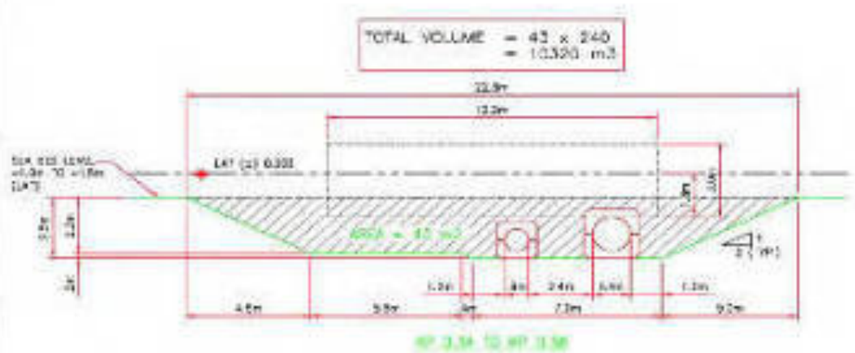


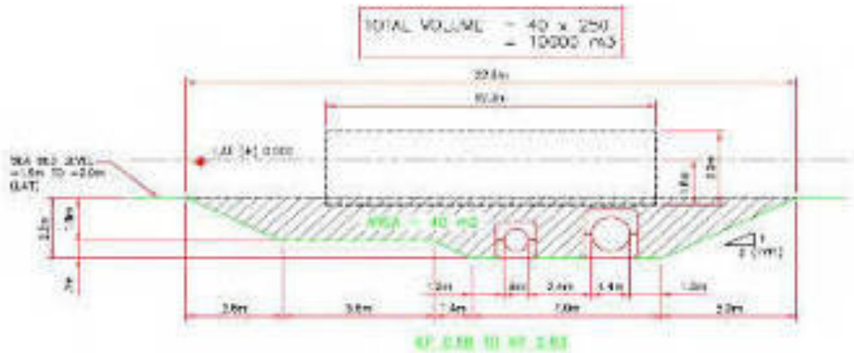
Figure N-14 Trenching Profile of Intake and Discharge Pipeline Installations



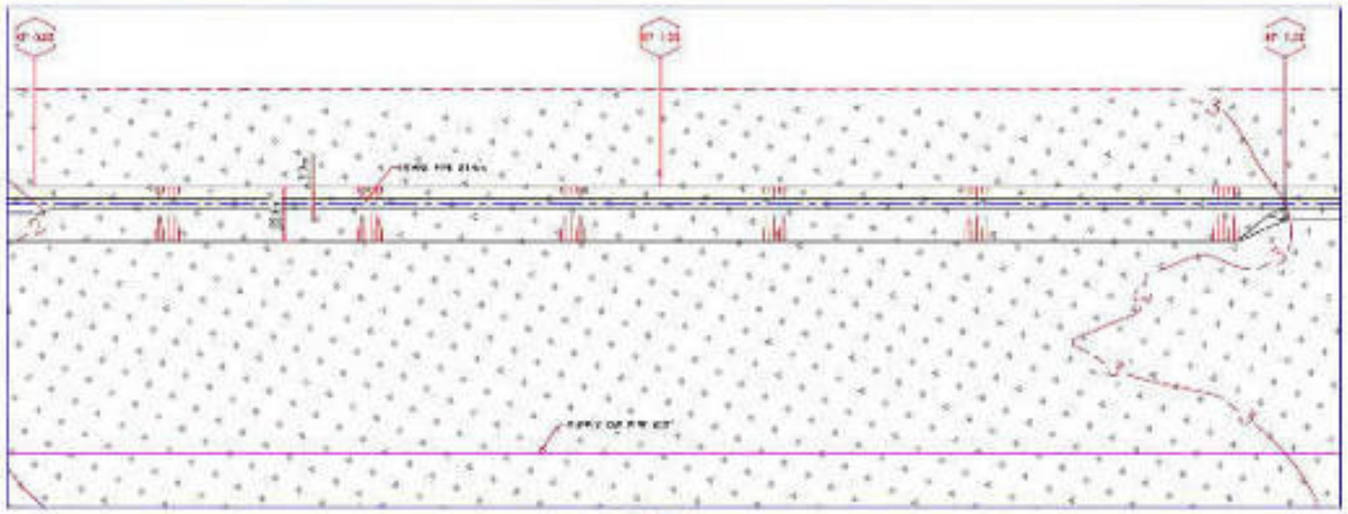


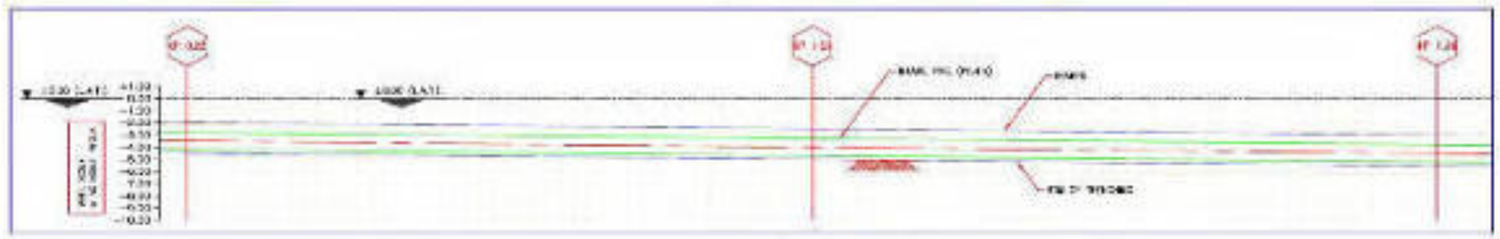
PLAN VIEW

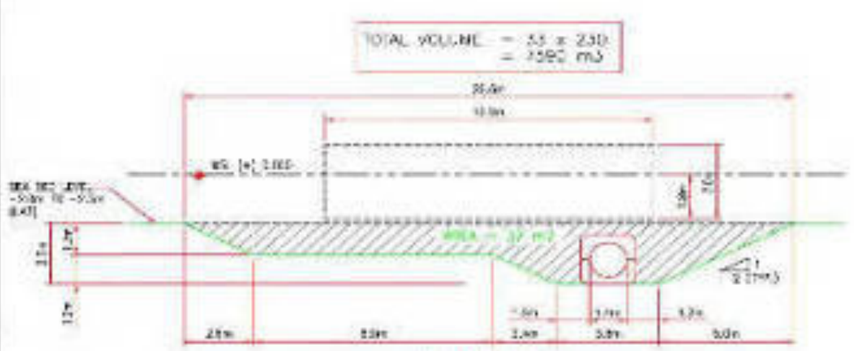


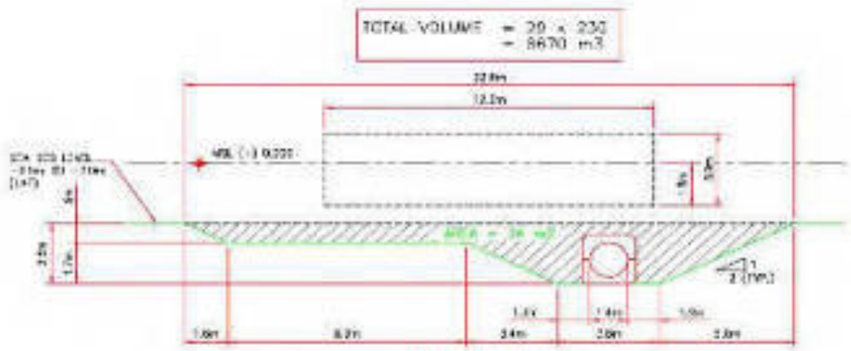


FOR INFORMATION

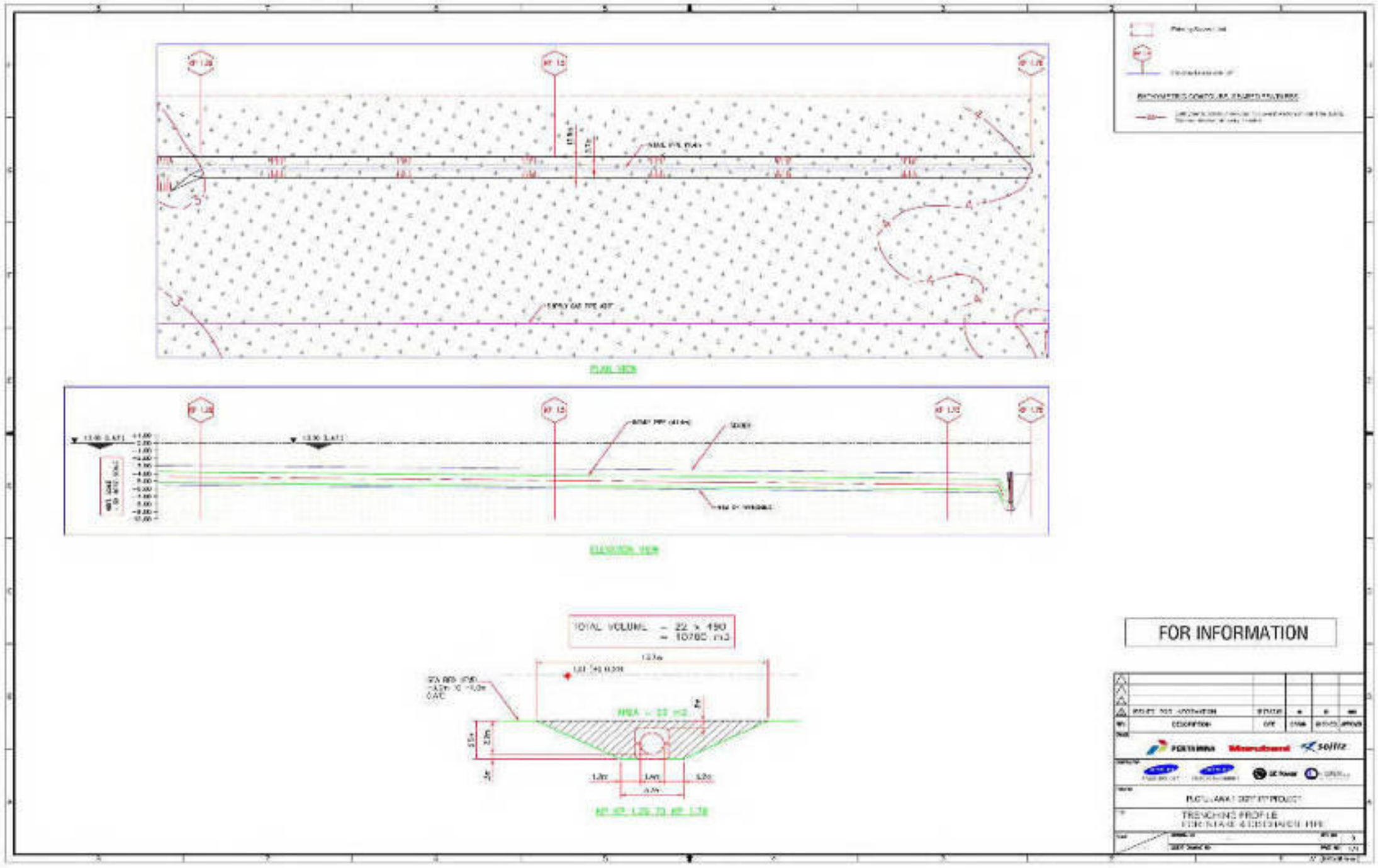





TOTAL VOLUME = 55 x 230
= 7590 m3


TOTAL VOLUME = 39 x 230
= 8670 m3


FOR INFORMATION
PERTAMINA
Mitsubishi Heavy Industries
Sojitz
TRENCHING PROFILE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Impact Evaluation and Significance

Sediment dispersion modelling was conducted for both the wet (west) and dry (east) seasons to evaluate the magnitude and extent of the dredge plume (elevated TSS above background concentrations). In order to assess the magnitude of impact a simulation of the elevated TSS incorporated the processes of settling sediment (deposition, settling velocity, flocculation, erosion). The model assumptions were as follows:

1. Elevated TSS resulting from the intake and discharge pipeline installation, assumed the initial condition and boundary condition of TSS = 0;

2. Considering sediment characteristics the model was designed in one layer with six fraction compositions of sediments. Sediment fractions 1-3 represented 'fine sediment' and fractions 4-6 'hard sediment'. The critical shear stress of each fraction = 0.1 N / m^3;

3. Total dredging material of 57,522 m^3, with a dredging duration of 45 days, assuming 1,278.3/day m^3; and

4. The dredging location represented as points sources, with the total number of points being 45, or one point source a day.

Based on the model results, elevated TSS parameters from the dredging of intake-outfall pipe installation ranges from 2 to 9 mg/l. The direction of TSS movement as influenced by the hydrodynamic condition in the location of the study, is dominant to the northwest. The fulfilment of the Indonesian regulatory limit is influence by the ambient condition of the TSS concentration in the location of the project. As discussed previously there are a number of exceedances from the baseline sampling results at stations MW9 and MW10 which in a no project condition are above the limits of the Minister of Environment Decree No. 51 of 2004 attachment III for marine biota. The distribution of TSS lasts for 45 days and after the activity stops, by day 47 TSS is not recorded in the modelled area. The modelled magnitude of elevated TSS from the installation of the intake and discharge pipelines at the baseline sampling stations is presented in ***Table N-11***.

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Table N-11 ***Prediction Magnitude of Impact Average of TSS Parameters from the Intake and Discharge Pipeline Installation***

Location	TSS Concentration (mg/l)			Standard Limit (mg/l)*	
	Baseline Setting	Magnitude of Impact (TSS Increase)	Resultant Environmental Condition	Mangrove	Coral Reef
MW7	<8	0.0	<8	80	20
MW9	647	0.0	647	80	20
MW10	142	3.4	145.4	80	20
MW11	11	6.7	17.7	80	20
MW12	12	0	12	80	20
MW13	50	0	50	80	20
MW17	11	0	11	80	20

** MoEF Decree No.51 year 2004 Annex III for Marine Biota*
Exceedances highlighted
Locations refer to the sampling stations as illustrated in ***Figure N-8*** *to* ***Figure N-11*** *and described in Annex B Environmental Baseline Surveys Results*

Based on the simulation of the impact of the dredging activity of 57,522 m^3 at the end of intake and discharge pipeline installation (day of 45), TSS distribution is dominant to the northwest and broader in the east (dry) season. However, in total average the TSS distribution is broader at the west (wet) season. The modelled areas of the impact distribution for the maximum TSS distribution of 9 mg/l over the 45 day installation period is shown in ***Table N-12.***

Table N-12 ***Area and Trajectory of Maximum Elevated TSS from the Intake and Discharge Pipeline Installation***

Period	West Season (Km^2)	East Season (Km^2)
Day 1	1.77 north west	2.62 west
Day 5	2.12 north west	2.53 west
Day 10	1.78 north west	0.87 north
Day 15	1.65 north west	1.23 north west
Day 20	2.14 north west	1.78 north west
Day 30	1.74 north west	2.24 north west
Day 40	3.21 north west	0.68 north west
Day 45 (end)	0.59 north west	2.14 north west

The results of increased TSS dispersion from the intake and discharge pipelines installation are presented in ***Figure N-15*** and ***Figure N-16***.

Figure N-15 Modelled TSS Elevations from Seawater Water Intake and Wastewater Pipeline Installation in West (Wet) Season

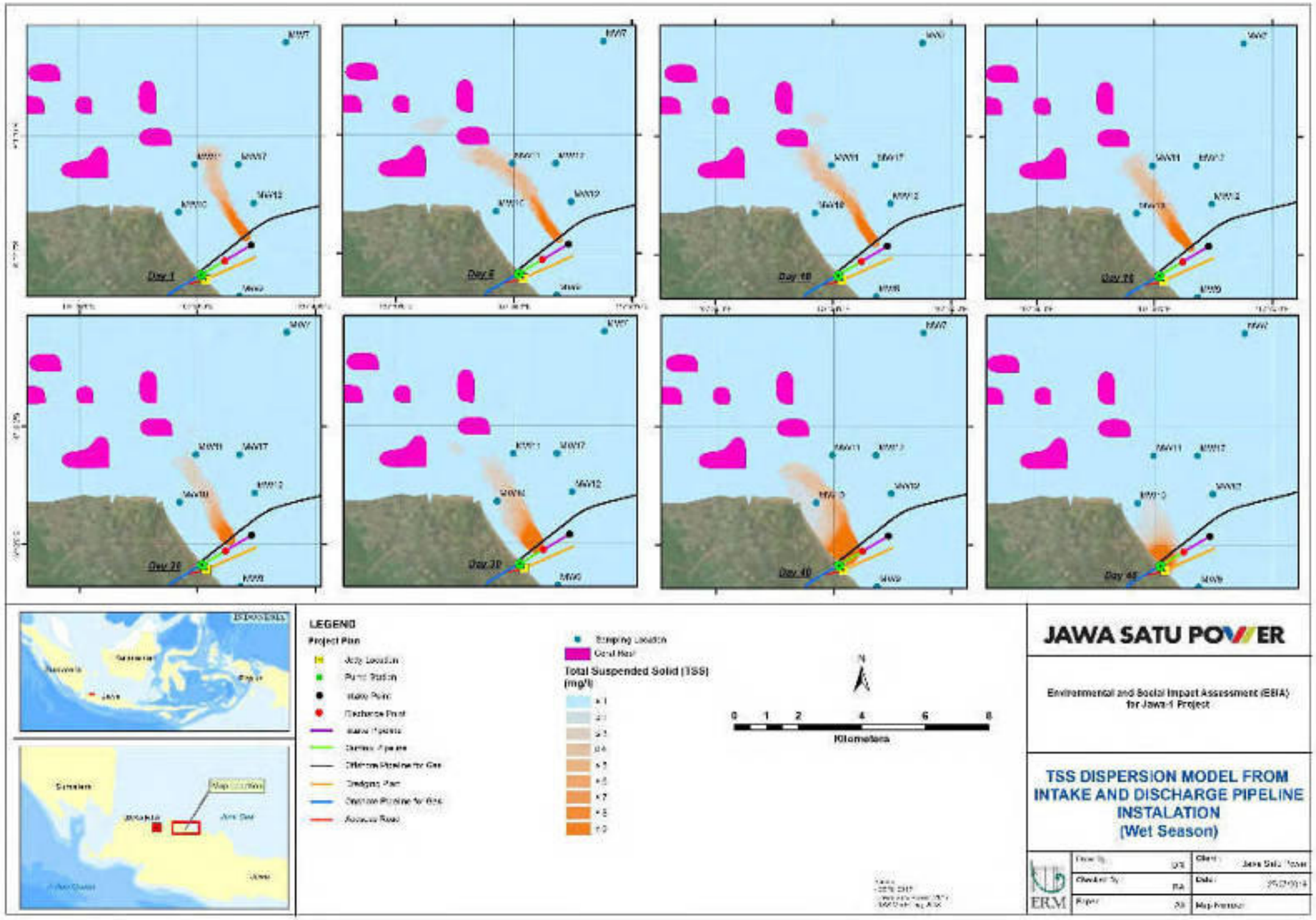
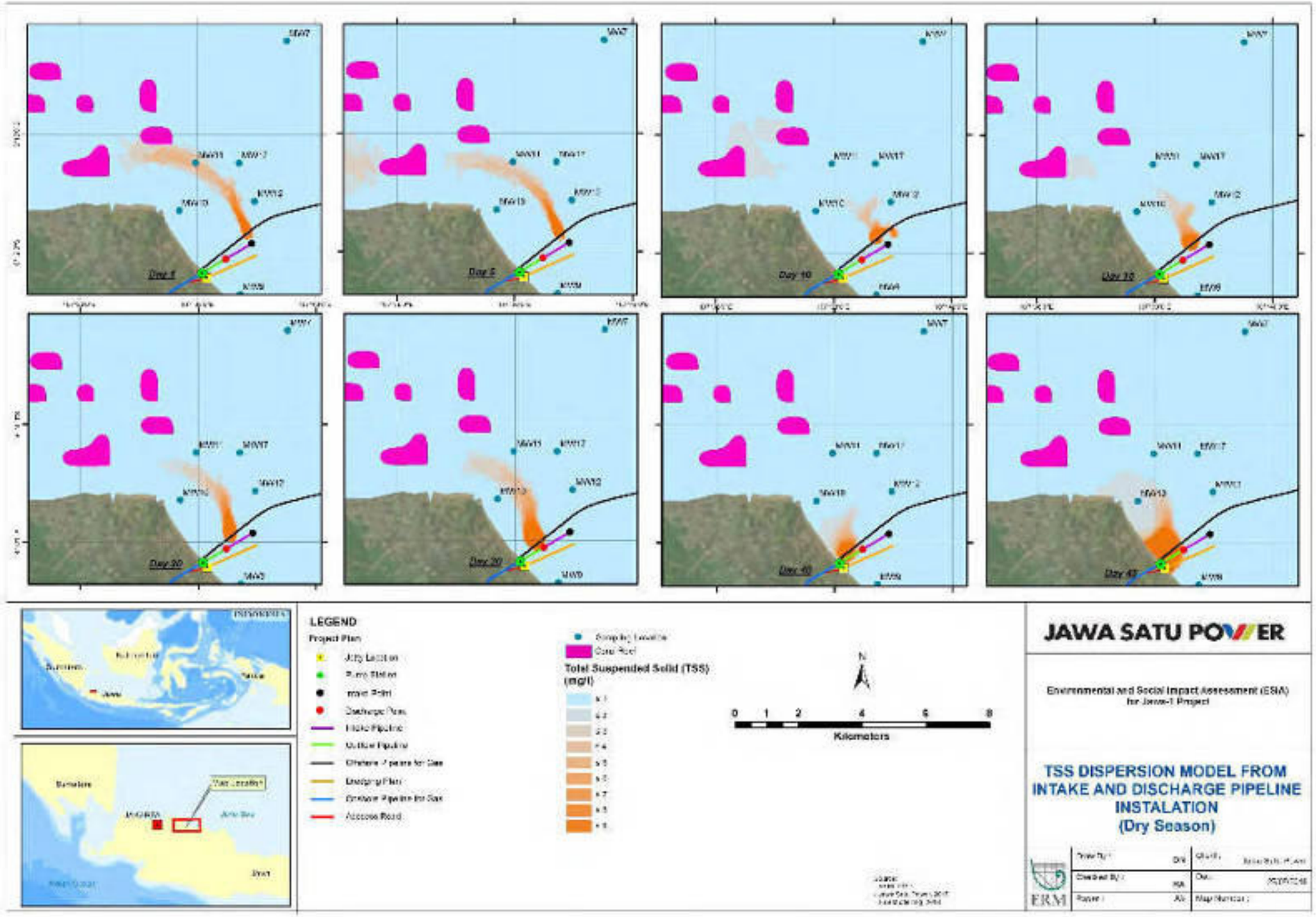


Figure N-16 Modelled TSS Elevations from Seawater Water Intake and Wastewater Pipeline Installation in East (Dry) Season



The nature of the benthic has been discussed in the preceding sections. The loss of infauna and epifauna communities as a result of intake and discharge pipeline will affect a relatively small area of the widely occurring habitats and communities along this coastal area. Assumed with the total length of the dredging area 1.781 km and trench-opening dimension 18 m for a water depth of less than -3.00 MSL and 13.7 m beyond -3 MSL, the total seabed area impacted is approximately 29,951 m^2 for a limited period of time (45 days). As previously discussed, the recovery of the benthos in the affected area is expected to occur following the end of the dredging activity and return to background levels over a reasonable timescale. This impact as additional to the physical removal of the benthos and associated sediment is not considered significant as it minimises disturbance to the area of activities.

With the exception of baseline elevated TSS recorded at two baseline sampling stations (MW10 and MW11), the contribution of TSS from pipeline installation does not exceed the regulation limit of the Minister of Environment Decree No. 51 of 2004 attachment III for marine biota. The modelled TSS from pipeline installation does approach the nearest area of coral as shown in secondary data. The 2017 coral survey did not establish viable coral communities at this location given the high baseline TSS.

Considering the magnitude of elevated TSS, area impacted and duration, the distribution of TSS from intake and discharge pipeline installation impact magnitude is considered to be **small**. The sensitivity of the receptor is classed as **medium** given the natural exceedances against regulatory limits, resulting in an impact of **Minor** significance (***Table N-13***).

Table N-13 Assessment of Impacts from Loss and Degradation of Marine Habitats during Construction

Evaluation of Significance		**Sensitivity/Vulnerability/ Importance of Resource/Receptor**		
		Low	**Medium**	**High**
Magnitude of Impact	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	**Minor**	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

Mitigation Measures, Management, and Monitoring

The mitigation and monitoring discussed for jetty installation should be implemented for the installation of the outfall and intake pipelines.

Assessment of Residual Impact

Given the medium sensitivity of the environment from the baseline exceedance of TSS standards, the residual impact remains **Minor**.

N.2.5 Pipeline Installation and Trenching

Referring to the Regulation of the Minister of Transportation No.129 of 2016, the installation of subsea pipelines in water depths of <20 m require burial of 2 m from the seabed. The subsea pipeline burial activity will be carried out from a depth of 0-20 m for the length of 14,000 m (14 km) using a post trenching method. The prediction of TSS dispersion assumes a Jet Trenching ROV is used with a discharge debit 360 m^3/hour.

Impact Evaluation and Significance

There is concern over the use of a jetting system in fine grained sediment as this has the potential to remobilise large amounts of sediment and significantly increase TSS. Sediment dispersion modelling was conducted along the pipeline length to assess this potential impact. The total volume of sediment transport predicted from a calculation of burial depth (2m)+ diameter of pipeline (20"/0.508 m) x pipe wide (0.508 m) X total length of burial pipe (14,000 m)= 17,836.90 m^3 (1.78 Ha).

Assuming that in a day a trencher machine moves to bury 20 join pipes (1 join = 12 m); then 1 day represents a distance of 240 m; therefore, the time to trench the pipeline over 14,000 m is 59 days. Thus, the volume of sediment transport within 1 day is 305.77 m^3 with a trencher working for about 8 hours/day. From the total sediment transport, there are two phases, i.e. the floating phase and the settling phase with a ratio of 50:50. The model simulated sediment transport with main inputs of the result of hydrodynamic modelling and the baseline condition of TSS=0 (simulation to see the magnitude of impact) simulated for 58 days over 2 seasons, to identify the movement of TSS if the construction is conducted during the west season or east season. Based on the simulation results, the magnitude of impact from the bursts of the trencher which is a floating phase or TSS, with the TSS values of all locations far below the quality standards. Impacts occur only along the pipe of the location of MW13 and MW14. The modelled magnitude of impacts are presented in **Table N-14**.

Table N-14 Prediction Magnitude of Impact TSS Parameter from Installation Subsea Pipeline Activities

Location	TSS Concentrations (mg/l)			Quality Standard (mg/l) *	
	Baseline Setting	Magnitude of Impact (TSS Increase)	Resultant Environmental Condition	Mangrove	Coral
MW12 (0793222;9315547)	12	0	12	80	20
MW13 (0796821;9315687)	50	3.0	53	80	20
MW14 (0799792;9318454)	<8	4.0	12	80	20
MW15 (0803583;9321011)	<8	0	<8	80	20
MW16 (0803691;9319248)	10	0	10	80	20

* *Decree of the Minister of Environment No. 51 of 2004 Quality Standard of Seawater for Marine Biota*

Locations refer to the sampling stations as illustrated in ***Figure N-1***
Exceedances shown as highlighted

Based on the simulation, in the west season; TSS increases of <4.7mg/L are dominant on the coastal base pipe but for the east season, it is <1.7mg/L. The modelled areas of the impact distribution for the maximum TSS distribution of 9 mg/l over the 59 day period during the west and east seasons are presented in ***Table N-15***.

Table N-15 Area and Trajectory of Maximum Elevated TSS from Pipeline Installation

Period	West Season (km²)	East Season (km²)
Day 1	0.09 around trenching location	0.09 around trenching location
Day 10	0.078 around trenching location	0.081 around trenching location
Day 20	0.067 around trenching location	0.072 around trenching location
Day 30	0.09 around trenching location	0.09 around trenching location
Day 40	0.081 around trenching location	0.078 around trenching location
Day 50	0.065 around trenching location	0.063 around trenching location
Day 59	0.008 around trenching location	0.003 around trenching location

The results of increased TSS dispersion from the burial subsea pipeline activities are presented in **Figure N-17**.

Figure N-17 Modelled TSS Elevations from Subsea Pipeline Installation in West (Wet) Season

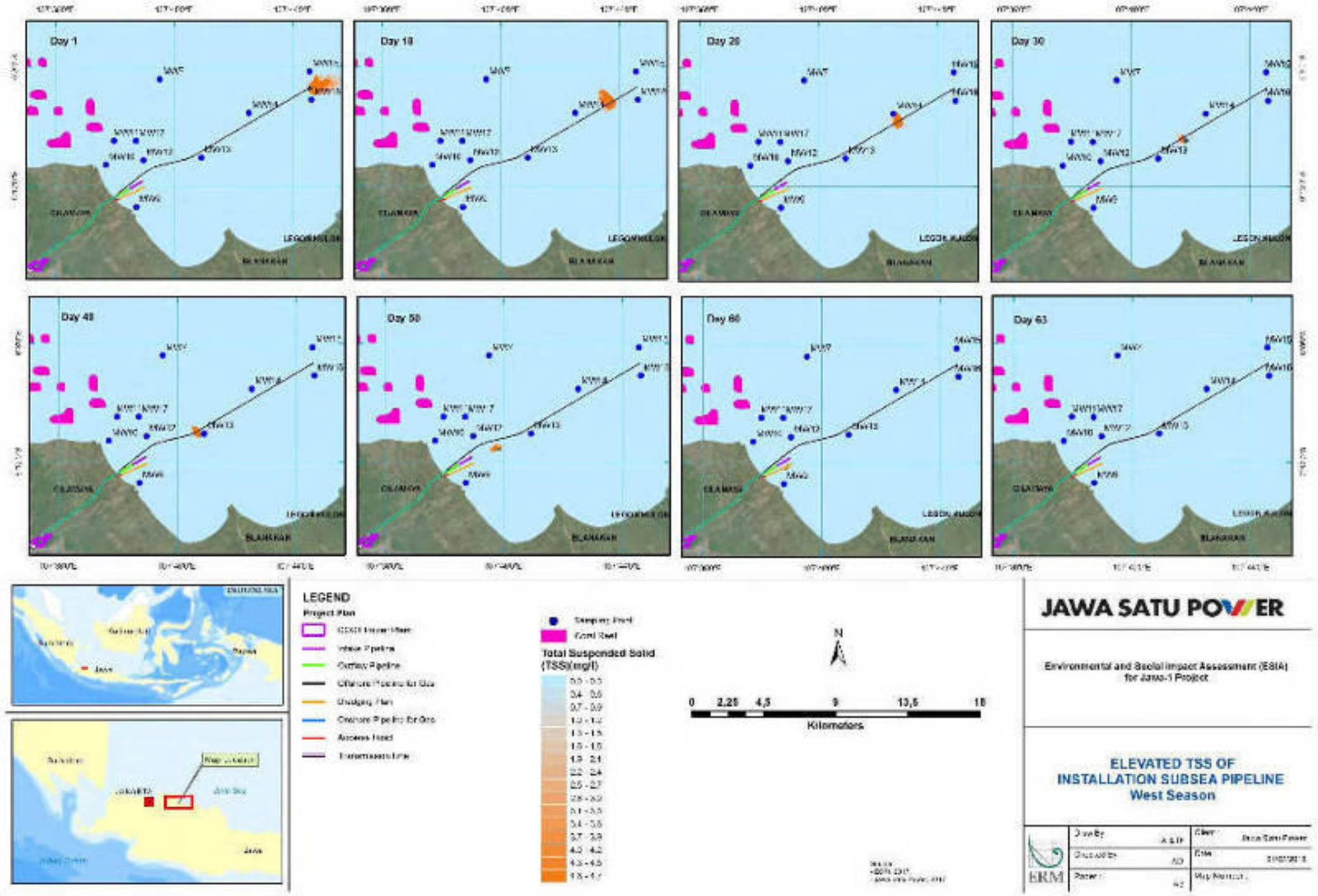
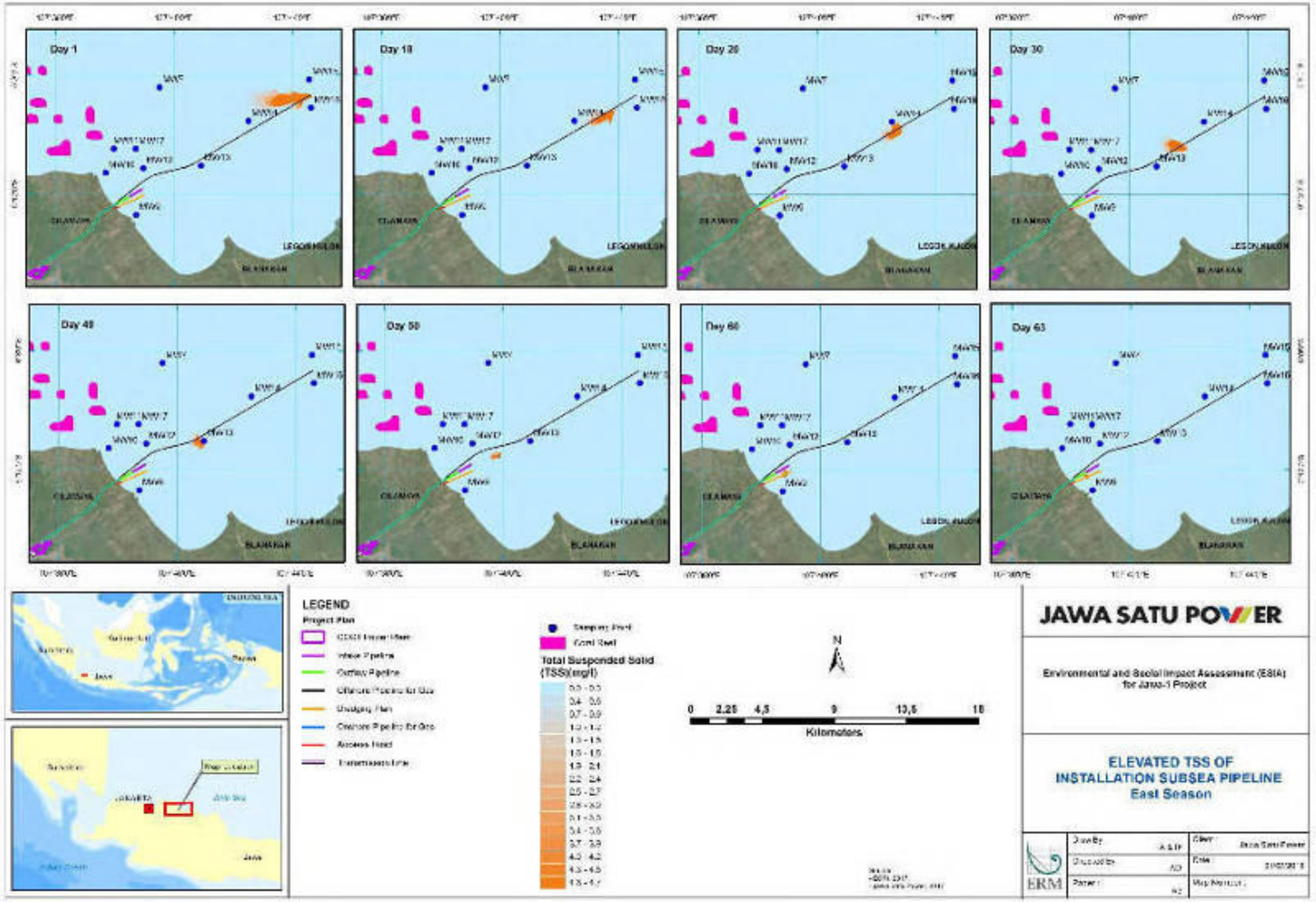


Figure N-18 Modelled TSS Elevations from Subsea Pipeline Installation in East (Dry) Season



Based on the above, any impacts to water quality from pipeline installation are localised (ranging from 0.09 km^2 to 0.003 km^2 around the trenching location) with TSS levels are within the applicable standards; therefore magnitude is ranked as **Small**. The sensitivity of the seawater from measured TSS results is **low**, given water quality is good as indicated by baseline samples measuring below the standards. The resultant impact significant is ranked as **Negligible** overall.

Table N-16 Water Quality Impact of elevated TSS from Pipeline Installation

Evaluation of Significance		**Sensitivity/Vulnerability/ Importance of Resource/Receptor**		
		Low	Medium	High
Magnitude of Impact	Negligible	Negligible	Negligible	Negligible
	Small	**Negligible**	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

Mitigation Measures, Management, and Monitoring

Given the negligible significance ranking, no further mitigation is required.

PLTGU Jawa 1 Independent Power Project

ANNEX O
RKL RPL
(AMDAL MONITORING & MANAGEMENT PLAN)

Prepared for:

PT Jawa Satu Power (JSP)

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JAWA SATU POWER

ENVIRONMENTAL MANAGEMENT PLAN (RKL)

AND

ENVIRONMENTAL MONITORING PLAN (RPL)

Development of Steam Gas Power Plant (PLTGU) with Capacity of 1.760 MW, Transmission Network, Gas Pipe, Cooling Water Pipe, Pump House, Jetty, Floating Facilities and Integrated Regasification Unit

in

Karawang Regency, Subang Regency and Bekasi Regency, West Java Province

March 2018

FOREWORD

In line with Presidential Regulation No. 3 of 1986 on the Acceleration of the Implementation of National Strategic Project, PT Jawa Satu Power (hereinafter referred to as PT JSP) plans to build and operate the Steam Gas Power Plant (PLTGU) with Capacity of 1,760 MW, Transmission Network, Cooling Water Pipe, Pump House, Jetty, Floating Facilities and Integrated Regasification Unit in Karawang Regency, Subang Regency and Bekasi Regency, West Java Province (hereinafter referred to as PLTGU Jawa-1 Project Development Plan).

In accordance with the Regulation of State Minister of Environment No. 05 of 2012 on Types of Business and/or Activity Plan which is Required to Have Environmental Impact Analysis, the Jawa-1 Project Development Plan shall be supplemented by an Environmental Impact Analysis (AMDAL) document. This is in accordance with the Decree of Director of Prevention of Environmental Impact of Business and Activities No. S.67/PDLUK/PUAI/1/2017 concerning Directive of environment document preparation of AMDAL document.

In addition, based on the Regulation of the State Minister of Environment No. 08 of 2013 on the Procedures for Assessment and Inspection of Environmental Documents and the Issuance of Environmental Permits, the plan for development activities of the Jawa-1 Project is the

Authority of Minister whose the Assessment is carried out by the Central KPA.

The Document of Environmental Management Plan and Environmental Monitoring Plan (RKL-RPL) is prepared in accordance with the Regulation of the State Minister of the Environment No. 16 of 2012 on the Guidelines for the Preparation of Environmental Documents and based on the approved Terms of Reference (KA) document.

We would like to thank to all parties who have been instrumental in the preparation of this document.

Jakarta, 27 March 2018

PT Jawa Satu Power

Ginanjar

President Director

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CHAPTER 1
INTRODUCTION

1.1 BACKGROUND

The development plan of PLTGU Jawa-1 is covered in the Electricity Supply Business Plan (RUPTL) 2016-2025 by PT PLN supported by Letter of the Director General of Electricity of the Ministry of Energy and Mineral Resources Number 778/04/DJL.3/2017 dated March 14, 2017 who states that PLTGU Jawa-1 as Electricity Strategic Infrastructure project in accordance with Presidential Regulation Number 4 of 2016 on the Acceleration of Electricity Infrastructure Development. PLTGU Jawa-1 development plan is proposed to anticipate the growth of electricity consumption and support the creation of energy security. In view of the average growth of Java-Bali electricity demand of 2,329 MW (7.5%) per year compared to the average power reserve which is the difference from power generation capacity with peak usage in 2013, 2014 and 2015, amounted to 6,782 MW (22%), the power generation reserves are still lower than the power generation ideally of 10,565 MW (30%).

Under the current policy, the Indonesian government opens opportunities for private companies to build and operate power plants where the electricity produced is supplied to PT PLN through a mechanism of Power Purchase Agreement or PPA. Through this arrangement, private companies will

be selected as Independent Power Producer or IPP through a tender process. The result of IPP qualification selection for Jawa-1 Project establishes PT Jawa Satu Power (hereinafter referred to as PT JSP) as the winner. It is expected that the implementation of the Jawa-1 project the construction can started in September 2018 and start operating in the I/II quarter of 2021.

The development of the Jawa-1 Project will be complemented by the construction of an Extra High Voltage Airline (SUTET), the construction of gas pipe on seabed and on land, the construction of water pipes on land and on seabed, Jetty and LNG Floating Storage and Regasification Unit - FSRU LNG in integrated manner. The integration of PLTGU's development plan management, SUTET 500 kV, and LNG FSRU aims to improve the effectiveness and efficiency of resource use in accelerating the overall implementation of development at the same time, so the operation of all plans can be implemented simultaneously.

The results of important impact forecasts and evaluations on the ANDAL document subsequently used as the basis for preparation of the Environmental Management Plan (RKL) and Environmental Monitoring Plan (RPL) documents. The preparation of this RKL-RPL document refers to the Regulation of the State Minister of Environment of the

Republic of Indonesia Number 16 of 2012 on the Guidelines for the Preparation of Environmental Documents.

1.2 PURPOSE AND OBJECTIVES AS WELL AS THE USEFULNESS OF ENVIRONMENTAL MANAGEMENT AND MONITORING

1.2.1 Purpose and objectives

The specific purposes and objectives of environmental management and environmental monitoring, that is:

1. Implement environmental laws and regulations related to Jawa-1 Project development plan.
2. To ensure the environmental changes caused by the development activities of PLTGU Jawa-1 Project by PT Jawa Satu Power did not degrade the quality of environment.
3. To maintain the environment quality in and around the location of the PLTGU Jawa-1 Project development plan through the implementation of the Environmental Management Plan.
4. To formulate various policy and prevention efforts, mitigation and control of environmental impacts to enhance/develop positive impacts to the maximum and minimize negative impacts as a results of the Jawa-1 PLTGU Project development activities.
5. To formulate the parties involved and related in the implementation, coordination and supervision of environmental management and environmental monitoring activities in the event of development activities of PLTGU Jawa-1 Project by PT Jawa Satu Power.

1.2.2 Usefulness

The usefulness of the preparation of Environmental Management Plan and the Environmental Monitoring Plan for the development activities of PLTGU Jawa-1 Project by PT Jawa Satu Power is as follows:

A. Usefulness for Activity Initiatives

1. As reference for environmental management related to the development and operation activities of PLTGU Jawa-1 Project by PT Jawa Satu Power.
2. Coordinate with institutions related with environmental management, control and mitigation activities arising from the development of Jawa-1 Projects by PT Jawa Satu Power from the pre-construction to operation steps.

B. Usefulness for Government

1. As a guidance for government institutions related with implementation supervision of environmental management will be implemented by PT Jawa Satu Power.
2. As material for government institutions in assessing the seriousness and concern of the initiator in handling to the environmental issues.
3. As a guidance for government institutions in informing the communities about the community's concerns to the impacts of the development activities of PLTGU Jawa-1.

C. Usefulness for Community

It is a means of social control and provides assurance/guarantee that the initiator in implementing the development of PLTGU Jawa-1 Project by PT Jawa Satu Power will not cause harm, abolish social conflict and promote social integration among the communities directly and indirectly involved in the activity.

1.3 ENVIRONMENTAL POLICY

PT JSP as the initiator of the Jawa-1 Project will wisely apply environmentally sound development principles. This is in accordance with the mandate contained in Law No. 32 of 2009 on the Protection and Management of the Environment.

Implementation of comprehensive environmental management and environmental monitoring is performed so that negative impacts on the environment can be suppressed or minimized and controlled and at the same time positive impacts can be encouraged or enhanced.

Environmental management and environmental monitoring to the environmental components are based on three approaches: (1) technology principles of implementation of the best available environmental technology, (2) economic, social and cultural; and (3) institutional. In addition, PT JSP will implement not only the obligatory environmental management instruments and its implementation, but also implement voluntary management

instruments such as ISO 14000 implementation, cleaner production, and etc.

Application of environmental management instruments, both mandatory and voluntary, is a manifestation of the company's awareness to the environmental conservation efforts. Especially for the implementation of voluntary management instruments other than as a form of industry sector proactivity towards environmental conservation, it is also strongly influenced by global trends, and can improve the company image.

Efforts to be taken to minimize negative impacts and increase positive impacts are including:

- Treat waste water generating and domestic wastewater activities in an effective treatment unit in order to comply with the required provisions (Regulation of Environment Minister No. 8 of 2009 and Regulation of Environment Minister No. 5 of 2014);
- Manage the stack emissions effectively to meet the required provisions (Regulation of Environment Minister No. 21 of 2008);
- Prioritize the use of local labor in accordance with the number and skill required, and prioritize local entrepreneurs in accordance with the specifications and qualifications of goods and service procurement required;

- Identify and implement community-based Comdev or CSR programs to enable communities involved in activities.

CHAPTER 2
ENVIRONMENTAL MANAGEMENT PLAN (RKL)

This section presents the forms of the environmental management plan undertaken for the impact generated in order to avoid, prevent, minimize and/or control negative impacts as well as increase the positive impacts incurred.

The description of the environmental management plan is presented in ***Table 2-1*** and***Table 2-2*** below.

Table 2-1 Matrix of Environmental Management Plan (Significant Impact Managed Based on Results of Management Direction on ANDAL)

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
A. Managed Significant Impact (Results of Management Direction on ANDAL)							
1. Pre-Construction Stage							
1	Community Grievance	Land Acquisition (access road plan, land pipeline plan, Jetty plan, pump house plan, laydown area and tower construction access road of SUTET 500 kV).	a. Availability official reports and sale and purchase/lease agreements and compensation of cultivated plants approved and acknowledged by the involved parties. b. Availability of community grievance handling management. c. There is evidence of grievance handling from communities related to land acquisition	a. Conduct inventory of land and cultivated plants, farmers, landowners, farm labors and rice farmers and fishponds that rely their life from land which is the location of the access road site plan, land pipeline plan, Jetty plan, pump house plan, laydown areas and construction tower access road of SUTET 500 kV. b. Coordinate with relavant government such as Land Agency, Indonesian Forest Enterprise *(Perhutani)*, Forestry Service, Muara Village, Cilamaya Subdistrict. c. Make accurate measurements to the land to be acquired for construction purposes including involving stakeholders in boundary setting and calculating the land area, as well as cultivated plants. d. Conduct deliberate consensus	a. Land acquisition and land leasing for access road plans, land pipeline plans, Jetty plans, pump house plans in the Muara Village. b. Location of compensated land in villages crossed by tower construction access line of SUTET 500 kV. c. Coordination is performed at the relevant	Before and during land acquisition activities took place	**Executive Institution:** PT JSP and executive contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. Ministry of ESDM– Directorate General of Electricity

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				with landowners attended by stakeholders related to the determination of the sale and purchase value, land lease and cultivated plant compensation. e. Conduct approach and deliberation with farmer owners, cultivator of rice fields and fishponds related to the amount of compensation to the arable land and cultivated plants which on the land purchased or leased f. Documenting any agreed meetings and decisions. g. Prioritize employment opportunities for farmers, landowners, farm labors and cultivator farmers in receiving labor and the provision of goods and services of development activities of PLTGU Jawa-1 in accordance with the needs, requirements and qualifications required. h. Conduct early socialization related to the mechanism of labor recruitment and business	government institution offices d. Acceptance and settlement of grievance are made at the PT JSP office in the field (PLTGU location).		d. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				opportunity related to PLTGU Jawa-1 activities to the community of farm workers and cultivators who lost their livelihood. i. Create CSR programs in the field of empowering the community of farm labors and cultivators to maintain and/or improve the welfare of the community who lost their livelihood. j. Inform the community about the number and types of employment opportunities available on a regular basis through the Department of Manpower. k. Establish and implement a Grievance Mechanisms system are representative, transparent and accessible to the community. l. Socialize grievance compliant mechanisms related to land acquisition to communities directly affected by land acquisition activities. m. Respond to every community grievance in a friendly and transparent manner in accordance			

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				with the actual conditions. n. Conduct deliberations with the community to reach approval related to the handling of community grievance if necessary. o. Create an official reports of any grievance handling that has been followed up and declared completed which is acknowledged by the representative of the community who has submitted the grievance.			
2.	**Construction**						
1	Increased Employment Opportunities	Acceptance of Construction Labor of FSRU, PLTGU, SUTET 500 kV and GITET Cibatu Baru II 500 kV.	a. Socialization of information on the mechanism of receipt of labor. b. The process of labor absorption comply with Law No. 13 of 2003 c. The process of labor absorption comply with Local Regulation of Karawang No. 1 of 2011 d. Fulfillment of local labor quota/allocation of 60%	a. Conducting socialization the available employment opportunities, requirements needed, required amount and acceptance mechanisms, in collaboration with the local Department of Manpower. b. Coordinate with the Department of Manpower and Industry of the Karawang regency, Bekasi regency and Subang regency, subdistrict and village governments related to the recruitment of labor. c. Prioritize qualified local	Affected villages and villages around the location of PLTGU Jawa-1	Before and during labor recruitment of the construction stages (± 3 years)	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. Department of Manpower and Transmigration of Karawang Regency b. Department of Manpower and Transmigration of Bekasi Regency c. Department of Manpower and Transmigration of Subang Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				communities in accordance with project needs of affected villages/ subdistricts. If it can not be fulfilled it can be prioritized at district, provincial and national levels. d. Make allocation/quota of total local labor recruitment i.e. labor from affected village/urban villages, i.e. equal to 60% or in accordance with applicable local regulation. e. Require contractors to prioritize acceptance of local labor in accordance with the required qualifications in accordance with established quota with priority level: 1) First priority: Direct affected residents who lost their livelihoods as a result of land acquisition, i.e. land-owning farmers, rice-field farmers and fishponds, and farm labors and fishponds involved in the cycle of activities by			d. Department of Manpower and Transmigration of West Java province e. DLHK of Karawang Regency f. DLHK of Bekasi Regency g. DLHK of Subang Regency h. DLHK of West Java province i. Ministry of Energy and Mineral Resources – Directorate General of Electricity j. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				first providing socialization and basic training to work on the PLTGU Jawa-1 project, 2) The second priority: the job seeker communities located in the villages are directly become the project site and predicted to receive direct negative impacts from project activities, such as Cilamaya and Muara Village for the PLTGU Jawa-1 activities and 37 other villages for the construction of SUTET and GITET, 3) Third priority: job seeker communities from Karawang regency, Bekasi regency and Subang regency. f. Periodically informs to the communities about the number and types of employment available through the Department of Manpower and Transmigration of the Karawang Regency, Bekasi			

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				Regency and Subang Regency, Village Heads and Subdistrict Heads openly and transparently. g. Publish information on the use of construction labors through various media, such as brochures, bulletin boards or other media that is easily accessible to the community.			
2	Changes in Income Level Community	Reception of Construction Labor	a. Increase or maintain the income of community around the activity location b. The initiator comply with Law No. 13 of 2003 on the Manpower, Minimum Wage of West Java Province and/or Karawang Regency/ Bekasi Regency/ Subang Regency and work contract agreement c. The absorption of local community who lost their livelihood to work according to their competence d. The process of labor absorption comply with Local Regulation of Karawang No. 1 of 2011	a. Prioritize the acceptance of construction labors from affected communities around the project site b. Pay the wage of labor in accordance with the type of work and the ability of worker and in accordance with the minimum wage set by the local regency and/or province government. c. Fulfill workers' rights beyond wages to be paid by referring to Indonesian regulations, such as health insurance, old age insurances, employment guarantees, overtime pay, and etc. d. Building partnerships with around village governments to	Affected villages and villages around the location of PLTGU Jawa-1.	Before and during labor recruitment of the construction stages (± 3 years)	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. Department of Manpower and Transmigration of Karawang Regency b. Department of Manpower and Transmigration of Bekasi Regency c. Department of Manpower and Transmigration of West Java province d. DLHK of Karawang Regency e. DLHK of Bekasi Regency f. DLHK of West Java province

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				facilitate the delivery of information on business opportunities that can be utilized by local residents, SMEs, cooperatives, private business and local companies e. Create CSR programs in the field of empowering communities to maintain and improve the welfare of residents who lose their work who appropriate and well targeted.			g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province **e.** Ministry of Environment and Forestry
3	Increased dust concentration ($TSP/PM_{10}/PM_{2,5}$)	Mobilization of Equipment and Materials (By Land)	Concentration of TSP, PM_{10}, $PM_{2.5}$ meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution.	a. Use a road worthy vehicles in accordance with the road class to be passed and has all the required letter and permit. b. Ensure that all vehicles used in the mobilization activities of equipment and materials are road worthy and meet emission quality standards in accordance with the	Location of PLTGU Jawa-1 activities and roads to be passed by vehicles during mobilization of equipment and materials	During equipment and material mobilization activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				Regulation of Ministry of Environment and Forestry No. P.20/MENLHK/SETJEN/KUM.1/3/2017 on the Quality Standard of New Type Automotive Gas Disposal Vehicle of Category M, N, and category O. c. The vehicles use the fuel recommended by the manufacturer and do not use fuel are caused the high exhaust gas emissions d. Conduct vehicle maintenance regularly in accordance with recommendations as evidenced by periodic service cards provided by the company and/or designated workshop companies e. The mobilization is performed outside of peak hours (at 07.00-09.0) and 16.00-19.00) and/or as agreed with the community. f. Clean up any construction vehicles that go in and out of the activity location from dust, dirt and mud are sticked with water spray. g. An open vehicle that operates to transport material must be			province d. Department of Transportation of Karawang Regency e. Department of Transportation of Bekasi Regency f. Department of Transportation of West Java Province g. Ministry of Energy and Mineral Resources - Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				covered with a perfect tarp to prevent dust from material transported flying on the road h. Conduct water spraying on road routes affected material spills by construction vehicles. i. Install the number of grievance contacts to each vehicle to make it easier for community to report in case of inappropriate condition. j. Prepare a standby reserve vehicle and tow vehicles to anticipate abnormal condition. k. As part of the fulfillment of social and environmental responsibilities (CSR), planting plants in the area of roads that will be passed the mobilization of equipment and building materials. Planting location and plant species to be reviewed by involving relevant government institutions.			
4	Changes in Disease Prevalence	Mobilization of Equipment and Materials (By Land)	a. There is a plans and efforts to prevent and manage diseases related to mobilization activities	a. Conduct management to the primary impact of increased Dust Concentration (TSP/PM_{10}/$PM_{2,5}$) which can be a source of	Affected villages and villages passed by equipment and	During equipment and material mobilization	**Executive Institution:** PT JSP and Executive Contractor

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			b. The equipment and material Mobilization Activities does not contribute to an increase in health disorders respiratory tract infection of the communities.	respiratory diseases and other dust related diseases. b. Working together with Community Health Center *(Puskemas)* conducting regular and ongoing campaigns on the health of the villagers around the location of activities are included as villages in the study area c. If deemed necessary, through the CSR program, assist the Puskesmas in providing health services to the affected communities directly. d. Records the prevalence of the last three-year diseases from Puskesmas and other health facilities around the location e. In relation to the existence of labor potentially infectious and carry disease it is necessary to be conducted: 1) Requires labor contractor users to conduct regular medical check-up once each year during the construction stages took places 2) Requires companies and	material mobilization activities	activities	**Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Health Office of Karawang Regency e. Health Office of Bekasi Regency f. Health Office of West Java Province g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry i. DLLAJ of Bekasi Regency j. DLLAJ of Karawang Regency k. DLLAJ of Subang Regency **Report Recipient Institution:**

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				executive contractors to conduct health education and spread of infectious diseases that may occur during construction activities to all workers involved in the project without exception 3) Prohibits workers to stop by places that are suspected to be a source of infectious diseases 4) Provide health protection insurance to every worker received. 5) Assist Puskesmas in providing health services to affected communities. 6) Conduct a medical check-up for each employee and non-skilled worker at least once time per year during construction activities at a designated health clinic in accordance with applicable provisions 7) Provide a community grievance contact number			a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Environment and Forestry
5	Increased dust	Land Clearing	Concentration of TSP, PM_{10},	a. Every vehicle out of the land	Transport vehicle	During land	**Executive Institution:**

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
	concentration ($TSP/PM_{10}/PM_{2,5}$)		$PM_{2.5}$ meets the required quality standards of the Indonesia Regulation. The initiator of the activity meets the regulation: Government Regulation No. 41 of 1999 on the Control of Air Pollution, among others:	clearing site activities is cleaned of dust, land and dirt on the body and wheels of the vehicle. b. Reducing dust heap by watering/spraying water to the soil surface, especially on the not rain days c. Cover unopened areas with cover crops such as grass after land clearing is completed d. Planting immediately after stockpiling is completed, especially in areas that will not be established and areas designated as green open space. e. Prepare SOPs of land preparation activities as an effort to prevent or minimize the impact of increasing TSP, PM10 and PM 2,5. f. Prepare emergency or improper preventive and handling measures during land clearing activities, such as strong winds or tornadoes.	unit, PLTGU location, construction road, jetty, SUTET and GITET	clearing activities	PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Energy and Mineral Resources – Directorate General of Electricity e. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency **c.** DLHK of West Java province **d.** Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
6	Increased Noise	Land Clearing	The intensity of the noise generated does not exceed the quality standard based on Decree of Environment Minister No. 48 of 1996, namely: a. 55 dBA for residential environment, b. 70 dBA of road & industrial environment as well as trade and service environment	a. Creation of guardrail on the (project) location activities that can help reduce noise to the surrounding environment b. Use the land clearing equipment that has been inspected and certified in accordance with applicable regulations c. Establish policy that prohibits the use of high noise equipment at 00.00-05.00 (break time) or based on an agreement with the surrounding community d. Suspend equipment and activities that generate noise during certain circumstances such as religious ceremonies, and others based on community suggestion. e. Perform routine maintenance of machinery/equipment in accordance with the specified schedule to ensure that the machine/equipment is working efficiently f. Only make a land clearing in the planned area g. Install the muffler in the vehicle and heavy equipment unit if possible	The project area and its distribution up to radius of 500 m in the residential sensitive areas and antopometric activities of the community, especially in the Muara village and Cilamaya village, Cilamaya Wetan Subdistrict	During land clearing activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Energy and Mineral Resources – Directorate General of Electricity e. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency **c.** DLHK of West Java

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				h. Immediately conduct the planting and greening on areas that are not built after the land clearing is completed			province **d.** Ministry of Environment and Forestry
7	The existence of Mangrove	Land Clearing	a. Maintain the area and quality of Mangrove at the activity location that are not built b. Availability of nursery land and plant seed placement c. There is a coastal land rehabilitation program by planting Mangrove which can be integrated with the obligation of Borrow-to-Use Forestry Permit (IPPKH)	a. Maintaining Mangrove vegetation in areas where there is no land clearing and construction activities of PLTGU Jawa-1 b. Replacing Mangrove vegetation affected 2 times the extention of Mangrove vegetation cleared at other locations within the Ciasem Bay area or in accordance with IPPKH obligations. c. Planting Mangrove on the coast of project area by considering the operation activities of PLTGU Jawa-1 as a whole, involving the community and related institutions (Indonesian Forest Enterprise *(Perhutani)* and Department of Forestry of Karawang Regency). This is also	The activity location of PLTGU Jawa-1 and the surrounding Mangrove vegetation area	During land clearing activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:**

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				conducted as part of the fulfillment of Social and Environmental Responsibility (CSR). d. Preparing land and labor for plant nurseries and mangrove plant maintenance or cooperating with third parties within long term agreements ranging from preparation, planting and maintenance. e. Collaborate with Perhutani and/ Department of Forestry and related institutions in managing and maintaining Mangrove vegetation that continues to grow and develop in the sedimentated area (new emerging land)			a. DLHK of Karawang Regency b. DLHK of Bekasi Regency **c.** DLHK of West Java province **d.** Ministry of Environment and Forestry
8	Changes in Fauna Habitat	Land Clearing	a. Maintain the floral biodiversity as part of terrestrial fauna habitat in areas not built and defined as Green Open Space (RTH) as well as around the project sites b. There is a program of rehabilitation and revegetation of land under	a. Planting RTH areas with various types of plants that have a function as a wildlife habitat and have aesthetic and decorative functions for beauty. b. Conduct plant maintenance by replacing dead plants, pruning, thinning and other forms of maintenance to preserve the RTH area	Location of PLTGU, access road, jetty, pump house and pipe on land	During land clearing activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			the location activities of PLTGU jawa 1, mainly by using plant species that support wildlife habitat c. There are rehabilitation and greening programs outside the activity location	c. Preparing land and labor for plant nurseries and plant maintenance or cooperating with third parties within long term agreements ranging from preparation, planting and maintenance. d. As part of the fulfillment of social and environmental responsibilities (CSR), along with the communities conduct greening outside PLTGU areas such as road sides, coast, river sides and other places. planting locations and plant species to be reviewed and involving government institutions e. Develop biodiversity action plan which one of the focus is related to the conservation program of bird species diversity in the activity location and surrounding area			Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Department of Transportation of Karawang Regency e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
9	Changes in Fauna Biodiversity	Land Clearing	a. Maintain the fauna biodiversity was found in the location is not built in the area of PLTGU Jawa -1 and the surrounding area mainly the preservation of protected species, endemic species and migrant species b. There are RTH area in the project site, especially PLTGU and GITET	a. Planting RTH areas with species that have a function as a wildlife habitat and have aesthetic and decorative functions for beauty. b. Conduct plant maintenance by replacing dead plants, pruning, thinning and other forms of maintenance to preserve the RTH area c. Along with communities and stakeholders play an active role in safeguarding important habitats for fauna around the activity location such as mangroves, river borders and/or specific locations are important to wildlife habitats such as nest locations.	Location of PLTGU, access road, jetty, pump house and pipe on land	During land clearing activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Department of Transportation of Karawang Regency e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							d. Ministry of Environment and Forestry
10	Increased TSS Content	pipeline deployment at Sea	The concentration of TSS meets the quality standard required in accordance with Decree of Environment Minister No. 51 of 2004 on the Sea Water Quality Standard Appendix 1: TSS is 80 mg/l or does not exceed the TSS baseline conditions (if TSS has exceeded the quality standard in the baseline)	a. Installation of sea pipelines is performed during the east season, i.e. April – September b. Install silt protector or similar technology around the pipeline deployment area if needed and possible	Location of pipeline deployment at sea	During the deployment of the subsea pipelines	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok **Report Recipient Institution:** a. DLHK of Karawang

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							Regency b. DLHK of Bekasi Regency **c.** DLHK of West Java province **d.** Ministry of Environment and Forestry
11	Increased TSS Content	Dredging and Placement of Dredge Results	The concentration of TSS meets the quality standard required in accordance with Decree of Environment Minister No. 51 of 2004 on the Sea Water Quality Standard Appendix 1: TSS namely 80 mg/l	a. Conduct a dredging and disposal of dredged material in accordance with the permit was granted. b. Install a silt protector around the dredging area if needed	Dredging areas and surrounding waters	During the dredging activity	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							Report Recipient Institution: a. DLHK of Karawang Regency b. DLHK of Bekasi Regency **c.** DLHK of West Java province **d.** Ministry of Environment and Forestry
12	Disruption of Fishermen's Activities	Dredging and Placement of Dredge Results	a. The absence of significant disruption to fisherman's activities resulting from dredging activities and placement of dredge results b. Availability of warning signs to prevent disruption of fisherman's activities	a. Conduct socialization through the installation of warning signs on the dredging area. b. Conduct periodic socialization on the dredging activities to fishermen community by involving elements of local leadership such as Village (Urban Village Head) and Subdistrict Head c. Map the patterns of fishing activities in Ciasem Bay waters mainly around pipeline deployment area so that when the fishing activity around the construction pipeline deployment location can be adjusted with high fisherman's activities	Dredging areas and surrounding waters	During the dredging activity	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				d. Map the important locations for fishermen around the dredging location e. Map the distribution of impacts due to dredging so that potential disruption to the fishermen can be predicted and anticipated f. Provide compensation for fishermen if the location of activities there is a direct disruption to the destruction of fisherman catching equipments g. Conduct the continuing coordination to fisherman groups around the project construction area related to activities and risks that may be arised			f. Harbor Master Office and Port Authority (KSOP) of Class III Pamanukan. **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency **c.** DLHK of West Java province **d.** Ministry of Environment and Forestry
13	Increased Noise	Construction of PLTGU and Supporting Facilities	The intensity of the noise generated does not exceed the quality standard based on Decree of Environment Minister No. 48 of 1996, namely: a. 55 dBA for residential environment, b. 70 dBA of road & industrial	a. Use the equipment that has been inspected and certified in accordance with applicable regulations b. Perform routine maintenance of machinery/equipment in accordance with the specified schedule to ensure that the	Construction Project Site of PLTGU and Supporting Facilities	During the construction activity of PLTGU took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			environment as well as trade and service environment	machine/equipment is working efficiently c. Unbuilt area will function as RTH or buffer zone of noise barrier d. Install the muffler in the vehicle and heavy equipment unit if possible e. Group the types of construction activities between day and night work			province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
14	Increased Noise	Development of GITET 500kV	The intensity of the noise generated does not exceed the quality standard based on Decree of Environment Minister No. 48 of 1996, namely: a. 55 dBA for residential environment, b. 70 dBA of road & industrial environment as well as trade and service	a. Use the equipment that has been inspected and certified in accordance with applicable regulations b. Perform routine maintenance of machinery/equipment in accordance with the specified schedule to ensure that the machine/equipment is working efficiently	GITET Development Project Site	During the construction activity of PLTGU took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Bekasi Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			environment	c. Unbuilt area will function as RTH or buffer zone of noise barrier d. Install the muffler in the vehicle and heavy equipment unit if possible e. Group the types of construction activities between day and night work f. Build a 3 meter high wall around the GITET construction location before construction started			b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
15	Decreasing Employment Opportunities	Discharge of Construction Labor	a. Discharge of labor in accordance with Law No. 13 of 2003 on Manpower, Provincial and/or Regency Minimum Wage and Work Contract Agreement b. There is documentation of labor discharge included c. There is a notification letter and/or discharge of	a. The initiator regularly informs the Department of Manpower and Transmigration of Regency on the amount of discharge of labor during the construction period and the end of the construction period. b. Provide information and coordinate to the Head of Urban Village (Lurah) and Head of	The construction areas of FSRU, PLTGU, GITET, SUTET and Transmission Networks and surrounding Villages are affected by project of the	During construction labor discharge activities.	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			labor to the Department of Manpower and Transmigration, Head of Sub-district and Head of Village/Urban-Village d. There is documentation in the form of explanation sheets of employment contracts concerning the discharge of labor when receipt of labor	Subdistrict openly and transparently c. Describes the labor discharge mechanism initiated during labor recruitment d. Initiator of activities or contractors will conduct socialization and consultation on the discharge of labor at all stages e. Assist in directing the labor who has completed his/ her contract period in other similar activities f. Discharge the labor gradually	origin of labor		province e. Department of Manpower and Transmigration of Bekasi Regency f. Department of Manpower and Transmigration of Subang Regency g. Department of Manpower and Transmigration of Karawang Regency h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							Forestry
16	Changes in Income Level Community	Discharge of Construction Labor	The initiator of activity complies with applicable regulations: Law No. 13 of 2003 on Manpower, Provincial and/or Regency Minimum Wage and Work Contract Agreement	a. The initiator regularly informs the Department of Manpower and Transmigration of Regency on the amount of discharge of labor during the construction period and the end of the construction period. b. Provide information to the Head of Urban Village (Lurah) and Head of Subdistrict openly and transparently c. Describes the labor discharge initiated during labor recruitment d. Initiator of activities or contractors will conduct socialization and consultation on the discharge of labor at all stages e. Conduct the mechanisms of employee mechanisms in accordance with applicable regulations f. Fulfillment of labor rights in accordance with the agreement in the employment contract	The Project Sites of FSRU, PLTGU, GITET, SUTET and Transmission Networks and surrounding Villages are affected by project of the origin of labor	During construction labor discharge activities.	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Department of Manpower and Transmigration of Bekasi Regency f. Department of Manpower and Transmigration of Subang Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							g. Department of Manpower and Transmigration of Karawang Regency h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency **d.** DLHK of West Java province **e.** Ministry of Environment and Forestry
2. Operation							
1	Increased Employment Opportunities	Reception of Operation Labor	a. Socialization of information on the receipt of labor. b. The initiator of activity complies with applicable regulations: Law No. 13 of 2003 on Manpower, Provincial and/or Regency Minimum Wage	a. At the socialization stages, the initiator socialize the available employment opportunities, the required requirements, the required amount and the receipt process b. Coordinate with the Department	39 villages directly affected by PLTGU Jawa-1 activities included in Karawang regency, Bekasi Regency	Before and during labor recruitment of the operation stages	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. Department of Manpower and Transmigration of

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			and Work Contract Agreement c. The process of labor absorption comply with Local Regulation of Karawang No. 1 of 2011 d. The absorption of local labor as labor during construction activities took place e. Fulfillment of local labor quota/allocation of 60%	of Manpower and Industry of the Karawang regency, Bekasi regency and Subang regency, Subdistrict and Village Governments as well as community representatives related to the recruitment of labor. c. Prioritize local communities by adhere the following provisions: 1) Acceptance of labor with Senior High School level and lower focused on affected urban-village, 2) Acceptance of D3 level education labor is focused to be met from the West Province, and 3) Acceptance of S1 level education labor is focused to be fulfilled nationally d. Make allocation/quota of total local labor recruitment i.e. labor from affected Village/Urban villages, i.e. equal to 60% or in accordance with applicable local regulation. e. Require contractors to	and Subang Regency.		Bekasi Regency b. Department of Manpower and Transmigration of Subang Regency c. Department of Manpower and Transmigration of Karawang Regency d. DLHK of Bekasi Regency e. DLHK of Subang Regency f. DLHK of West Java province g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				prioritize acceptance of local labor in accordance with the required qualifications in accordance with established quota. f. Periodically informs to the communities about the number and types of employment available through the Department of Manpower and Transmigration of the Karawang Regency, Bekasi Regency and Subang Regency, Village Heads and Subdistrict Heads openly and transparently. g. Publish information system on the use of construction labors through various media, such as leaflets, bulletin boards or other media			
2	Decreased Sea Water Temperature	Operational of FSRU	The temperature of sea water in the affected area during the FSRU operation meets the quality standard in accordance with the Decree of Environment Minister No. 51 of 2004 by taking into account the baseline environmental setting	a. The waste water from the process at FSRU will be managed in accordance with the provisions set out in MARPOL 73/78 before being discharged into the sea b. Dispose of FSRU process water in the water column c. The outlet pipe will be equipped	FSRU and the surrounding area	During FSRU operations	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of Subang Regency b. DLHK of West Java province

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			conditions at the time of AMDAL	with a diffuser			c. Department of Marine and Fisheries of Subang Regency d. Ministry of Energy and Mineral Resources – Directorate General of Electricity e. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Subang Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry
3	Decreased Fish Catchment Area	Operational of FSRU	There is a alternatative programs built to develop fisherman productivity in event of catchment result management	a. Coordinate and socialize to fishermen and related parties around the operational area of FSRU b. Conduct the socioeconomic studies related to increasing the productivity of catching and managing the fishermen catch result management	FSRU and the surrounding area	During FSRU operations	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of West Java province b. Department of Marine and Fisheries of Subang Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				c. Develop CSR program to encourage productivity of fisherman catch results d. If necessary, provide compensation to fishermen if at the mooring location there is a important points of fish catch such as FADs			c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Subang Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry
4	Increased dust concentration ($TSP/PM_{10}/PM_{2,5}$)	Operational of HSRG	a. Concentration of TSP, PM_{10}, $PM_{2.5}$ meets the required quality standards of the Indonesia Regulation No. 41 of 1999 on the Control of Air Pollution. b. Operation of HSRG in accordance with the Decree of the Head of the Environmental Impact Management Agency No. 205 of 1996 on the Technical	a. Perform routine maintenance of HSRG in accordance with the SOP b. Installing Continuous Emission Monitoring Systems (CEMS) on the stack, to measure the concentration of emissions continuously, processing and reporting CEMS measurement data in accordance with applicable regulations. (based on Minister of Environment Regulation no. 21 of 2008.	PLTGU Project Site	During the operational activity of HSRG took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			Guidelines for Air Pollution Control of Stationary Source c. The dust concentration level meets the quality standard of the Regulation of Minister of Environment No. 21 of 2008 on Static Emission Sources Quality Standard for Business and/or Activities of a Thermal Power Plant: Particulate (30 mg/m^3) d. The concentration of managed (particulate) parameters meets ambient and emission air quality standards	c. Ensure CEMS devices work continuously for 24 hours d. Perform regular calibration to the installed CEMS devices. e. Ensure the implementation of routine maintenance and calibration of installed CEMS units is not conducted simultaneously. f. To make design of examination of stack technical requirements in accordance with theTechnical Guidelines for Air Pollution Control of Stationary Source the Decree of Head of Environmental Impact Control Agency No. 205 of 1996			of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
5	Increased Concentration of SO_2	Operational of HSRG	a. The initiator of the activity comply the Government Regulation No.: 41 of 1999 on the Control of Air Pollution, SO_2 (24 hours) i.e. 365 µg/m^3 b. Operation of HSRG in accordance with the Decree of the Head of the Environmental Impact	a. Perform routine maintenance to the HSRG operational in accordance with the SOP b. Installing Continuous Emission Monitoring Systems (CEMS) on the stack, to measure the concentration of emissions continuously, processing and reporting CEMS measurement data in accordance with applicable	PLTGU Project Site	During the operational activity of HSRG took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			Management Agency No. 205 of 1996 on the Technical Guidelines for Air Pollution Control of Stationary Source c. The initiator of the activity comply the regulation of the Minister of Environment No.: 21 of 2008 on Static Emission Sources Quality Standard for Business and/or Activities of a Thermal Power Plant, SOx (150 mg/m^3) d. The availability of CEMS devices that can be operated continuously in accordance with the provisions in the Minister of Environment Regulation No. 21 of 2008	regulations. (based on Minister of Environment Regulation No. 21 of 2008. c. Ensure CEMS devices work continuously for 24 hours d. Perform regular calibration to the installed CEMS devices. e. Ensure the implementation of routine maintenance and calibration of installed CEMS units is not conducted simultaneously. f. Immediately report to BLH of Karawang regency if SOx (visible by naked eye) exceeds the standard quality threshold value. g. To make design of examination of stack technical requirements in accordance with theTechnical Guidelines for Air Pollution Control of Stationary Source the Decree of Head of Environmental Impact Control Agency No. 205 of 1996 h. Prepare the emergency response system and socialize it to all elements within the regional radius in the study area			and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				i. Conduct simulation of emergency conditions on the emission stack by involving community who are estimated to be affected			
6	Increased Concentration of NOx	Operational of HSRG	a. NOx concentration meets quality standard of Ambient air quality Government Regulation No.. 41 of 1999 on the Control of Air Pollution, SO2 (24 hours) i.e. 150 µg/m^3 b. Operation of HSRG in accordance with the Decree of the Head of the Environmental Impact Management Agency No. 205 of 1996 on the Technical Guidelines for Air Pollution Control of Stationary Source c. The NOx concentration meet the quality standard of the Regulation of Minister of Environment No. 21 of 2008 on Static Emission Sources Quality Standard for Business and/or Activities of a Thermal Power Plant,	a. Using a boiler with low NOx burner systems b. Perform routine maintenance to the boiler operations with low NOx burner system in accordance with the SOP c. Installing Continuous Emission Monitoring Systems (CEMS) on the stack, to measure the concentration of emissions continuously, processing and reporting CEMS measurement data in accordance with applicable regulations. (based on Minister of Environment Regulation No. 21 Year d. Ensure CEMS devices work continuously for 24 hours e. Perform regular calibration to the installed CEMS devices. f. Ensure the implementation of routine maintenance and calibration of installed CEMS units is not conducted simultaneously.	PLTGU Project Site	During the operational activity of HSRG took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency **b.** DLHK of West Java province **c.** Ministry of

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			SOx (400 mg/m^3) d. The concentration of managed (NOx) parameters meets ambient and emission air quality standards e. The availability of CEMS devices that can be operated continuously in accordance with the provisions in the Minister of Environment Regulation No. 21 of 2008	g. To make design of examination of stack technical requirements in accordance with theTechnical Guidelines for Air Pollution Control of Stationary Source the Decree of Head of Environmental Impact Control Agency No. 205 of 1996 h. Immediately report to DLH of Karawang regency if NOx exceeds the standard quality threshold value. i. Prepare the emergency response system and socialize it to all elements within the regional radius in the study area j. Conduct simulation of emergency conditions on the emission stack by involving community who are estimated to be affected			Environment and Forestry
7	Increased Noise	Operational of HSRG	a. Noise level does not exceed the quality standard of Decree of the State Minister of Environment Number: Kep-48/MenLH/11/1996 on the Noise Level Quality Standard of 55 dBA for	a. Perform routine maintenance to the HSRG and its supporting components according to the instructions and needs b. Install muffler equipment in accordance with the design of the building layout and project needs c. Revegetate around the HSRG area	PLTGU Project Site	During the operational activity of HSRG took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			settlement, 70 dB for industrial area. b. Initiator of Activity complies with Regulation of the Minister of Manpower and Transmigration Number 13 of 2011 on Threshold Value of Physical Factor and Chemical Factor in Workplace that is 85 dBA with exposure time per day for 8 hours c. Availability of HSRG Design documentation that is friendly to the surrounding environment d. Availability of safety induction materials for visiting guests who have some materials adjusted to guest needs. e. There is a HSRG space documentation and green open spaces around the HSRG home area f. Availability of noise level measurement results with equipments	to reduce noise d. Providing Green Open Space (RTH) within the project location by referring to the applicable regulations on green open spaces e. Every worker in the power plant location is required to use earplugs are meet the SNI as needed f. Conduct regular health check-up for workers g. Establish a length of time limit to worker permitted within the power plant location as recommended by the doctor or relevant institution on health h. Monitoring data results is tabulated and compared with standard noise level in accordance with Decree of the Minister of Environment No. KEP-48/MENLH/11/1996 year 1996			province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
8	Changes in Disease Prevalence	Operational of HSRG	a. There is a plans and efforts to prevent and manage diseases related to HSRG operational activities b. HSRG operational activities do not contribute to an increase in public health problems.	a. Requires labor contractor users to conduct regular medical check-up once each year during the operation stages took places b. Provide health protection insurance to every worker received. c. Assist Puskesmas in providing health services to affected communities. d. Conduct a medical check-up for each employee and non-skilled worker at least once time per year during construction activities at a designated health clinic e. Fulfillment of health requirements for the recruitment of labor f. Perform regular health check-up for employees g. Provide a community grievance contact number	PLTGU Project Site	During the operational activity of HSRG took place	**Executive Institution:** PT JSP and Executive Contractor **Executive Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Health Office of Karawang Regency **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
9	Increased Salt Particles	Operational of Cooling Tower System	Air quality in the area around the cooling tower system meets the quality standards required in Government Regulation No. 41 of 1999 on the Control of Air Pollution: a. TSP (24 hours) i.e. 230 230 µg/m^3 b. PM_{10} (24 hours) i.e 150 µg/m^3 c. $PM_{2,5}$ (24 hours) i.e 65 µg/m^3	a. Using cooling tower that has high effectiveness in its operation b. Perform routine maintenance of cooling tower system facilities c. Install drift eliminator to minimize salt particles released along with replacement of water in cooling tower	Cooling tower location	During the operational activity took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							c. Ministry of Environment and Forestry
10	Increased Noise	Operational of Cooling Tower System	Noise level at the location of nearby residents meets the quality standard in the Decree of the State Minister of Environment. 48/MENLH/XI/1996 on Noise Level Standards	Construction of damper wall, double metal wall and acoustic insulation with P dimension covering cooling tower unit.	Around the location of noise sources especially cooling tower	During the operational activity took place	**Executive Institution:** PT JSP and Executive Contractor **Executive Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province **c.** Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
11	Increased temperature	Operational of Cooling Tower System	a. Maintain the quality of waste water in accordance with quality standard of the Regulation of Environment Minister No. 08 of 2009 on Waste Water Quality Standard for Business and/or Activities of Thermal Power Plant b. The level of quality of seawater affected by increased temperature still meets the quality standard applied Decree of Environment Minister No. 51 of 2004 on the Sea Water Quality Standard Appendix III for Marine Biota:	a. Perform machine maintenance regularly b. Taking blowdown from cold side of cooling tower	PLTGU Cooling Water System	During the operational activity took place	**Executive Institution:** PT JSP and Executive Contractor **Executive Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
12	Increased salinity	Operational of Cooling Tower System	At a radius of 30 meters from outfall of salinity level is equivalent to the natural	Limiting the maximum Cycle of Concentration in the cooling system circuit is limited to 1.4	PLTGU project site and surrounding areas	During PLTGU operations	**Executive Institution:** PT JSP and Executive Contractor

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			salinity condition of the surrounding area according to the Regulation of Environment Minister No. 8 of 2009 on the quality standard of thermal activity waste water				**Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry

Table 2-2 Matrix of Environmental Management Plan (Managed Other Impact)

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
B. Other impacts are need to be managed (Results of Management Direction on ANDAL)							
1) Pre-Construction Stage							
1	Community Grievance	Socialization of Activity Plans	a. Availability of community grievance handling management. b. There is evidence of grievance handling related to PLTGU Jawa-1 activity plan	a. Developing communication systems and mechanisms of community grievance submission at the village/ urban-village level b. Conduct periodic and ongoing socialization to communities and stakeholders regarding project activity plans c. Socialize grievance submission mechanisms, including organization and company personnel along with project executive in charge of receiving grievance d. Provide representative room / offices to be reached by the community in submitting grievance and its employees who are ready to accommodate the grievance of community e. Provide a grievance submission contact number f. Respond to every community grievance in a friendly and transparent manner in accordance	Activity location of PLTGU Jawa-1 and nearest settlement of project location	During the socialization activities of PLTGU Jawa-1 activity plan	**Executive Institution:** PT JSP **Supervisory Institution:** a. BPN of Karawang Regency b. Agriculture Office of Karawang Regency c. DLHK of Karawang Regency d. BPN of Bekasi Regency e. Agriculture Office of Bekasi Regency f. DLHK of Bekasi Regency g. DLHK of West Java province h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:**

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				with the actual conditions. g. Make a monitoring and create reports of grievance handling from the community			a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. Ministry of ESDM- Directorate General of Electricity d. Ministry of Environment and Forestry a.
2	Changes in Land Ownership Status	Land acquisition	Land acquisition for the purpose of road construction shall refer to the provisions stipulated in the Presidential Regulation No. 148 of 2015 on the Fourth Amendment to Presidential Regulation No. 71 of 2012 on the Implementation of Land Acquisition for Development in the Public Interest	a. Conducting participatory mapping to the land to be acquired for thepurpose of access road construction b. Conduct Check and Clearance to the Legality of Land Ownership to be acquired c. Conducting fair negotiations to the lands will be acquired d. Involve elements of local community leaders in the land acquisition process e. Provide a fair compensation in accordance with applicable regulations or the result of negotiated agreement from the initiator and the landowner. f. The process of land acquisition will be conducted directly	Location of the creation plan of Access Road in Muara Village, Cilamaya Wetan Subdistrict	During the land acquisition process took place	**Executive Institution:** PT JSP **Supervisory Institution:** a. BPN of Karawang Regency b. Agriculture Office of Karawang Regency c. DLHK of Karawang Regency d. DLHK of West Java province e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient**

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				between the landowner and the initiator.			**Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. Ministry of ESDM- Directorate General of Electricity d. Ministry of Environment and Forestry
3	Changes in Agricultural Land Function	Land acquisition	a. Construction activities do not contribute to the decreasing agricultural productivity of local communities. b. The initiator has a CSR program related to improving agricultural productivity	a. Provide additional agricultural socialization as part of corporate CSR programs in collaboration with department of agricultural and farmer groups b. Provide appropriate agricultural equipment to farmers affected to improve agricultural productivity c. Maximizing project land located on agricultural land, especially rice fields in order it can be used as agricultural land, such as in the SUTET tower sites by first providing socialization to farmers related to the prohibition and limitation of activities can be conducted.	38 villages directly affected by PLTGU Jawa-1 activities included in Karawang regency and Bekasi Regency.	During Land Acquisition Activities and continued to the construction and operation stages	**Executive Institution:** PT JSP **Supervisory Institution:** a. BPN of Karawang Regency b. Agriculture Office of Karawang Regency c. DLHK of Karawang Regency d. BPN of Bekasi Regency e. Agriculture Office of Bekasi Regency f. DLHK of Bekasi Regency g. DLHK of West Java province h. Ministry of Energy and Mineral Resources – Directorate General of

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				d. Immediately rehabilitating the land that only can be used its re-functioned into agricultural land			Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. Ministry of ESDM-Directorate General of Electricity d. Ministry of Environment and Forestry
4	Changes in Community Livelihood Patterns	Land acquisition	a. The creation of new jobs and/or livelihoods for the communities directly affected in the Muara village such as landowners, farmers, farm labors, fishpond labors and fishpond labors. b. Number and status of locallabors absorbed in project activitiesas well asincreased incomes of residentsaroundthe project.	a. Conduct Inventory of farmers, landowners, farm labors and tenant farmers, who rely their life from land which is the location of the PLTGU Jawa-1 plan b. Conduct deliberate consensus with landowners attended by stakeholders related to the determination of the sale and purchase value and other compensation will be desired by communities.	38 villages directly affected by PLTGU Jawa-1 activities included in Karawang regency and Bekasi Regency.	During Land Acquisition Activities and continued to the construction and operation stages	**Executive Institution:** PT JSP **Supervisory Institution:** a. BPN of Karawang Regency b. Agriculture Office of Karawang Regency c. DLHK of Karawang Regency d. BPN of Bekasi Regency e. Agriculture Office of Bekasi Regency f. DLHK of Bekasi Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			c. Increasing number of residents workingin the informalsector. d. Increased community income. e. Guidance Activities on the economic activities of services was developed in the projectarea.	c. Provide opportunities for farmers, landowners, farm labors and tenant farmers to take precedence over recruitment of labor and the supply of goods and services in the development of PLTGU Jawa-1 in accordance with the needs, requirements of the PLTGU Jawa-1 activities d. Conduct early socialization related to the employment opportunities and business opportunities related to the activities of PLTGU Jawa 1 to the people who lost their livelihood. e. Creating CSR programs in the field of community empowerment to maintain and/or improve the welfare of residents who lost their livelihoods and are not enable to be absorbed in Jawa-1 development activities. f. Provide training for community are lose their livelihoods related to land acquisition for community who want to work in			g. DLHK of West Java province h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. Ministry of ESDM- Directorate General of Electricity d. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				the PLTGU Jawa1 project according to the needs of the company and the community desire, such as training of artisans, security training, and etc. g. Periodically inform to the community about the number and types of job opportunities available through relevant institututions such as farmer groups, youth organization, village, subdistrict and Department of Manpower h. Establish and implement Grievance Mechanisms and institutions that are representative and transparent and easily accessible to communities, especially community who lose their livelihood i. Socialize grievance grievance mechanisms related to land acquisition to communities directly affected by land acquisition activities. j. Respond to every community			

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				grievance in a friendly and transparent manner in accordance with the actual conditions. k. Conduct deliberations with the community to reach approval related to the handling of community grievance if necessary.			
5	Changes in Income Level Community	Land acquisition	a. The absence of reduction in the average number of community incomes that becomes landowners, tenant farmers, farm labors, fishpond owners and fishpond labors after procurement for PLTGU Jawa-1 activities b. Communities who shifted professions becomes the PLTGU Jawa-1 project receive incomes according to the set minimum wage and not lower than their monthly average incomes when they become farmers.	a. Conduct Inventory of farmers, landowners, farm labors and tenant farmers, who rely their life from land which is the location of the PLTGU Jawa-1 plan b. Provide opportunities for farmers, landowners, farm labors and tenant farmers to take precedence over recruitment of labor and the supply of goods and services in the development of PLTGU Jawa-1 in accordance with the needs, requirements of the PLTGU Jawa-1 activities c. Creating CSR programs in the field of community empowerment to maintain and/or improve the welfare of residents who lost	38 villages directly affected by PLTGU Jawa-1 activities included in Karawang regency and Bekasi Regency.	During Land Acquisition Activities and continued to the construction and operation stages	**Executive Institution:** PT JSP **Supervisory Institution:** a. BPN of Karawang Regency b. Agriculture Office of Karawang Regency c. DLHK of Karawang Regency d. BPN of Bekasi Regency e. Agriculture Office of Bekasi Regency f. DLHK of Bekasi Regency g. DLHK of West Java province h. Ministry of Energy and Mineral Resources – Directorate General of Electricity

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				their livelihoods and are not enable to be absorbed in Jawa-1 development activities. d. Provide opportunities for communities through individual businesses, SMEs, cooperatives and the like to be involved in the PLTGU Jawa-1 project In accordance with the needs and requirements of the company.			i. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. Ministry of ESDM- Directorate General of Electricity d. Ministry of Environment and Forestry
2) Construction Stage							
1	Changes in Population	Reception of Construction Labor	Controlled population administration at the construction stage as listed the number of incoming residents from outside the affected areas of the village as a direct result of the use of manpower of the PLTGU Jawa 1 project development	a. The initiator establishes a policy or regulation for the internal company and all executive contractors, concerning the administration of population: b. Obligate all workers (migrants) to have temporary residence administration permits or similar permits in accordance with the location of the workers' residence c. Record the identity Card and/or Certificate of Residence Permit (migrants) of the village which	39 villages directly affected by PLTGU Jawa-1 activities included in Karawang regency, Bekasi Regency and Subang Regency.	Before and during labor recruitment of the operation stages	**Executive Institution:** PT JSP and Executive Contractor **Executive Institution:** a. Department of Manpower and Transmigration of Karawang Regency b. Department of Manpower and Transmigration of Bekasi Regency c. Department of Manpower and Transmigration of Subang Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				became the temporary residence of workers coming from outside the regency, Bekasi, Karawang regency and Subang regency. d. Obligate all project workers to have ID Card and/or Certificate of Residence in Karawang Regency, Bekasi Regency or Subang Regency according to location of temporary residence of workers during construction took place e. Documenting the complete data of the project workers including the origin of the residence and the identity card (ID Card and / or Certificate of Residence Permit) f. Report periodically the number of project workers, and their mutations, by separating by identity card (ID Card / Family Card and/or Certificate of Residence Permit), including foreign workers, to initiators and related institutions g. Obligate the contractor to return the migrant workers to the original location as evidenced by the written agreement between the			d. DLHK of Karawang Regency e. DLHK of Bekasi Regency f. DLHK of Subang Regency g. DLHK of West Java province h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				employee and the company.			
2	Increased Business Opportunities	Reception of Construction Labor	a. The establishment of new businesses by local communities regarding the existence of construction workers around construction activity locations b. The development of businesses during construction activities, especially businesses that are directly related to construction activities c. The absorption of a number of MSMEs, cooperatives, business groups, individual businesses and local companies around the location of activities.	a. Socialize the needs, requirements, qualifications and project specifications to MSMEs, cooperatives, business groups, individual businesses and local companies before the project is implemented and consult so that they can gradually meet the requirements, qualifications and specifications of project. b. Publish the needs of goods and services provisions as well as requirements periodically and continously, through a variety of media that is easily seen by the public, such as bulletin boards, local radio, leaflets or other media. c. Obligate partner contractors to consider and prioritize MSMEs, cooperatives, business groups, individual businesses and local companies as required, requirements, qualifications, and specifications of project. d. Coordinate with Subdistrict Government, DPKUM (Trade Office,	39 villages directly affected by PLTGU Jawa-1 activities included in Karawang regency, Bekasi Regency and Subang Regency.	Before and during labor recruitment of the operation stages	**Executive Institution:** PT JSP and Executive Contractor **Executive Institution:** a. Department of Manpower and Transmigration of Karawang Regency b. Department of Manpower and Transmigration of Bekasi Regency c. Department of Manpower and Transmigration of Subang Regency d. DLHK of Karawang Regency e. DLHK of Bekasi Regency f. DLHK of Subang Regency g. DLHK of West Java province h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				Cooperative and SMEs) and Department of Manpower and Transmigration, to collect data on growth of new business, at least about Name, Address, Business Sector, Number of Employee, Asset Value, Volume and Sales Region e. As part of the fulfillment of Social and Environmental Responsibility (CSR), implement the program of economic empowerment and capacity building of MSMEs, Cooperatives and other local businesses. Type and strategy of program implementation to be reviewed through social mapping studies with village communities and by involving government institutions or other relevant stakeholders.			**Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
3	Community Grievance	Reception of Construction Labor	a. The process of labor absorption comply with Law No. 13 of 2003 b. The process of labor absorption comply with Local Regulation of	a. Support, consider and prioritize workers from local labor (especially villages in the study area) in accordance with project needs and in accordance with the qualifications of	Village around the area of PLTGU Jawa-1	Before and during labor recruitment of the operation stages	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. Department of Manpower

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			Karawang No. 1 of 2011 c. Availability of community grievance handling management. d. There is evidence of grievance handling to the construction labor recruitment problems	available personnel b. Conduct early socialization related to job opportunities of PLTGU Jawa 1 c. Periodically will inform the communities about the number and types of job opportunities available through the Department of Manpower and Transmigration of the Karawang Regency d. Periodically will socialize the job opportunity to the Head of Urban Village (Lurah) and Head of Subdistrict openly and transparently e. Establish and implement institution and systems of Grievance Mechanisms are representative, transparent and accessible to the community. f. Socialize the grievance mechanism related to the recruitment of workers to the community g. Respond to every community grievance in a friendly and transparent manner in accordance with the actual conditions.			and Transmigration of Karawang Regency b. Department of Manpower and Transmigration of Bekasi Regency c. Department of Manpower and Transmigration of Subang Regency d. DLHK of Karawang Regency e. DLHK of Bekasi Regency f. DLHK of Subang Regency g. DLHK of West Java province h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency **d.** DLHK of West Java

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				h. Conduct deliberations with the community to reach approval related to the handling of community grievance if necessary. f. Create an official reports of any grievance handling that has been followed up and declared completed which is acknowledged by the representative of the community who has submitted the grievance.			province **e.** Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
4	Increased Concentration of NOx CO dan HC	Mobilization of Equipment and Materials (By Land)	Concentration of NOx, CO and HC meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution:	a. Vehicles that operate are road worthy vehicles in accordance with the road class to be passed and has all the required letter and permit. b. All vehicles used in the mobilization activities of equipment and materials are road worthy and meet emission quality standards in accordance with the Regulation of Ministry of Environment and Forestry No. P.20/MENLHK/SETJEN/KUM.1/3/2017 on the Quality Standard of New Type Automotive Gas Disposal Vehicle of Category M, N, and category O. a. The vehicles used will be effectively maintained to minimize exhaust emissions and ensure that during operation the vehicles meets the quality standards for motor vehicle exhaust emissions required by applicable regulations b. The vehicles use the fuel recommended by the manufacturer and do not use fuel are caused	Affected villages and villages passed by equipment and material mobilization activities	During equipment and material mobilization activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLLAJR of Karawang Regency e. DLLAJR of Bekasi Regency f. DLLAJR of Subang Regency g. DLHK of West Java province h. Department of Transportation of Karawang Regency i. Department of Transportation of Bekasi Regency j. Department of Transportation of Subang Regency k. Department of Transportation of West

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				the high exhaust gas emissions c. Vehicles are serviced periodically in accordance with recommendations as evidenced by periodic service cards provided by the company and/or designated workshop companies d. The mobilization is performed outside of peak hours (at 07.00-09.0) and 16.00-19.00). e. Install the number of grievance contacts to each vehicle to make it easier for community to report in case of inappropriate condition. f. Prepare a standby reserve vehicle and tow vehicles to anticipate abnormal condition. g. As part of the fulfillment of social and environmental responsibilities (CSR), planting plants in the area of roads that will be passed the mobilization of equipment and building materials. Planting location and plant species to be reviewed by involving government institutions.			Java Province l. Ministry of Energy and Mineral Resources – Directorate General of Electricity m. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
5	Increased Noise	Mobilization of Equipment and Materials (By Land)	The intensity of the noise generated does not exceed the quality standard based on Decree of Environment	a. Vehicles that operate are road worthy vehicles in accordance with the road class to be passed and has all the required letter	Villages affected by the construction of PLTGU Jawa-1	During the demobilization activity took place	**Executive Institution:** PT JSP and Executive Contractor

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			Minister No. 48 of 1996, namely: a. 55 dBA for residential environment, b. 70 dBA of road & industrial environment as well as trade and service environment	and permit. b. Make SOPs about driving procedures while passing through residential areas such as not honking, not playing gas and etc. c. Set the speed of vehicle as it passes the residential areas that is a maximum of 30 Km/hour. d. Strive for non-conforming vehicles that is the time interval between one vehicle and other vehicle between 10 – 15 minutes. e. Ensure cargo of carrier vehicles according to their capacity f. The mobilization is performed outside of peak hours (at 07.00-09.0) and 16.00-19.00). g. There is no mobilization activity between the hours of 00.00-05.00 (hours of night rest) unless certain circumstances require to be conducted at night according to police and DLLAJ directives or in accordance with the agreement with the surrounding community			**Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLLAJR of Karawang Regency e. DLLAJR of Bekasi Regency f. DLLAJR of Subang Regency g. DLHK of West Java province h. Department of Transportation of Karawang Regency i. Department of Transportation of Bekasi Regency j. Department of Transportation of Subang Regency k. Department of Transportation of West Java Province l. Ministry of Energy and Mineral Resources – Directorate General of

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				h. Install traffic signs on vehicle speed restrictions. i. Use a vehicles which are roadworthy. as evidenced by the Motor Vehicle (KIR) test and other relevant requirements j. Install muffler on vehicles used as needed and possibly to be used k. Each vehicle has a GPS that can be monitored centrally by JSP and/or executive contractor. l. Install the grievance contact number in each vehicle			Electricity m. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
6	Increased Business Opportunities	Mobilization of Equipment and Materials (By Land)	a. The absorption of a number of MSMEs, cooperatives, business groups, individual businesses and local companies around the location of activities. b. There is documentation of company policy to prioritize MSMEs, cooperatives, business groups, individual businesses and local companies as required, requirements, qualifications, and	a. The activity initiator or executive contractor will consider and prioritize MSMEs, cooperatives, business groups, individual businesses and local companies as required, requirements, qualifications, and specifications of project. b. The activity initiator or executive contractor will socialize the needs, requirements, qualifications and project specifications to MSMEs, cooperatives, business groups,	Villages affected by the construction of PLTGU Jawa-1	During mobilization and construction activities took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLLAJR of Karawang Regency e. DLLAJR of Bekasi Regency f. DLLAJR of Subang

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			specifications of project. c. There is a data reports of MSMEs, cooperatives, business groups, individual businesses and local companies around the location of activities. d. There is documentation and material of socialization of the needs, requirements, qualifications, and specifications of the project to local entrepreneurs before the activities are implemented so that MSMEs, cooperatives, business groups, individual businesses and local companies e. There is a Circular Letter to contractors who need goods and services in the mobilization of equipments and materials to prioritize MSMEs, cooperatives, business groups, individual businesses and local companies as long as they	individual businesses and local companies before the project is implemented and consult so that they can gradually meet the requirements, qualifications and specifications of project. c. Requires each contractor who need goods and services in the mobilization of equipments and materials to prioritize MSMEs, cooperatives, business groups, individual businesses and local companies as long as they meet the requirements, qualifications and specifications of project d. As part of the fulfillment of Social and Environmental Responsibility (CSR), implement the program of economic empowerment and increasing capacity of local MSMEs. Type and strategy of program implementation to be reviewed through social mapping studies with village communities and by involving government institutions or other relevant stakeholders.			Regency g. DLHK of West Java province h. Department of Transportation of Karawang Regency i. Department of Transportation of Bekasi Regency j. Department of Transportation of Subang Regency k. Department of Transportation of West Java Province l. Ministry of Energy and Mineral Resources – Directorate General of Electricity m. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency

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			meet the requirements, qualifications and specifications of project				d. DLHK of West Java province e. Ministry of Environment and Forestry
7	Community Grievance	Mobilization of Equipment and Materials (By Land)	a. Availability of community grievance handling management. b. There is evidence of the grievance handling from the community related to equipment and material mobilization activities (by land)	a. Conduct early socialization related to job opportunities of PLTGU Jawa 1 b. Periodically will inform the communities about the number and types of job opportunities available through the Department of Manpower and Transmigration of the Karawang Regency c. Periodically will socialize the job opportunity to the Head of Urban Village (Lurah) and Head of Subdistrict openly and transparently d. Establish and implement institution and systems of Grievance Mechanisms are representative, transparent and	Roads passed by vehicles in the construction stages of PLTGU Jawa-	During the mobilization activity took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLLAJR of Karawang Regency e. DLLAJR of Bekasi Regency f. DLLAJR of Subang Regency g. DLHK of West Java province h. Department of

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				accessible to the community. e. Socializing the grievance mechanisms to the community f. Respond to every community grievance in a friendly and transparent manner in accordance with the actual conditions. g. Conduct deliberations with the community to reach approval related to the handling of community grievance if necessary. h. Create an official reports of any grievance handling that has been followed up and declared completed which is acknowledged by the representative of the community who has submitted the grievance.			Transportation of Karawang Regency i. Department of Transportation of Bekasi Regency j. Department of Transportation of Subang Regency k. Department of Transportation of West Java Province l. Ministry of Energy and Mineral Resources – Directorate General of Electricity m. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry

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8	Disruption of Land Traffic	Mobilization of Equipment and Materials (By Land)	a. The activity initiator and executive contractor comply with the provisions of Law No. 22 of 2009 on Road Traffic and Transportation b. No significant disruption to land traffic may result in other derivative effects	a. Conduct study of Traffic Impact Analysis b. Ensure all vehicles that operate are road worthy vehicles in accordance with the road class to be passed and has all the required letter and permit. c. Prepare driving SOPs for all vehicles used in the development of PLTGU Jawa-1 including speed limitation, tonnage limitation of vehicle load, tire quality, etc. d. Make every effort possible to mobilize activities outside of peak hours (at 07.00-09.0) and 16.00-19.00). e. Coordinate with relevant institutions (DLLAJR and traffic police) if they require escort and/or traffic engineering related to heavy equipment mobilization f. Install the number of grievance contacts to each vehicle to make it easier for community to report in case of inappropriate condition. g. Cover a pickup vehicle carrying	Roads passed by vehicles in the construction stages of PLTGU Jawa-1	During the mobilization activity took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLLAJR of Karawang Regency e. DLLAJR of Bekasi Regency f. DLLAJR of Subang Regency g. DLHK of West Java province h. Department of Transportation of Karawang Regency i. Department of Transportation of Bekasi Regency j. Department of Transportation of Subang Regency k. Department of Transportation of West

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				material to avoid falling material transported on the highways h. Prepare a standby reserve vehicle and tow vehicles to anticipate abnormal condition. i. Provide traffic guidance to locations are expected to cause significant traffic disruption such as T-junction entrance to project area on Cilamaya road			Java Province l. Ministry of Energy and Mineral Resources – Directorate General of Electricity m. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province f. Ministry of Environment and Forestry
9	Increased Noise	Mobilization of Equipment and Materials (By Sea)	a. The intensity of the noise generated does not exceed the quality standard based on Decree of Environment Minister No. 48 of 1996, namely: 1) 55 dBA for residential environment, 2) 70 dBA of road & industrial environment	a. Set the speed of the ship as it passes the water settlement which are close to the inhabitants so as not to cause noise that disturbs the comfort of residents b. Ensure cargo of carrier vehicles according to their capacity c. There is no mobilization activity between the hours of 00.00-05.00 (hours of night rest) unless	The voyage routes of mobilization activities is mainly near the coast of Muara village	During equipment and material mobilization activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of West Java

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			as well as trade and service environment b. There is no significant disruption to the activities of fishermen as a result of Equipment and Material Mobilization activities (By Sea) c. There is documentation of Letter of notification regarding commencement of mobilization activities to relevant institutions and fishermen groups along with the timing of the implementation d. The availability of socialization material of mobilization activities (by sea) that is easy to understand by fishermen and its implementation schedule e. There is documentation of the Map of fishermen and fishing activities around the development including information on important locations for fishermen and	certain circumstances require to be conducted at night according to water police directives and KSOP class 3 Pamanukan			province d. KSOP Class III Pamanukan e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Director General of Marine Transportation, Ministry of Marine Affairs g. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency **c.** DLHK of West Java province Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			evidence that has been conducted direction to all executive operators of mobilization activities by sea				
10	Disruption of Fishermen's Activities	Mobilization of Equipment and Materials (By Sea)	a. There is no significant disruption to the activities of fishermen as a result of equipment and material mobilization activities (by sea) b. Availability of warning signs to prevent disruption of fisherman's activities	a. Coordinate and socialize to fishermen and related parties around the sea mobilization route area b. Install warning signs related to mobilization/demobilization activities in the area around the entry lines to the Jetty c. Conduct routine inspections and maintenance signs d. Conduct routine patrols	The voyage routes of mobilization activities is mainly near the coast of Muara village	During equipment and material mobilization activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of West Java province d. Department of Fisheries of Subang Regency e. Department of Fisheries of Karawang Regency f. Directorate of Traffic and Sea Transportation, Ministry of Marine Affairs g. Ministry of Environment and Forestry **Report Recipient Institution:**

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							a. DLHK of Karawang Regency b. DLHK of Subang Regency **c.** DLHK of West Java province **d.** Ministry of Environment and Forestry
11	Disruption of Sea Traffic	Mobilization of Equipment and Materials (By Sea)	No incidents of sea transportation disruption caused by mobilization of equipment and materials by sea	a. Coordinate and socialize to fishermen and related parties around the sea mobilization route area b. Install warning signs related to mobilization/demobilization activities in the area around the shipping passed c. Conduct routine inspections and maintenance signs d. Conduct routine patrols e. Provide an appeal to fishermen to conduct intensive coordination during fishing on the shipping area.	The voyage routes of mobilization activities is mainly near the coast of Muara village	During equipment and material mobilization activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of West Java province d. KSOP Class III Pamanukan e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Director General of Marine Transportation, Ministry of Marine Affairs g. Ministry of Environment

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							and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency **c.** DLHK of West Java province **d.** Ministry of Environment and Forestry
12	Increased Concentration of NOx CO dan HC	Land Clearing	a. Concentration of NOx, CO and HC meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution: b. Emissions from all equipment do not exceed the quality standard specified in the Regulation of the Minister of Environment and Forestry No. P20/ MENLHK/SETJENKUM/ KUM.1/3/2017 on the Quality Standard of New Type Automotive Gas	a. Vehicles and equipment used in land clearing activities are road worthy vehicles in accordance with its designation and capacity b. The vehicle and equipments are used will be effectively maintained to minimize exhaust emissions and ensure that during operation the vehicles meets the quality standards for motor vehicle exhaust emissions required by applicable regulations through random inspection c. The vehicle and equipments are used in the clearing activities	Location of land clearing area of PLTGU Jawa-1	During land clearing activities took place (± 2 years)	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Department of Transportation of Karawang Regency e. Ministry of Energy and Mineral Resources – Directorate General of Electricity

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			Disposal Vehicle of Category M, N, and category O.	us the fuel recommended by the manufacturer and do not use fuel are caused the high exhaust gas emissions d. Vehicles are serviced periodically in accordance with recommendations as evidenced by periodic service cards provided by the company and/or designated workshop companies e. Install the number of grievance contacts to each vehicle to make it easier for community to report in case of inappropriate condition. f. As part of the fulfillment of social and environmental responsibilities (CSR), planting plants in the area of roads that will be passed the mobilization of equipment and building materials. Planting location and plant species to be reviewed by involving government institutions.			f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Environment and Forestry
13	Increased Surface Run Off	Land Clearing	a. Controlled run off water management such as the smooth of run off water	a. Make SOP of land clearing activities and monitoring mechanisms for executive	Location of PLTGU Jawa-1	During land clearing activities	**Executive Institution:** PT JSP and Executive Contractor

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			into drainage/river channels b. There was no puddle around the site of the project preparation	contractor to be supervised and ensured to implrmrnt SOP properly b. Land clearing activities is performed in stages and planned and limited to the project area c. Make a temporary drainage system around the outer boundary of the project sites with dimensions that can accommodate water run off during peak periods of rainy season or maximum rainfall at the site of activity d. Conduct maintenance of drainage channels from sedimentation and other obstacles so that water does not overflow to areas outside the project sites e. Create a sediment trap to prevent sediment from entering to open water f. Build a settling pond with dimensions that can accommodate water during the highest rainfall g. Make a maintenance of setting pond from sedimentation and silting due to various materials		took place (± 2 years)	**Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Department of Transportation of Karawang Regency e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				h. Construct absorption or biopore wells in areas that have been declared completed its clearing by considering the design plans of PLTGU Jawa 1, aspects of K3 and other relevant aspects			
14	Increased Soil Erosion	Land Clearing	The level of soil erosion during land clearing can be controlled	i. Make SOP of land clearing activities that include erosion control during land clearing activities along with supervisory mechanisms for executive contractors to be supervised and ensured to run SOPs correctly j. Land clearing activities is performed in stages and planned and limited to the project area k. Make a temporary drainage system around the outer boundary of the project sites with dimensions that can accommodate water run off during peak periods of rainy season or maximum rainfall at the site of activity l. Create a sediment trap to prevent sediment from entering to open water m. Build a settling pond with	Location of PLTGU Jawa-1	During land clearing activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Department of Transportation of Karawang Regency e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:**

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				dimensions that can accommodate water during the highest rainfall n. Make a maintenance of setting pond from sedimentation and silting due to various materials			a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Environment and Forestry
15	Increased TSS Content	Land Clearing	a. The concentration of TSS in seawater meets the quality standard according to Decree of Environment Minister No. 51 of 2004 by taking into account the environmental setting conditions at the time of AMDAL b. There is a drainage system before cleaning is performed c. There is a representative place to accumulate material d. Availability of temporary waste disposal in the location of activities	a. Establish a temporary drainage system and renew the existing system and equipped with sedimentation ponds and litter trap to perform engineering flow of rainwater runoff so as not enter to the sea directly. b. Minimize the effects of rainwater blows on soil erosion through ground cover with tarpaulins or other materials on the land being cleared (landfill, compaction and pavement of soil). c. Stabilization of backfill soil slopes to prevent erosion and landslides. d. The preparation and maintenance of sediment traps is limited to the land being cleared to reduce the sediment entering the	Location of land clearing area of PLTGU Jawa-1	During land clearing activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Department of Transportation of Karawang Regency e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry

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				drainage channels and towards the settling pond. e. Maintenance of settling pond to ensure settling pond capacity to the amount of sediment entering during peak rain period. f. Placing the pile material of the land clearing results that has been established and protected from the potential flow of water that can flow directly into the sea. g. Keep surface soil in a safe location from surface runoff and erosion or perform special handling for reuse during rehabilitation and replanting on RTH lands. h. Immediately plant the completed site of land cleaning activities, especially in areas that are not or yet to be built			**Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Environment and Forestry
16	Changes in Land Cover	Land Clearing	a. Available and maintained at least 30% of land within the activity location as green open space (RTH) b. The design of the layout activities that provides at	a. Land clearing in the areas to be conducted development activities, whereas in areas where there is no development activities immediately conducted clearing for planting and greening	Site area of PLTGU and Jetty	During land clearing activities (± 2 years)	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			least 30% of land as RTH c. Availability of nursery location and plant seed placement	activities. b. Immediately planting and rehabilitating the vegetation in the area that has been designated as RTH by considering the needs of development activities as well as K3 c. Plant RTH area with various types of plants that have function as wildlife habitat and have aesthetic function and decoration for beauty by remain considering K3 factor related to PLTGU Jawa-1 activities.			Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Energy and Mineral Resources – Directorate General of Electricity e. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency **c.** DLHK of West Java province Ministry of Environment and Forestry
17	Changes in Flora Biodiversity	Land Clearing	a. Maintained and increased quality and terrestrial flora biodiversity in areas that are not built and designated as RTH b. Availability of nursery land and plant seed placement c. There is a land	a. Planting RTH areas with species that have a function as a wildlife habitat and have aesthetic and decorative functions for beauty as well as considering aspects of K3 b. Conduct plant maintenance by replacing dead plants, pruning,	Location of land clearing area of PLTGU Jawa-1	During land clearing activities took place (± 2 years)	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			rehabilitation and revegetation program within the location of activities using local species and supporting as a wildlife habitat	thinning and other forms of maintenance to preserve the RTH area c. Prepare the land for plant nursery d. As part of the fulfillment of social and environmental responsibilities (CSR), along with the communities conduct greening outside PLTGU jawa-1 areas such as road sides, coast, river sides and other places. planting locations and plant species to be reviewed and involving government institutions			c. DLHK of West Java province d. Department of Transportation of Karawang Regency e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Environment and Forestry
18	Changes in Plankton Abundance	Land Clearing	Plankton abundance is remain maintained at a range of> 15,000 individual/litter (Basmi, 1987) or at a number relatively similar to the baseline	Manage to the primary impacts, namely: a. Establish a temporary drainage system and renew the existing system and equipped with sedimentation ponds and litter trap to perform engineering flow	Location of land clearing area of PLTGU Jawa-1	During land clearing activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				of rainwater runoff so as not enter to the sea directly. b. Minimize the effects of rainwater blows on soil erosion through ground cover with tarpaulins or other materials on the land being cleared (landfill, compaction and pavement of soil). c. Stabilization of backfill soil slopes to prevent erosion and landslides. d. The creation and maintenance of sediment traps is limited to the land being cleared to reduce the sediment entering the drainage channels and towards the settling pond. e. Maintenance of settling pond to ensure settling pond capacity to the amount of sediment entering during peak rain period. f. Placing the pile material of the land clearing results that has been established and protected from the potential flow of water that can flow directly into the sea.			b. DLHK of Bekasi Regency c. DLHK of West Java province d. Department of Transportation of Karawang Regency e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				g. Keep surface soil in a safe location from surface runoff and erosion or perform special handling for reuse during rehabilitation and replanting on RTH lands. h. Immediately plant the completed site of land cleaning activities, especially in areas that are not or yet to be built			
19	Community Grievance	Land Clearing	a. Availability of community grievance handling management. b. There is evidence of grievance handling from communities related to land clearing	a. Conduct management of land clearing according to the above management plan b. Developing communication systems and mechanisms of community grievance submission at the village/ urban-village level c. Establish and implement institution and systems of Grievance Mechanisms are representative, transparent and accessible to the community. d. Socialize the grievance mechanism related to land acquisition to the community e. Respond to every community grievance in a friendly and transparent manner in accordance	Location of PLTGU Jawa-1	During land clearing activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Energy and Mineral Resources – Directorate General of Electricity e. Ministry of Environment and Forestry **Report Recipient**

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				with the actual conditions. f. Conduct deliberations with the community to reach approval related to the handling of community grievance if necessary. g. Create an official reports of any grievance handling that has been followed up and declared completed which is acknowledged by the representative of the community who has submitted the grievance.			**Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency **c.** DLHK of West Java province **d.** Ministry of Environment and Forestry
20	Decreased Fish Catchment Area	Mooring of FSRU	There is a alternatative programs built to develop fisherman productivity in event of catchment result management	a. Coordinate and socialize to fishermen and related parties around the mooring area of FSRU b. Conduct the socioeconomic studies related to increasing the productivity of catching and managing the fishermen catch result management c. Develop CSR program to encourage productivity of fisherman catch results d. If necessary, provide compensation to fishermen if at the mooring location there is a	Villages around FSRU	During FSRU mooring activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry

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				important points of fish catch such as FADs			e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok f. Director General of Marine Transportation, Ministry of Marine Affairs g. Port Operator Unit of Pamanukan h. Department of Marine and Fisheries of Subang Regency i. Department of Marine and Fisheries of West Java Province **Report Recipient Institution:** a. DLHK of Subang Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry
21	Disruption of Fishermen's Activities	Mooring of FSRU	a. The absence of significant disruption to fisherman's activities resulting from	a. Coordinate and socialize to fishermen and related parties around the mooring area of FSRU	Villages around FSRU	During FSRU mooring activities	**Executive Institution:** PT JSP and Executive Contractor

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			FSRU mooring b. Availability of warning signs to prevent disruption of fisherman's activities	b. Install warning signs related to FSRU mooring activity. c. Map the distribution of impacts caused by the development of FSRU mooring activities d. If necessary, provide compensation to fishermen if at the mooring location there is a important points of fish catch such as FADs			**Supervisory Institution:** a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok f. Director General of Marine Transportation, Ministry of Marine Affairs g. Port Operator Unit of Pamanukan h. Department of Marine and Fisheries of Subang Regency i. Department of Marine and Fisheries of West Java Province

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							Report Recipient Institution: a. DLHK of Subang Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry
22	Community Grievance	Mooring of FSRU	a. Availability of community grievance handling management. b. There is evidence of grievance handling from communities related to FSRU mooring activities	a. Conduct periodic and ongoing socialization to communities and related stakeholders around FSRU regarding FSRU mooring activity b. Developing communication systems and mechanisms of community grievance submission at the village/ urban-village level c. Establish and implement institution and systems of Grievance Mechanisms are representative, transparent and accessible to the community. d. Socialize the grievance mechanism related to land acquisition to the community e. Respond to every community grievance in a friendly and transparent manner in accordance	Villages around FSRU	During FSRU mooring activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok

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				with the actual conditions. f. Conduct deliberations with the community to reach approval related to the handling of community grievance if necessary. g. Create an official reports of any grievance handling that has been followed up and declared completed which is acknowledged by the representative of the community who has submitted the grievance.			f. Director General of Marine Transportation, Ministry of Marine Affairs g. Port Operator Unit of Pamanukan h. Department of Marine and Fisheries of Subang Regency i. Department of Marine and Fisheries of West Java Province **Report Recipient Institution:** a. DLHK of Subang Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry
23	Changes in Plankton Abundance	Pipeline deployment at Sea	Plankton abundance is remain maintained at a range of> 15,000 individual/litter (Basmi, 1987) or at a number relatively similar to the baseline	The impact to the plankton is the secondary impact (derivative) from the decrease of seawater quality in the form of increasing TSS concentration due to the pipeline deployment activity at Sea. Therefore, the management is not conducted directly, but through the	The waters around the area of pipeline deployment at Sea	During the pipeline deployment at sea	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Subang Regency b. DLHK of West Java province

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				management of its primary impact is the management of the impact of decreasing of the quality of sea water in the form of increasing TSS concentration due to the pipeline at sea			c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok f. Director General of Marine Transportation, Ministry of Marine Affairs g. Port Operator Unit of Pamanukan h. Department of Marine and Fisheries of Subang Regency i. Department of Marine and Fisheries of West Java Province **Report Recipient Institution:** a. DLHK of Subang Regency **b.** DLHK of West Java province

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							c. Ministry of Environment and Forestry
24	Disruption of Fishermen's Activities	Pipeline deployment at Sea	a. The absence of significant disruption to fisherman's activities resulting from activity of pipeline deployment at sea b. Availability of warning signs to prevent disruption of fisherman's activities	a. Coordinate and socialize to fishermen around the area of pipeline deployment at sea by involving elements of local leaders and other related parties. b. Install warning signs related to pipeline deployment activities at sea. c. Map the area of impact distribution due to the construction of pipeline deployment activities at sea d. If necessary, provide compensation to fishermen if at the mooring location there is a important points of fish catch such as FADs	The villages around the area of pipeline deployment at Sea	During the pipeline deployment at sea	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok f. Director General of Marine Transportation, Ministry of Marine Affairs g. Port Operator Unit of Pamanukan h. Department of Marine

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							and Fisheries of Subang Regency i. Department of Marine and Fisheries of West Java Province **Report Recipient Institution:** a. DLHK of Subang Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry
25	Community Grievance	Pipeline deployment at Sea	a. Availability of community grievance handling management. b. There is evidence of grievance handling from communities related to pipeline deployment at Sea	a. Conduct periodic and ongoing socialization to communities and stakeholders regarding activty plan of pipeline deployment at Sea b. Developing communication systems and mechanisms of community grievance submission at the village/ urban-village level c. Establish and implement institution and systems of Grievance Mechanisms are representative, transparent and accessible to the community.	The villages around the area of pipeline deployment at Sea	During the pipeline deployment at sea	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				d. Socialize the grievance mechanism related to land acquisition to the community e. Respond to every community grievance in a friendly and transparent manner in accordance with the actual conditions. f. Conduct deliberations with the community to reach approval related to the handling of community grievance if necessary. g. Create an official reports of any grievance handling that has been followed up and declared completed which is acknowledged by the representative of the community who has submitted the grievance.			e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok f. Director General of Marine Transportation, Ministry of Marine Affairs g. Port Operator Unit of Pamanukan h. Department of Marine and Fisheries of Subang Regency i. Department of Marine and Fisheries of West Java Province **Report Recipient Institution:** a. DLHK of Subang Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry
26	Disruption of Sea Traffic	Pipeline deployment at Sea	No incidents of sea transportation disruption caused by operational of	a. Install signs along the activity area of pipeline deployment	The villages around the area of pipeline	During the pipeline deployment at	**Executive Institution:** PT JSP and Executive Contractor

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			pipeline deployment at sea	b. Conduct socialization and counseling to the fishermen regarding the activity of pipeline deployment c. Coordinate with local stakeholders related to activity of pipeline deployment at sea d. Give an appeal to fishermen to avoid fishing activities in the area of pipeline deployment activities.	deployment at Sea	sea	**Supervisory Institution:** a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok f. Director General of Marine Transportation, Ministry of Marine Affairs g. Port Operator Unit of Pamanukan h. Department of Marine and Fisheries of Subang Regency i. Department of Marine and Fisheries of West Java Province

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							Report Recipient Institution: a. DLHK of Subang Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry
27	Increased dust concentration (TSP/PM10/PM2,5), NOx, CO and HC	Pipeline deployment on land	a. Concentration of TSP/PM10/PM2,5, NOx, CO and HC meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution: b. Availability of documentation of the completeness documents and permit of marine mobilization equipment are required c. Availability of documentation of exhaust gas emission measurement d. There is documentation in the form of in and out reports of the ship	a. Ensure vehicle and equipment that operate are road worthy vehicles in accordance with the road class to be passed and has all the required letter and permit. b. Emissions from all equipment do not exceed the quality standard specified in the Regulation of the Minister of Environment and Forestry No. P20/ MENLHK/SETJENKUM/ KUM.1/3/2017 on the Quality Standard of New Type Automotive Gas Disposal Vehicle of Category M, N, and category O. c. The vehicle and equipment use the fuel recommended by the manufacturer and do not use fuel are caused the high exhaust gas	The Muara Village of Cilamaya Wetan Subdistrict, with radius of 500 meters from Tanjung Jaya road and along the path of pipeline deployment on the land side.	During the pipeline deployment took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				emissions d. Vehicle and equipment are serviced periodically in accordance with recommendations as evidenced by periodic service cards provided by the company and/or designated workshop companies e. Every vehicle and equipment that in and out of the area of land pipe deployment is cleaned with water spray. f. An open vehicle that operates to transport material must be covered with a perfect tarp to prevent dust from material transported flying on the road g. Conduct water spraying on road routes affected material spills by vehicle and equipment of land pipeline deployment h. Install the number of grievance contacts to each vehicle to make it easier for community to report in case of inappropriate condition. i. Prepare a standby reserve vehicle and tow vehicles to			b. DLHK of West Java province c. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				anticipate abnormal condition.			
28	Increased Noise	Pipeline deployment on land	The intensity of the noise generated does not exceed the quality standard based on Decree of Environment Minister No. 48 of 1996, namely: a. 55 dBA for residential environment, b. 70 dBA of road & industrial environment as well as trade and service environment	a. Use the vehicle and equipment of pipeline deployment that has been inspected and certified in accordance with applicable regulations b. Make a policy of not execute activity of pipeline deployment in land by using equipment that generates high noise during the hours of 00.00-05.00 (break time) c. Suspend equipment and activities that generate noise during certain circumstances such as religious ceremonies, and others based on community suggestion which is expected to be affected by noise. d. Perform routine maintenance of machinery/equipment in accordance with the specified schedule to ensure that the machine/equipment is working efficiently e. Install the muffler in the vehicle and heavy equipment unit if possible f. Create a fence at the time of pipeline deployment that is in	The Muara Village of Cilamaya Wetan Subdistrict, with radius of 500 meters from Tanjung Jaya road and along the path of pipeline deployment on the land side.	During the pipeline deployment took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				direct contact with the existing settlement on Tanjung Jaya road. g. Immediately conduct the planting on the areas that are not built after the land clearing is completed			
29	Increased particulate concentration (TSP/PM10/PM2,5), NOx, CO and HC	Development of Jetty	Concentration of TSP/PM10/PM2,5, NOx, CO and HC meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution:	a. Vehicle and equipment that operate are road worthy vehicles in accordance with the road class to be passed and has all the required letter and permit. b. Check the feasibility of all equipment to be used in the activity of land pipe deployment. The emissions of all equipment do not exceed the quality standards specified in Regulation of the Minister of Environment and Forestry No. P20/ MENLHK/SETJENKUM/ KUM.1/3/2017 on the Quality Standard of New Type Automotive Gas Disposal Vehicle of Category M, N, and category O. c. The vehicle and equipment use the fuel recommended by the manufacturer and do not use fuel are caused the high exhaust gas	Location of Jetty Construction facility	During Jetty Construction facility	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok f. Director General of Marine Transportation, Ministry of Marine

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				emissions d. Vehicle and equipment are serviced periodically in accordance with recommendations as evidenced by periodic service cards provided by the company and/or designated workshop companies e. Conduct water spraying on road routes affected material spills by vehicle and equipment. f. Install the number of grievance contacts to each vehicle to make it easier for community to report in case of inappropriate condition. g. Prepare a standby reserve vehicle and tow vehicles to anticipate abnormal condition.			Affairs g. Port Operator Unit of Pamanukan h. Department of Marine and Fisheries of Subang Regency i. Department of Marine and Fisheries of West Java Province **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
30	Increased Noise	Development of Jetty	The intensity of the noise generated does not exceed the quality standard based on Decree of Environment Minister No. 48 of 1996, namely: a. 55 dBA for residential environment, b. 70 dBA of road & industrial environment as well as trade and service environment	a. Use the jetty construction equipment that has been inspected and certified in accordance with applicable regulations b. Make a policy of not execute activity of Jetty construction in land by using equipment that generates high noise during the hours of 00.00-05.00 (break time) c. Suspend equipment and activities that generate noise during certain circumstances such as religious ceremonies, and others based on community suggestion which is expected to be affected by noise. d. Perform routine maintenance of machinery/equipment in accordance with the specified schedule to ensure that the machine/equipment is working efficiently e. Install the muffler in the vehicle and heavy equipment unit if possible	Location of Jetty Construction	During Jetty Construction	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok f. Director General of Marine Transportation, Ministry of Marine Affairs g. Port Operator Unit of Pamanukan h. Department of Marine and Fisheries of Subang Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							i. Department of Marine and Fisheries of West Java Province **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
31	Increased TSS Content	Development of Jetty	The concentration of TSS meets the quality standard required in accordance with Decree of Environment Minister No. 51 of 2004 on the Sea Water Quality Standard Appendix 1, TSS that is 80 mg/l or relatively equal to the value of TSS in the environmental baseline before the Jetty construction activity is performed	a. Prepare SOP of tarsus construction activities and ensure all executive contractors carry out SOP properly and correctly b. Use the Jetty construction method that has taken into consideration the pattern of sea currents that exist on the location of the development plan a. Install silt protector or similar technology around the pipeline deployment area if needed and possible	Location of Jetty Construction	During Jetty Construction facility	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok f. Port Operator Unit of Pamanukan g. Department of Marine and Fisheries of Subang Regency h. Director General of Marine Transportation, Ministry of Marine Affairs i. Department of Marine and Fisheries of West Java Province **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
32	Changes in Plankton Abundance	Development of Jetty	Plankton abundance is remain maintained at a range of> 15,000 individual/litter	a. Prepare SOP of tarsus construction activities and ensure all executive contractors	Location of Jetty construction activities and	During the construction activity of	**Executive Institution:** PT JSP and Executive Contractor

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			(Basmi, 1987) or at a number relatively similar to the baseline	carry out SOP properly and correctly b. Use the Jetty construction method that has taken into consideration the pattern of sea currents that exist on the location of the development plan c. Install silt protector or similar technology around the pipeline deployment area if needed and possible	coral reef area	Jetty took place	**Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok f. Port Operator Unit of Pamanukan g. Department of Marine and Fisheries of Subang Regency h. Department of Marine and Fisheries of West Java Province **Report Recipient Institution:** a. DLHK of Karawang

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
33	Community Grievance	Dredging and Placement of Dredge Results	a. Availability of community grievance handling management. b. There is evidence to the grievance handling from the community related to from dredging activities and placement of dredge results	a. Conduct periodic and ongoing socialization to communities and stakeholders regarding project activity plans b. Developing communication systems and mechanisms of community grievance submission at the village/ urban-village level c. Socialize grievance submission mechanisms, including organization and company personnel along with project executive in charge of receiving grievance d. Provide representative room / offices to be reached by the community in submitting grievance and its employees who are ready to accommodate the grievance of community e. Provide a grievance submission contact number f. Respond to every community	Dredging areas and surrounding waters	During the dredging activity	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of Karawang Regency b. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok c. DLHK of West Java province d. Ministry of Energy and Mineral Resources – Directorate General of Electricity e. Ministry of Environment and Forestry f. Ministry of Fisheries and Marine Affairs **Report Recipient**

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				grievance in a friendly and transparent manner in accordance with the actual conditions. g. Make a monitoring and create reports of grievance handling from the community			**Institution:** a. DLHK of Karawang Regency **b.** DLHK of West Java province Ministry of Environment and Forestry
34	Disruption of Sea Traffic	Dredging and Placement of Dredge Results	No incidents of sea transportation disruption caused by dredging activities and placement of dredge results	a. Install signs along the activity area of dredging at sea b. Conduct socialization and counseling to the fishermen regarding the activity of dredging at sea c. Coordinate with local stakeholders related to activity of dredging at sea d. Give an appeal to fishermen to avoid fishing activities in the activity area of dredging at sea.	Location of dredging at sea	During activity of dredging at sea	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok f. Port Operator Unit of Pamanukan

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							g. Department of Marine and Fisheries of Subang Regency h. Department of Marine and Fisheries of West Java Province **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
35	Increased dust concentration (TSP/PM10/PM2,5), NOx, CO and HC	Construction of Access Road	Concentration of (TSP/PM10/PM2,5), NOx, CO and HC meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution:	a. Vehicle and equipment that operate are road worthy vehicles in accordance with the road class to be passed and has all the required letter and permit. b. Emissions from all equipment do not exceed the quality standard specified in the Regulation of the Minister of Environment and Forestry No. P.20/MENLHK/SETJEN/KUM.1/3/2017 on the Quality Standard of New Type Automotive Gas Disposal	Location the Development of construction road	During construction activity of construction road took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Department of Transportation of Karawang Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				Vehicle of Category M, N, and category O. c. The vehicle and equipment use the fuel recommended by the manufacturer and do not use fuel are caused the high exhaust gas emissions d. Vehicle and equipment are serviced periodically in accordance with recommendations as evidenced by periodic service cards provided by the company and/or designated workshop companies e. An open vehicle that operates to transport material must be covered with a perfect tarp to prevent dust from material transported flying on the road f. Conduct water spraying on road routes affected material spills by vehicle and equipment of land pipeline deployment g. Install the number of grievance contacts to each vehicle to make it easier for community to report in case of inappropriate condition.			e. Department of Transportation of Bekasi Regency f. Department of Transportation of West Java Province g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				h. Prepare a standby reserve vehicle and tow vehicles to anticipate abnormal condition.			
36	Increased Noise	Construction of Access Road	Noise on development areas of construction road meets the required thresholds in the Decree of Environment Minister No. 48 of 1996, namely: a. 55 dBA for residential environment, b. 70 dBA of road & industrial environment as well as trade and service environment	a. Use the equipment that has been inspected and certified in accordance with applicable regulations b. Prepare SOPs about driving procedures while passing through residential areas such as not honking, not playing gas and etc. c. Make a policy of not execute activity by using equipment that generates high noise during the hours of 00.00-05.00 (break time) d. Suspend equipment and activities that generate noise during certain circumstances such as religious ceremonies, and others based on community suggestion which is expected to be affected by noise. e. Perform routine maintenance of machinery/equipment in accordance with the specified schedule to ensure that the machine/equipment is working efficiently f. Install the muffler in the	Location the Development of construction road	During construction activity of construction road took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				vehicle and heavy equipment unit if possible g. Install GPS on each vehicle so the vehicle speed can be monitored h. Immediately planting on areas not built after land clearing is completed if possible with respect to aspects of OSH, aesthetics and protection functions			and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
37	Increased dust concentration (TSP/PM10/PM2,5), NOx, CO and HC	Construction of PLTGU and Supporting Facilities	Concentration of (TSP/PM10/PM2,5), NOx, CO and HC meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution:	a. The vehicle and equipment are used will be effectively maintained to minimize exhaust emissions and ensure that during operation the vehicles meets the quality standards for motor vehicle exhaust emissions required by applicable regulations b. The vehicle and equipment use the fuel recommended by the manufacturer and do not use fuel are caused the high exhaust gas emissions c. Vehicle and equipment are serviced periodically in accordance with recommendations as evidenced by periodic service cards provided by the company and/or designated workshop companies d. Every vehicle and equipment that in and out of the area of PLTGU construction is cleaned with water spray. e. An open vehicle that operates to transport material must be covered with a perfect tarp to	Location of PLTGU construction area and surrounding villages affected	During construction activity of road access took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				prevent dust from material transported flying on the road f. Conduct water spraying on road routes affected material spills by vehicle and equipment of land pipeline deployment g. Installation of barrier/covers in construction area to reduce particulate distribution h. Install the number of grievance contacts to each vehicle to make it easier for community to report in case of inappropriate condition. i. Prepare a standby reserve vehicle and tow vehicles to anticipate abnormal condition. j. Vehicle and equipment that operate are road worthy vehicles in accordance with the road class to be passed and has all the required letter and permit. k. Emissions from all equipment do not exceed the quality standard specified in the Regulation of the Minister of Environment and Forestry No.			

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				P.20/MENLHK/SETJEN/KUM.1/3/2017 on the Quality Standard of New Type Automotive Gas Disposal Vehicle of Category M, N, and category O.			

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
38	Community Grievance	Construction of PLTGU and Supporting Facilities	a. Availability of community grievance handling management. b. There is evidence to the grievance handling from the community related to construction of PLTGU and supporting facilities	a. Developing communication systems and mechanisms of community grievance submission at the village/ urban-village level b. Conduct periodic and ongoing socialization to communities and stakeholders regarding project activity plans c. Socialize grievance submission mechanisms, including organization and company personnel along with project executive in charge of receiving grievance d. Provide representative room / offices to be reached by the community in submitting grievance and its employees who are ready to accommodate the grievance of community e. Provide a grievance submission contact number f. Respond to every community grievance in a friendly and transparent manner in accordance with the actual conditions.	Construction Project Site of PLTGU and Supporting Facilities	During the construction activity of PLTGU took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				g. Make a monitoring and create reports of grievance handling from the community			
39	Increased Noise	Development of Transmission Network of 500 kV	The intensity of the noise generated does not exceed the quality standard based on Decree of Environment Minister No. 48 of 1996, namely: a. 55 dBA for residential environment, b. 70 dBA of road & industrial environment as well as trade and service environment	a. Use the equipment that has been inspected and certified in accordance with applicable regulations b. Conduct periodic inspection to the feasibility of the supporting machine used, to ensure the machine condition is being used in a feasible condition and does not cause high noise. c. Establish policy that prohibits the use of high noise equipment at 00.00-05.00 (break time) or in accordance with the agreement with the surrounding community d. Suspend equipment and activities that generate noise during certain circumstances such as religious ceremonies, and others based on community suggestion which is expected to be affected by noise. e. Perform routine maintenance of machinery/equipment in accordance	Location of transmission network construction and its surroundings	During construction activity of Transmission Network took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Energy and Mineral Resources – Directorate General of Electricity e. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				with the specified schedule to ensure that the machine/equipment is working efficiently f. Install the muffler in the vehicle and heavy equipment unit if possible			d. Ministry of Environment and Forestry
40	Community Grievance	Development of Transmission Network of 500 kV	a. Availability of community grievance handling management. b. There is evidence of grievance handling from communities related to transmission network construction activities	a. Developing communication systems and mechanisms of community grievance submission at the village/ urban-village level b. Conduct periodic and ongoing socialization to communities and stakeholders regarding project activity plans c. Socialize grievance submission mechanisms, including organization and company personnel along with project executive in charge of receiving grievance d. Provide representative room / offices to be reached by the community in submitting grievance and its employees who are ready to accommodate the grievance of community e. Provide a grievance submission contact number	37 Villages along the transmission network	During construction activity of transmission network took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Energy and Mineral Resources – Directorate General of Electricity e. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				f. Respond to every community grievance in a friendly and transparent manner in accordance with the actual conditions. g. Make a monitoring and create reports of grievance handling from the community			**c.** DLHK of West Java province **d.** Ministry of Environment and Forestry
41	Increased Dust Concentration of NOx CO dan HC	Development of GITET 500kV	Concentration of TSP/PM10/PM2,5, NOx, CO and HC meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution	a. Vehicle and equipment that operate are road worthy vehicles in accordance with the road class to be passed and has all the required letter and permit. b. Emissions from all equipment do not exceed the quality standard specified in the Regulation of the Minister of Environment and Forestry No. P.20/MENLHK/SETJEN/KUM.1/3/2017 on the Quality Standard of New Type Automotive Gas Disposal Vehicle of Category M, N, and category O. c. The vehicle and equipment use the fuel recommended by the manufacturer and do not use fuel	Location of GITET construction and surrounding villages affected	During the construction activity of PLTGU took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Department of Transportation of Karawang Regency d. Ministry of Energy and Mineral Resources – Directorate General of Electricity e. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				are caused the high exhaust gas emissions d. Vehicle and equipment are serviced periodically in accordance with recommendations as evidenced by periodic service cards provided by the company and/or designated workshop companies e. Every vehicle and equipment that in and out of the area of GITET construction is cleaned with water spray. f. An open vehicle that operates to transport material must be covered with a perfect tarp to prevent dust from material transported flying on the road g. Conduct water spraying on road routes affected material spills by vehicle and equipment of land pipeline deployment h. Install the number of grievance contacts to each vehicle to make it easier for community to report in case of inappropriate condition. i. Prepare a standby reserve			**Report Recipient Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				vehicle and tow vehicles to anticipate abnormal condition.			
42	Community Grievance	Development of GITET 500kV	a. Availability of community grievance handling management. b. There is evidence of grievance handling from communities related to GITET construction activities	a. Developing communication systems and mechanisms of community grievance submission at the village/ urban-village level b. Conduct periodic and ongoing socialization to communities and stakeholders regarding project activity plans c. Socialize grievance submission mechanisms, including organization and company personnel along with project executive in charge of receiving grievance d. Provide representative room / offices to be reached by the community in submitting grievance and its employees who are ready to accommodate the grievance of community e. Provide a grievance submission contact number f. Respond to every community grievance in a friendly and transparent manner in accordance	Location of GITET construction and surrounding villages	During the construction activity of PLTGU took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Bekasi Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				with the actual conditions. g. Make a management and create reports of grievance handling from the community			
43	• Changes in pH • Increased TOC Content • Increased BOD Concentration • Increased COD Concentration • Increased Concentrations of Oil and Fats • Increased Ammonia (NH3) • The existence of floating objects • Increased Total Coliform	Handling of Construction Waste	a. The quality of domestic wastewater meets the quality standard of the Regulation of Environment Minister No. 68 of 2016 on the Quality Standards of Domestic Wastewater b. Solid waste management in accordance with the provisions of Law No.18 of 2008 on the Waste Management c. B3 Waste Management Complies with the Regulation of Environment Minister No. 101 of 2014 on the Hazardous and Toxic Waste Management	a. Perform solid waste floating collection periodically to be accommodated at shelters in accordance with the characteristics of solid waste types (biodegradable and nonbiodegradable). b. Provide domestic solid waste shelters according to its types (biodegradable and nonbiodegradable). c. Separate domestic solid waste according to its type and place it according to its type (biodegradable and nonbiodegradable). d. Conduct delivery periodically of solid wastes resulting from the FSRU construction e. Deliver solid waste (biodegradable and nonbiodegradable) to licensed third parties to be further	Construction Area of PLTGU Jawa-1	During the construction activity of PLTGU Jawa-1 took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Department of Transportation of Karawang Regency d. Ministry of Energy and Mineral Resources – Directorate General of Electricity e. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				managed. f. Temporarily accomodate B3 waste and B3 contaminated material in the B3 waste bin shelter provided. g. Deliver B3 Waste to a third party who owns the B3 waste management license h. Make a recording of B3 waste manifest delivered to third party (licensed B3 waste management) i. Periodic maintenance to the sanitary facilities (septic tanks)			c. Ministry of Environment and Forestry
44	Decreased dissolved oxygen level (DO)	Hydrostatic Test	Use of Hydrostatic test Materials use materials that are safe in accordance with the technical recommendations of the Directorate General of Oil and Gas	a. Selects chemicals for non-toxic pipe hydrostatic test according to LC 50 test results b. Using chemicals for hydrostatic test pipe recommended by Directorate General of Oil and Gas	Pipeline deployment area	At the time of Hydrostatic test	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Department of Transportation of Karawang Regency d. Ministry of Energy

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							and Mineral Resources – Directorate General of Electricity e. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
45	Increased dust concentration (TSP/PM10/PM2,5), NOx, CO and HC	Demobilization of Equipment (By Land)	a. Concentration of TSP, PM_{10}, $PM_{2.5}$ meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution.	a. Vehicles that operate are road worthy vehicles in accordance with the road class to be passed and has all the required letter and permit. b. All vehicles used in the mobilization activities of equipment and materials are road worthy and meet emission quality standards in accordance with the Regulation of Ministry of Environment and Forestry No. P.20/MENLHK/SETJEN/KUM.1/3/2017 on the Quality Standard of New Type Automotive Gas Disposal Vehicle of Category M, N, and category O. c. The vehicles use the fuel recommended by the manufacturer and do not use fuel are caused the high exhaust gas emissions d. Vehicles are serviced periodically in accordance with recommendations as evidenced by periodic service cards provided by the company and/or designated workshop companies e. The mobilization is undertaken	Location of PLTGU Jawa-1 activities and roads to be passed by vehicles during demobilization of equipment and materials	During equipment and material demobilization activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Department of Transportation of Karawang Regency f. Department of Transportation of Bekasi Regency g. Department of Transportation of Subang Regency h. Department of Transportation of West Java Province i. Ministry of Energy and Mineral Resources – Directorate General of Electricity j. Ministry of Environment

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				outside of peak hours (at 07.00-09.0) and 16.00-19.00). f. Every vehicle tire that in and out of the activity area is cleaned with water spray. g. An open vehicle that operates to transport material must be covered with a perfect tarp to prevent dust from material transported flying on the road h. Conduct water spraying on road routes affected material spills by construction vehicles. i. Install the number of grievance contacts to each vehicle to make it easier for community to report in case of inappropriate condition. j. Prepare a standby reserve vehicle and tow vehicles to anticipate abnormal condition. k. As part of the fulfillment of social and environmental responsibilities (CSR), planting plants in the area of roads that will be passed the mobilization of equipment and building materials. Planting location and			and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				plant species to be reviewed by involving government institutions.			
46	Increased Noise	Demobilization of Equipment (By Land)	Noise generated by demobilization activities meets quality standards based on Decree of Environment Minister No. 48 of 1996, namely: a. 55 dBA for residential environment, b. 70 dBA of road & industrial environment as well as trade and service environment	a. Vehicles that operate are road worthy vehicles in accordance with the road class to be passed and has all the required letter and permit. b. Prepare SOPs about driving procedures while passing through residential areas such as not honking and not playing gas. c. Set the speed of vehicle as it passes the residential areas that is a maximum of 30 Km/hour.	Project area and road passed by demobilization activities	During the demobilization activity took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Department of Transportation of

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				d. Strive for non-conforming vehicles that is the time interval between one vehicle and other vehicle between 10 – 15 minutes. e. Ensure cargo of carrier vehicles according to their capacity f. The mobilization is performed outside of peak hours (at 07.00-09.0) and 16.00-19.00). g. There is no mobilization activity between the hours of 00.00-05.00 (hours of night rest) unless certain circumstances require to be conducted at night according to police directives and DLLAJ h. Install traffic signs on vehicle speed restrictions. i. Use a vehicles which are roadworthy. as evidenced by the Motor Vehicle (KIR) test and other relevant requirements j. Install muffler on vehicles used as needed and possibly to be used k. Install the grievance contact number in each vehicle			Karawang Regency e. Department of Transportation of Bekasi Regency f. Department of Transportation of West Java Province g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Department of Transportation of Subang Regency f. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
47	Community Grievance	Demobilization of Equipment (By Land)	a. Availability of community grievance handling management. b. There is evidence of the grievance handling from the community related to equipment demobilization activities (by land)	a. Developing communication systems and mechanisms of community grievance submission at the village/ urban-village level b. Conduct periodic and ongoing socialization to communities and stakeholders regarding project activity plans c. Socialize grievance submission mechanisms, including organization and company personnel along with project executive in charge of receiving grievance d. Provide representative room /	Along the demobilization lines	During the demobilization activity took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Department of Transportation of Karawang Regency e. Department of Transportation of

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				offices to be reached by the community in submitting grievance and its employees who are ready to accommodate the grievance of community e. Provide a grievance submission contact number f. Respond to every community grievance in a friendly and transparent manner in accordance with the actual conditions. g. Make a monitoring and create reports of grievance handling from the community			Bekasi Regency f. Department of Transportation of West Java Province g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
48	Increased dust concentration (TSP/PM10/PM2,5)	Commissioning of Operation	a. Concentration of TSP, PM_{10}, $PM_{2.5}$ meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution:	a. Install a particulate control unit (electrostatic precipitator) b. Initiator of Activity will inform to the DLH of West Java Province, LH of Karawang Regency and DLH of Subang Regency about	Activity location of PLTGU Jawa-1 and nearest settlement of project location	During the commissioning took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			b. Emission measurement results meets the quality standard of the Regulation of Minister of Environment No. 21 of 2008 on Static Emission Sources Quality Standard for Business and/or Activities of a Thermal Power Plant: Total Particulate (30 mg/m^3)	commissioning / start-up plan of power plant and its development. c. The initiator of activity will socialize on the plan and progress of the commissioning of the power plant to the Village Head (Urban Village Head) and Subdistrict Head openly and transparently and ensure that any information submitted is known and understood by the community around the location of activity d. Install an emission level monitoring equipment in an ideal location to check emission levels during commisioning e. Stop operating commissioning activities if emissions released during commissioning reach dangerous levels for humans f. Prepare emergency response management system			Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
49	Increased Concentration of SO_2	Commissioning of Operation	The SO_2 concentration meets the quality standards required by Indonesian regulations as per the regulations: Government Regulation No. 41 of 1999 on the Control of Air	a. Install controlling unit of SO_2 (*seawater* FGD) b. Initiator of Activity will inform to the DLH of West Java Province, LH of Karawang Regency and DLH of Subang Regency about	Activity location of PLTGU Jawa-1 and nearest settlement of project location	During the commissioning took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. Department of Manpower

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			Pollution: SO_2 (24 hours) i.e. 365 µg/m^3 and Regulation of the Minister of Environment No. 21 of 2008 on Static Emission Sources Quality Standard for Business and/or Activities of a Thermal Power Plant: SO_2 (150 mg/m^3)	commissioning / start-up plan of power plant and its development. c. The initiator of activity will socialize on the plan and progress of the commissioning of the power plant to the Village Head (Urban Village Head) and Subdistrict Head openly and transparently and ensure that any information submitted is known and understood by the community around the location of activity d. Install an emission level monitoring equipment in an ideal location to check emission levels during commisioning e. Stop operating commissioning activities if emissions released during commissioning reach dangerous levels for humans f. Prepare emergency response management system			and Transmigration of Karawang Regency b. DLHK of Karawang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of West Java province d. Ministry of Environment and Forestry
50	Increased Concentration of NOx	Commissioning of Operation	Concentration of NOx, meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution: NOx (24 hours) i.e. 150 µg/m^3 and	a. Using a boiler with low NOx burner systems b. Initiator of Activity will inform to the DLH of West Java Province, LH of Karawang Regency and DLH of Subang Regency about	Activity location of PLTGU Jawa-1 and nearest settlement of project location	During the commissioning took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. Department of Manpower

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			Regulation of the Minister of Environment No. 21 of 2008 on Static Emission Sources Quality Standard for Business and/or Activities of a Thermal Power Plant: NOx i.e 320 mg/m^3	commissioning / start-up plan of power plant and its development. c. The initiator of activity will socialize on the plan and progress of the commissioning of the power plant to the Village Head (Urban Village Head) and Subdistrict Head openly and transparently and ensure that any information submitted is known and understood by the community around the location of activity d. Install an emission level monitoring equipment in an ideal location to check emission levels during commisioning e. Stop operating commissioning activities if emissions released during commissioning reach dangerous levels for humans f. Prepare emergency response management system			and Transmigration of Karawang Regency b. DLHK of Karawang Regency c. DLHK of Bekasi Regency d. DLHK of Subang Regency e. DLHK of West Java province f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
51	Increased Concentration of Carbon Monoxide (CO)	Commissioning of Operation	Concentration of CO meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution: CO (24 hours) i.e. 10,000 µg/m^3	a. Initiator of Activity will inform to the DLH of West Java Province, LH of Karawang Regency and DLH of Subang Regency about commissioning / start-up plan of power plant and its development.	Activity location of PLTGU Jawa-1 and nearest settlement of project location	During the commissioning took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. Department of Manpower

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				b. The initiator of activity will socialize on the plan and progress of the commissioning of the power plant to the Village Head (Urban Village Head) and Subdistrict Head openly and transparently and ensure that any information submitted is known and understood by the community around the location of activity c. Install an emission level monitoring equipment in an ideal location to check emission levels during commisioning d. Stop operating commissioning activities if emissions released during commissioning reach dangerous levels for humans e. Prepare emergency response management system			and Transmigration of Karawang Regency b. DLHK of Karawang Regency c. DLHK of Bekasi Regency d. DLHK of Subang Regency e. DLHK of West Java province f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
52	Increased Concentration of Volatile Organic Compound (VOC)	Commissioning of Operation	The results of VOC measurements at the time of commissioning meets the provisions of the quality standard of the Regulation of the Minister of Environment No.13 of 2009 on Static Emission Sources Quality	a. Ensure LNG piping and loading arm connections are properly installed prior to offloading to prevent potential leakage during offloading. b. Conduct a continuous water curtain around the loading arm during offloading process to	Location of FSRU commissioning	During the commissioning took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. Department of Manpower and Transmigration of Karawang Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			Standard for Oil and Gas Business and/or Activity.	prevent damage to ship wall path due to LNG leakage.			b. DLHK of Karawang Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of West Java province d. Ministry of Environment and Forestry
53	Increased Noise	Commissioning of Operation	a. Noise level does not exceed the quality standard of Decree of the State Minister of Environment Number: Kep-48/MenLH/11/1996 on the Noise Level Quality Standard of 55 dBA for settlement, 70 dB for industrial area. b. Initiator of Activity complies with Regulation of the Minister of Manpower and	a. Perform installation and commissioning to the HSRG and its supporting components according to the instructions and needs b. Install muffler equipment in accordance with the design of the building layout and project needs c. Revegetate around the HSRG area to reduce noise	Project Site of PLTGU and Supporting Facilities	During the PLTGU commissioning took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources –

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			Transmigration Number 13 of 2011 on Threshold Value of Physical Factor and Chemical Factor in Workplace that is 85 dBA with exposure time per day for 8 hours	d. Providing Green Open Space (RTH) within the project location by referring to the applicable regulations on green open spaces e. Every worker in the power plant location is required to use earplugs are meet the SNI standard as needed f. Conduct regular health check-up for workers g. Establish a length of time limit to worker permitted within the power plant location as recommended by the doctor or relevant institution on health h. Monitoring data results is tabulated and compared with standard noise level in accordance with Decree of the Minister of Environment No. KEP-48/MENLH/11/1996 year 1996			Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
54	Community Grievance	Commissioning of Operation	a. Availability of community grievance handling management. b. There is evidence of grievance handling from communities related to	a. Developing communication systems and mechanisms of community grievance submission at the village/ urban-village level b. Conduct periodic and ongoing socialization to communities and	Activity location of PLTGU Jawa-1 and nearest settlement of project location	During the Commissioning took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			commissioning activities	stakeholders regarding project activity plans c. Socialize grievance submission mechanisms, including organization and company personnel along with project executive in charge of receiving grievance d. Provide representative room / offices to be reached by the community in submitting grievance and its employees who are ready to accommodate the grievance of community e. Provide a grievance submission contact number f. Respond to every community grievance in a friendly and transparent manner in accordance with the actual conditions. g. Make a monitoring and create reports of grievance handling from the community			Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** b. DLHK of Karawang Regency c. DLHK of Subang Regency d. DLHK of Bekasi Regency e. DLHK of West Java province f. Ministry of Environment and Forestry
55	Changes in Community Livelihood Patterns	Discharge of Construction Labor	The construction labor discharge comply with Law No. 13 of 2013 on Manpower	a. The mechanism of employee discharge and its handling comply the applicable laws and regulations.	Activity location of PLTGU Jawa-1 and nearest settlement of	During construction labor discharge	**Executive Institution:** PT JSP and Executive Contractor

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				b. Create a retirement preparatory program for employees to be independent after the activity	project location	activities.	**Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Department of Manpower and Transmigration of Bekasi Regency f. Department of Manpower and Transmigration of Karawang Regency g. Department of Manpower and Transmigration of Subang Regency h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							c. DLHK of Bekasi Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
56	Community Grievance	Discharge of Construction Labor	a. Discharge of labor in accordance with Law No. 13 of 2003 on Manpower, Provincial and/or Regency Minimum Wage and Work Contract Agreement b. There is documentation of labor discharge included c. There is a notification letter and/or discharge of labor to the Department of Manpower and Transmigration, Head of Sub-district and Head of Village/Urban-Village d. There is documentation in the form of explanation sheets of employment contracts concerning the discharge of labor when receipt of labor	a. The initiator regularly informs the Department of Manpower and Transmigration of Regency on the amount of discharge of labor during the construction period and the end of the construction period. b. Provide information and coordinate to the Head of Urban Village (Lurah) and Head of Subdistrict openly and transparently c. Describes the labor discharge mechanism initiated during labor recruitment d. Initiator of activities or contractors will conduct socialization and consultation on the discharge of labor at all stages e. Assist in directing the labor who has completed his/ her contract period in other similar	Activity location of PLTGU Jawa-1 and nearest settlement of project location	During construction labor discharge	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Department of Manpower and Transmigration of Bekasi Regency f. Department of Manpower and Transmigration of Karawang Regency g. Department of Manpower and Transmigration of Subang Regency h. Ministry of Energy and Mineral Resources – Directorate General of

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				activities f. Discharge the labor gradually			Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
3) Operation Stage							
1.	Increased Business Opportunities	Reception of Operation Labor	a. The formation of new businesses by local communities b. Increased existing community businesses during construction activities	Consider and prioritize local entrepreneurs according to project needs and requirements and qualifications and specifications owned by local entrepreneurs	39 villages directly affected by PLTGU Jawa-1 activities included in Karawang regency, Bekasi Regency and Subang Regency.	Before and during labor recruitment of the operation stages	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Department of Manpower and Transmigration of

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							Bekasi Regency f. Department of Manpower and Transmigration of Karawang Regency g. Department of Manpower and Transmigration of Subang Regency h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
2	Changes in Income Level Community	Reception of Operation Labor	a. Increase or maintain the income of community around the activity location as well as comply Law No. 13 of 2003 on the Manpower, Minimum Wage of West Java Province and/or Karawang Regency/ Bekasi Regency/ Subang Regency and work contract agreement b. The process of labor absorption comply with Local Regulation of Karawang No. 1 of 2011 c. Fulfillment of local labor quota/allocation of 60%	a. Prioritize the recruitment of construction labors from affected communities around the project site b. Pay the wage of labor in accordance with the type of work and the ability of worker and not lower than minimum wage set by the Regency Government. c. Fulfill workers' rights beyond wages to be paid by referring to Indonesian regulations, such as health insurance, old age insurances, employment guarantees, overtime pay, and etc. d. Build a partnerships or in accordance with the surrounding village government to facilitate the delivery of information about business opportunities that can be utilized by surrounding residents e. Implementation of CSR programs in the field of empowering communities to maintain and improve the welfare of residents who lose their work	39 villages directly affected by PLTGU Jawa-1 activities included in Karawang regency, Bekasi Regency and Subang Regency.	Before and during labor recruitment of the operation stages	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Department of Manpower and Transmigration of Bekasi Regency f. Department of Manpower and Transmigration of Karawang Regency g. Department of Manpower and Transmigration of Subang Regency h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry **Report Recipient**

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				who appropriate and well targeted.			**Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
3	Community Grievance	Reception of Operation Labor	a. Acceptance of labor meets the provisions of Law no. 13 of 2003 on the Manpower, Minimum Wage of West Java Province and/or Karawang Regency/ Bekasi Regency/ Subang Regency and work contract agreement b. The process of labor absorption comply with Local Regulation of Karawang No. 1 of 2011 c. Availability of community grievance handling	a. Developing communication systems and mechanisms of community grievance submission at the village/ urban-village level b. Implement labor recruitment in accordance with the provisions of Law No. 13 of 2003 on the Manpower, Minimum Wage of West Java Province and/or Karawang Regency/ Bekasi Regency/ Subang Regency and work contract agreement c. Implement the process of labor absorption comply with Local Regulation of Karawang No. 1 of	39 villages directly affected by PLTGU Jawa-1 activities included in Karawang regency, Bekasi Regency and Subang Regency.	Before and during labor recruitment of the operation stages	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. Department of Manpower and Transmigration of Karawang Regency b. Department of Manpower and Transmigration of Bekasi Regency c. Department of Manpower and Transmigration of Subang Regency d. DLHK of Karawang

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			management. d. There is evidence of grievance handling from communities related to acceptance of operational labors	2011 d. Conduct periodic and ongoing socialization to communities and stakeholders regarding project activity plans e. Socialize grievance submission mechanisms, including organization and company personnel along with project executive in charge of receiving grievance f. Provide representative room / offices to be reached by the community in submitting grievance and its employees who are ready to accommodate the grievance of community g. Provide a grievance submission contact number h. Respond to every community grievance in a friendly and transparent manner in accordance with the actual conditions. i. Make a monitoring and create reports of grievance handling from the community			Regency e. DLHK of Bekasi Regency f. DLHK of Subang Regency g. DLHK of West Java province h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
4	• Increased Concentration of SO2 • Increased Concentration of NOx • Increased Concentration of Carbon Monoxide (CO) • VOC • Opacity	Operational of FSRU	The emissions of HSRG/ genset comply with the Regulation of the Minister of Environment No.13 of 2009 (as set out in appendix II) on Static Emission Sources Quality Standard for Oil and Gas Business and/or Activity.	a. Perform routine maintenance of the generator (every 2000, 4000, and 8000 hours. b. Replace the machine in accordance with the operating hours (engine change out). c. Ensure LNG piping and loading arm connections are properly installed prior to offloading to prevent potential leakage during offloading. d. Conduct a continuous water curtain around the loading arm during offloading process to prevent damage to ship wall path due to LNG leakage.	FSRU and the surrounding area	During FSRU operations	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of West Java province b. DLHK of Subang Regency c. DLHK of West Java province d. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok e. Director General of Marine Transportation, Ministry of Marine Affairs f. Department of Marine and Fisheries of Subang g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient**

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							Institution: a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
5	• Increased TSS Content • Increased BOD Concentration • Increased COD Concentration • Increased Concentrations of Oil and Fats • Increased Ammonia (NH3) • The existence of floating objects • Increased Total • Changes in pH • Coliform • Increased Chlorine (CL)	Operation of FSRU	a. The quality of wastewater from FSRU in accordance with the Minister of Environment Regulation No. 8 of 2009 on Waste Water Quality Standard for Business and/or Activities of Thermal Power Plant, i.e. pH and salinity within radius of 30 m in accordance with the initial conditions b. Waste management meets the requirements set forth in Government Regulation 101 2014 on B3 waste management, Regulation of the Minister of Transportation No. PM 29 of 2014 on the Prevention of Maritime Environmental	a. providing an adequate number of waste bins and being transported to the land by using supply boat to subsequently delivered to the nearest landfill. b. Domestic wastewater and sanitary wastes from workers will be managed using the Sewage Treatment Plant located within the FSRU area. c. Deck drainage wastes will be managed by providing oil catcher facilities equipped with a sump pit to absorb if there are oil spills d. B3 waste will be managed by providing a storage container both for B3 solid waste such as rag cloth and B3 wastewater such as used oil. B3 waste will be transported using a	FSRU and the surrounding area	During FSRU operating activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of West Java province b. DLHK of Subang Regency c. DLHK of West Java province d. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok e. Director General of Marine Transportation, Ministry of Marine Affairs f. Department of Marine and Fisheries of Subang g. Ministry of Energy and

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
	• Increased Salinity		Pollution, Regulation of the Minister of Transportation No. KM 4 of 2005 on Prevention of Pollution from Ships, and Regulation of the Minister of Transportation No. PM 58 of 2013 on Pollution Prevention in Waters and Ports.	supply boat to be managed in cooperation with third parties who have B3 waste management permit e. Conduct periodic maintenance of the desalination unit to ensure the equipment effectiveness			Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
6	Changes in Plankton Abundance	Operational of FSRU	Plankton abundance is remain maintained at a range of> 15,000 individual/litter (Basmi, 1987) or at a number relatively similar to the baseline	The impact to the plankton is the secondary impacts (derivative) from increased sea water pollution due to activities derived from domestic FSRU activities. Therefore, the management is not conducted directly, but through the management of its primary impacts, namely the management of the impact of increasing domestic pollution caused by FSRU	PLTGU and the surrounding area	During PLTGU operations	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of West Java province b. DLHK of Subang Regency c. DLHK of West Java province d. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							e. Director General of Marine Transportation, Ministry of Marine Affairs f. Department of Marine and Fisheries of Subang g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
7	Disruption of Fishermen's Activities	Operational of FSRU	a. The absence of significant disruption to fisherman's activities resulting from FSRU operation b. Availability of warning signs to prevent disruption of fisherman's activities	a. Coordinate and socialize to fishermen around FSRU operation area by involving related regional leaders around FSRU operational area, restricted zone and limited zone of the FSRU area. b. Install warning signs related to FSRU activity. c. Install a warning signs to the area around the restricted zone and limited zones of FSRU d. Inspect and maintain signs on the area around the restricted zone and limited zone of FSRU e. Conduct routine patrols f. Provide an appeal to fishermen to conduct intensive coordination during fishing on the limited area.	FSRU and the surrounding area	During FSRU operations	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of West Java province b. DLHK of Subang Regency c. DLHK of West Java province d. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok e. Director General of Marine Transportation, Ministry of Marine Affairs f. Department of Marine and Fisheries of Subang g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient**

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							Institution: a. DLHK of Subang Regency a. DLHK of West Java province b. Ministry of Environment and Forestry
8	Community Grievance	Operational of FSRU	a. Availability of community grievance handling management. b. There is evidence of grievance handling from communities related to FSRU operating activities	a. Developing communication systems and mechanisms of community grievance submission at the village/ urban-village level b. Conduct periodic and ongoing socialization to communities and stakeholders regarding project activity plans c. Socialize grievance submission mechanisms, including organization and company personnel along with project executive in charge of receiving grievance d. Provide representative room / offices to be reached by the community in submitting grievance and its employees who	FSRU and the surrounding area	During FSRU operations	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of West Java province b. DLHK of Subang Regency c. DLHK of West Java province d. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok e. Department of Marine and Fisheries of Subang f. Director General of

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				are ready to accommodate the grievance of community e. Provide a grievance submission contact number f. Respond to every community grievance in a friendly and transparent manner in accordance with the actual conditions. g. Make a monitoring and create reports of grievance handling from the community			Marine Transportation, Ministry of Marine Affairs g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
9	Disruption of Sea Traffic	Operational of FSRU	No incidents of sea transportation disruption caused by operational of FSRU	a. Create zoning in the form of restricted and limited zones around the FSRU b. Provide an appeal to fishermen to conduct intensive coordination during fishing on the limited area. c. Give an appeal to fishermen to avoid fishing activities in the area of limited zone.	FSRU and the surrounding area	During FSRU operations	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of West Java province b. DLHK of Subang Regency c. DLHK of West Java province

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				d. Install signs along the area of restricted and limited zones e. Conduct socialization and counseling to the fishermen regarding the activity of zoning in the FSRU area f. Coordinate with local stakeholders related with FSRU operations			d. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok e. Director General of Marine Transportation, Ministry of Marine Affairs f. Department of Marine and Fisheries of Subang g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
10	Increased CO and Temperature	Operational of HSRG	Carbon monoxide levels meets the quality standard Regulation of Environment	a. Establish a safe limits and safe procedures for working around	PLTGU Project Site	During the operational activity of	**Executive Institution:** PT JSP and Executive Contractor

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			Minister No.: 13 of 2009 on the Quality Standard of Oil and Gas Industry Activity, Emission Source of combustion process	HRSG b. Perform periodic maintenance to the air quality measuring instrument (CEMS) installed c. The scheduling of CEMS instrument maintenance is performed intermittently d. Preparing emergency response plan to anticipate emergency situation due to CO gas pollution		HSRG took place	**Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
11	Increased CO2	Operational of	There are reports of periodic	a. Plant and maintain trees in the	PLTGU Project	During the	**Executive Institution:**

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
	Emissions	HSRG	GHG emission calculations during the operation of PLTGU as well as efforts to reduce GRK emissions	project area as a greening site that serves to increase CO2 uptake by plants b. Perform energy efficiency by optimizing work equipment related to energy use as an effort to reduce CO2 emission	Site	operational activity of HSRG took place	PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
12	Community Grievance	Operational of HSRG	a. Availability of community grievance handling management. b. There is evidence of grievance handling from communities related to HSRG operation	a. Developing communication systems and mechanisms of community grievance submission at the village/ urban-village level b. Conduct periodic and ongoing socialization to communities and stakeholders regarding project activity plans c. Socialize grievance submission mechanisms, including organization and company personnel along with project executive in charge of receiving grievance d. Provide representative room / offices to be reached by the community in submitting grievance and its employees who are ready to accommodate the grievance of community e. Provide a grievance submission contact number f. Respond to every community grievance in a friendly and transparent manner in accordance with the actual conditions. g. Make a monitoring and create	PLTGU Project Site	During the operational activity of HSRG took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				reports of grievance handling from the community			e. Ministry of Environment and Forestry
13	• Increased Salinity • Changes in pH Increased TSS Content	Desalination and Demineralization of Sea Water	a. The quality of wastewater generated from the desalination process meets the standard quality standard of Regulation of Environment Minister No. 8 of 2009 on waste water quality standard for thermal activity b. At a radius of 30 meters from outfall of salinity level is equivalent to the natural salinity condition of the surrounding area c. The abundance of the plankton community has a good diversity index	Perform periodic desalination machine maintenance	PLTGU site and surrounding areas	During PLTGU operations	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of West Java province b. DLHK of Karawang Regency c. DLHK of West Java province d. Department of Marine and Fisheries of Subang e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							b. DLHK of West Java province c. Ministry of Environment and Forestry
14	• Increased Chlorine (Cl2) • Increased Zinc (Zn) Increased concentration of phosphate (PO4)	Operational of Cooling Tower System	The quality of wastewater generated from cooling system operation process meets the standard quality standard of Regulation of Environment Minister No. 8 of 2009 on waste water quality standard for thermal activity	The use of chemicals required for cooling tower operation is performed in accordance with the optimum dose	PLTGU site and surrounding areas	During PLTGU operations	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							c. Ministry of Environment and Forestry
15	• Increased COD Concentration • Increased Concentrations of Oil and Fats • Increased Total Organic Carbon (TOC) Content	Industrial Wastewater Treatment	The quality of wastewater of the PLTGU activities meets the standard quality standard of Regulation of Environment Minister No. 8 of 2009 on waste water quality standard for thermal activity	a. Build wastewater treatment units for water contaminated by chemicals and oils b. Reduce the wastewater oil level by building an oil separator unit prior to channeling it to the wastewater treatment unit c. Conduct neutralizing pH levels through a neutralization pond facility to neutralize pH for before being flowed into the sea.	Location of PLTGU Jawa-1	During PLTGU operations	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Department of Marine and Fisheries of Subang f. Department of Marine and Fisheries of Karawang g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							Report Recipient Institution: a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
16	• Changes in pH • Increased TSS Content • Increased BOD Concentration • Increased COD Concentration • Increased Concentrations of Oil and Fats • Increased Ammonia (NH3) • The existence of floating objects	Domestic Wastewater Treatment	The quality of domestic wastewater meets the quality standard of the Regulation of Environment Minister No. 68 of 2016 on the Quality Standards of Domestic Wastewater	a. Create an on-site waste treatment facility in the form of Sewage Treatment Plant (STP) consisting of several treatment chambers, including screening, aeration, mud treatment, sedimentation, deposition and separation/recirculation of sludge waste. Add hypochlorite in the effluent stream for disinfection. b. Conduct chlorinated in the effluent tanks to the treated water before being channeled into the Java Sea. c. Conduct removal of sediment sludge at a liquid waste	Location of PLTGU Jawa-1	During PLTGU operations	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Department of Marine and Fisheries of Subang f. Department of Marine and Fisheries of Karawang

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
	• Increased Total Coliform			treatment facility to be sent to sludge thickener and transported by a licensed local carrier. d. Install debit gauge or flow rate of wastewater on the inlet and outlet of WTP			g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
17	The existence of Floating Objects/Trash	Handling of Non B3 Solid Waste	Solid waste management in accordance with the provisions of Law No.18 of 2008 on the Waste Management	a. Perform solid waste floating collection periodically to be accommodated at shelters in accordance with the characteristics of solid waste types (biodegradable and nonbiodegradable). b. Provide domestic solid waste shelters according to its types (biodegradable and	FSRU and PLTGU areas and surrounding areas	During operation of FSRU and PLTGU	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				nonbiodegradable). c. Separate domestic solid waste according to its type and place it according to its type (biodegradable and nonbiodegradable). d. Conduct delivery periodically of solid wastes resulting from operation of FSRU to waste storage facility at PLTGU e. Deliver solid waste (biodegradable and nonbiodegradable) to licensed third parties to be further managed.			d. DLHK of West Java province e. Department of Marine and Fisheries of Subang f. Department of Marine and Fisheries of Karawang g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
18	Decreased Environmental	Handling of Non B3 Solid Waste	Solid waste management in accordance with the	a. Provide domestic solid waste shelters according to its types	Location of PLTGU Jawa-1	During operation of	**Executive Institution:** PT JSP and Executive

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
	Sanitation		provisions of Law No.18 of 2008 on the Waste Management	(biodegradable and nonbiodegradable). b. Separate domestic solid waste according to its type and place it according to its type (biodegradable and nonbiodegradable). c. Deliver solid waste (biodegradable and nonbiodegradable) to third parties to be further managed.		PLTGU and Transmission Network and GITET	Contractor **Supervisory Institution** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Department of Marine and Fisheries of Subang f. Department of Marine and Fisheries of Karawang g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							d. DLHK of West Java province e. Ministry of Environment and Forestry
19	Decreased Environmental Sanitation	Handling of B3 Waste	a. B3 Waste Management Complies with the Regulation of Environment Minister No. 101 of 2014 on the Hazardous and Toxic Waste Management b. B3 Waste Management in accordance with Decree of Head of Environmental Impact Control Agency No. 01 of 1995 on Procedures and Requirements for the Storage and Collection of Hazardous and Toxic Waste (B3) c. Handling of B3 waste from the type of used lubricant in accordance with the provisions of Decree of Head of Environmental Impact Control Agency No. 255 of 1996 on Procedures for Storage and Collection	a. Store B3 Waste in a storage container which has a temporary license for B3 waste storage b. Provide special waste storage to temporarily accommodate B3 waste. c. Temporarily accomodate B3 waste and B3 contaminated material in the B3 waste bin shelter provided. d. Before 90 days, deliver B3 waste to land and submitted to third parties who have obtained B3 waste management permit to be further managed e. Deliver B3 Waste to a third party who owns the B3 waste management license f. Make a recording of B3 waste manifest delivered to third party (licensed B3 waste management) g. B3 Waste Management with	Location of PLTGU Jawa-1	During operation of FSRU and PLTGU and Transmission Network and GITET	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Department of Marine and Fisheries of Subang f. Department of Marine and Fisheries of Karawang g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
			of Used Lubricant Oil.	incenerator complies with the Regulation of Environment Minister No. 101 of 2014 on the Hazardous and Toxic Waste Management			**Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
20	Increased Electric Field and Magnetic Field	Operational and Maintenance of Transmission Network 500kV and GITET 500kV	Electric field exposure does not exceed 5 kV/m and magnetic field exposure does not exceed 0.1 mT	Install facilities (grounding) to eliminate electromagnetic induction effects on Transmission Network and GITET.	Network Transmission and GITET	Network Transmission and GITET	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient**

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
							Institution: a. DLHK of Bekasi Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
21	Community Grievance	Operational and Maintenance of Transmission Network 500kV and GITET 500kV	a. Availability of community grievance handling management. b. There is evidence of grievance handling from communities related to the operation and maintenance of transmission network and GITET	a. Developing communication systems and mechanisms of community grievance submission at the village/ urban-village level b. Conduct periodic and ongoing socialization to communities and stakeholders regarding project activity plans c. Socialize grievance submission mechanisms, including organization and company personnel along with project executive in charge of receiving grievance d. Provide representative room / offices to be reached by the community in submitting grievance and its employees who are ready to accommodate the grievance of community e. Provide a grievance submission	39 villages directly affected by PLTGU Jawa-1 activities included in Karawang regency, Bekasi Regency and Subang Regency.	Network Transmission and GITET	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Ministry of Environment

No.	Managed Environmental Impacts	Source of Impact	Success Indicator of Environmental Management	Forms of Environmental Management	Location of Environmental Management	Period of Environmental Management	Institution of Environmental Management
				contact number f. Respond to every community grievance in a friendly and transparent manner in accordance with the actual conditions. g. Make a monitoring and create reports of grievance handling from the community			and Forestry

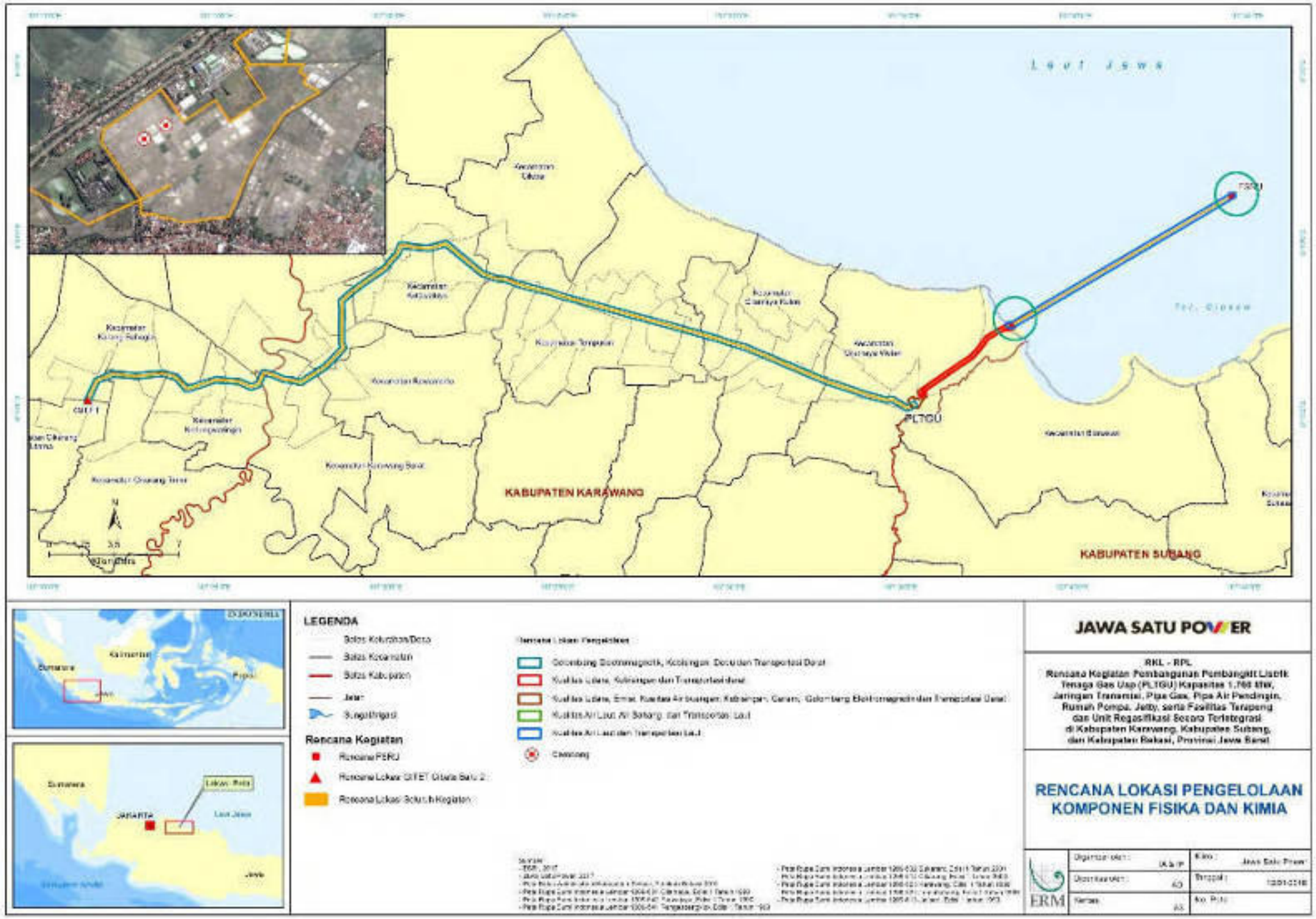

Figure 2-1 Physical and Chemical Component Site Management Plan

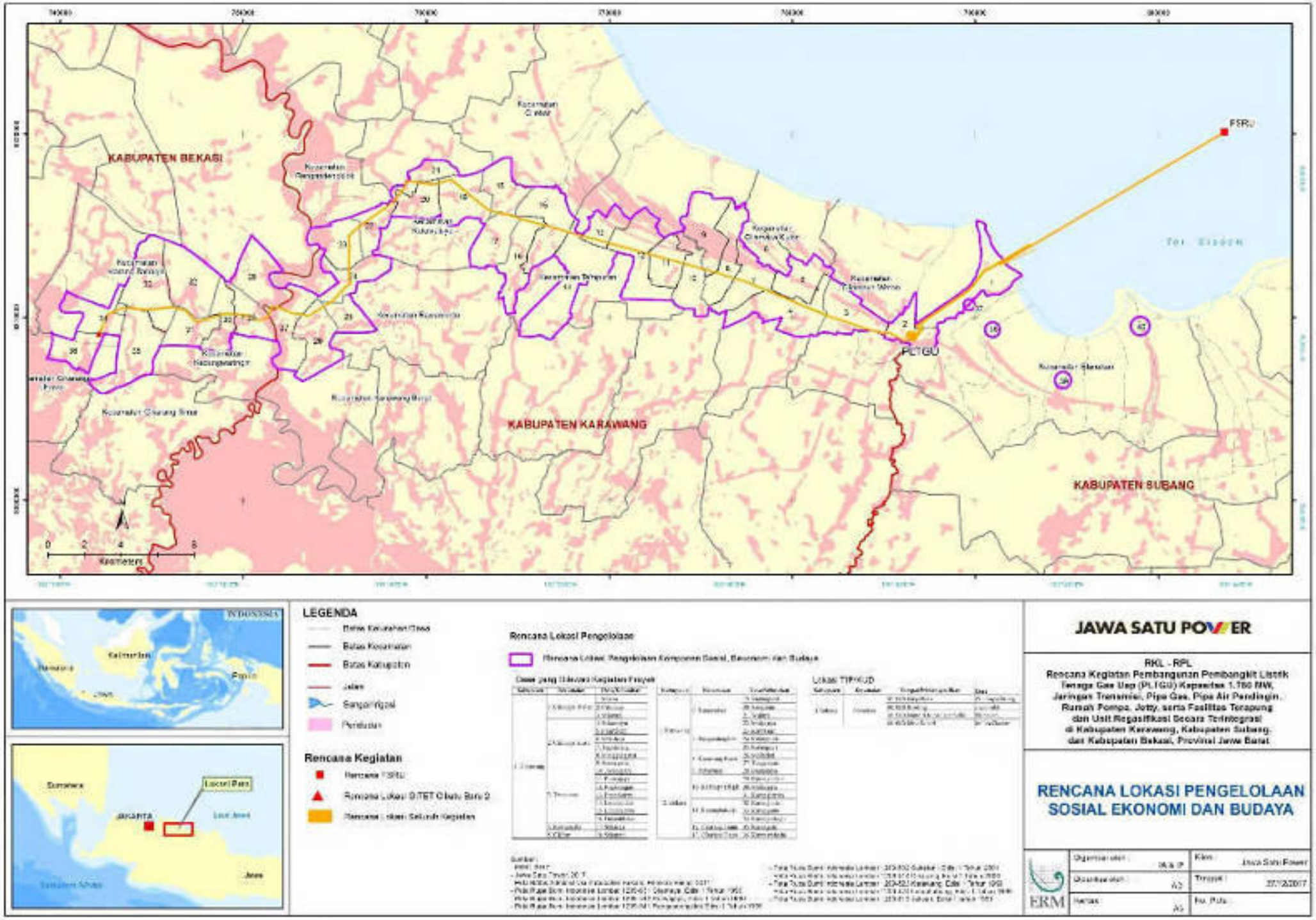

Figure 2-2 Map of Social and Cultural Management Plan

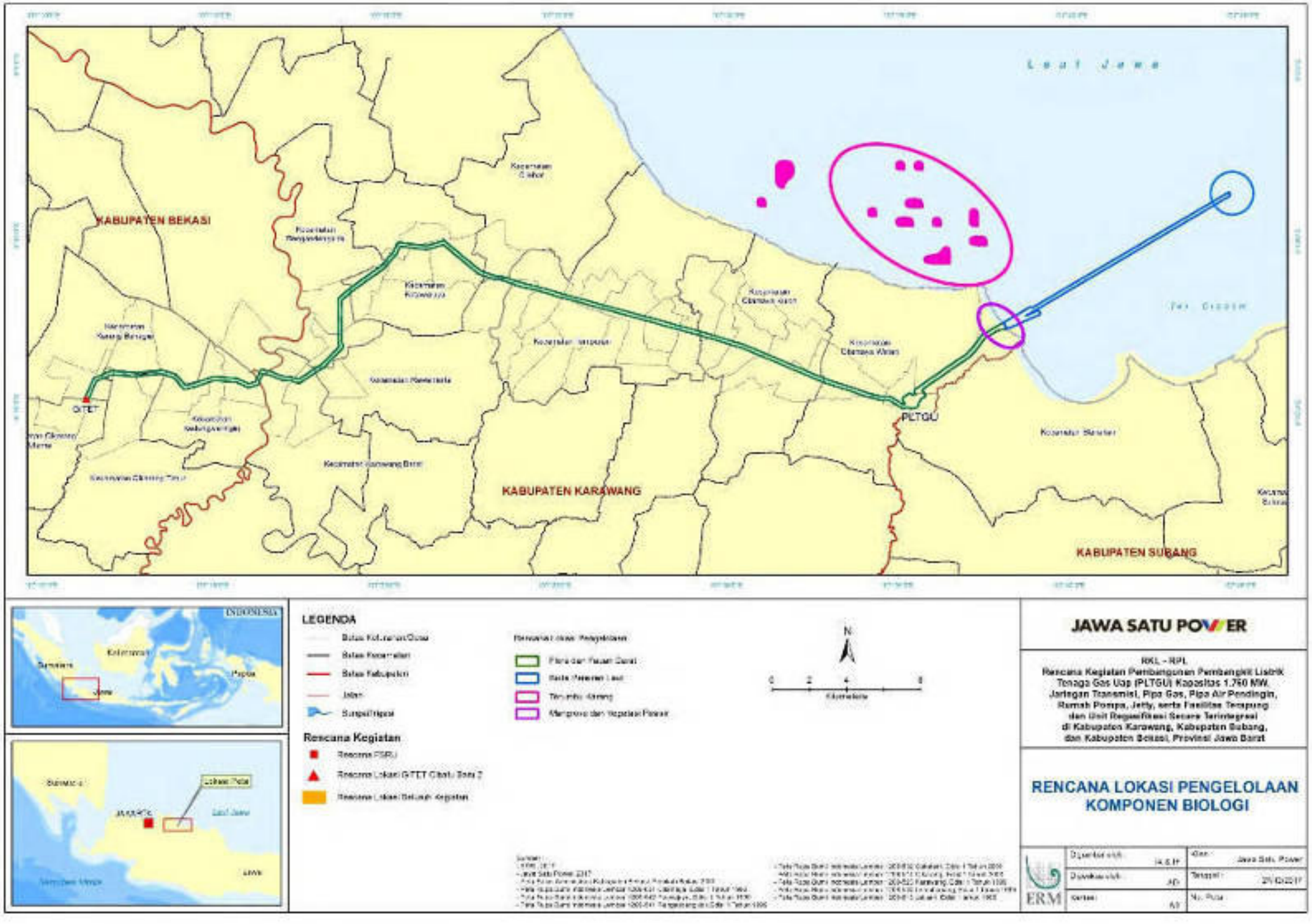

Figure 2-3 Map of Biological Component Site Management Plan

CHAPTER 3

ENVIRONMENTAL MONITORING PLAN (RPL)

A plan description Environmental monitoring is delivered in a matrix ***Table 3-1***and ***Table 3-2***the following.

Table 3-1 Matrix of Environmental Management Plan **(Significant Impact Managed Based on Results of Management Direction on ANDAL)**

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
A. Monitored Significant Impact (Results of Management Direction on ANDAL)							
. Pre-Construction Stage							
1	Community Grievance	Land acquisition	a. Availability of community grievance handling management. b. There is evidence of grievance handling from communities related to land acquisition	**Data collection method:** Secondary data collection is obtained by checking the grievance community submitted to the grievance recipient post. **Data analysis:** Data is tabulated and described comparatively.	Muara Village, Cilamaya Subdistrict, Karawang Regency	Twice a year during land acquisition activities took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. Ministry of ESDM– Directorate General of Electricity d. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
I. Construction							
1	Increased Employment Opportunities	Reception of Construction Labor	a. Socialization of information on the receipt of labor. b. The absorption of local labor as labor during construction activities took place c. The process of labor absorption comply with Law No. 13 of 2003 d. The process of labor absorption comply with Local Regulation of Karawang No. 1 of 2011 e. Fulfillment of local labor quota/allocation of 60%	**Data collection method:** a. Primary data collection in the form of data of labor recruitment process and the number of local workers through interviews with labor recruitment contractors. b. Check the process and documentation of labor recruitment. c. Interviews with village government officials and relevant stakeholders. **Data analysis:** a. The data on the amount of local labor received is tabulated and described comparatively. b. Data is tabulated and described descriptively.	Village around PLTGU location and network of SUTET and GITET Cibatu 39 villages directly affected by PLTGU Jawa 1 activities included in Karawang regency, Bekasi Regency and Subang Regency.	Twice a year during the work recruitment activities.	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. Department of Manpower and Transmigration of Karawang Regency b. Department of Manpower and Transmigration of Bekasi Regency c. Department of Manpower and Transmigration of Subang Regency d. Department of Manpower and Transmigration of West Java province e. DLHK of Karawang Regency f. DLHK of Bekasi Regency g. DLHK of Subang Regency h. DLHK of West Java province i. Ministry of Energy and Mineral Resources – Directorate General of Electricity j. Ministry of Environment

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
							and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
2	Changes in Income Level Community	Reception of Construction Labor	a. Increase or maintain the income of community around the activity location b. The initiator comply with Law No. 13 of 2003 on the Manpower, Minimum Wage of West Java Province and/or Karawang Regency/ Bekasi Regency/ Subang Regency and work contract agreement c. The absorption of local community who lost their livelihood to work according to their	**Data collection method:** a. Primary data collection is the income data of the affected communities through surveys and interviews with affected communities, workers and employers (executive contractors). b. Collect evidence of giving wages randomly from companies and executive contractors who are legally bound to the initiator. c. Interviews with businesses outside the company that have a linked to	At 39 villages directly affected by PLTGU Jawa-1 activities included in Karawang regency, Bekasi Regency and Subang Regency.	Twice a year during the work recruitment activities.	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. Department of Manpower and Transmigration of Karawang Regency b. Department of Manpower and Transmigration of Bekasi Regency c. Department of Manpower and Transmigration of Subang Regency d. Department of Manpower and Transmigration of

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
			competence d. The process of labor absorption comply with Local Regulation of Karawang No. 1 of 2011	projects such as canteen, token of pulses and others related to their income. d. Secondary data collection in the form of household income statistics obtained from the relevant offices. e. The data that has been collected is documented. **Data analysis:** Data is tabulated and described comparatively.			West Java province e. DLHK of Karawang Regency f. DLHK of Bekasi Regency g. DLHK of Subang Regency h. DLHK of West Java province i. Ministry of Energy and Mineral Resources – Directorate General of Electricity j. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
3	Increased dust concentration ($TSP/PM_{10}/PM_{2,5}$)	Mobilization of Equipment and Materials (By Land)	Concentration of TSP, PM_{10}, $PM_{2.5}$ meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control	**Data collection method:** a. Air quality sampling refers to the Indonesian National Standard, or International Standard that can be traced.	Monitoring is performed around the location of nearby	Twice a year during equipment and material mobilization	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:**

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
			of Air Pollution:	b. Data collection is performed by accredited laboratories. c. Data Collection Method in accordance with SNI 19-7119.6-2005: Ambient air Part 6: "Determination of Sampling Location of the Ambient Air Quality Monitoring Test ". d. Data analysis method according to SNI 19-7119.3-2005: Ambient air Part 3: Total suspended particle test method using high volume air sampler (HVAS) equipment with gravimetric method (PM10 and PM2.5). **Data analysis:** The analysis data is described descriptively and compared with the quality standards and baselines.	activities and nearby settlements around the location of activities and settlements around the equipment and material mobilization lines. Which refers to the air sampling point in the baselines a. Tegalwar (6°15' 30.624" S 107°34' 30.424" E) b. Urban Village of Rawagempol Wetan (6°14' 10.714" S 107°34' 44.956" E) c. Village of Cilamaya	activities.	a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Department of Transportation of Karawang Regency f. Department of Transportation of Bekasi Regency g. Department of Transportation of West Java Province h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Environment

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
					Hilir, Subdistrict. Blanakan; (6°16' 4.912" S 107°35' 43.616" E) d. Location of PLTGU (6°14' 43.662" S 107°35' 13.272" E) e. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E) f. Village of Muara (6°13' 55.264" S 107°36' 43.154" E) g. Village of Karang Rahayu (6°13' 50.053" S107°11' 6.592" E) h. Access road nearby PLTGU		and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
					(6°14' 27.495" S 107°35' 32.667" E) i. Road of Cilamaya (6°15' 29.672" S 107°34' 32.143" E) j. Roadway of Tegal Urung (6°13' 26.505" S 107°32' 29.852" E)		
4	Changes in Disease Prevalence	Mobilization of Equipment and Materials (By Land)	a. There is a plans and efforts to prevent and manage diseases related to mobilization activities b. The equipment and material Mobilization Activities does not contribute to an increase in health disorders of the communities.	**Data collection method:** a. Secondary data collection in the form of health profile of puskesmas in urban villages are included in study area, acceptance and mobilization data of labor and data recapitulation of employees health b. Primary data collection in the form of interviews with the community, village officials and health institutions located at the	a. At 39 villages directly affected by PLTGU Jawa-1 activities included in Karawang regency, Bekasi Regency and Subang Regency. b. Health	Twice a year during equipment and material mobilization activities.	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Health Office of Karawang Regency f. Health Office of Bekasi Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
				location around the PLTGU Jawa-1 project **Data analysis:** Data is tabulated and described comparatively.	institutions are located in study areas such as clinics, physician practice, puskesmas and hospital.		g. Health Office of West Java Province h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry j. DLLAJ of Bekasi Regency k. DLLAJ of Karawang Regency l. DLLAJ of Subang Regency **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Environment and Forestry
5	Increased dust concentration ($TSP/PM_{10}/PM_{2,5}$)	Land Clearing	Concentration of TSP, PM_{10}, $PM_{2.5}$ meets the required quality standards of the Indonesia Regulation. The initiator of the activity meets the regulation:	**Data collection method:** a. Air quality sampling refers to the Indonesian National Standard, or International Standard that can be traced, data collection is performed	Monitoring is performed in the area around the location of activity and the nearest	Twice a year during equipment and material mobilization activities.	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
			Government Regulation No. 41 of 1999 on the Control of Air Pollution.	by accredited laboratories. b. Data Collection Method in accordance with SNI 19-7119.6-2005: Ambient Air Part 6: "Determination of Sampling Location of the Ambient Air Quality Monitoring Test ". c. Data analysis method according to SNI 19-7119.3-2005: Ambient air Part 3: Total suspended particle test method using high volume air sampler (HVAS) equipment with gravimetric method (PM10 and PM2.5). **Data analysis** The analysis data is described descriptively and compared with the quality standards and baselines.	settlements around the location activity of land clearing area of PLTGU, Jetty, and GITET site which refers to the baseline air sampling of AMDAL a. Urban Village of Rawagempol Wetan (6°14' 10.714" S 107°34' 44.956" E) b. Village of Cilamaya Hilir, Subdistrict. Blanakan; (6°16' 4.912" S 107°35' 43.616" E) c. Location of PLTGU (6°14'		b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Energy and Mineral Resources – Directorate General of Electricity e. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency **c.** DLHK of West Java province **d.** Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
					43.662" S 107°35' 13.272" E) d. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E) e. Village of Muara (6°13' 55.264" S 107°36' 43.154" E) f. Village of Karang Rahayu (6°13' 50.053" S107°11' 6.592" E) g. Jetty (6°12' 29.775" S 107°39' 18.315" E) h. GITET (6°13' 50.053" S 107°11' 6.560" E)		

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
					i. Monitoring of Land Clearing (6°14' 48.221" S 107°35' 12.482" E)		
6	Increased Noise	Land Clearing	The intensity of the noise generated does not exceed the quality standard based on Decree of Environment Minister No. 48 of 1996, namely: a. 55 dBA for residential environment, b. 70 dBA of road & industrial environment as well as trade and service environment	**Data collection method:** a. Conduct noise measurements with sound level meters. b. Compare the noise measurement results with the Decree of State Minister of Environment Number: Kep-48/Menlh/11/1996 on Noise Level Standards. **Data analysis:** Data is tabulated and described comparatively.	Monitoring is performed in the area around the location of activity and the nearest settlements around the location activity of land clearing area of PLTGU, Jetty, and GITET site which refers to the baseline air sampling of AMDAL a. Urban Village of Rawagempol Wetan (6°14'	Monitored every three months during land clearing activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Energy and Mineral Resources – Directorate General of Electricity e. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency **c.** DLHK of West Java

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			Institution of Environmental Monitoring
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
					10.714" S 107°34' 44.956" E) b. Village of Cilamaya Hilir, Subdistrict. Blanakan; (6°16' 4.912" S 107°35' 43.616" E) c. Location of PLTGU (6°14' 43.662" S 107°35' 13.272" E) d. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E) e. Village of Muara (6°13' 55.264" S 107°36' 43.154" E) f. Village of		province **d.** Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			Institution of Environmental Monitoring
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
					Karang Rahayu (6°13' 50.053" S107°11' 6.592" E) g. *Jetty* (6°12' 29.775" S 107°39' 18.315" E) h. GITET (6°13' 50.053" S 107°11' 6.560" E) i. Monitoring of Land Clearing (6°14' 48.221" S 107°35' 12.482" E)		
7	The existence of Mangrove	Land Clearing	a. Maintain the area and quality of Mangrove at the activity location that are not built b. Availability of nursery land and plant seed placement c. There is a coastal land	**Data collection method:** a. Transect method on permanent plot area. The data recorded are growth, species, and number of individuals b. Observation and analysis of vegetation (especially for	Project site of Jetty and Pump House on the coastline of Muara village.	Conducted every 3 months at the Land clearing stage	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
			rehabilitation program by planting Mangrove which can be integrated with the obligation of Borrow-to-Use Forestry Permit (IPPKH)	natural vegetation) green open space within the activity location c. Analysis of reports on RTH planting and rehabilitation activities d. Analysis of satellite imagery or aerial photographs or drones every 6 **Data analysis:** a. Vegetation analysis on Mangrove density based on criteria contained in the Regulation of Minister of Environment No. 201 of 2004 on Raw Criteria and Guidelines for Mangrove Damage Determination b. Vegetation analysis of dominance, frequency of species distribution, and percent of live vegetation analysis of dominance, frequency of species distribution, and percent of life			c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency **c.** DLHK of West Java province **d.** Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			Institution of Environmental Monitoring
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
8	Changes in Fauna Habitat	Land Clearing	a. Maintain the floral biodiversity as part of terrestrial fauna habitat in areas not built and defined as Green Open Space (RTH) as well as around the project sites b. There is a program of rehabilitation and revegetation of land under the location activities of PLTGU Jawa 1, mainly by using plant species that support wildlife habitat c. There are rehabilitation and greening programs outside the activity location	a. Observation and analysis of animals in the area around the company's activities b. Analysis of reports on RTH planting and rehabilitation activities c. Descriptive analysis	Green open space, in the location of land clearing activities around PLTGU site plan, Jetty, Pump House and GITET site and plantation location outside the activities of planting for greening	Conducted every 6 months	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Department of Transportation of Karawang Regency e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Environment

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
							and Forestry
9	Changes in Fauna Biodiversity	Land Clearing	a. Maintain the fauna biodiversity was found in the location is not built in the area of PLTGU Jawa -1 and the surrounding area mainly the preservation of protected species, endemic species and migrant species b. There are RTH area in the project site, especially PLTGU and GITET	a. Observation and analysis of fauna in green open spaces within the activity location and surrounding area into study areas including along transmission network, pipelines and Jetty areas and around tarsus. b. Analysis of reports on RTH planting and rehabilitation activities c. Monitoring analysis of flora and fauna in the entire study area. d. Descriptive analysis	Green open space, location of land clearing around PLTGU site plan, Jetty, Pump House and GITET area.	Conducted every 6 months	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Department of Transportation of Karawang Regency e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Environment

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
							and Forestry
10	Increased TSS Content	pipeline deployment at Sea	The concentration of TSS meets the quality standard required in accordance with Decree of Environment Minister No. 51 of 2004 on the Sea Water Quality Standard Appendix 1: TSS is 80 mg/l or does not exceed the TSS baseline conditions (if TSS has exceeded the quality standard in the baseline)	**Data collection method:** a. Conduct monitoring of TSS parameters in aquatic environment around Pipe deployment location b. Data Collection Method in accordance with SNI 6964.8:2015: Sea Water Quality Part 8: "Sea Water Test Sampling Method c. Data Analysis Method: SNI 06-6989.3-2004 Water and Wastewater - Part 3: Total suspended solid test method gravimetrically **Data analysis** The analysis data is described descriptively and compared with the quality standards and baselines.	Locations around the pipeline deployment plan at sea, according to the point of sampling of water at the baseline of AMDAL 1. SW-1 west side Sea of the pipeline deployment plan (6°8'24.972" S 107°39' 31.039" E) 2. Eastern coastal waters of the pipeline deployment location plan (6°11' 43.114" S 107°46' 1.082" E) 3. Coastal waters	Every 3 months during pipeline deployment at sea.	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Energy and Mineral Resources – Directorate General of Electricity e. Ministry of Environment and Forestry f. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency **c.** DLHK of West Java province

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
					of the east side - River Estuary of Cilamaya (6°12'42.798" S107°38' 43.760" E) 4. Coastal waters of the northwest side of the pipeline deployment location plan (6°11' 17.579" S 107°37' 41.734" E) 5. Sea waters of the northwestern side of the pipeline deployment plan (6 ° 10 '29.186 "S 107 ° 37' 58.171" E)		**d.** Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
11	Increased TSS Content	Dredging and Placement of Dredge Results	The concentration of TSS meets the quality standard required in accordance with Decree of Environment Minister No. 51 of 2004 on the Sea Water Quality Standard Appendix 1: TSS namely 80 mg/l	**Data collection method:** a. Conduct monitoring of TSS parameters in aquatic environment around Pipe deployment location b. Data Collection Method in accordance with SNI 6964.8:2015: Sea Water Quality Part 8: "Sea Water Test Sampling Method c. Data Analysis Method: SNI 06-6989.3-2004 Water and Wastewater - Part 3: Total suspended solid test method gravimetrically **Data analysis** The analysis data is described descriptively and compared with the quality standards and baselines.	Location the sea excavation Line plan, according to the point of sampling of water at the baseline of AMDAL a. West side of the excavation line (6°11' 47.363" S 107°38' 50.309" E) b. Outside west side of the excavation line (6°11' 3.210" S 107°40' 54.749" E) c. Inside East side of the excavation (6°9' 33.002" S 107°42' 31.026" E) d. Outside East side of the	Every 3 months during activity of dredging at sea	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Energy and Mineral Resources - Directorate General of Electricity e. Ministry of Environment and Forestry f. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency **c.** DLHK of West Java province **d.** Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
					excavation (6°9' 6.234" S 107°44' 37.421" E)		
12	Disruption of Fishermen's Activities	Dredging and Placement of Dredge Results	a. The absence of significant disruption to fisherman's activities resulting from dredging activities and placement of dredge results b. Availability of warning signs to prevent disruption of fisherman's activities	**Data collection method:** Surveys and interviews with fishing communities randomly regarding disruption of fishing activities. **Data analysis:** Data is tabulated and presented descriptively.	Fisherman villages around the dredging activities of Cilamaya Village, and Muara Village of Cilamaya Wetan Subdistrict	Every 3 months during activity of dredging at sea	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
							c. DLHK of West Java province **d.** Ministry of Environment and Forestry
13	Increased Noise	Construction of PLTGU and Supporting Facilities	The intensity of the noise generated does not exceed the quality standard based on Decree of Environment Minister No. 48 of 1996, namely: a. 55 dBA for residential environment, b. 70 dBA of road & industrial environment as well as trade and service environment	**Data collection:** Conduct noise measurements in the area around the PLTGU construction area according to the monitoring parameters. **Data analysis:** Monitoring data results is tabulated and compared with standard noise level in accordance with Decree of the Minister of Environment No. KEP-48/MENLH/11/1996 year 1996	Site location of PLTGU and the surrounding area is adjusted to the location of the baseline air sampling of the AMDAL a. Location of PLTGU (6°14' 43.662" S 107°35' 13.272" E) b. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E) c. Monitoring of Land Clearing	Every 3 months during PLTGU Construction activity	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
					(6°14' 48.221" S 107°35' 12.482" E)		c. Ministry of Environment and Forestry
14	Increased Noise	Development of GITET 500kV	The intensity of the noise generated does not exceed the quality standard based on Decree of Environment Minister No. 48 of 1996, namely: a. 55 dBA for residential environment, b. 70 dBA of road & industrial environment as well as trade and service environment	**Data collection:** Conduct noise measurements in the area around the GITET construction area according to the monitoring parameters. **Data analysis:** Monitoring data results is tabulated and compared with standard noise level in accordance with Decree of the Minister of Environment No. KEP-48/MENLH/11/1996 year 1996	Site location of GITET and the surrounding area is adjusted to the location of the baseline air sampling of the AMDAL a. Village of Karang Rahayu (6°13' 50.053" S107°11' 6.592" E) b. GITET (6°13' 50.053" S 107°11' 6.560" E)	Every 3 months during GITET Construction activity	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
15	Decreasing Employment Opportunities	Discharge of Construction Labor	a. Discharge of labor in accordance with Law No. 13 of 2003 on Manpower, Provincial and/or Regency Minimum Wage and Work Contract Agreement b. There is documentation of labor discharge included c. There is a notification letter and/or discharge of labor to the Department of Manpower and Transmigration, Head of Sub-district and Head of Village/Urban-Village d. There is documentation in the form of explanation sheets of employment contracts concerning the discharge of labor when receipt of labor	**Data collection method:** a. Primary data collection in the form of data of labor recruitment process and the number of local workers through interviews with labor recruitment contractors. b. Check the process and documentation of labor recruitment. c. Interviews with village government officials and relevant stakeholders. **Data analysis:** Data on the amount of labor discharges is tabulated and described	At 39 villages directly affected by PLTGU Jawa 1 activities included in Karawang regency, Bekasi Regency and Subang Regency.	Monitored every three months during the construction stages with reporting every six months	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Department of Manpower and Transmigration of Bekasi Regency f. Department of Manpower and Transmigration of Subang Regency g. Department of Manpower and Transmigration of Karawang Regency h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:**

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
							a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
16	Changes in Income Level Community	Discharge of Construction Labor	The initiator of activity complies with applicable regulations: Law No. 13 of 2003 on Manpower, Provincial and/or Regency Minimum Wage and Work Contract Agreement	**Data collection method:** a. Primary data collection is the income data of the affected communities through surveys and interviews with affected communities, workers and employers (executive contractors). b. Collect evidence of giving wages randomly from companies and executive contractors who are legally bound to the initiator c. Interviews with businesses outside the company that have a linked to projects such as canteen, token of pulses and others related to their income.	At 39 villages directly affected by PLTGU Jawa 1 activities included in Karawang regency, Bekasi Regency and Subang Regency.	Twice a year during construction activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Department of Manpower and Transmigration of Bekasi Regency f. Department of Manpower and Transmigration of Subang Regency g. Department of Manpower and Transmigration of Karawang Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
				d. Secondary data collection in the form of household income statistics obtained from the relevant offices. f. The data that has been collected is documented **Data analysis:** Data is tabulated and described comparatively.			h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency **d.** DLHK of West Java province **e.** Ministry of Environment and Forestry
I. Operation							
1	Increased Employment Opportunities	Reception of Operation Labor	a. Socialization of information on the receipt of labor. b. The initiator of activity complies with applicable regulations: Law No. 13 of 2003 on Manpower, Provincial and/or Regency Minimum Wage and Work Contract Agreement	**Data collection method:** a. Primary data collection in the form of data of labor recruitment process and the number of local workers through interviews with labor recruitment contractors. b. Check the process and documentation of labor recruitment.	At 39 villages directly affected by PLTGU Jawa 1 activities included in Karawang regency, Bekasi Regency and Subang Regency.	Monitored every six months during the operation stage	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. Department of Manpower and Transmigration of Bekasi Regency b. Department of Manpower and Transmigration of Subang Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
			c. The process of labor absorption comply with Local Regulation of Karawang No. 1 of 2011 d. The absorption of local labor as labor during construction activities took place e. Fulfillment of local labor quota/allocation of 60%	c. Interviews with village government officials and relevant stakeholders. **Data analysis:** Data on the amount of labor acceptance is tabulated and described			c. Department of Manpower and Transmigration of Karawang Regency d. DLHK of Bekasi Regency e. DLHK of Subang Regency f. DLHK of West Java province g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
2	Decreased Sea Water Temperature	Operational of FSRU	The temperature of sea water in the affected area during the FSRU operation meets the quality standard in accordance with the Decree of Environment	Data collection: Measurement of wastewater temperature derived from FSRU and sea temperature around the FSRU location.	Location around FSRU, according to the point of sampling of water at the baseline of AMDAL	a. Waste water from FSRU once a month during the operation	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of Subang Regency

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
			Minister No. 51 of 2004 by taking into account the baseline environmental setting conditions	Data analysis: Water quality data are collected compared to benchmarks (indicator) that has been established on Decree of Environment Minister No. 51 of 2004, then evaluated against compliance with regulations, trends, and critical levels.	a. Sea waters of the northwestern side of FSRU (6°11' 3.241" S 107°40' 55.204" E) b. Southeast sea waters of FSRU (6°9' 32.545" S 107°42' 31.316" E) c. North side sea waters of FSRU (6°8' 8.738" S 107°44' 34.104" E) d. South side sea waters of FSRU (6°9' 6.069" S 107°44' 37.908" E) e. Northwest side sea waters of FSRU (6°10' 29.291" S 107°38' 42.672" E)	stage b. Seawater once a month during the operation stage.	b. DLHK of West Java province c. Department of Marine and Fisheries of Subang Regency d. Ministry of Energy and Mineral Resources – Directorate General of Electricity e. Ministry of Environment and Forestry **Report Recipient** **Institution:** **a.** DLHK of Subang Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			Institution of Environmental Monitoring
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
3	Decreased Fish Catchment Area	Operational of FSRU	There is a alternatative programs built to develop fisherman productivity in event of catchment result management	**Data collection method:** Surveys and interviews with communities randomly related to income of fishermen Collect data on the implementation of CSR program related to increased fishermen productivity. **Data analysis:** Result data is tabulated and presented descriptively	Fisherman villages are activity around FSRU (Muara Village, Cilamaya Subdistrict and Belanakan Village, Belanakan Subdistrict)	Monitored every six months during the operation stage	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of West Java province b. Department of Marine and Fisheries of Subang Regency c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Subang Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry
4	Increased Dust Concentration (TSP/PM10/PM2,5)	Operational of HSRG	**a.** Concentration of TSP, PM_{10}, $PM_{2.5}$ meets the required quality standards of the	**Data collection:** a. Take continuous air samples with CEMS devices at PLTGU stack point	Measurements using CEMS at the point of emission source (stack) of	a. For air quality at the emission	**Executive Institution:** PT JSP and Executive Contractor

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
			Indonesia Regulation No. 41 of 1999 on the Control of Air Pollution. b. Operation of HSRG in accordance with the Decree of the Head of the Environmental Impact Management Agency No. 205 of 1996 on the Technical Guidelines for Air Pollution Control of Stationary Source c. The dust concentration level meets the quality standard of the Regulation of Minister of Environment No. 21 of 2008 on Static Emission Sources Quality Standard for Business and/or Activities of a Thermal Power Plant: Particulate (30 mg/m^3) d. The concentration of managed (particulate) parameters meets ambient and emission air quality	b. Take ambient air samples around PLTGU according to monitoring parameters. c. Examples of air are analyzed in the laboratory. **Data analysis:** Data is analyzed in accordance with the method established in Government Regulation No. 41 of 1999 on the Control of Air Pollution. Data of analysis results compared with benchmarks (indicators), then evaluated against compliance with rules, trends, and critical levels.	PLTGU and ambient air sampling in the area around PLTGU in accordance with the baseline air sampling at the time of AMDAL a. Location of PLTGU (6°14' 43.662" S 107°35' 13.272" E) b. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E)	source point of PLTGU Stack) the measurement is performed continuously b. For ambient air quality is Monitored Every six months during the operation stage	**Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			Institution of Environmental Monitoring
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			standards				
5	Increased Concentration of SO_2	Operational of HSRG	a. The initiator of the activity comply the Government Regulation No.: 41 of 1999 on the Control of Air Pollution, SO_2 (24 hours) i.e. 365 µg/m^3 b. Operation of HSRG in accordance with the Decree of the Head of the Environmental Impact Management Agency No. 205 of 1996 on the Technical Guidelines for Air Pollution Control of Stationary Source c. The initiator of the activity comply the regulation of the Minister of Environment No.: 21 of 2008 on Static Emission Sources Quality Standard for Business and/or Activities of a Thermal Power Plant, SOx (150 mg/m^3) d. The availability of CEMS	**Data collection:** a. Take continuous air samples with CEMS devices at PLTGU stack point b. Take ambient air samples around PLTGU according to monitoring parameters. c. Examples of air are analyzed in the laboratory. **Data analysis:** Data is analyzed in accordance with the method established in Government Regulation No. 41 of 1999 on the Control of Air Pollution. Data of analysis results compared with benchmarks (indicators), then evaluated against compliance with rules, trends, and critical levels.	Measurements using CEMS at the point of emission source (stack) of PLTGU and ambient air sampling in the area around PLTGU in accordance with the baseline air sampling at the time of AMDAL a. Location of PLTGU (6°14' 43.662" S 107°35' 13.272" E) b. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E)	a. For air quality at the emission source point the measurement is performed continuously b. For ambient air quality is Monitored Every six months during the operation stage	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** d. DLHK of Karawang Regency **e.** DLHK of West Java province **a.** Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			Institution of Environmental Monitoring
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			devices that can be operated continuously in accordance with the provisions in the Minister of Environment Regulation No. 21 of 2008				
6	Increased Concentration of NOx	Operational of HSRG	a. NOx concentration meets quality standard of Ambient air quality Government Regulation No.. 41 of 1999 on the Control of Air Pollution, SO2 (24 hours) i.e. 150 µg/m^3 b. Operation of HSRG in accordance with the Decree of the Head of the Environmental Impact Management Agency No. 205 of 1996 on the Technical Guidelines for Air Pollution Control of Stationary Source c. The NOx concentration meet the quality standard of the Regulation of Minister of Environment No. 21 of	**Data collection:** a. Take continuous air samples with CEMS devices at PLTGU stack point b. Take ambient air samples around PLTGU according to monitoring parameters. c. Examples of air are analyzed in the laboratory. **Data analysis:** Data is analyzed in accordance with the method established in Government Regulation No. 41 of 1999 on the Control of Air Pollution. Data of analysis results compared with benchmarks (indicators), then evaluated against compliance with rules, trends, and critical levels.	Measurements using CEMS at the point of emission source (stack) of PLTGU and ambient air sampling in the area around PLTGU in accordance with the baseline air sampling at the time of AMDAL a. Location of PLTGU (6°14' 43.662" S 107°35' 13.272" E) b. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E)	a. For air quality at the emission source point the measurement is undertaken continuously b. For ambient air quality is Monitored Every six months during the operation stage	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
			2008 on Static Emission Sources Quality Standard for Business and/or Activities of a Thermal Power Plant, SOx (400 mg/m^3) d. The concentration of managed (NOx) parameters meets ambient and emission air quality standards e. The availability of CEMS devices that can be operated continuously in accordance with the provisions in the Minister of Environment Regulation No. 21 of 2008				and Forestry
7	Increased Noise	Operational of HSRG	a. Noise level does not exceed the quality standard of Decree of the State Minister of Environment Number: Kep-48/MenLH/11/1996 on the Noise Level Quality Standard of 55 dBA for settlement, 70 dB for	**Data collection:** Conduct noise measurements in the area around the PLTGU according to the monitoring parameters. **Data analysis:** Monitoring data results is tabulated and compared with	The area around the PLTGU according to the baseline air sampling at the time of AMDAL a. Location of PLTGU (6°14' 43.662" S	Monitored every six months during the operation stage	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			Institution of Environmental Monitoring
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			industrial area. b. Initiator of Activity complies with Regulation of the Minister of Manpower and Transmigration Number 13 of 2011 on Threshold Value of Physical Factor and Chemical Factor in Workplace that is 85 dBA with exposure time per day for 8 hours	standard noise level in accordance with Decree of the Minister of Environment No. KEP-48/MENLH/11/1996 year 1996	107°35' 13.272" E) b. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E)		Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
8	Changes in Disease Prevalence	Operational of HSRG	a. There is a plans and efforts to prevent and manage diseases related to HSRG operational activities b. HSRG operational activities do not contribute to an increase in public health problems.	**Data collection method:** a. Collect data on the realization of health check-up of new employees b. Collect data on the realization of periodic inspection of labor c. Collect data on the realization of the provision of health insurance facilities to employees d. Collect data on the realization of the implementation of health coaching program	Village and Health Facilities Around the site of PLTGU (Cilamaya Village, Cilamaya Wetan Subdistrict)	Monitored every six months during the operation stage	**Executive Institution:** PT JSP and Executive Contractor **Executive Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
				e. Collect secondary data on community health **Data analysis:** Data is tabulated and described comparatively.			e. Health Office of Karawang Regency **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
9	Increased Salt Particles	Operational of Cooling Tower System	Air quality in the area around the cooling tower system meets the quality standards required in Government Regulation No. 41 of 1999 on the Control of Air Pollution.	**Data collection method:** a. Conduct air sampling in the area around the cooling tower, b. Conduct sampling of comparative natural air on the area around PLTU c. air samples is analyzed in the laboratory for salt content test. **Data analysis:** Data of monitoring results is tabulated and compared to natural conditions around and then evaluated against compliance with rules, trends, and critical levels.	Monitoring is undertaken in the area around the activity location and the nearest settlement of PLTGU, determination of monitoring point which refers to the baseline air sampling of AMDAL a. Location of PLTGU (6°14' 43.662" S 107°35' 13.272"	Monitored every six months during the operation stage	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:**

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
					E) b. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E)		a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
10	Increased Noise	Operational of Cooling Tower System	Noise level at the location of nearby residents meets the quality standard in the Decree of the State Minister of Environment. 48/MENLH/XI/1996 on Noise Level Standards	**Data collection method:** Conduct periodic noise measurements in the area around the cooling tower, **Data analysis:** Data of monitoring results is tabulated and compared to stipulated limits and then evaluated against compliance with rules, trends, and critical levels.	The surrounding area of the Cooling Water System and the village around the PLTGU facility (Cilamaya Village, Cilamaya Wetan Subdistrict) is in accordance with the baseline air sampling at the time of AMDAL a. Location of PLTGU (6°14' 43.662" S 107°35' 13.272" E) b. Puskesmas of Cilamaya	During the operational activity took place	**Executive Institution:** PT JSP and Executive Contractor **Executive Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
					(6°14' 56.092" S 107°35' 52.477" E)		and Forestry
11	Increased temperature	Operational of Cooling Tower System	a. Maintain the quality of waste water in accordance with quality standard of the Regulation of Environment Minister No. 08 of 2009 on Waste Water Quality Standard for Business and/or Activities of Thermal Power Plant b. The level of quality of seawater affected by increased temperature still meets the quality standard applied Decree of Environment Minister No. 51 of 2004 on the Sea Water Quality	**Data collection:** Measurement of wastewater temperature derived from Cooling tower and sea temperature around PLTGU location. **Data analysis:** Water quality data are collected compared to benchmarks (indicator) that has been established on Regulation of Environment Minister No. 08 of 2009, then evaluated against compliance with regulations, trends, and critical levels.	a. Cooling tower blowdown b. Outfall facilities and surrounding water bodies adapted to the water sampling point at the time of baseline data collection around the outfall point*:* 1. (6°12' 42.798" S 107°38' 43.760" E) 2. (6°11'	Monitored every six months during the operation stage	**Executive Institution:** PT JSP and Executive Contractor **Executive Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			Institution of Environmental Monitoring
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			Standard Appendix III for Marine Biota:		17.579" S 107°37' 41.734" E) 3. (6°10' 29.186" S 107°37' 58.171" E) 4. (6°11' 8.187" S 107°38' 58.241" E) 5. (6°11' 3.045" S 107°40' 55.203" E) 6. (6°10' 29.291" S 107°38' 42.672" E)		province c. Ministry of Environment and Forestry
12	Increased salinity	Operational of Cooling Tower System	At a radius of 30 meters from outfall of salinity level is equivalent to the natural salinity condition of the surrounding area according to the Regulation of Environment Minister No. 8 of 2009 on the quality	Limiting the maximum Cycles Concentration in the cooling system circuit is limited to 1.4	Outfall facilities and surrounding water bodies adapted to the water sampling point at the time of baseline data collection around	During PLTGU operations	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province

No.	Managed Environmental Impacts	Source of Impact	Success Indicator	Forms of Environmental Monitoring			
				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	Institution of Environmental Monitoring
			standard of thermal activity waste water		the outfall point a. (6°12' 42.798" S 107°38' 43.760" E) b. (6°11' 17.579" S 107°37' 41.734" E) c. (6°10' 29.186" S 107°37' 58.171" E) d. (6°11' 8.187" S 107°38' 58.241" E) e. (6°11' 3.045" S 107°40' 55.203" E) f. (6°10' 29.291" S 107°38' 42.672" E)		c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry

Table 3-2 Matrix of Environmental Monitoring Plan (Significant Impact Monitored Based on Results of Management Direction on ANDAL)

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
I. Pre-Construction Stage							
1	Community Grievance	Socialization of Activity Plans	a. Availability of community grievance handling management. b. There is evidence of grievance handling from communities related to activity plan	**Data collection method:** a. Secondary data collection is obtained by checking the grievance community submitted to the grievance recipient post. b. Primary data collection at the time to solialize activities to the community who deliver grievance about the process of grievance submission, handling and follow-up of the company against such grievance **Data analysis:** Data is tabulated and described comparatively.	Activity location of PLTGU Jawa-1 and nearest settlement of project location	During the socialization activities of PLTGU Jawa-1 activity plan	**Executive Institution:** PT JSP **Supervisory Institution:** a. BPN of Karawang Regency b. Agriculture Office of Karawang Regency c. DLHK of Karawang Regency d. BPN of Bekasi Regency e. Agriculture Office of Bekasi Regency f. DLHK of Bekasi Regency g. DLHK of West Java province h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Report Recipient Institution: a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. Ministry of ESDM– Directorate General of Electricity d. Ministry of Environment and Forestry
2	Changes in Land Ownership Status	Land acquisition	Land acquisition for the purpose of road construction shall refer to the provisions stipulated in the Presidential Regulation No. 148 of 2015 on the Fourth Amendment to Presidential Regulation No. 71 of 2012 on the Implementation of Land Acquisition for Development in the Public Interest	**Data collection method:** a) Primary data collection through direct survey to the community of land owners b) Secondary data collection through relevant government agencies (BPN, Village Government and Local Subdistrict Government) c) Collect land acquisition data along with documentary evidence of land	Location of the creation plan of Access Road in Muara Village, Cilamaya Wetan Subdistrict	During the land acquisition process took place	**Executive Institution:** PT JSP **Supervisory Institution:** a. BPN of Karawang Regency b. Agriculture Office of Karawang Regency c. DLHK of Karawang Regency d. DLHK of West Java province e. Ministry of Energy

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				acquisition process and its compensation **Data analysis:** Data is tabulated and presented descriptively.			and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. Ministry of ESDM– Directorate General of Electricity d. Ministry of Environment and Forestry
3	Changes in Agricultural Land Function	Land acquisition	a. Construction activities do not contribute to the decreasing agricultural productivity of local communities. b. The initiator has a CSR program related to	**Data collection method:** a. Surveys and interviews with community randomly related to community perceptions regarding land acquisition conducted for the PLTGU Jawa 1 development plan	Land acquisition location in Muara and Cilamaya Village, Cilamaya Wetan Subdistrict	Once in the land acquisition period	**Executive Institution:** PT JSP **Supervisory Institution:** a. BPN of Karawang Regency b. Agriculture Office of Karawang Regency

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			improving agricultural productivity	b. Interviews with village/Urban Village and Subdistrict governments related to the development of community perceptions in each affected village/subdistrict **Data analysis:** Data is tabulated and described comparatively.			c. DLHK of Karawang Regency d. BPN of Bekasi Regency e. Agriculture Office of Bekasi Regency f. DLHK of Bekasi Regency g. DLHK of West Java province h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. Ministry of ESDM– Directorate General of Electricity d. Ministry of

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Environment and Forestry
4	Changes in Community Livelihood Patterns	Land acquisition	a. The creation of new jobs and/or livelihoods for the communities directly affected in the Muara village such as landowners, farmers, farm labors, fishpond labors and fishpond labors. b. Number and status of locallabors absorbed in project activitiesas well asincreased incomes of residentsaroundthe activity location. c. Increasing number of residents workingin the informalsector. d. Increased community income. e. Guidance Activities on the economic activities of services was developed in the projectarea.	**Data Collection Method:** a. Field observation b. Interviews with community with questionnaire guidlines, as well as in-depth interviews c. Interviews with institutions related to licensing **Data analysis:** Data is tabulated and described comparatively.	Land acquisition location in Muara and Cilamaya Village, Cilamaya Wetan Subdistrict	Once in the land acquisition period	**Executive Institution:** PT JSP **Supervisory Institution:** a. BPN of Karawang Regency b. Agriculture Office of Karawang Regency c. DLHK of Karawang Regency d. BPN of Bekasi Regency e. Agriculture Office of Bekasi Regency f. DLHK of Bekasi Regency g. DLHK of West Java province h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Report Recipient Institution: a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. Ministry of ESDM–Directorate General of Electricity d. Ministry of Environment and Forestry
5	Changes in Income Level Community	Land acquisition	a. The absence of reduction in the average number of community incomes that becomes landowners, tenant farmers, farm labors, fishpond owners and fishpond labors after PLTGU Jawa-1 development b. Communities who shifted professions becomes the PLTGU Jawa-1 project receive incomes according to the set	**Data collection method:** a. Surveys and interviews with community randomly related to community perceptions regarding land acquisition conducted for the PLTGU Jawa 1 development plan b. Interviews with village/Urban Village and Subdistrict governments related to the development of community perceptions in each affected	Land acquisition location in Muara and Cilamaya Village, Cilamaya Wetan Subdistrict	Once in the land acquisition period	**Executive Institution:** PT JSP **Supervisory Institution:** a. BPN of Karawang Regency b. Agriculture Office of Karawang Regency c. DLHK of Karawang Regency d. BPN of Bekasi Regency e. Agriculture Office of Bekasi Regency

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			minimum wage and not lower than their monthly average incomes when they become farmers.	village/subdistrict **Data analysis:** Data is tabulated and described comparatively.			f. DLHK of Bekasi Regency g. DLHK of West Java province h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. Ministry of ESDM– Directorate General of Electricity d. Ministry of Environment and Forestry
II. Construction Stage							
1	Changes in Population	Reception of Construction	Controlled population administration at the	**Data collection method:** a. Primary data collection in	At 39 villages directly	Every six months during	**Executive Institution:** PT JSP and Executive

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
		Labor	construction stage as listed the number of incoming residents from outside the affected areas of the village as a direct result of the use of manpower of the PLTGU Jawa 1 project development	the form of the number of migrant workers through surveys, in-depth interviews, and observation b. Secondary data collection is obtained from literature study (library) and statistical data c. Data collection of each contractor required by the initiator to conduct data collection **Data analysis:** Data is tabulated and described comparatively.	affected by PLTGU Jawa-1 activities included in Karawang regency, Bekasi Regency and Subang Regency.	the operation stage	Contractor **Executive Institution:** a. Department of Manpower and Transmigration of Karawang Regency b. Department of Manpower and Transmigration of Bekasi Regency c. Department of Manpower and Transmigration of Subang Regency d. DLHK of Karawang Regency e. DLHK of Bekasi Regency f. DLHK of Subang Regency g. DLHK of West Java province h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
2	Increased Business Opportunities	Reception of Construction Labor	a. The establishment of new businesses by local communities related to the needs of goods during construction activities b. The development of businesses during construction activities, especially businesses that are directly related to the needs of goods during construction activities c. The absorption of a number of MSMEs, cooperatives, business groups, individual businesses and local companies around the location of activities.	**Data collection method:** a. Collect and document the types of new businesses that are formed b. Examine company policies on Increased Business Opportunities c. Examine the data of company and executive contractors related to the use of MSMEs, cooperatives, business groups, individual businesses and local companies around the location of activities in supporting the development activities of PLTGU Jawa-1 d. Conduct interviews with related parties outside companies such as village officials, cooperatives and business owners **Data analysis:** Descriptive analysis to the growing business activities	At 39 villages directly affected by PLTGU Jawa-1 activities included in Karawang regency, Bekasi Regency and Subang Regency.	Twice a year during the work recruitment activities.	**Executive Institution:** PT JSP and Executive Contractor **Executive Institution:** a. Department of Manpower and Transmigration of Karawang Regency b. Department of Manpower and Transmigration of Bekasi Regency c. Department of Manpower and Transmigration of Subang Regency d. DLHK of Karawang Regency e. DLHK of Bekasi Regency f. DLHK of Subang Regency g. DLHK of West Java province h. Ministry of Energy and Mineral Resources – Directorate General

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							of Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
3	Community Grievance	Reception of Construction Labor	a. The process of labor absorption comply with Law No. 13 of 2003 b. The process of labor absorption comply with Local Regulation of Karawang Regency No. 1 of 2011 c. Availability of community grievance handling	**Data collection method:** a. Secondary data collection is obtained by checking the grievance community submitted to the grievance recipient post. b. Primary data collection in the form of random interviews to the community	Village around PLTGU location and network of SUTET (39 villages directly affected by PLTGU Jawa-1 activities included in	Twice a year during the work recruitment activities.	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. Department of Manpower and Transmigration of Karawang Regency b. Department of

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			management. d. There is evidence of grievance handling from communities related to acceptance of construction labors	who deliver grievance about the process of grievance submission, handling and follow-up of the company against such grievance **Data analysis:** Data is tabulated and described comparatively.	Karawang regency, Bekasi Regency and Subang Regency.)		Manpower and Transmigration of Bekasi Regency c. Department of Manpower and Transmigration of Subang Regency d. DLHK of Karawang Regency e. DLHK of Bekasi Regency f. DLHK of Subang Regency g. DLHK of West Java province h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Regency c. DLHK of Subang Regency **d.** DLHK of West Java province **e.** Ministry of Environment and Forestry
4	Increased Concentration of NOx CO dan HC	Mobilization of Equipment and Materials (By Land)	Concentration of NOx, CO and HC meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution.	**Data collection method:** a. Air quality sampling refers to the Indonesian National Standard, or International Standard that can be traced, data collection is performed by accredited laboratories. b. Data Collection Method in accordance with SNI 19-7119.6-2005: Ambient Air Part 6: "Determination of Sampling Location of the Ambient Air Quality Monitoring Test ". c. SNI 19-7119.2-2005: Ambient air-part 7: Test method of nitrogen dioxide (NO_2) by Griess Saltzman method using spectrophotometer	Monitoring is undertaken in the area around the location of activity and the nearest settlements around the location activity of land clearing area of PLTGU, Jetty, and GITET site which refers to the baseline air sampling of AMDAL	Once a year during equipment and material mobilization activities.	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLLAJR of Karawang Regency e. DLLAJR of Bekasi Regency f. DLLAJR of Subang Regency g. DLHK of West Java province h. Department of

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				Data analysis method **a.** The analysis data results is described descriptively and compared with quality standards. **b.** Data Analysis Method: SNI 19-4845-1998: Test method of CO gas content in air with NDIR	a. Urban Village of Rawagempol Wetan (6°14' 10.714" S 107°34' 44.956" E) b. Village of Cilamaya Hilir, Subdistrict. Blanakan; (6°16' 4.912" S 107°35' 43.616" E) c. Location of PLTGU (6°14' 43.662" S 107°35' 13.272" E) d. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E)		Transportation of Karawang Regency i. Department of Transportation of Bekasi Regency j. Department of Transportation of Subang Regency k. Department of Transportation of West Java Province l. Ministry of Energy and Mineral Resources - Directorate General of Electricity m. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
					e. Village of Muara (6°13' 55.264" S 107°36' 43.154" E) f. Village of Karang Rahayu (6°13' 50.053" S107°11' 6.592" E) g. *Jetty* (6°12' 29.775" S 107°39' 18.315" E) h. GITET (6°13' 50.053" S 107°11' 6.560" E) i. Monitoring of Land Clearing (6°14' 48.221" S 107°35' 12.482" E)		province e. Ministry of Environment and Forestry

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
5	Increased Noise	Mobilization of Equipment and Materials (By Land)	The intensity of the noise generated does not exceed the quality standard based on Decree of Environment Minister No. 48 of 1996, namely: a. 55 dBA for residential environment, b. 70 dBA of road & industrial environment as well as trade and service environment	**Data collection method:** a. Conduct noise measurements with sound level meter b. Compare the noise measurement results with the Decree of State Minister of Environment Number: Kep-48/MenLH/11/1996 on Noise Level Standard **Data analysis:** Data is tabulated and described comparatively.	Monitoring is undertaken in the area around the location of activity and the nearest settlements around the location activity of land clearing area of PLTGU, Jetty, and GITET site which refers to the baseline air sampling of AMDAL a. Urban Village of Rawagempol Wetan (6°14' 10.714" S 107°34'	Twice a year during equipment and material mobilization activities.	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLLAJR of Karawang Regency e. DLLAJR of Bekasi Regency f. DLLAJR of Subang Regency g. DLHK of West Java province h. Department of Transportation of Karawang Regency i. Department of Transportation of Bekasi Regency j. Department of Transportation of

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
					44.956" E) b. Village of Cilamaya Hilir, Subdistrict. Blanakan; (6°16' 4.912" S 107°35' 43.616" E) c. Location of PLTGU (6°14' 43.662" S 107°35' 13.272" E) d. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E) e. Village of Muara (6°13' 55.264" S 107°36' 43.154" E) f. Village of Karang		Subang Regency k. Department of Transportation of West Java Province l. Ministry of Energy and Mineral Resources – Directorate General of Electricity m. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
					Rahayu (6°13' 50.053" S107°11' 6.592" E) g. *Jetty* (6°12' 29.775" S 107°39' 18.315" E) h. GITET (6°13' 50.053" S 107°11' 6.560" E) i. Monitoring of Land Clearing (6°14' 48.221" S 107°35' 12.482" E)		

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
6	Increased Business Opportunities	Mobilization of Equipment and Materials (By Land)	a. The absorption of a number of MSMEs, cooperatives, business groups, individual businesses and local companies around the location of activities. b. There is documentation of company policy to prioritize MSMEs, cooperatives, business groups, individual businesses and local companies as required, requirements, qualifications, and specifications of project. c. There is a data reports of MSMEs, cooperatives, business groups, individual businesses and local companies around the location of activities. d. There is documentation and material of socialization of the needs, requirements, qualifications, and	**Data collection method:** a. Collect and document the types of new businesses that are formed b. Examine company policies on Increased Business Opportunities c. Examine the data of company and executive contractors related to the use of MSMEs, cooperatives, business groups, individual businesses and local companies around the location of activities in supporting the development activities of PLTGU Jawa-1 d. Conduct interviews with related parties outside companies such as village officials, cooperatives and business owners **Data analysis:** Descriptive analysis to the growing business activities	At 39 villages directly affected by PLTGU Jawa-1 activities included in Karawang regency, Bekasi Regency and Subang Regency.	Twice a year during the work recruitment activities.	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLLAJR of Karawang Regency e. DLLAJR of Bekasi Regency f. DLLAJR of Subang Regency g. DLHK of West Java province h. Department of Transportation of Karawang Regency i. Department of Transportation of Bekasi Regency j. Department of Transportation of Subang Regency

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			specifications of the project to local entrepreneurs before the activities are implemented so that MSMEs, cooperatives, business groups, individual businesses and local companies e. There is a Circular Letter to contractors who need goods and services in the mobilization of equipments and materials to prioritize MSMEs, cooperatives, business groups, individual businesses and local companies as long as they meet the requirements, qualifications and specifications of project				k. Department of Transportation of West Java Province l. Ministry of Energy and Mineral Resources – Directorate General of Electricity m. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
7	Community Grievance	Mobilization of Equipment and Materials (By Land)	a. Availability of community grievance handling management. b. There is evidence of the grievance handling from the community related to equipment and material mobilization activities by land	**Data collection method:** a. Secondary data collection is obtained by checking the grievance community submitted to the grievance recipient post. b. Primary data collection in the form of random interviews to the community who deliver grievance about the process of grievance submission, handling and follow-up of the company against such grievance **Data analysis:** Data is tabulated and described comparatively.	At 39 villages directly affected by PLTGU Jawa-1 activities included in Karawang regency, Bekasi Regency and Subang Regency.	Once in six months during construction activities took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLLAJR of Karawang Regency e. DLLAJR of Bekasi Regency f. DLLAJR of Subang Regency g. DLHK of West Java province h. Department of Transportation of Karawang Regency i. Department of Transportation of Bekasi Regency j. Department of Transportation of Subang Regency

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							k. Department of Transportation of West Java Province l. Ministry of Energy and Mineral Resources – Directorate General of Electricity m. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province a. Ministry of Environment and Forestry
8	Disruption of Land Traffic	Mobilization of Equipment and Materials (By Land)	a. The activity initiator and executive contractor comply with the provisions of Law No. 22	**Data collection method:** a. Inspect the environmental management documentation	Roads passed by vehicles in the construction stages of PLTGU	Once in six months during construction activities	**Executive Institution:** PT JSP and Executive Contractor

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			of 2009 on Road Traffic and Transportation b. No significant disruption to land traffic may result in other derivative effects	b. Make observations in the field c. Inspect the signs and lights installed **Data analysis:** Data is analyzed and presented descriptively	Jawa-1	took place	**Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLLAJR of Karawang Regency e. DLLAJR of Bekasi Regency f. DLLAJR of Subang Regency g. DLHK of West Java province h. Department of Transportation of Karawang Regency i. Department of Transportation of Bekasi Regency j. Department of Transportation of Subang Regency k. Department of Transportation of West Java Province l. Ministry of Energy

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							and Mineral Resources – Directorate General of Electricity m. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
9	Increased Noise	Mobilization of Equipment and Materials (By Sea)	a. The intensity of the noise generated does not exceed the quality standard based on Decree of Environment Minister No. 48 of 1996, namely: 1) 55 dBA for residential environment,	**Data collection method:** a. Conduct noise measurements with sound level meter b. Compare the noise measurement results with the Decree of State Minister of Environment Number: Kep-48/MenLH/11/1996	Monitoring is undertaken in the area around the Jetty location and the surrounding settlement	Twice a year during equipment and material mobilization activities.	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Subang

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			2) 70 dBA of road & industrial environment as well as trade and service environment b. There is no significant disruption to the activities of fishermen as a result of Equipment and Material Mobilization activities (By Sea) c. There is documentation of Letter of notification regarding commencement of mobilization activities to relevant institutions and fishermen groups along with the timing of the implementation d. The availability of socialization material of mobilization activities (by sea) that is easy to understand by fishermen and its implementation schedule e. There is documentation of the Map of fishermen and fishing activities around	on Noise Level Standard **Data analysis:** Data is tabulated and described comparatively.	which refers to the baseline air sampling of AMDAL a. Village of Muara (6°13' 55.264" S 107°36' 43.154" E) b. *Jetty* (6°12' 29.775" S 107°39' 18.315" E)		Regency c. DLHK of West Java province d. KSOP Class III Pamanukan e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Director General of Marine Transportation, Ministry of Marine Affairs g. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency **c.** DLHK of West Java province **d.** Ministry of Environment and

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			the development including information on important locations for fishermen and evidence that has been conducted direction to all executive operators of mobilization activities by sea				Forestry
10	Disruption of Fishermen's Activities	Mobilization of Equipment and Materials (By Sea)	a. There is no significant disruption to the activities of fishermen as a result of equipment and material mobilization activities by sea b. Availability of warning signs to prevent disruption of fisherman's activities	**Data collection method:** a. Recording the documentation of environmental management activities b. Make observations in the field c. Inspect the signs and lights installed **Data analysis:** Data is tabulated and presented descriptively.	Nearest fisherman villages to the voyage routes of mobilization activities is mainly near the coast of Muara village	Twice a year during equipment and material mobilization activities.	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** h. DLHK of Karawang Regency i. DLHK of Subang Regency j. DLHK of West Java province k. KSOP Class III Pamanukan l. Ministry of Energy and Mineral Resources – Directorate General of Electricity m. Directorate of Traffic and Sea Transportation,

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Ministry of Transportation n. Ministry of Environment and Forestry **Report Recipient Institution:** e. DLHK of Karawang Regency f. DLHK of Subang Regency **g.** DLHK of West Java province Ministry of Environment and Forestry
11	Disruption of Sea Traffic	Mobilization of Equipment and Materials (By Sea)	No incidents of sea transportation disruption caused by mobilization of equipment and materials by sea	**Data collection method:** a. Inspect and record environmental management documentation b. Observe sea traffic activity c. Inspect and verify the effectiveness of installed signs **Data analysis:**	Nearest fisherman villages to the voyage routes of mobilization activities is mainly near the coast of Muara village	Twice a year during equipment and material mobilization activities.	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** h. DLHK of Karawang Regency i. DLHK of Subang Regency j. DLHK of West Java province k. KSOP Class III

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				Data is analyzed and presented descriptively			Pamanukan l. Ministry of Energy and Mineral Resources – Directorate General of Electricity m. Director General of Marine Transportation, Ministry of Marine Affairs n. Ministry of Environment and Forestry **Report Recipient Institution:** e. DLHK of Karawang Regency f. DLHK of Subang Regency **g.** DLHK of West Java province Ministry of Environment and Forestry
12	Increased Concentration of NOx CO dan HC	Land Clearing	a. Concentration of NOx, CO and HC meets the required quality standards as per Government Regulation No.	**Data collection method:** a. Air quality sampling refers to the Indonesian National Standard, or International	Monitoring is undertaken in the area around the	Monitored every three months during land clearing	**Executive Institution:** PT JSP and Executive Contractor

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			41 of 1999 on the Control of Air Pollution. b. Emissions from all equipment do not exceed the quality standard specified in the Regulation of the Minister of Environment and Forestry No. P20/ MENLHK/SETJENKUM/ KUM.1/3/2017 on the Quality Standard of New Type Automotive Gas Disposal Vehicle of Category M, N, and category O.	Standard that can be traced, data collection is performed by accredited laboratories. b. Data Collection Method in accordance with SNI 19-7119.6-2005: Ambient Air Part 6: "Determination of Sampling Location of the Ambient Air Quality Monitoring Test ". c. SNI 19-7119.2-2005: Ambient air-part 7: Test method of nitrogen dioxide (NO_2) by Griess Saltzman method using spectrophotometer d. Data Analysis Method: SNI 19-4845-1998: Test method of CO gas content in air with NDIR **Data analysis:** The analysis data results is described descriptively and compared with quality standards.	location of activity and the nearest settlements around the location activity of land clearing area of PLTGU, Jetty, Pump House and GITET site which refers to the baseline air sampling of AMDAL a. Urban Village of Rawagempol Wetan (6°14' 10.714" S 107°34' 44.956" E) b. Village of Cilamaya Hilir,	activities	**Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Department of Transportation of Karawang Regency e. Ministry of Energy and Mineral Resources - Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Environment and

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
					Subdistrict. Blanakan; (6°16' 4.912" S 107°35' 43.616" E) c. Location of PLTGU (6°14' 43.662" S 107°35' 13.272" E) d. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E) e. Village of Muara (6°13' 55.264" S 107°36' 43.154" E) f. Village of Karang Rahayu (6°13' 50.053" S107°11'		Forestry

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
					6.592" E) g. *Jetty* (6°12' 29.775" S 107°39' 18.315" E) h. GITET (6°13' 50.053" S 107°11' 6.560" E) i. Monitoring of Land Clearing (6°14' 48.221" S 107°35' 12.482" E)		
13	Increased Surface Run Off	Land Clearing	a. Controlled run off water management such as the smooth of run off water into drainage/river channels b. There was no puddle around the site of the project preparation	**Data collection method:** Primary data collection through observation and recording of surface runoff in nearby river bodies **Data analysis:** Primary data is presented tabularly and the results of the analysis are presented in comparative descriptive	Water body according to the point of sampling of water at the baseline of AMDAL a. RW-1 River of Mekarmaya, Cilamaya Wetan,	Monitored every three months during land clearing activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Department of

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
					Karawang Regency 0785457E; 9308707S b. RW-2 River of Mekarmaya, Cilamaya Wetan, Karawang Regency 0786335E; 9308636S c. RW-5 River of Cilamaya 0787977E; 9309670S d. RW-6 Irigation (Village of Muara) 0790250E; 9312835S		Transportation of Karawang Regency e. Ministry of Energy and Mineral Resources - Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Environment and Forestry
14	Increased Soil Erosion	Land Clearing	c. The level of soil erosion during land clearing can be controlled	**Data collection method:** Primary data collection through observation and recording of	The location of PLTGU Jawa-1 land clearing	Monitored every three months during	**Executive Institution:** PT JSP and Executive Contractor

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				the rate of surface soil erosion in nearby river bodies **Data analysis:** **Primary data is presented tabularly and the results of the analysis are presented in comparative descriptive**	activity according to the sampling point at the time of baseline data collection: PL1 Monitoring of Land Clearing (6°14' 48.221" S 107°35' 12.482" E)	land clearing activities	**Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Department of Transportation of Karawang Regency e. Ministry of Energy and Mineral Resources - Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Environment and Forestry
15	Increased TSS Content	Land Clearing	a. The concentration of TSS in the water bodies around the land clearing meets the quality standard in accordance with Government Regulation No. 82 of 2001 on the management of water quality and control of water pollution, by taking into account the condition of the environmental setting b. There is a drainage system before cleaning is undertaken c. There is a representative place to accumulate material d. Availability of temporary waste disposal in the location of activities	**Data Collection Method:** Water sampling refers to SNI 6964.8: 2015: on "Methods of Taking, testing of water samples conducted in the laboratory **Data analysis:** SNI 06-6989.3-2004 Water and Wastewater - Part 3: Total suspended solid test method gravimetrically	Water body according to the point of sampling of water at the baseline of AMDAL a. RW-1 River of Mekarmaya, Cilamaya Wetan, Karawang Regency (6°14' 51.958" S 107°34' 46.913" E) b. RW-2 River of Mekarmaya, Cilamaya Wetan, Blanakan Regency 54.127" S	Monitored every three months during the pre-construction stages with reporting every 6 months	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Department of Transportation of Karawang Regency d. Ministry of Energy and Mineral Resources - Directorate General of Electricity e. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
					107°35' 15.470" E) c. RW-5 River of Cilamaya (6°14' 20.225" S 107°36' 8.686" E) d. RW-6 Irigation Village of Muara (6°12' 36.894" S 107°37' 22.069" E) e. In the settling pond area around PLTGU plan		Regency c. DLHK of West Java province d. Ministry of Environment and Forestry
16	Changes in Land Cover	Land Clearing	a. Available and maintained at least 30% of land within the activity location as green open space (RTH) b. The design of the layout activities that provides at least 30% of land as RTH	**Data collection method:** a. Observation and analysis of vegetation (especially for natural vegetation) green open space within the activity location b. Analysis of reports on RTH planting and rehabilitation activities	Location of land clearing around PLTGU site plan, Jetty, Pump House and GITET area.	Conducted every 3 months at the Land clearing stage	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			c. Availability of nursery location and plant seed placement	c. Analysis of satellite imagery or aerial photographs or drones every 6 months **Data analysis:** Data is tabulated and described comparatively Descriptive Analysis			c. DLHK of West Java province d. Ministry of Energy and Mineral Resources – Directorate General of Electricity e. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency **c.** DLHK of West Java province **d.** Ministry of Environment and Forestry
17	Changes in Flora Biodiversity	Land Clearing	a. Maintained and increased quality and terrestrial flora biodiversity in areas that are not built and designated as RTH b. Availability of nursery land and plant seed	**Data collection method:** a. Observation and analysis of vegetation (especially for natural vegetation) green open space within the activity location	Green open space area, inside PLTGU site area, Jetty, Pump House and GITET and planting location outside	Conducted every 6 months	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			placement c. There is a land rehabilitation and revegetation program within the location of activities using local species and supporting as a wildlife habitat	b. Analysis of reports on the planting and rehabilitation activities **Data analysis:** The analysis is presented in comparative descriptive	of activity location		b. DLHK of Bekasi Regency c. DLHK of West Java province d. Department of Transportation of Karawang Regency e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Environment and Forestry
18	Changes in	Land Clearing	Plankton abundance is remain	**Data collection method:**	Water body	Monitored	**Executive Institution:**

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
	Plankton Abundance		maintained at a range of> 15,000 individual/litter (Basmi, 1987) or at a number relatively similar to the baseline	a. Methods of data collection and data analysis refers to Indonesian National Standards, or International Standards that can be traced b. Data collection and analysis is performed by accredited laboratories c. Data collection using water sampler and plankton net d. The sample analysis is performed in the laboratory for density calculations as well as its abundance **Data analysis:** Comparative descriptive analysis	according to the point of sampling of water at the baseline of AMDAL a. RW-1 River of Mekarmaya, Cilamaya Wetan, Karawang Regency (6°14' 51.958" S 107°34' 46.913" E) b. RW-2 River of Mekarmaya, Cilamaya Wetan, Blanakan Regency 54.127" S 107°35' 15.470" E) c. RW-5 River of Cilamaya	every 3 months during the operation stage	PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Department of Transportation of Karawang Regency e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
					(6°14' 20.225" S 107°36' 8.686" E) d. RW-6 Irigation Village of Muara (6°12' 36.894" S 107°37' 22.069" E)		province d. Ministry of Environment and Forestry
19	Community Grievance	Land Clearing	a. Availability of community grievance handling management. b. There is evidence of grievance handling from communities related to land clearing	**Data collection method:** a. Observation and documentation of the existence of the management of community grievance recipient. b. Secondary data collection is obtained by checking the grievance community submitted to the grievance recipient post. c. Primary data collection in the form of random interviews to the community who deliver grievance about	At 39 villages directly affected by PLTGU Jawa-1 activities included in Karawang regency, Bekasi Regency and Subang Regency.	Every 3 months during land clearing activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Energy and Mineral Resources – Directorate General of Electricity e. Ministry of

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				the process of grievance submission, handling and follow-up of the company against such grievance **Data analysis:** Data is tabulated and analyzed descriptively.			Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency **c.** DLHK of West Java province **d.** Ministry of Environment and Forestry
20	Decreased Fish Catchment Area	Mooring of FSRU	There is a alternatative programs built to develop fisherman productivity in event of catchment result management	**Data collection method:** Surveys and interviews with communities randomly related to income of fishermen Collect data on the implementation of CSR program related to increased fishermen productivity. **Data analysis:** Result data is tabulated and presented descriptively	Muara Village, Cilamaya Village, Cilamaya Wetan Subdistrict and Belanakan Village of Blanakan Subdistrict	Every 3 months during FSRU mooring activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok f. Director General of Marine Transportation, Ministry of Marine Affairs g. Port Operator Unit of Pamanukan h. Department of Marine and Fisheries of Subang Regency i. Department of Marine and Fisheries of West Java Province **Report Recipient Institution:** a. DLHK of Subang Regency **b.** DLHK of West Java province **c.** Ministry of

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Environment and Forestry
21	Disruption of Fishermen's Activities	Mooring of FSRU	a. The absence of significant disruption to fisherman's activities resulting from FSRU mooring b. Availability of warning signs to prevent disruption of fisherman's activities	**Data collection method:** a. Recording the documentation of environmental management activities b. Make observations in the field c. Inspect the signs and lights installed **Data analysis:** Comparative descriptive analysis	Muara Village, Cilamaya Village, Cilamaya Wetan Subdistrict and Belanakan Village of Blanakan Subdistrict	Every 3 months during FSRU mooring activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok f. Director General of Marine Transportation, Ministry of Marine

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Affairs g. Port Operator Unit of Pamanukan h. Department of Marine and Fisheries of Subang Regency i. Department of Marine and Fisheries of West Java Province **Report Recipient Institution:** a. DLHK of Subang Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry
22	Community Grievance	Mooring of FSRU	a. Availability of community grievance handling management. b. There is evidence of grievance handling from communities related to FSRU placement	**Data collection method:** a. Secondary data collection is obtained by checking the grievance community submitted to the grievance recipient post. b. Primary data collection in	Muara Village, Cilamaya Village, Cilamaya Wetan Subdistrict and Belanakan Village of Blanakan	Every 3 months during FSRU mooring activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Subang Regency b. DLHK of West Java

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				the form of random interviews to the community who deliver grievance about the process of grievance submission, handling and follow-up of the company against such grievance **Data analysis:** Data is tabulated and analyzed descriptively.	Subdistrict		province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok f. Director General of Marine Transportation, Ministry of Marine Affairs g. Port Operator Unit of Pamanukan h. Department of Marine and Fisheries of Subang Regency i. Department of Marine and Fisheries of West Java Province **Report Recipient**

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Institution: a. DLHK of Subang Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry
23	Changes in Plankton Abundance	Pipeline deployment at Sea	Plankton abundance is remain maintained at a range of> 15,000 individual/litter (Basmi, 1987) or at a number relatively similar to the baseline c.	**Data collection:** Plankton sampling, then analyzed in the laboratory to find out the plankton community index (diversity/H', uniformity/S and dominance/D). **Data analysis:** The results of plankton abundance observations is presented in the plankton community index (diversity/H', uniformity/S and dominance/D). **)**	The waters around the pipeline deployment area at Sea, referring to the baseline water quality collection points of AMDAL a. West side of the excavation line (6°11' 47.363" S 107°38' 50.309" E) b. Outside west side of the	Every three months during pipe deployment activities at sea	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
					excavation line (6°11' 3.210" S 107°40' 54.749" E) c. Inside East side of the excavation (6°9' 33.002" S 107°42' 31.026" E) d. Outside East side of the excavation (6°9' 6.234" S 107°44' 37.421" E)		Class II Tanjung Priok f. Director General of Marine Transportation, Ministry of Marine Affairs g. Port Operator Unit of Pamanukan h. Department of Marine and Fisheries of Subang Regency i. Department of Marine and Fisheries of West Java Province **Report Recipient Institution:** a. DLHK of Subang Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry
24	Disruption of Fishermen's	Pipeline deployment at	a. The absence of significant disruption to	**Data collection method:** a. Secondary data collection is	Muara Village, Cilamaya	Every three months during	**Executive Institution:** PT JSP and Executive

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
	Activities	Sea	fisherman's activities resulting from activity of pipeline deployment at sea b. Availability of warning signs to prevent disruption of fisherman's activities	obtained by checking the grievance community submitted to the grievance recipient post. b. Primary data collection in the form of field monitoring regarding activities and types of disruption that occurs to the fishermen, random interviews to the community who deliver grievance about the process of grievance submission, handling and follow-up of the company against such grievance **Data analysis:** Data is tabulated and analyzed descriptively.	Village, Cilamaya Wetan Subdistrict	pipe deployment activities at sea	Contractor **Supervisory Institution:** a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok f. Director General of Marine Transportation, Ministry of Marine Affairs g. Port Operator Unit of Pamanukan h. Department of Marine and Fisheries of

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Subang Regency i. Department of Marine and Fisheries of West Java Province **Report Recipient Institution:** a. DLHK of Subang Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry
25	Community Grievance	Pipeline deployment at Sea	a. Availability of community grievance handling management. b. There is evidence of grievance handling from communities related to pipeline deployment at Sea	**Data collection method:** a. Secondary data collection is obtained by checking the grievance community submitted to the grievance recipient post. b. Primary data collection in the form of random interviews to the community who deliver grievance about the process of grievance submission, handling and	Muara Village, Cilamaya Village, Cilamaya Wetan Subdistrict	Every three months during pipe deployment activities at sea	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				follow-up of the company against such grievance **Data analysis:** Data is tabulated and analyzed descriptively.			d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok f. Director General of Marine Transportation, Ministry of Marine Affairs g. Port Operator Unit of Pamanukan h. Department of Marine and Fisheries of Subang Regency i. Department of Marine and Fisheries of West Java Province **Report Recipient Institution:** a. DLHK of Subang Regency **b.** DLHK of West Java province

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							c. Ministry of Environment and Forestry
26	Disruption of Sea Traffic	Pipeline deployment at Sea	No incidents of sea transportation disruption caused by operational of pipeline deployment at sea	**Data collection method:** a. Secondary data collection is obtained by checking the grievance community submitted to the grievance recipient post. b. Primary data collection in the form of field monitoring regarding activities and types of disruption that occurs to the fishermen, random interviews to the community who deliver grievance about the process of grievance submission, handling and follow-up of the company against such grievance **Data analysis:** Data is analyzed and presented descriptively	The villages around the area of pipeline deployment at Sea	Every three months during pipe deployment activities at sea	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok f. Director General of Marine Transportation,

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Ministry of Marine Affairs g. Port Operator Unit of Pamanukan h. Department of Marine and Fisheries of Subang Regency i. Department of Marine and Fisheries of West Java Province **Report Recipient Institution:** a. DLHK of Subang Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry
27	Increased particulate concentration (TSP/PM10/PM2,5), NOx, CO dan HC	Pipeline deployment on land	Concentration of TSP/PM10/PM2,5, NOx, CO and HC meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution.	**Data Collection Method:** a. Air quality sampling refers to the Indonesian National Standard, or International Standard that can be traced, data collection is performed by accredited laboratories.	Monitoring is made in the area around the nearest settlement with the location of	Every 3 months during pipeline deployment on land.	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				b. Data Collection Method in accordance with SNI 19-7119.6-2005: Ambient Air Part 6: "Determination of Sampling Location of the Ambient Air Quality Monitoring Test ". c. The collection of emission air quality in accordance with Decree of Head of Environmental Impact Control Agency No. No.205 of 1996 on "Technical Guidelines for Air Pollution Control of Stationary Source" **Data analysis:** a. Data analysis method according to SNI 19-7119.3-2005: Ambient air Part 3: Total suspended particle test method using high volume air sampler (HVAS) equipment with gravimetric method (PM_{10} and $PM_{2.5}$). b. Data Analysis Method: SNI 19-4845-1998: Test method of CO gas content in air with NDIR	pipe deployment on land which refers to the baseline air sampling of AMDAL, i.e. the sampling point of Muara Village, 0789041E; 9310432S		b. DLHK of West Java province c. Ministry of Energy and Mineral Resources - Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
28	Increased Noise	Pipeline deployment on land	The intensity of the noise generated does not exceed the quality standard based on Decree of Environment Minister No. 48 of 1996, namely: a. 55 dBA for residential environment, b. 70 dBA of road & industrial environment as well as trade and service environment	**Data collection method:** a. Conduct noise measurements with sound level meter b. Compare the noise measurement results with the Decree of State Minister of Environment Number: Kep-48/MenLH/11/1996 on Noise Level Standard **Data analysis:** Data is tabulated and described comparatively.	Monitoring is made in the area around the nearest settlement with the location of pipe deployment on land which refers to the baseline air sampling of AMDAL, i.e. the sampling point of Muara Village, 0789041E; 9310432S	Every 3 months during pipeline deployment at sea.	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
29	Increased	Development of	Concentration of	**Data Collection Method:**	Monitoring is	Every 3 months	**Executive Institution:**

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
	particulate concentration (TSP/PM10/PM2,5), NOx, CO dan HC	Jetty	TSP/PM10/PM2,5, NOx, CO and HC meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution:	a. Air quality sampling refers to the Indonesian National Standard, or International Standard that can be traced, data collection is performed by accredited laboratories. b. Data Collection Method in accordance with SNI 19-7119.6-2005: Ambient Air Part 6: "Determination of Sampling Location of the Ambient Air Quality Monitoring Test ". c. The collection of emission air quality in accordance with Decree of Head of Environmental Impact Control Agency No. No.205 of 1996 on "Technical Guidelines for Air Pollution Control of Stationary Source" **Data analysis:** a. Data analysis method according to SNI 19-7119.3-2005: Ambient air Part 3: Total suspended particle test method using high volume air	carried out in the area around the Jetty location and the surrounding nearest settlement which refers to the baseline air sampling of AMDAL a. Village of Muara (6°13' 55.264" S 107°36' 43.154" E) b. *Jetty* (6°12' 29.775" S 107°39' 18.315" E)	during Jetty Construction activity	PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources - Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok f. Director General of Marine Transportation, Ministry of Marine Affairs g. Port Operator Unit of Pamanukan h. Department of Marine

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				sampler (HVAS) equipment with gravimetric method (PM_{10} and $PM_{2.5}$). b. Data Analysis Method: SNI 19-4845-1998: Test method of CO gas content in air with NDIR			and Fisheries of Subang Regency i. Department of Marine and Fisheries of West Java Province **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
30	Increased Noise	Development of Jetty	The intensity of the noise generated does not exceed the quality standard based on Decree of Environment Minister No. 48 of 1996, namely: a. 55 dBA for residential environment, b. 70 dBA of road & industrial environment as well as trade and service environment	**Data collection method:** a. Conduct noise measurements with sound level meter b. Compare the noise measurement results with the Decree of State Minister of Environment Number: Kep-48/MenLH/11/1996 on Noise Level Standard **Data analysis:** Data is tabulated and described	Monitoring is carried out in the area around the Jetty location and the surrounding nearest settlement which refers to the baseline air	Every 3 months during pipeline deployment on land.	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				comparatively.	sampling of AMDAL a. Village of Muara (6°13' 55.264" S 107°36' 43.154" E) b. Jetty (6°12' 29.775" S 107°39' 18.315" E)		of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok f. Director General of Marine Transportation, Ministry of Marine Affairs g. Port Operator Unit of Pamanukan h. Department of Marine and Fisheries of Subang Regency i. Department of Marine and Fisheries of West Java Province **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							province c. Ministry of Environment and Forestry
31	Increased TSS Content	Development of Jetty	The concentration of TSS meets the quality standard required in accordance with Decree of Environment Minister No. 51 of 2004 on the Sea Water Quality Standard Appendix 1, TSS that is 80 mg/l or relatively equal to the value of TSS in the environmental baseline before the Jetty construction activity is carried out	**Data collection method:** a. Conduct monitoring of TSS parameters in aquatic environment around Pipe deployment location b. Data Collection Method in accordance with SNI 6964.8:2015: Sea Water Quality Part 8: "Sea Water Test Sampling Method c. Data Analysis Method: SNI 06-6989.3-2004 Water and Wastewater – Part 3: Total suspended solid test method gravimetrically **Data analysis** The analysis data is described descriptively and compared with the quality standards and baselines.	The water area around the Jetty construction site adjusted to the baseline sampling area of AMDAL i.e. the Water Area Around the Jetty (6°12 '29.775 "S 107°39' 18.315" E)	Every 3 months during Jetty Construction activity	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok f. Port Operator Unit of Pamanukan g. Department of Marine

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							and Fisheries of Subang Regency h. Director General of Marine Transportation, Ministry of Marine Affairs i. Department of Marine and Fisheries of West Java Province **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
32	Changes in Plankton Abundance	Development of Jetty	Plankton abundance is remain maintained at a range of> 15,000 individual/litter (Basmi, 1987) or at a number relatively similar to the baseline	**Data collection method:** a. Methods of data collection and data analysis refers to Indonesian National Standards, or International Standards that can be traced b. Data collection and analysis	The AMDAL baseline i.e. area around the Water Jetty (6°12 '29.775 "S 107°39' 18.315" E)	Every 3 months during Jetty Construction activity	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				is performed by accredited laboratories c. Data collection using water sampler and plankton net d. The sample analysis is performed in the laboratory for density calculations as well as its abundance **Data analysis:** Data analysis is made using comparative descriptive method			province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok f. Port Operator Unit of Pamanukan g. Department of Marine and Fisheries of Subang Regency h. Department of Marine and Fisheries of West Java Province **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							c. Ministry of Environment and Forestry
33	Community Grievance	Dredging and Placement of Dredge Results	a. Availability of community grievance handling management. b. There is evidence to the grievance handling from the community related to dredging activities and placement of dredge results	**Data collection method:** a. Secondary data collection is obtained by checking the grievance community submitted to the grievance recipient post. b. Primary data collection in the form of random interviews to the community who deliver grievance about the process of grievance submission, handling and follow-up of the company against such grievance **Data analysis:** Data is tabulated and analyzed descriptively.	Muara Village, Cilamaya Wetan Subdistrict	Every 3 months during dredging activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of Karawang Regency b. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok c. DLHK of West Java province d. Ministry of Energy and Mineral Resources – Directorate General of Electricity e. Ministry of Environment and Forestry f. Ministry of Fisheries and Marine Affairs **Report Recipient**

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Institution: a. DLHK of Karawang Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry
34	Disruption of Sea Traffic	Dredging and Placement of Dredge Results	No incidents of sea transportation disruption caused by dredging activities and placement of dredge results	**Data collection method:** a. Secondary data collection is obtained by checking the grievance community submitted to the grievance recipient post. b. Primary data collection in the form of field monitoring regarding activities and types of disruption that occurs to the fishermen and sea transportation activities, random interviews to the community who deliver grievance about the process of grievance submission, handling and follow-up of the company against such grievance	Muara Village, Cilamaya Wetan Subdistrict	Every 3 months during dredging activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry e. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				Data analysis: Data is analyzed and presented descriptively			Priok f. Port Operator Unit of Pamanukan g. Department of Marine and Fisheries of Subang Regency h. Department of Marine and Fisheries of West Java Province **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
35	Increased dust concentration (TSP/PM10/PM2,5), NOx, CO and HC	Construction of Access Road	Concentration of (TSP/PM10/PM2,5), NOx, CO and HC meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution:	**Data Collection Method:** Data Collection Method in accordance with SNI 19-7119.6-2005: Ambient Air Part 6: "Determination of Sampling Location of the Ambient Air Quality Monitoring Test ".	Monitoring is carried out in the area around the activity location and the nearest settlement	Every 3 months during development construction activity	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				Data analysis: a. Data analysis method refers to SNI 19-7119.3-2005 : Ambient air Part 3: Total suspended particle test method using high volume air sampler (HVAS) equipment with gravimetric method (PM_{10} and $PM_{2.5}$). b. Data analysis method refers to SNI 19-7119.7-2005 : Ambient air-part 7: Test method of sulfur dioxide (SO_2) with pararosaniline method and test method of nitrogen dioxide (NO_2) level by Griess Saltzman method using spectrophotometer c. Data analysis method refers to SNI 19-4845-1998 : Test method of CO gas content in air with NDIR d. Comparative descriptive analysis	with PLTGU which refers to the baseline air sampling of AMDAL a. Location of PLTGU (6°14' 43.662" S 107°35' 13.272" E) b. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E)		Regency c. DLHK of West Java province d. Department of Transportation of Karawang Regency e. Department of Transportation of Bekasi Regency f. Department of Transportation of West Java Province g. Ministry of Energy and Mineral Resources - Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							d. Ministry of Environment and Forestry
36	Increased Noise	Construction of Access Road	Noise on development areas of construction road meets the required thresholds in the Decree of Environment Minister No. 48 of 1996, namely: a. 55 dBA for residential environment, b. 70 dBA of road & industrial environment as well as trade and service environment	**Data collection method:** a. Conduct noise measurements with sound level meter b. Compare the noise measurement results with the Decree of State Minister of Environment Number: Kep-48/MenLH/11/1996 on Noise Level Standard **Data analysis:** Data is tabulated and described comparatively.	Monitoring is carried out in the area around the activity location and the nearest settlement with PLTGU which refers to the baseline air sampling of AMDAL a. Location of PLTGU (6°14' 43.662" S 107°35' 13.272" E) b. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E)	Every 3 months during road development construction activity	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Energy and Mineral Resources – Directorate General of Electricity e. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
37	Increased dust concentration (TSP/PM10/PM2,5), NOx, CO and HC	Construction of PLTGU and Supporting Facilities	Concentration of (TSP/PM10/PM2,5), NOx, CO and HC meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution:	**Data collection method:** Air quality sampling refers to the Indonesian National Standard, or International Standard that can be traced, data collection is performed by accredited laboratories. **Data analysis:** The analysis data results is described descriptively and compared with quality standards.	Monitoring is carried out in the area around the activity location and the nearest settlement with PLTGU which refers to the baseline air sampling of AMDAL a. Location of PLTGU (6°14' 43.662" S 107°35' 13.272" E)	Monitored Every 3 months During the PLTGU development took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:**

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
					b. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E)		a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
38	Community Grievance	Construction of PLTGU and Supporting Facilities	a. Availability of community grievance handling management. b. There is evidence to the grievance handling from the community related to construction of PLTGU and supporting facilities	**Data collection method:** a. Secondary data collection is obtained by checking the grievance community submitted to the grievance recipient post. b. Primary data collection in the form of random interviews to the community who deliver grievance about the process of grievance submission, handling and follow-up of the company against such grievance **Data analysis:** Data is tabulated and described comparatively.	Cilamaya Village, Cilamaya Wetan Subdistrict	Every 3 months during PLTGU construction activity	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry
39	Increased Noise	Development of Transmission Network of 500kV	The intensity of the noise generated does not exceed the quality standard based on Decree of Environment Minister No. 48 of 1996, namely: a. 55 dBA for residential environment, b. 70 dBA of road & industrial environment as well as trade and service environment	**Data collection method:** a. Conduct noise measurements with sound level meter b. Compare the noise measurement results with the Decree of State Minister of Environment Number: Kep-48/MenLH/11/1996 on Noise Level Standard **Data analysis:** Data is tabulated and described comparatively.	Settlements around Site of T 003, T 005, T 009, T 010, T 021, T 046, T 058, T 059, T 061, T 066, T 067, T 068, T 073, T 082, T092, T 094, T 095, T 096, T 098, T 102, T 103, T 112, T 113, T 115, T 116, T 117 to radius of 500 meters.	Every 3 months during the transmission network construction stage	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Energy and Mineral Resources – Directorate General of Electricity e. Ministry of Environment and Forestry **Report Recipient Institution:** e. DLHK of Karawang

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Regency a. DLHK of Bekasi Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
40	Community Grievance	Development of Transmission Network of 500kV	a. Availability of community grievance handling management. b. There is evidence of grievance handling from communities related to transmission network construction activities	**Data collection method:** a. Secondary data collection is obtained by checking the grievance community submitted to the grievance recipient post. b. Primary data collection in the form of random interviews to the community who deliver grievance about the process of grievance submission, handling and follow-up of the company against such grievance **Data analysis:** Data is tabulated and analyzed descriptively.	At 37 villages directly affected by Jawa 1 transmission network construction activities included in Karawang regency, Bekasi Regency and Subang Regency.	Every 3 months during the transmission network construction activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of West Java province d. Ministry of Energy and Mineral Resources – Directorate General of Electricity e. Ministry of Environment and Forestry **Report Recipient**

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Institution: a. DLHK of Karawang Regency b. DLHK of Bekasi Regency **c.** DLHK of West Java province **d.** Ministry of Environment and Forestry
41	Increased Dust Concentration of NOx CO dan HC	Development of GITET 500kV	Concentration of (TSP/PM10/PM2,5), NOx, CO and HC meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution:	**Data collection method:** a. Data Collection Method in accordance with SNI 19-7119.6-2005: Ambient Air Part 6: "Determination of Sampling Location of the Ambient Air Quality Monitoring Test ". b. Data analysis method refers to SNI 19-7119.3-2005 : Ambient air Part 3: Total suspended particle test method using high volume air sampler (HVAS) equipment with gravimetric method (PM_{10} and $PM_{2.5}$). c. Data analysis method refers to SNI 19-7119.7-2005 : Ambient air-part 7: Test method of	Monitoring is carried out in the area around the activity location and the nearest settlement with GITET site which refers to the baseline air sampling of AMDAL a. Village of Karang Rahayu	Every 3 months during GITET construction activity	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Department of Transportation of Karawang Regency d. Ministry of Energy and Mineral Resources - Directorate General of Electricity e. Ministry of Environment and

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				sulfur dioxide (SO_2) with pararosaniline method and test method of nitrogen dioxide (NO_2) level by Griess Saltzman method using spectrophotometer d. Data analysis method refers to SNI 19-4845-1998 : Test method of CO gas content in air with NDIR **Analysis** Comparative descriptive analysis	(6°13' 50.053" S107°11' 6.592" E) b. GITET (6°13' 50.053" S 107°11' 6.560" E)		Forestry **Report Recipient Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
42	Community Grievance	Development of GITET 500kV	a. Availability of community grievance handling management. b. There is evidence of grievance handling from communities related to GITET construction activities	**Data collection method:** a. Secondary data collection is obtained by checking the grievance community submitted to the grievance recipient post. b. Primary data collection in the form of random interviews to the community who deliver grievance about the process of grievance submission, handling and follow-up of the company against such grievance	Karang Rahayu Village	Every 3 months during GITET Construction activity	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				Data analysis: Data is tabulated and analyzed descriptively.			Forestry **Report Recipient Institution:** a. DLHK of Bekasi Regency **b.** DLHK of West Java province **c.** Ministry of Environment and Forestry
43	• Changes in pH • Increased TOC Content • Increased BOD Concentration • Increased COD Concentration • Increased Concentrations of Oil and Fats • Increased Ammonia (NH3) • The existence of floating objects • Increased Total Coliform	Handling of Construction Waste	a. The quality of domestic wastewater meets the quality standard of the Regulation of Environment Minister No. 68 of 2016 on the Quality Standards of Domestic Wastewater b. Solid waste management in accordance with the provisions of Law No.18 of 2008 on the Waste Management c. B3 Waste Management Complies with the Regulation of Environment Minister No. 101 of 2014 on the Hazardous and	**Data collection method:** a. Records waste volumes based on the type and characteristics (Solid, Liquid & B3) which collected and submitted to third parties b. Documenting waste submitting activities to third parties **Data analysis** The results of solid waste volume recording are tabulated and presented descriptively	Construction activity location of PLTGU Jawa-1	Once a month or every waste delivery during the construction period of PLTGU Jawa-1	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Department of Transportation of Karawang Regency d. Ministry of Energy and Mineral Resources – Directorate General of Electricity e. Ministry of

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			Toxic Waste Management				Environment and Forestry **Report Recipient Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
44	Decreased dissolved oxygen level (DO)	Hydrostatic Test	Use of Hydrostatic test Materials use materials that are safe in accordance with the technical recommendations of the Directorate General of Oil and Gas	**Data collection method:** a. Record and document the use of hydrostatic test materials clearly, including the type of material, amount, usage time, and other important information. b. Conduct water measurement and sampling **Data analysis** a. The recording results of the use of hydrostatic test material are tabulated and	The pipeline deployment area at Sea, referring to the baseline water quality collection points of AMDAL a. West side of the excavation line (6°11' 47.363" S 107°38' 50.309" E)	At the time of Hydrostatic test	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Department of Transportation of Karawang Regency d. Ministry of Energy and Mineral Resources – Directorate General

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				presented descriptively b. The analysis results is presented in comparative descriptive	b. Outside west side of the excavation (6°11' 3.210" S 107°40' 54.749" E) c. Inside East side of the excavation (6°9' 33.002" S 107°42' 31.026" E) d. Outside East side of the excavation (6°9' 6.234" S 107°44' 37.421" E)		of Electricity e. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
45	Increased dust concentration (TSP/PM10/PM2,5), NOx, CO and HC	Demobilization of Equipment (By Land)	Concentration of TSP, PM_{10}, $PM_{2.5}$ meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution.	**Data collection method:** Data Collection Method in accordance with SNI 19-7119.6-2005: Ambient Air Part 6: "Determination of Sampling Location of the Ambient Air Quality Monitoring Test ".	Monitoring is carried out in the area around the activity location and the nearest	Monitored every 3 months during the equipment demobilization stage	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				Data analysis: a. Data analysis method refers to SNI 19-7119.7-2005 : Ambient air-part 7: Test method of sulfur dioxide (SO_2) with pararosaniline method and test method of nitrogen dioxide (NO_2) level by Griess Saltzman method using spectrophotometer b. Data analysis method refers to SNI 19-7119.3-2005 : Ambient air Part 3: Total suspended particle test method using high volume air sampler (HVAS) equipment with gravimetric method (PM_{10} and $PM_{2.5}$). c. Data analysis method refers to SNI 19-4845-1998 : Test method of CO gas content in air with NDIR **Data analysis:** Data of test result is analyzed and presented in comparative	settlement of PLTGU, Jetty, and GITET site and the area passed during the land mobilization process, the determination of monitoring point which refers to the baseline air sampling of AMDAL a. Urban Village of Rawagempol Wetan (6°14' 10.714" S 107°34' 44.956" E) b. Village of Cilamaya Hilir, Subdistrict. Blanakan; (6°16' 4.912"		b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Department of Transportation of Karawang Regency f. Department of Transportation of Bekasi Regency g. Department of Transportation of Subang Regency h. Department of Transportation of West Java Province i. Ministry of Energy and Mineral Resources - Directorate General of Electricity j. Ministry of Environment and Forestry **Report Recipient Institution:**

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				descriptive	S 107°35' 43.616" E) c. Location of PLTGU (6°14' 43.662" S 107°35' 13.272" E) d. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E) e. Village of Karang Rahayu (6°13' 50.053" S107°11' 6.592" E) f. GITET (6°13' 50.053" S 107°11' 6.560" E) g. Village of Muara (6°13' 55.264" S 107°36' 43.154" E)		a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
					h. Jetty (6°12' 29.775" S 107°39' 18.315" E)		
46	Increased Noise	Demobilization of Equipment (By Land)	Noise generated by demobilization activities meets quality standards based on Decree of Environment Minister No. 48 of 1996, namely: a. 55 dBA for residential environment, b. 70 dBA of road & industrial environment as well as trade and service environment	**Data collection method:** c. Conduct noise measurements with sound level meter d. Compare the noise measurement results with the Decree of State Minister of Environment Number: Kep-48/MenLH/11/1996 on Noise Level Standard **Data analysis:** Data is tabulated and described comparatively.	Monitoring is carried out in the area around the activity location and the nearest settlement of PLTGU, Jetty, and GITET site and the area passed during the land mobilization process, the determination of monitoring point which refers to the baseline air sampling of AMDAL	Once during demobilization activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Department of Transportation of Karawang Regency f. Department of Transportation of Bekasi Regency g. Department of Transportation of Subang Regency h. Department of

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
					a. Urban Village of Rawagempol Wetan (6°14' 10.714" S 107°34' 44.956" E) b. Village of Cilamaya Hilir, Subdistrict. Blanakan; (6°16' 4.912" S 107°35' 43.616" E) c. Location of PLTGU (6°14' 43.662" S 107°35' 13.272" E) d. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E) e. Village of Karang Rahayu (6°13'		Transportation of West Java Province i. Ministry of Energy and Mineral Resources – Directorate General of Electricity j. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
					50.053" S107°11' 6.592" E) f. GITET (6°13' 50.053" S 107°11' 6.560" E) g. Village of Muara (6°13' 55.264" S 107°36' 43.154" E) h. Jetty (6°12' 29.775" S 107°39' 18.315" E)		
47	Community Grievance	Demobilization of Equipment (By Land)	a. Availability of community grievance handling management. b. There is evidence of grievance handling from communities related to demobilization activities	**Data collection method:** a. Secondary data collection is obtained by checking the grievance community submitted to the grievance recipient post. b. Primary data collection in the form of random interviews to the community who deliver grievance about	At 39 villages directly affected by construction activities of FSRU, PLTGU, GITET and transmisi network of Jawa 1 which included	Monitored once at the equipment and material mobilization stage	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				the process of grievance submission, handling and follow-up of the company against such grievance **Data analysis:** Data is tabulated and analyzed descriptively.	in Karawang regency, Bekasi Regency and Subang Regency.		d. DLHK of West Java province e. Department of Transportation of Karawang Regency f. Department of Transportation of Bekasi Regency g. Department of Transportation of Subang Regency h. Department of Transportation of West Java Province i. Ministry of Energy and Mineral Resources – Directorate General of Electricity j. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
480	Increased dust concentration (TSP/PM10/PM2,5)	Commissioning of Operation	a. Concentration of TSP, PM_{10}, $PM_{2.5}$ meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution: b. Emission measurement meets the quality standard of the Regulation of Minister of Environment No. 21 of 2008 on Static Emission Sources Quality Standard for Business and/or Activities of a Thermal Power Plant: Total Particulate (30 mg/m^3)	**Data collection method:** a. Data Collection Method in accordance with SNI 19-7119.6-2005: Ambient Air Part 6: "Determination of Sampling Location of the Ambient Air Quality Monitoring Test ". b. Data analysis method refers to SNI 19-7119.3-2005 : Ambient air Part 3: Total suspended particle test method using high volume air sampler (HVAS) equipment with gravimetric method (PM_{10} and $PM_{2.5}$). c. Data analysis method refers to SNI 19-7119.7-2005 : Ambient air-part 7: Test	Monitoring is carried out in the area around the activity location and the nearest settlement of PLTGU, determination of monitoring point which refers to the baseline air sampling of AMDAL a. Location of PLTGU (6°14' 43.662" S	Once during commissioning	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				method of sulfur dioxide (SO_2) with pararosaniline method and test method of nitrogen dioxide (NO_2) level by Griess Saltzman method using spectrophotometer **Data analysis:** a. Comparative descriptive analysis	107°35' 13.272" E) b. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E)		Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
49	Increased Concentration of SO_2	Commissioning of Operation	The SO_2 concentration meets the quality standards required by Indonesian regulations as per the regulations: Government Regulation No. 41 of 1999 on the Control of Air Pollution: SO_2 (24 hours) i.e. 365 µg/m^3 and Regulation of the Minister of Environment No. 21 of 2008 on Static Emission Sources Quality Standard for Business and/or Activities of a Thermal Power Plant: SO_2 (150 mg/m^3)	**Data collection method:** Data Collection Method in accordance with SNI 19-7119.6-2005: Ambient Air Part 6: "Determination of Sampling Location of the Ambient Air Quality Monitoring Test ". **Data analysis:** a. Data analysis method refers to SNI 19-7119.7-2005 : Ambient air-part 7: Test method of sulfur dioxide (SO_2) with pararosaniline method b. Comparative descriptive	Monitoring is carried out in the area around the activity location and the nearest settlement of PLTGU, determination of monitoring point which refers to the baseline air sampling of AMDAL	Once during commissioning	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. Department of Manpower and Transmigration of Karawang Regency b. DLHK of Karawang Regency c. DLHK of Bekasi Regency d. DLHK of Subang Regency e. DLHK of West Java province

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				analysis	a. Location of PLTGU (6°14' 43.662" S 107°35' 13.272" E) b. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E)		f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
50	Increased Concentration of NOx	Commissioning of Operation	Concentration of NOx, meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution: NOx (24 hours) i.e. 150 µg/m^3 and Regulation of the Minister of Environment No. 21 of 2008 on Static Emission Sources Quality Standard for Business and/or Activities of a Thermal Power Plant: NOx i.e 320 mg/m^3	**Data collection method:** Data Collection Method in accordance with SNI 19-7119.6-2005: Ambient Air Part 6: "Determination of Sampling Location of the Ambient Air Quality Monitoring Test ". **Data analysis:** a. Data Analysis Method refers to SNI 19-7119.7-2005: test method of nitrogen dioxide (NO_2) level by Griess Saltzman method using	Monitoring is carried out in the area around the activity location and the nearest settlement of PLTGU, determination of monitoring point which refers to the baseline air	Once during commissioning	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. Department of Manpower and Transmigration of Karawang Regency b. DLHK of Karawang Regency c. DLHK of Bekasi Regency d. DLHK of Subang Regency

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				spectrophotometer b. Comparative descriptive analysis	sampling of AMDAL a. Location of PLTGU (6°14' 43.662" S 107°35' 13.272" E) b. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E)		e. DLHK of West Java province f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
51	Increased Concentration of Carbon Monoxide (CO)	Commissioning of Operation	Concentration of CO meets the required quality standards as per Government Regulation No. 41 of 1999 on the Control of Air Pollution: CO (24 hours) i.e. 10,000 µg/m^3	**Data collection method:** Data collection is carried out by making air sampling directly in the field, then the air sampling results made in the laboratory **Data analysis:** a. Data analysis method refers to SNI 19-4845-1998 : Test method of CO gas content in air with NDIR	Monitoring is performed in the area around the activity location and the nearest settlement of PLTGU, determination of monitoring point which refers	Once during commissioning	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. Department of Manpower and Transmigration of Karawang Regency b. DLHK of Karawang Regency c. DLHK of Bekasi Regency

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				b. The analysis results is presented in comparative descriptive	to the baseline air sampling of AMDAL a. Location of PLTGU (6°14' 43.662" S 107°35' 13.272" E) b. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E)		d. DLHK of Subang Regency e. DLHK of West Java province f. Ministry of Environment and Forestry **Report Recipient Institution:** e. DLHK of Karawang Regency a. DLHK of West Java province b. Ministry of Environment and Forestry
52	Increased Concentration of Volatile Organic Compound (VOC)	Commissioning of Operation	The results of VOC measurements at the time of commissioning meets the provisions of the quality standard of the Regulation of the Minister of Environment No.13 of 2009 on Static Emission Sources Quality Standard for Oil and Gas Business and/or Activity.	**Data collection method:** Data collection is carried out by making air sampling directly in the field, then the air sampling results made in the laboratory **Data analysis:** The air sample analysis is performed with refers to EPA	Location of FSRU commissioning	During the commissioning took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. Department of Manpower and Transmigration of Karawang Regency b. DLHK of Karawang Regency

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				Method 8260, The analysis results is presented in comparative descriptive			c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of West Java province d. Ministry of Environment and Forestry
53	Increased Noise	Commissioning of Operation	a. Noise level does not exceed the quality standard of Decree of the State Minister of Environment Number: Kep-48/MenLH/11/1996 on the Noise Level Quality Standard of 55 dBA for settlement, 70 dB for	**Data collection:** Conduct noise measurement in the area around HSRG, cooling tower and area around PLTGU according to monitoring parameters. **Data analysis:** **Monitoring data results is**	Site location of PLTGU and the surrounding area is adjusted to the location of the baseline air sampling of the AMDAL	Once During Commissioning of PLTGU	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			industrial area. b. Initiator of Activity complies with Regulation of the Minister of Manpower and Transmigration Number 13 of 2011 on Threshold Value of Physical Factor and Chemical Factor in Workplace that is 85 dBA with exposure time per day for 8 hours	**tabulated and compared with standard noise level in accordance with Decree**	a. Location of PLTGU (6°14' 43.662" S 107°35' 13.272" E) b. Puskesmas of Cilamaya (6°14' 56.092" S 107°35' 52.477" E)		c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province Ministry of Environment and Forestry
54	Community Grievance	Commissioning of Operation	a. Availability of community grievance handling management. b. There is evidence of grievance handling from communities related to commissioning activities	**Data collection method:** a. Secondary data collection is obtained by checking the grievance community submitted to the grievance recipient post. b. Primary data collection in the form of random interviews to the community who deliver grievance about the process of grievance	Cilamaya Village, Muara Village and Subdistrict, Cilamaya Wetan Subdistrict	Once during commissioning	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				submission, handling and follow-up of the company against such grievance **Data analysis:** Data is tabulated and analyzed descriptively.			province e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
55	Changes in Community Livelihood Patterns	Discharge of Construction Labor	The construction labor discharge comply with Law No. 13 of 2013 on Manpower	**Data collection method:** a. Data of labor discharge is documented, labor discharge documents are documented and recorded	Activity location of PLTGU Jawa-1 and nearest settlement of project location	During construction labor discharge activities.	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				b. Collect documentation of grievance data, settlement process and documentation of grievance settlement related to labor discharge **Data analysis:** Data is tabulated and analyzed descriptively.			Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Department of Manpower and Transmigration of Bekasi Regency f. Department of Manpower and Transmigration of Karawang Regency g. Department of Manpower and Transmigration of Subang Regency h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry **Report Recipient**

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Institution: a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
56	Community Grievance	Discharge of Construction Labor	a. Discharge of labor in accordance with Law No. 13 of 2003 on Manpower, Provincial and/or Regency Minimum Wage and Work Contract Agreement b. There is documentation of labor discharge included c. There is a notification letter and/or discharge of labor to the Department of Manpower and Transmigration, Head of Sub-district and Head of Village/Urban-Village d. There is documentation in	**Data collection method:** a. Secondary data collection is obtained by checking the grievance community submitted to the grievance recipient post. b. Primary data collection in the form of random interviews to the community who deliver grievance about the process of grievance submission, handling and follow-up of the company against such grievance	Cilamaya Village, Muara Village and Subdistrict, Cilamaya Wetan Subdistrict	During construction labor discharge	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Department of Manpower and Transmigration of

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			the form of explanation sheets of employment contracts concerning the discharge of labor when receipt of labor	**Data analysis:** Data is tabulated and analyzed descriptively			Bekasi Regency f. Department of Manpower and Transmigration of Karawang Regency g. Department of Manpower and Transmigration of Subang Regency h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Ministry of

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Environment and Forestry
III. Operation Stage							
1.	Increased Business Opportunities	Reception of Operation Labor	a. The formation of new businesses by local communities b. Increased existing community businesses during construction activities	**Data collection method:** a. Collect and document the types of new businesses that are formed b. Examine company policies on Increased Business Opportunities **Data analysis:** Descriptive analysis to the growing business activities	At 39 villages directly affected by construction activities of FSRU, PLTGU, GITET and transmisi network of Jawa 1 which included in Karawang regency, Bekasi Regency and Subang Regency.	Monitored every six months during the operation stage	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Department of Manpower and Transmigration of Bekasi Regency f. Department of Manpower and Transmigration of Karawang Regency g. Department of Manpower and Transmigration of Subang Regency

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
2	Changes in Income Level Community	Reception of Operation Labor	a. Increase or maintain the income of community around the activity location as well as comply Law No. 13 of 2003 on the Manpower, Minimum Wage of West Java	**Data collection method:** a. Primary data collection in the form of income data of communities affected through surveys and interviews b. Secondary data collection	At 39 villages directly affected by construction activities of FSRU, PLTGU, GITET and	Monitored every six months during the operation stage	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			Province and/or Karawang Regency/ Bekasi Regency/ Subang Regency and work contract agreement b. The process of labor absorption comply with Local Regulation of Karawang Regency No. 1 of 2011 c. Fulfillment of local labor quota/allocation of 60%	in the form of household income statistics obtained from the relevant offices. c. The data that has been collected is documented **Data analysis:** Data is tabulated and described comparatively.	transmisi network of Jawa 1 which included in Karawang regency, Bekasi Regency and Subang Regency.		b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Department of Manpower and Transmigration of Bekasi Regency f. Department of Manpower and Transmigration of Karawang Regency g. Department of Manpower and Transmigration of Subang Regency h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:**

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
3	Community Grievance	Reception of Operation Labor	a. Acceptance of labor meets the provisions of Law no. 13 of 2003 on the Manpower, Minimum Wage of West Java Province and/or Karawang Regency/ Bekasi Regency/ Subang Regency and work contract agreement b. The process of labor absorption comply with Local Regulation of Karawang Regency No. 1 of 2011 c. Availability of community grievance handling management.	**Data collection method:** a. Secondary data collection is obtained by checking the grievance community submitted to the grievance recipient post. b. Primary data collection in the form of random interviews to the community who deliver grievance about the process of grievance submission, handling and follow-up of the company against such grievance **Data analysis:**	At 39 villages directly affected by construction activities of FSRU, PLTGU, GITET and transmisi network of Jawa 1 which included in Karawang regency, Bekasi Regency and Subang Regency.	Monitored every six months during the operation stage	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. Department of Manpower and Transmigration of Karawang Regency b. Department of Manpower and Transmigration of Bekasi Regency c. Department of Manpower and Transmigration of Subang Regency d. DLHK of Karawang Regency

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			d. There is evidence of grievance handling from communities related to labor acceptance	Data is tabulated and analyzed descriptively.			e. DLHK of Bekasi Regency f. DLHK of Subang Regency g. DLHK of West Java province h. Ministry of Energy and Mineral Resources – Directorate General of Electricity i. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
4	• Increased Concentration of SO2	Operational of FSRU	The emissions of genset comply with the Regulation of the Minister of	**Data collection method:** a. Take air samples at the emission source point areas	At static emission source points in FSRU	Monitored every six months during the	**Executive Institution:** PT JSP and Executive Contractor

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
	• Increased Concentration of NOx • Increased Concentration of Carbon Monoxide (CO) • VOC • Opacity		Environment No.13 of 2009 (as set out in appendix II) on Static Emission Sources Quality Standard for Oil and Gas Business and/or Activity.	in the FSRU according to the monitoring parameters. Examples of air are analyzed in the laboratory. **Data analysis:** a. The analysis data in accordance with the parameters set forth inRegulation of the Minister of Environment No.13 of 2009 on Static Emission Sources Quality Standard for Oil and Gas Business and/or Activity. b. Data of analysis results compared with benchmarks (indicators), then evaluated against compliance with rules, trends, and critical levels.	such as Electric generator	operation stage	**Supervisory Institution** a. DLHK of West Java province b. DLHK of Subang Regency c. DLHK of West Java province d. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok e. Director General of Marine Transportation, Ministry of Marine Affairs f. Department of Marine and Fisheries of Subang g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient**

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Institution: a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
5	• Increased TSS Content • Increased BOD Concentration • Increased COD Concentration • Increased Concentrations of Oil and Fats • Increased Ammonia (NH3) • The existence of floating objects • Increased Total • Changes in pH • Coliform • Increased Chlorine (CL) •	Operation of FSRU	a. Waste management meets the requirements set forth in Government Regulation 101 2014 on B3 waste management, Regulation of the Minister of Transportation No. PM 29 of 2014 on the Prevention of Maritime Environmental Pollution, Regulation of the Minister of Transportation No. KM 4 of 2005 on Prevention of Pollution from Ships, and Wastewater Quality of FSRU in accordance with Minister of Environment Regulation No. 8 of 2009 on Waste Water Quality	**Data collection:** Conduct regular recording and collecting of waste generated and submitted to the continued waste management Conduct waste water sampling Water samples are tested in the laboratory according to the parameters specified in Regulation of Environment Minister No. 8 of 2009 on Waste Water Quality Standard for Business and/or Activities of Thermal Power Plant Conduct collecting and recording pH and water discharge **Data analysis:** Data of monitoring results is	Location around FSRU, according to the point of sampling of water at the baseline of AMDAL a. Sea waters of the northwestern side of FSRU (6°11' 3.241" S 107°40' 55.204" E) b. Southeast sea waters of FSRU (6°9' 32.545" S 107°42' 31.316" E) c. North side	During FSRU operating activities	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of West Java province b. DLHK of Subang Regency c. DLHK of West Java province d. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok e. Director General of Marine Transportation, Ministry of Marine Affairs f. Department of Marine and Fisheries of

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			Standard for Business and/or Activities of Thermal Power Plant, i.e. pH and salinity within radius of 30 m in accordance with the initial conditions b. Waste management complies with Regulation of the Minister of Transportation No. PM 29 of 2014 on the Prevention of Maritime Environmental Pollution, Regulation of the Minister of Transportation No. KM 4 of 2005 on Prevention of Pollution from Ships, and Regulation of the Minister of Transportation No. PM 58 of 2013 on Pollution Prevention in Waters and Ports.	tabulated and compared to natural conditions around and then evaluated against compliance with rules, trends, and critical levels	sea waters of FSRU (6°8' 8.738" S 107°44' 34.104" E) d. South side sea waters of FSRU (6°9' 6.069" S 107°44' 37.908" E) e. Northwest side sea waters of FSRU (6°10' 29.291" S 107°38' 42.672" E)		Subang g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
6	Changes in Plankton Abundance	Operational of FSRU	Plankton abundance is remain maintained at a range of> 15,000 individual/litter	**Data collection:** Plankton sampling, then analyzed in the laboratory to find out	Location around FSRU, according to the point of sampling of	Monitored every six months during the	**Executive Institution:** PT JSP and Executive Contractor

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			(Basmi, 1987) or at a number relatively similar to the baseline	the plankton community index (diversity/H', uniformity/S and dominance/D). **Data analysis:** The results of plankton abundance observations is presented in the plankton community index (diversity/H', uniformity/S and dominance/D).	water at the baseline of AMDAL a. Sea waters of the northwestern side of FSRU (6°11' 3.241" S 107°40' 55.204" E) b. Southeast sea waters of FSRU (6°9' 32.545" S 107°42' 31.316" E) c. North side sea waters of FSRU (6°8' 8.738" S 107°44' 34.104" E) d. South side sea waters of FSRU (6°9' 6.069" S 107°44' 37.908" E)	operation stage	**Supervisory Institution** a. DLHK of West Java province b. DLHK of Subang Regency c. DLHK of West Java province d. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok e. Director General of Marine Transportation, Ministry of Marine Affairs f. Department of Marine and Fisheries of Subang g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:**

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
					e. Northwest side sea waters of FSRU (6°10' 29.291" S 107°38' 42.672" E)		a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
7	Disruption of Fishermen's Activities	Operational of FSRU	a. The absence of significant disruption to fisherman's activities resulting from FSRU operation b. Availability of warning signs to prevent disruption of fisherman's activities	**Data collection method:** a. Observing fisheries activities around FSRU operational area. b. Record incidents of fisheries disruption activities are occurred and actions taken **Data analysis** The data collected is tabulated, then described descriptively.	Fisherman Villages around FSRU of Belanakan Village of Belanakan subdistrict and Muara Village, Cilamaya Wetan Subdistrict	Monitored every six months during the operation stage	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of West Java province b. DLHK of Subang Regency c. DLHK of West Java province d. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok e. Director General of Marine Transportation, Ministry of Marine Affairs f. Department of Marine and Fisheries of

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Subang g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
8	Community Grievance	Operational of FSRU	a. Availability of community grievance handling management. b. There is evidence of grievance handling from communities related to FSRU operation	**Data collection method:** a) Secondary data collection is obtained by checking the grievance community submitted to the grievance recipient post. b) Primary data collection in the form of random interviews to the community	Fisherman Villages around FSRU of Belanakan Village of Belanakan subdistrict and Muara Village, Cilamaya Wetan	Monitored every six months during the operation stage	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of West Java province b. DLHK of Subang Regency c. DLHK of West Java

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				who deliver grievance about the process of grievance submission, handling and follow-up of the company against such grievance **Data analysis:** Data is tabulated and analyzed descriptively.	Subdistrict		province d. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok e. Department of Marine and Fisheries of Subang f. Director General of Marine Transportation, Ministry of Marine Affairs g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Environment and

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Forestry
9	Disruption of Sea Traffic	Operational of FSRU	No incidents of sea transportation disruption caused by operational of FSRU	**Data collection method:** a. Observing fisheries activities around FSRU operational area. b. Record incidents of transportation disruption activities are occurred and actions taken **Data analysis** The data collected is tabulated, then described descriptively	Fisherman Villages around FSRU of Belanakan Village of Belanakan subdistrict and Muara Village, Cilamaya Wetan Subdistrict	Monitored every six months during the operation stage	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of West Java province b. DLHK of Subang Regency c. DLHK of West Java province d. Harbor Master Office of Tanjung Priok and Port Authority of Class II Tanjung Priok e. Director General of Marine Transportation, Ministry of Marine Affairs f. Department of Marine and Fisheries of Subang g. Ministry of Energy and Mineral Resources – Directorate General of Electricity

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Subang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
10	Increased levels of Carbon Monoxide CO and Temperature	Operational of HSRG	Carbon monoxide levels meets the quality standard Regulation of Environment Minister No.: 13 of 2009 on the Quality Standard of Oil and Gas Industry Activity, Emission Source of combustion process	**Data collection method:** Emissions data are measured continuously using CEMS instruments **Data analysis** Data of monitoring results is tabulated and compared to natural conditions around and then evaluated against compliance with rules, trends, and critical levels	The emission stack source point of HSRG	Monitored continuously during the operation period	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Energy

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
11	Increased CO2 Emissions	Operational of HSRG	There are reports of periodic GHG emission calculations during the operation of PLTGU as well as efforts to reduce GRK emissions	**Data collection method:** *a.* Conduct an inventory of potential sources of generating CO2 in PLTGU Jawa 1 activities *b.* Document the CO2	PLTGU Project Site	Once a year during the operational activity of HSRG took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				mitigation activities that have been taken **Data analysis:** Data on the inventory results of emission sources and CO2 production is processed into a data base of CO2 production, then analyzed to the electricity ratio produced. The report presented in comparative descriptive			Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Forestry
12	Community Grievance	Operational of HSRG	a. Availability of community grievance handling management. b. There is evidence of grievance handling from communities related to HSRG operational activities	**Data collection method:** a. Secondary data collection is obtained by checking the grievance community submitted to the grievance recipient post. b. Primary data collection in the form of random interviews to the community who deliver grievance about the process of grievance submission, handling and follow-up of the company against such grievance **Data analysis:** Data is tabulated and analyzed descriptively	PLTGU Project Site	Once in six months during the operational activity of HSRG took place	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Karawang Regency b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Energy and Mineral Resources – Directorate General of Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							b. DLHK of Bekasi Regency c. DLHK of Subang Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
13	• Increased Salinity • Changes in pH Increased TSS Content	Desalination and Demineralization of Sea Water	a. The quality of wastewater generated from the desalination process meets the standard quality standard of Regulation of Environment Minister No. 8 of 2009 on waste water quality standard for thermal activity (Appendix 2B) b. At a radius of 30 meters from outfall of salinity level is equivalent to the natural salinity condition of the surrounding area c. The abundance of the	**Data collection method:** *a.* Conduct waste water sampling *b.* Water samples is tested in the laboratory according to the parameters specified in Regulation of Environment Minister No. 8 of 2009 on waste water quality standard for thermal activity (Appendix 2B) c. Conduct collecting and recording pH and water discharge **Data analysis:** Data of monitoring results is tabulated and compared to	a. Facilities of SWRO reject Water Outlet b. Outfall facilities and surrounding water bodies adapted to the water sampling point at the time of baseline data collection around the outfall	a. pH and water discharge are monitored daily b. Water quality such as TSS, Salinity and Abundance of Plankton Monitored Every six months during the operation stage	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of West Java province b. DLHK of Karawang Regency c. DLHK of West Java province d. Department of Marine and Fisheries of Subang e. Ministry of Energy and Mineral Resources – Directorate General of

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			plankton community has a good diversity index	natural conditions around and then evaluated against compliance with rules, trends, and critical levels	point: 1) (6°12' 42.798" S 107°38' 43.760" E) 2) (6°11' 17.579" S 107°37' 41.734" E) 3) (6°10' 29.186" S 107°37' 58.171" E) 4) (6°11' 8.187" S 107°38' 58.241" E) 5) (6°11' 3.045" S 107°40' 55.203" E) 6) (6°10' 29.291" S 107°38' 42.672" E)		Electricity f. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
14	• Increased Chlorine (Cl2)	Operational of Cooling Tower	The quality of wastewater generated from cooling	**Data collection method:** *a.* Conduct waste water sampling	Facilities of Cooling Tower	a. pH and water discharge	**Executive Institution:** PT JSP and Executive

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
	• Increased Zinc (Zn) Increased concentration of phosphate (PO4)	System	system operation process meets the standard quality standard of Regulation of Environment Minister No. 8 of 2009 on waste water quality standard for thermal activity (Appendix 1C)	*b.* Water samples is tested in the laboratory according to the parameters specified in Regulation of Environment Minister No. 8 of 2009 on waste water quality standard for thermal activity (Appendix 1C) c. Conduct collecting and recording pH and water discharge **Data analysis:** Data of monitoring results is tabulated and compared to natural conditions around and then evaluated against compliance with rules, trends, and critical levels	Blowdown Outlet	are monitored daily b. Cl2, Zn, and PO4 parameters are monitored Every six months during operation stage	Contractor **Supervisory Institution** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
15	• Increased COD Concentration	Industrial Wastewater	The quality of wastewater of the PLTGU activities meets	**Data collection method:** *a.* Conduct waste water sampling	Facilities of industrial	c. pH and water discharge	**Executive Institution:** PT JSP and Executive

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
	• Increased Concentrations of Oil and Fats • Increased Total Organic Carbon (TOC) Content	Treatment	the standard quality standard of Regulation of Environment Minister No. 8 of 2009 on waste water quality standard for thermal activity	*b.* Water samples is tested in the laboratory according to the parameters specified in Regulation of Environment Minister No. 8 of 2009 on waste water quality standard for thermal activity c. Conduct collecting and recording pH and water discharge **Data analysis:** a. Data of monitoring results is tabulated and compared to natural conditions around and then evaluated against compliance with rules, trends, and critical levels	liquid waste Outlet	are monitored daily d. COD, Oil, Fat, TOC parameters are monitored Every six months during operation stage	Contractor **Supervisory Institution** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Department of Marine and Fisheries of Subang f. Department of Marine and Fisheries of Karawang g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
16	• Changes in pH • Increased TSS Content • Increased BOD Concentration • Increased COD Concentration • Increased Concentrations of Oil and Fats • Increased Ammonia (NH3) • The existence of floating objects • Increased Total Coliform	Domestic Wastewater Treatment	The quality of domestic wastewater meets the quality standard of the Regulation of Environment Minister No. 68 of 2016 on the Quality Standards of Domestic Wastewater	**Data collection:** *a.* Conduct waste water sampling *b.* Water samples are tested in the laboratory according to the parameters specified in Regulation of Environment Minister No. 68 of 2016 on the Quality Standards of Domestic Wastewater c. Conduct collecting and recording pH and water discharge **Data analysis:** a. Data of monitoring results is tabulated and compared to natural conditions around and then evaluated against compliance with rules, trends,	Conducted in waste water holding pond	Monitoring period every month. pH and water discharge are monitored daily.	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Department of Marine and Fisheries of Subang f. Department of Marine and Fisheries of Karawang g. Ministry of Energy and Mineral Resources –

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				and critical levels			Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
17	The existence of Floating Objects/Trash	Handling of Non B3 Solid Waste	Solid waste management in accordance with the provisions of Law No.18 of 2008 on the Waste Management	**Data collection method:** Record the volume of solid waste collected and delivered to third parties on land **Data analysis** The results of solid waste volume recording are tabulated and presented descriptively	FSRU site area, PLTGU and GITET Site	Monitored daily during FSRU, PLTGU and GITET operations	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							d. DLHK of West Java province e. Department of Marine and Fisheries of Subang f. Department of Marine and Fisheries of Karawang g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Ministry of Environment and Forestry

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
18	Decreased Environmental Sanitation	Handling of Non B3 Solid Waste	Solid waste management in accordance with the provisions of Law No.18 of 2008 on the Waste Management	**Data collection method:** Record the volume of solid waste collected and delivered to third parties on land **Data analysis:** The results of solid waste volume recording are tabulated and presented descriptively	Site area of PLTGU, FSRU and Transmission Network and GITET	Monitored daily during FSRU, PLTGU and GITET operations	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Department of Marine and Fisheries of Subang f. Department of Marine and Fisheries of Karawang g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient**

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
							Institution: a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
19	Decreased Environmental Sanitation	Handling of B3 Waste	a. B3 Waste Management Complies with the Regulation of Environment Minister No. 101 of 2014 on the Hazardous and Toxic Waste Management b. B3 Waste Management in accordance with Decree of Head of Environmental Impact Control Agency No. 01 of 1995 on Procedures and Requirements for the Storage and Collection of Hazardous and Toxic Waste (B3) c. Handling of B3 waste from	**Data collection method:** a. Record the volume of solid waste collected and delivered to third parties on land b. Conduct recapitulation record of waste manifest that has been submitted **Data analysis:** The results of solid waste volume recording are tabulated and presented descriptively	Site area of PLTGU, FSRU and Transmission Network and GITET	Monitored daily during FSRU, PLTGU and GITET operations	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Department of Marine and Fisheries of Subang f. Department of Marine and Fisheries of

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			the type of used lubricant in accordance with the provisions of Decree of Head of Environmental Impact Control Agency No. 255 of 1996 on Procedures for Storage and Collection of Used Lubricant Oil.				Karawang g. Ministry of Energy and Mineral Resources – Directorate General of Electricity h. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Karawang Regency b. DLHK of Subang Regency c. DLHK of Bekasi Regency d. DLHK of West Java province e. Ministry of Environment and Forestry
20	Increased Electric Field and Magnetic Field	Operational and Maintenance of Transmission Network 500kV and GITET 500 kV	Electric field exposure does not exceed 5 kV/m and magnetic field exposure does not exceed 0.1 mT	**Data collection:** Conduct periodic measurements of the exposure levels of magnetic fields **Data analysis:**	Network Transmission and GITET	Monitored every six months during the operation stage	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Bekasi Regency

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
				Data of monitoring results is tabulated and compared to natural conditions around and then evaluated against compliance with rules, trends, and critical levels			b. DLHK of West Java province c. Ministry of Energy and Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Ministry of Environment and Forestry
21	Community Grievance	Operational and Maintenance of Transmission Network 500kV and GITET 500 kV	a. Availability of community grievance handling management. b. There is evidence of grievance handling from communities related to the operation and maintenance of transmission network and	**Data collection method:** a. Secondary data collection is obtained by checking the grievance community submitted to the grievance recipient post. b. Primary data collection in the form of random interviews	At 39 villages directly affected by PLTGU Jawa-1 activities included in Karawang regency, Bekasi Regency and	Monitored every six months during the operation stage	**Executive Institution:** PT JSP and Executive Contractor **Supervisory Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Ministry of Energy and

				Data Collection & Analysis Method	Monitoring Location	Time & Frequency	
			GITET	to the community who deliver grievance about the process of grievance submission, handling and follow-up against such grievance **Data analysis:** Data is tabulated and analyzed descriptively	Subang Regency.		Mineral Resources – Directorate General of Electricity d. Ministry of Environment and Forestry **Report Recipient Institution:** a. DLHK of Bekasi Regency b. DLHK of West Java province c. Ministry of Environment and Forestry

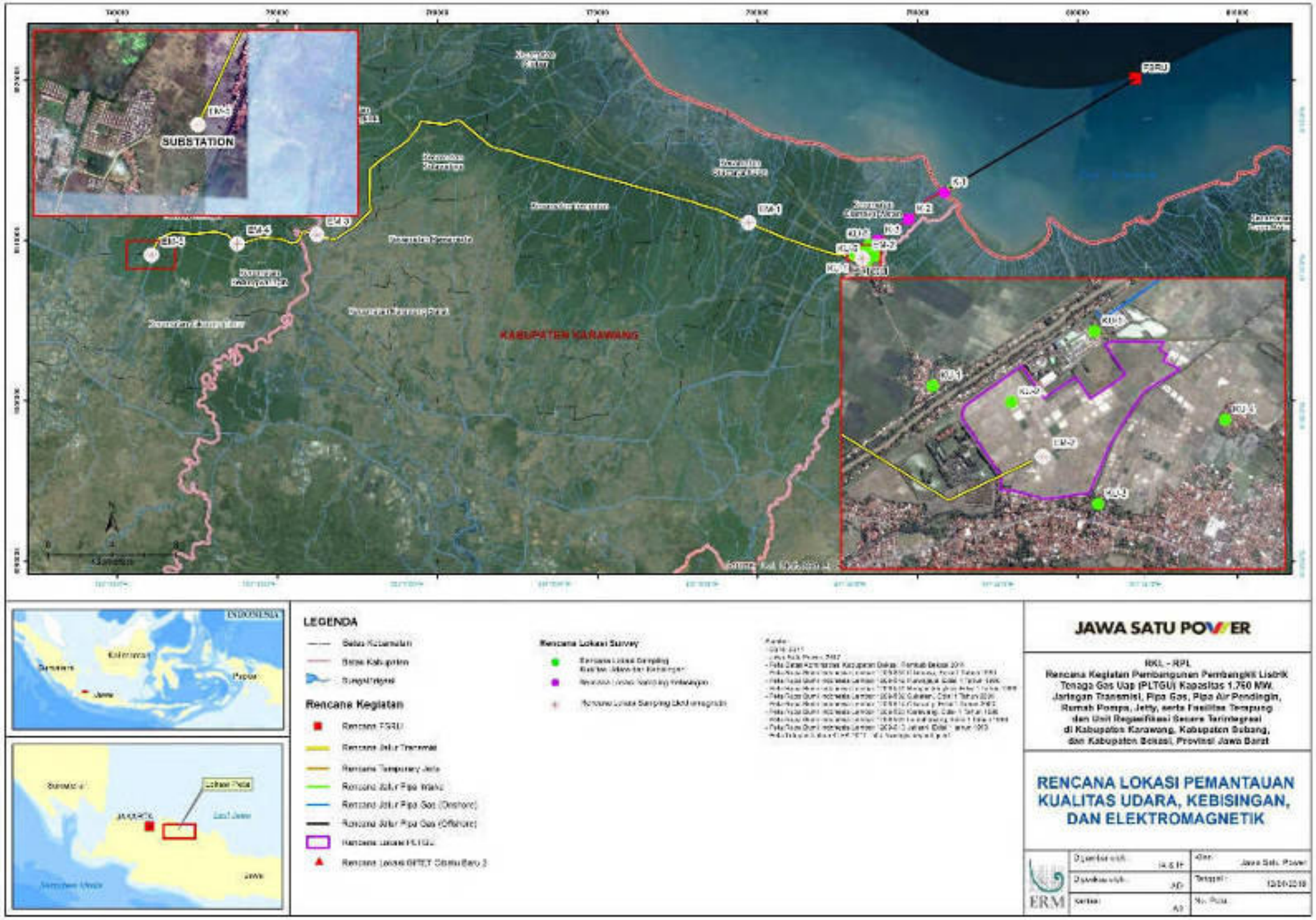

Figure 3-1 Map of the Monitoring Location of Air Quality, Noise and Electromagnetic

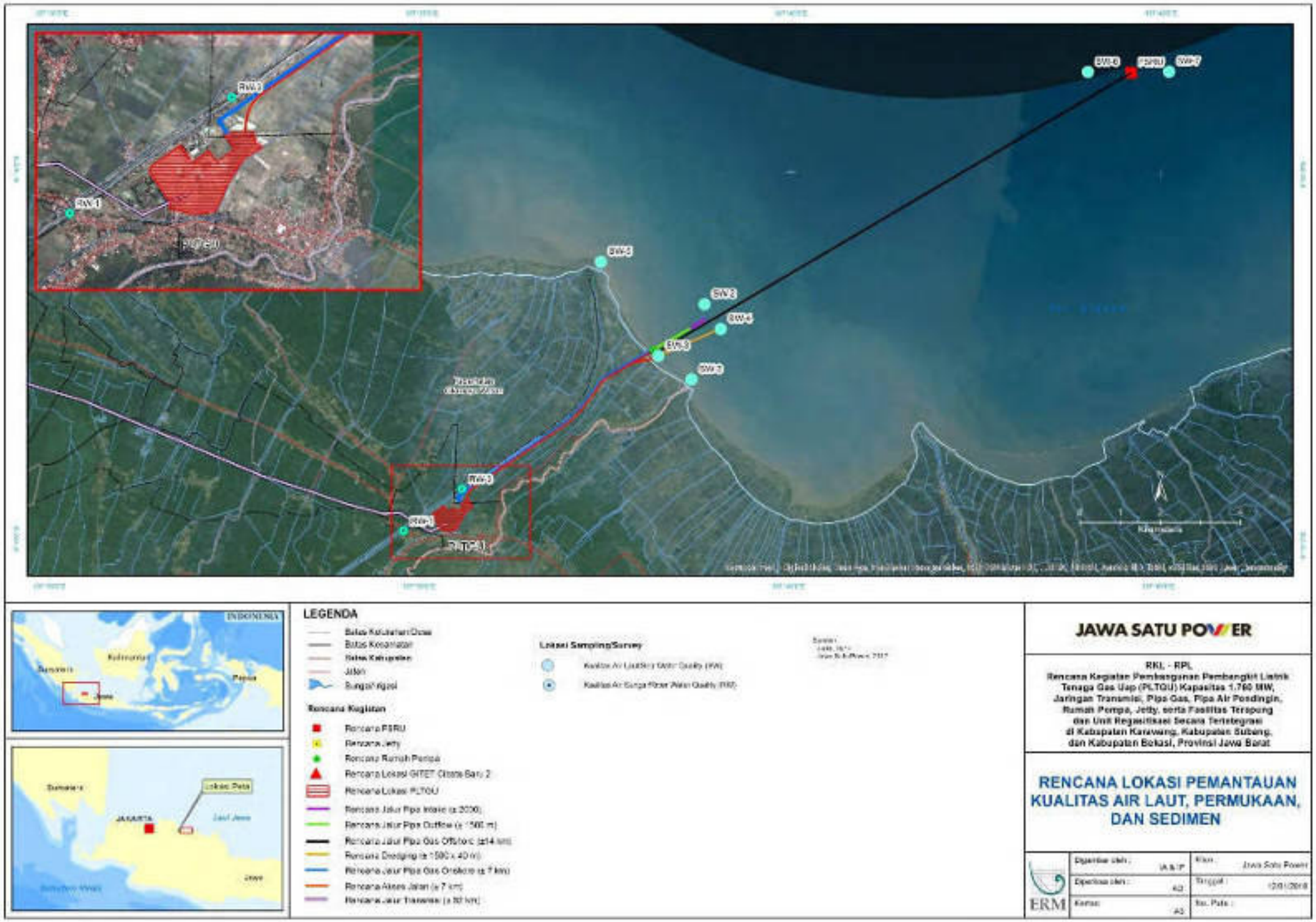

Figure 3-2 Map of the Monitoring Location of Sea Water Quality, Surface, and Sediment

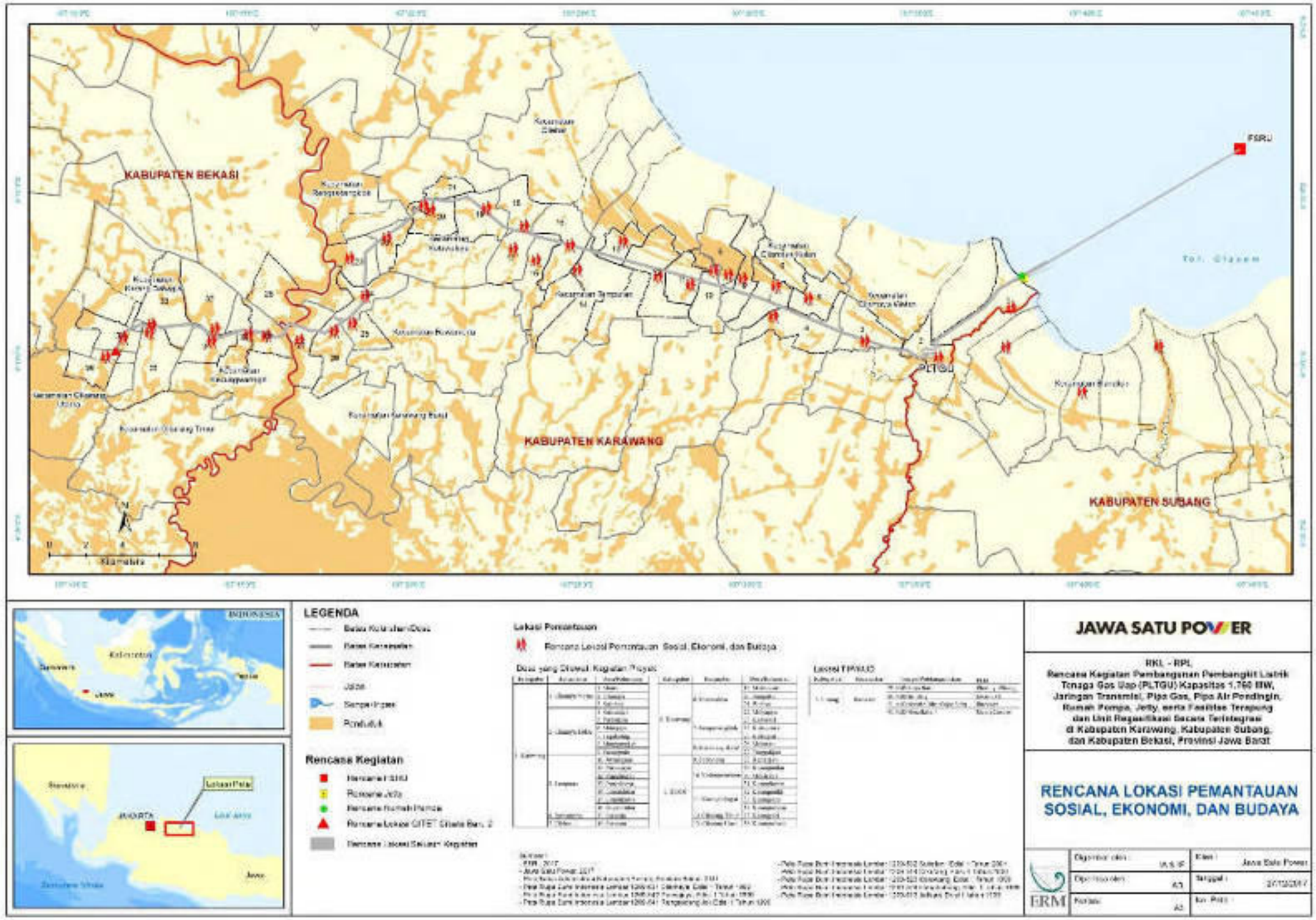

Figure 3-3 Map of the Location Plan of Social, Economic, and Cultural

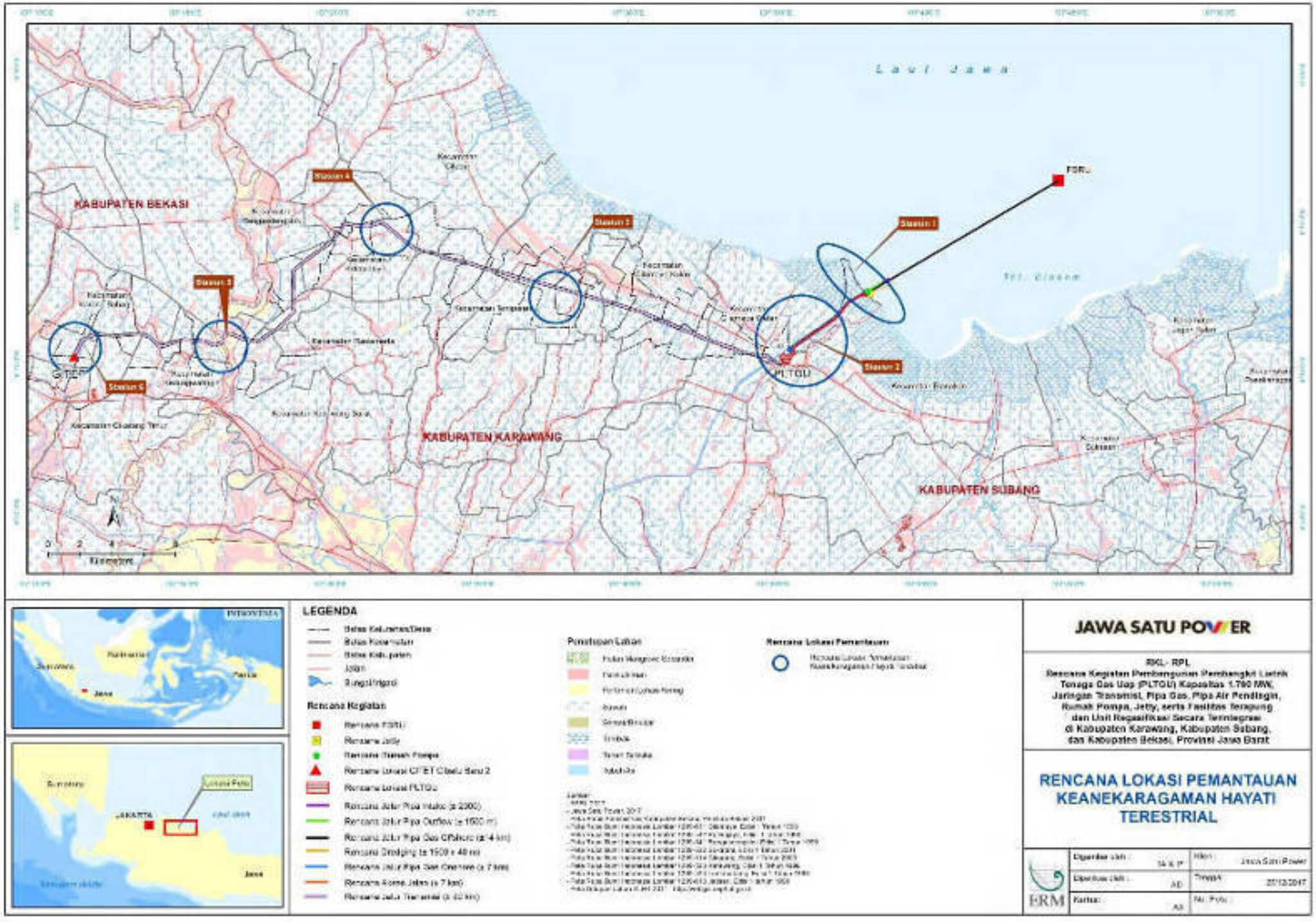

Figure 3-4 Map of the Location Plan of Terrestrial Biodiversity

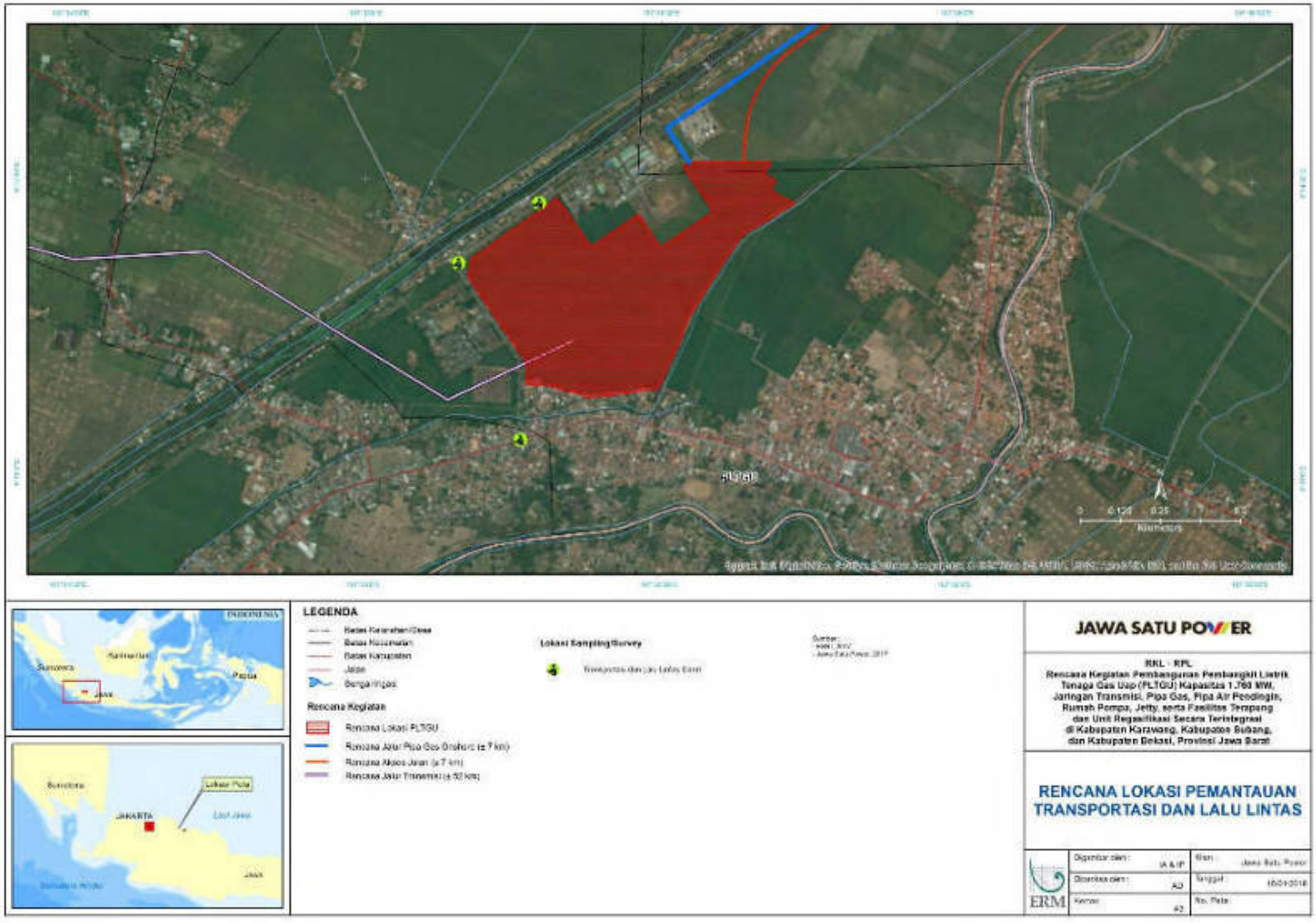

Figure 3-5 Map of the Location Plan of Transportation and Traffic

CHAPTER 4
NUMBER AND PERMITS FOR ENVIRONMENTAL PROTECTION AND MANAGEMENT (PPLH)

After this Amdal study obtained Environmental Permit and Environmental Feasibility from the Ministry of Environment and Forestry, PT JSP will apply for permit for Environmental Protection and Management. Based on Government Regulation No. 27 of 2012 on Environmental Permit, the permit shall be owned after ANDAL and RKL-RPL documents are approved among others as follows:

- Permit for disposal of wastewater into the sea
- Permit for temporary storage for B3 waste (TPS, LB3 Permit).
- Permit for groundwater retrieval (if required)
- Permit for sea water utilization

CHAPTER 5
STATEMENT OF IMPLEMENTATION COMMITMENTS OF THE RKL–RPL

The undersigned:

Name : Ginanjar

Company Name : PT Jawa Satu Power

Company Address : Pertamina Kwarnas Building, Lantai 6, Jl. Medan Merdeka Timur No. 6, Jakarta Pusat 10110

Position : President Director

Is the person in charge for the implementation of Environmental Impact Management and Monitoring activities of:

Name Business/Project: Development Plan of Steam Gas Power Plant (PLTGU) with Capacity of 1.760 MW, Transmission Network, Gas Pipe, Cooling Water Pipe, Pump House, Jetty, Floating Facilities and Integrated Regasification Unit

Location : Karawang Regency, Bekasi Regency, Subang Regency, West Java Province

Hereby declare solemnly that:

1. In preparing the ANDAL and RKL–RPL Documents for aforementioned business activities, we have referred

to the prevailing regulations and taking into account the direction of the technical supervisory institutions;

2. We undertake to comply, implement the environmental management and monitoring of such activities;
3. We are willing that our activities to be monitored for environmental impact by the authorized institution of such activities;
4. If we neglect to perform the Environmental Management activities as contained in this ANDAL and RKL-RPL Documents, we are willing to stop operations and in case of environmental pollution caused by our activities which are not included in this ANDAL and RKL-RPL Documents, we willing to be responsible according to the prevailing laws and regulations;
5. The results of environmental management and monitoring implementation efforts as described in the ANDAL and RKL-RPL documents will be reported to the Environmental Management Agency of West Java Province once every 6 (six) months during the construction stages and every 6 (six) months during the operation stages in accordance with West Java Local Regulation No. 01 of 2012;
6. If in the future there is a change/development of activity fundamentally that affect to the environment, then we will be responsible in accordance with the

applicable laws and regulations and the ANDAL and RKL-RPL documents shall be updated.

This statement letter was made for use as appropriate.

Jakarta, date, month, year

Declarer,

Signature and stamp on 6000 stamp duty

Ginanjar

President Director

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PLTGU Jawa 1 Independent Power Project

ANNEX P
CORAL REEFS OBSERVATION

Prepared for:

PT Jawa Satu Power (JSP)

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P. Coral Reefs

P.1 Coral Reefs Cover

The distribution and extent of coral reef ecosystems at the northern coast of West Java is limited in a few places only, among others are Karawang and Subang Districts (SLHD - Regional Environmental Status, 2008). Regarding the Data Book of Karawang District Environmental Status 2013 (***Table P-1***), the largest coral reefs in Karawang District that still can be observed at the offshore are coral reefs at Pasir Putih and the beaches at Sukajaya Village, Cilamaya Kulon Sub-district with a cover area of 1,229.80 Ha, which half of them are damaged. Other potentials are located around Ciparage beach, Tempuran Sub-district with a cover area of 247.27 Ha and the beaches around Cilamaya Wetan Sub-district with a cover area of 614.40 Ha, where more than half of them are damaged.

Coral reefs observation was conducted in July 2017 to determine the presence of coral reefs around Cilamaya waters area that near to the location of the proposed submarine pipeline construction (cooling water pipe, waste disposal pipe, and gas pipeline) IGCC. Based on the observation, there is no coral reefs found in the location of the proposed submarine pipeline construction (cooling water pipe, waste disposal pipe, and gas pipeline) IGCC. It happened due to high sedimentation in such waters. The sedimentation in coral reef ecosystem will affect in decline of corals' ability to grow and develop. The sedimentation

may cover the corals and block their eating process, and may also reduce the light needed by *zooxanthellae* in photosynthesizing (Nybakken, 1992). The coral reefs are only found on Pasir Putih offshore, Cilamaya Kulon Sub-district with more than five (5) km away from the location of the proposed submarine pipeline construction (cooling water pipe, waste disposal pipe, and gas pipeline) IGCC. The observation method of coral reefs is, by using robotics technology (CR Watch). It is combining transect method of 50 x 50 cm. The coral reefs observation is made in two (2) areas; they are five (5) stations at CR 03 and two (2) stations at CR 04. The conditions of coral reefs cover in both areas are presented in ***Figure P-2*** and ***Figure P-3***.

Table P-1 Coverage Area and Condition of Coral Reefs in Karawang District 2010

No	Sub-district (In the coastal)	Coverage Area (Ha)	Coral Reefs Area (Ha)			
			Very Good	Good	Moderate	Damaged
1	Cilamaya Wetan	614.40	-	14.70	261.10	338.60
2	Cilamaya Kulon	1,229.80	-	29.30	522.80	677.70
3	Tempuran	247.27	-	6.00	105.10	136.17
4	Cilebar	-	-	-	-	-
5	Pedes	-	-	-	-	-
6	Cibuaya	-	-	-	-	-
7	Tirtajaya	-	-	-	-	-
8	Batujaya	-	-	-	-	-
9	Pakisjaya	-	-	-	-	-
Total		2,091.47	-	50.00	889.00	1,152.47

Source: Data Book of Karawang District Environmental Status 2013

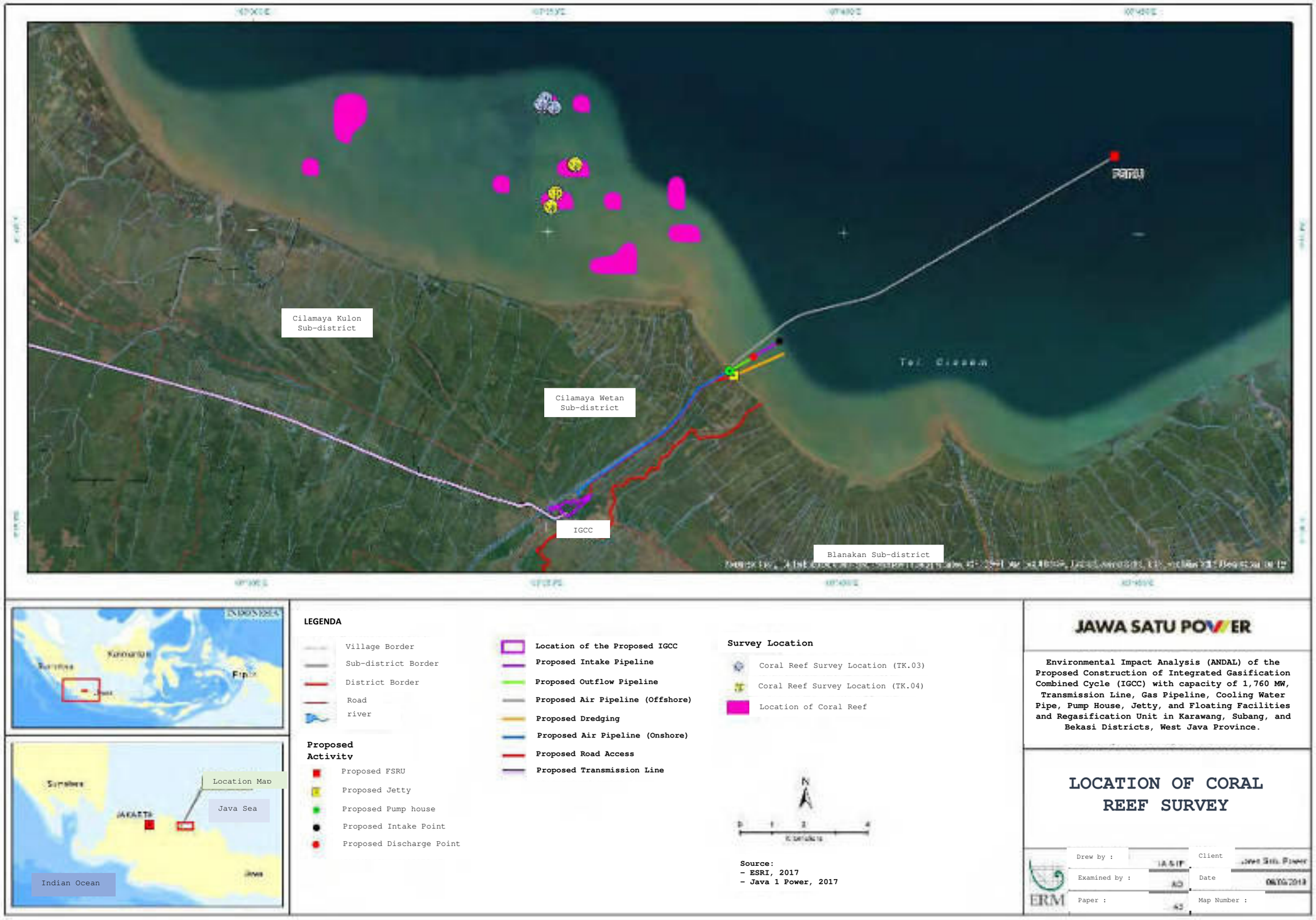
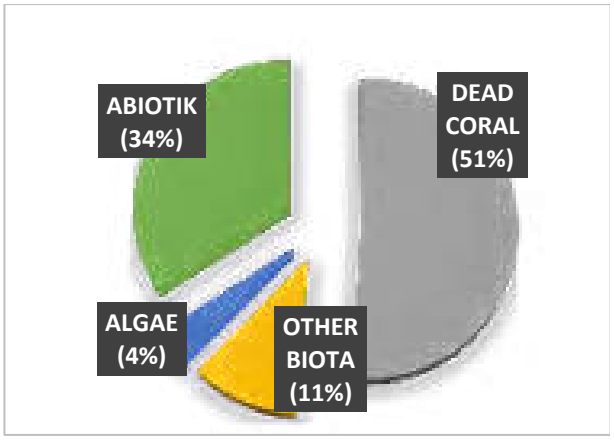
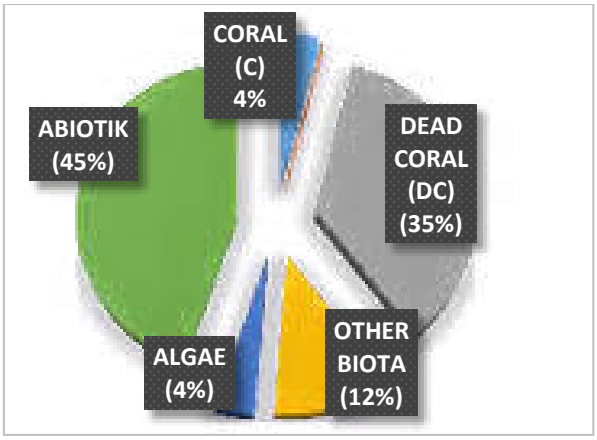


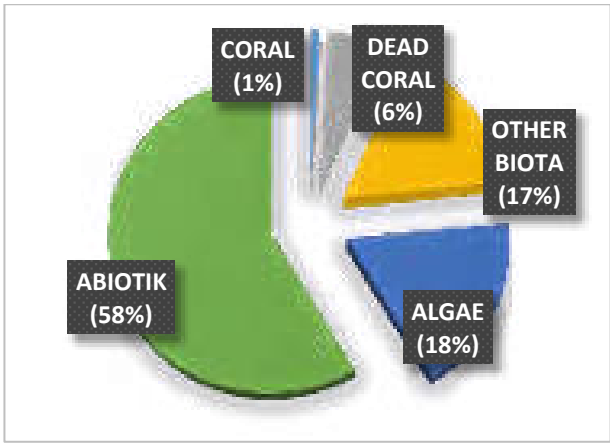
Figure P-1 The Distribution of Coral Reefs around the Construction Location



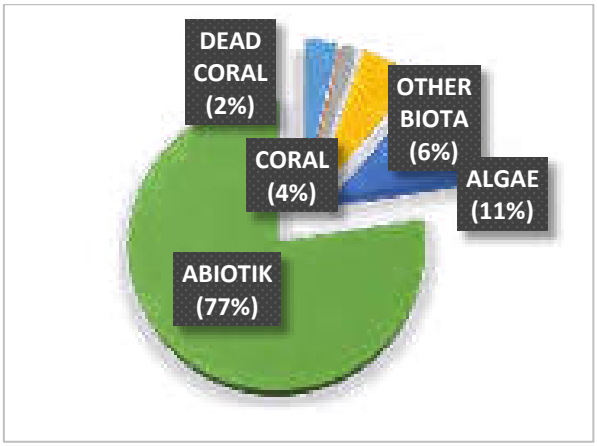
Station 1



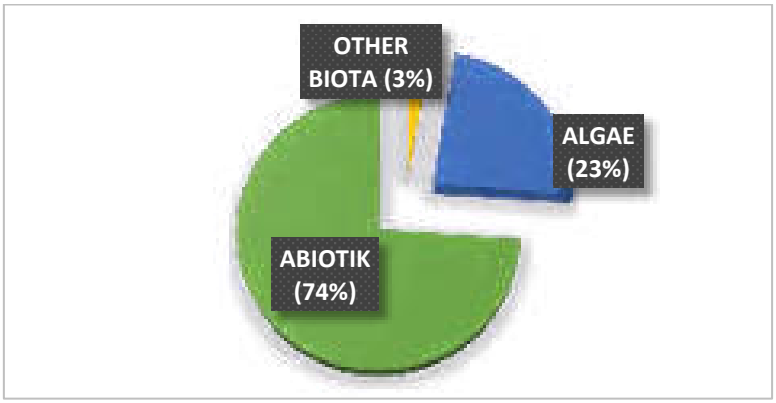
Station 2



Station 3



Station 4



Station 5

Remarks:

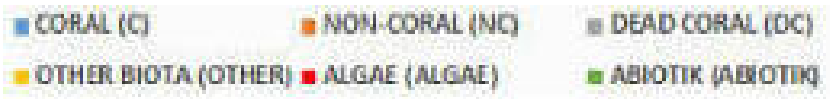
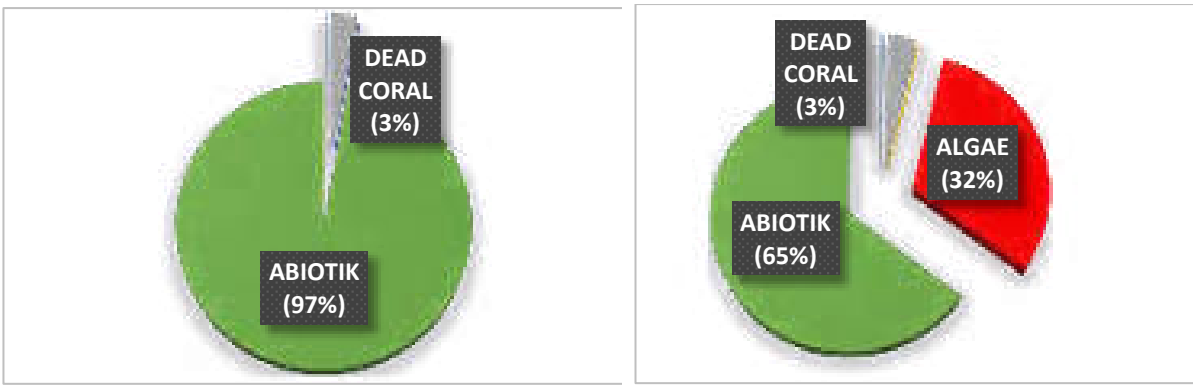


Figure P-2 The Percentage of Coral Reefs Coverage at CR 03 Area



Station 6 **Station 7**

Remarks:

Figure P-3 The Percentage of Coral Reefs Coverage at CR 04 Area

Based on the observation, from the total coral reefs coverage area, which is approximately 2,091.47 Ha, there is only 50.00 Ha or about 2% coral reefs are considered good.

There is about 42% coral reefs are considered moderate and 55% coral reefs are in damaged. Environmental Sensitivity Index of BP (2009) also shows that the coral reefs condition at the location is considered bad or poor due to water runoff effects from the land, which causes turbidity around the location. High concentration of sediment and nutrient, which comes form the land, is causing disturbance on coral habitat around the location.

Regarding the Report of Karawang District Environmental Status 2009, the potential of coral reefs is located at Pasir Putih offshore, Cilamaya Kulon Sub-district. It is

located at approximately two (2) – four (4) miles from the ocean with 3-8 meters depth. The species encountered in this area are *Acropora* and *Porifera* (sponge) forming patch reef clusters.

Basic Substrate Conditions on Coral Reefs

The hard and clean substrate is required as the settlement place for *planulae* larva, thus it enables the formation of new colonies. These hard substrates can be in the form of solid objects found in the seabed, i.e. rocks, mollusk shells, or even shipwrecks (*Nontji, 2005*). The basic substrate conditions of coral reefs in both Areas (CR 03 and CR 04) are described as follows:

CR 03 ST 1 (on the map is station 1)

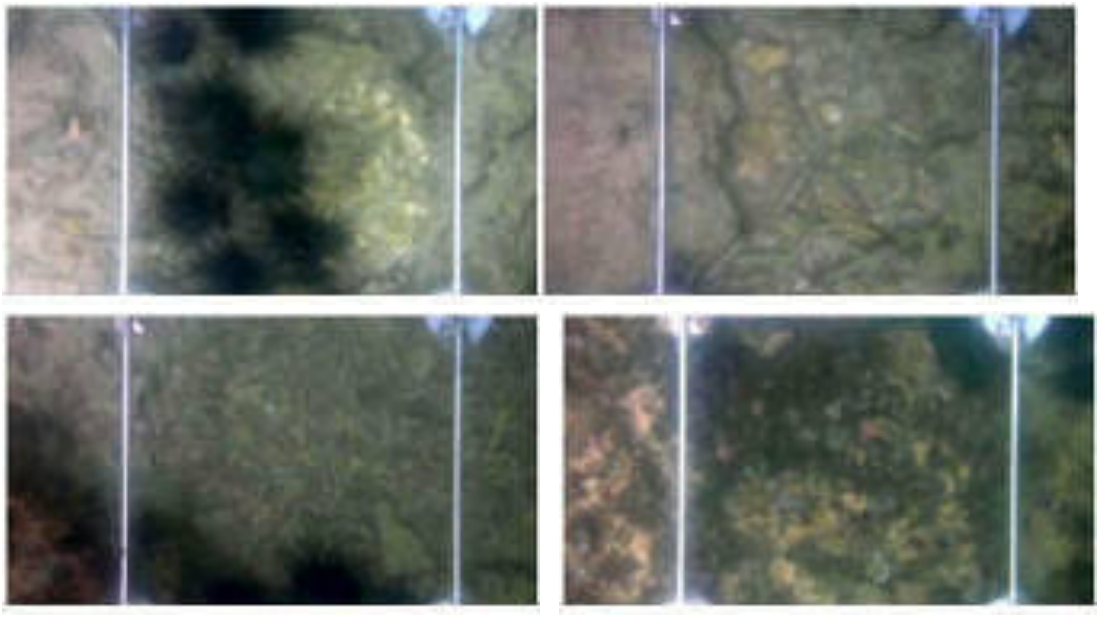


Figure P-4 Some Sample Photos of Basic Substrate at CR 03 ST 1

The location of observation is at three (3) – five (5) meters depth, while the position is in the protected area (non-exposed) and is in the middle of patch reefs. The

location is near to the fixed net cages. The basic substrate consists of coral fractures, reefs, and sponges. At such basic substrate area, there are sea urchins, macro algae and many types of rubble.

CR 03 ST 2 (on the map is station 2)

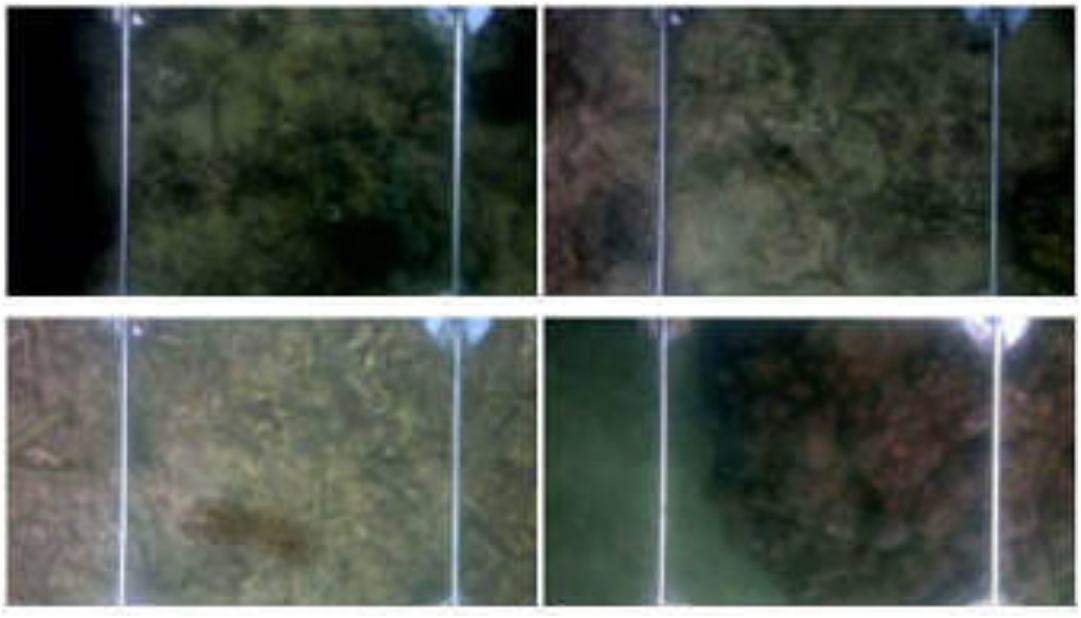


Figure P-5 Some Sample Photos of Basic Substrate at CR 03 ST 2

The observation is made at four (4) –five (5) meters depth with exposed location and the type of reefs distribution is slope. The location of observation at this station is located in the middle of patch reefs with clear waters (100% clarity). In this location, as shown in the picture above, the coral is healthy. Such basic substrate is dominated by rubbles and dead corals overgrown with algae.

CR 03 ST 3 (on the map is station 3)

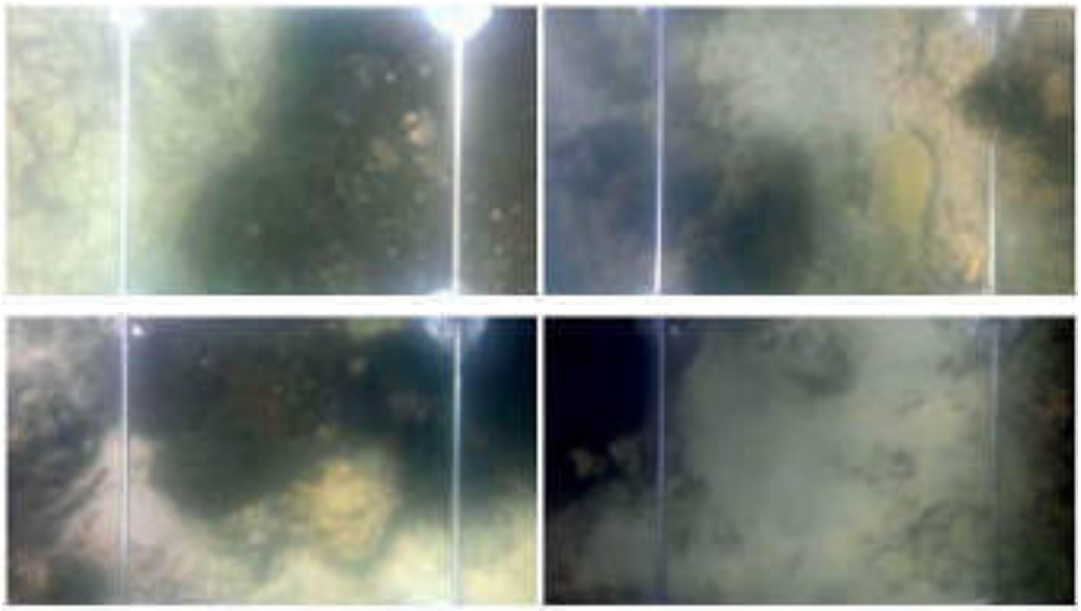


Figure P-6 Some Sample Photos of Basic Substrate at CR 03 ST 3

The observation is made at three (3) – four (4) meters depth with exposed location and the type of reefs distribution is slope. The waters are clear with 90% clarity. Most of the substrates are in the form of sand and dead corals overgrown with algae. In such substrate, there is biota, namely sea urchin.

CR 03 ST 4 (on the map is station 4)

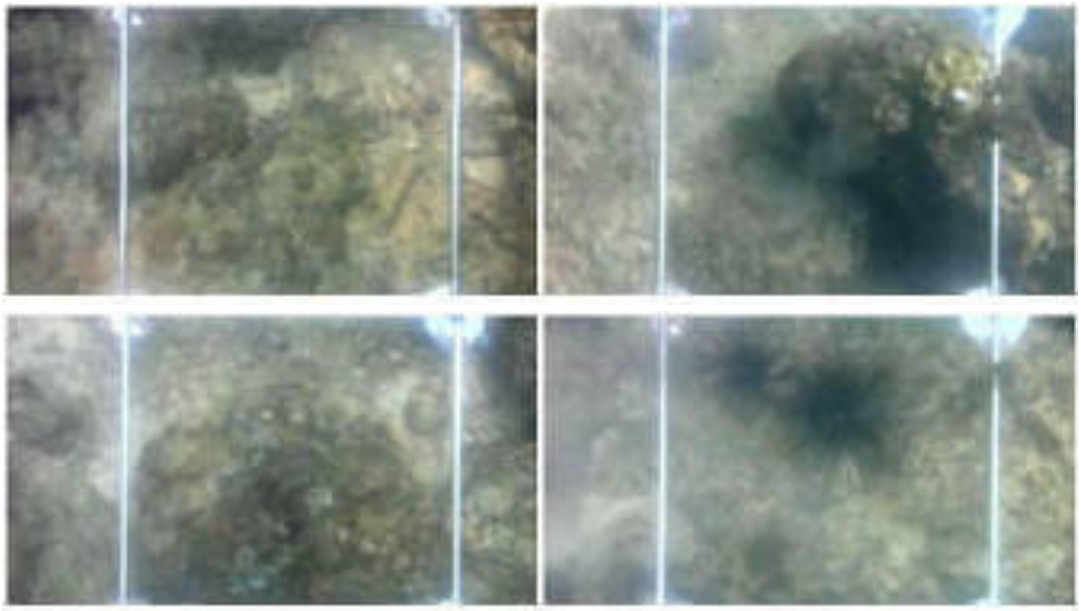


Figure P-7 Some Sample Photos of Basic Substrate at CR 03 ST 4

The observation is made at three (3) – four (4) meters depth with exposed location and the type of reefs distribution is slope. The location of observation is in the northern side of patch reefs with clear waters (90% clarity). Such basic substrate is dominated by macro-algae and there is also found several sea urchins.

CR 03 ST 5 (on the map is station 5)

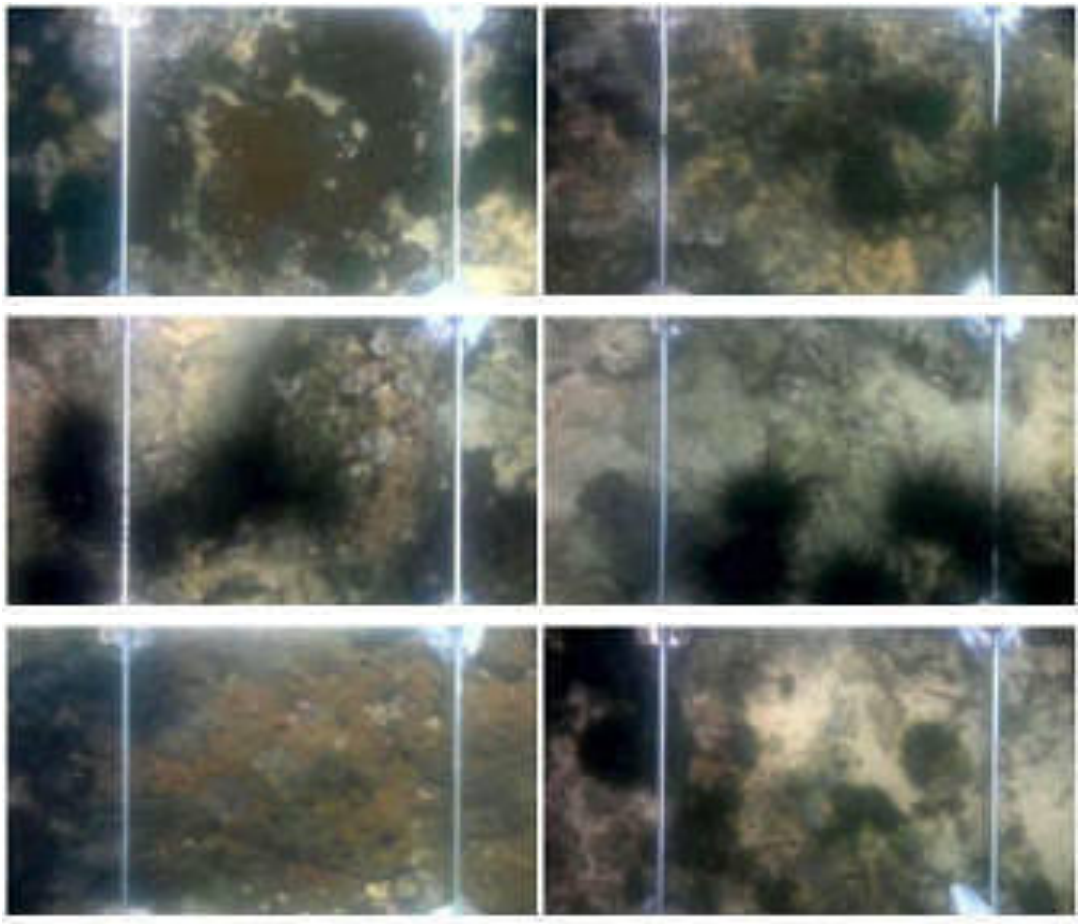


Figure P-8 Some Sample Photos of Basic Substrate at CR 03 ST 5

The observation is made at three (3) – four (4) meters depth with exposed location and the type of reefs distribution is slope. The location of sampling is in the southern part of patch reefs with clear waters (90% clarity). Such basic substrate is more diverse as there are macro-algae, dead corals overgrown with algae, sands, and lots of sea urchins.

CR 04 ST 1 (on the map is station 6)

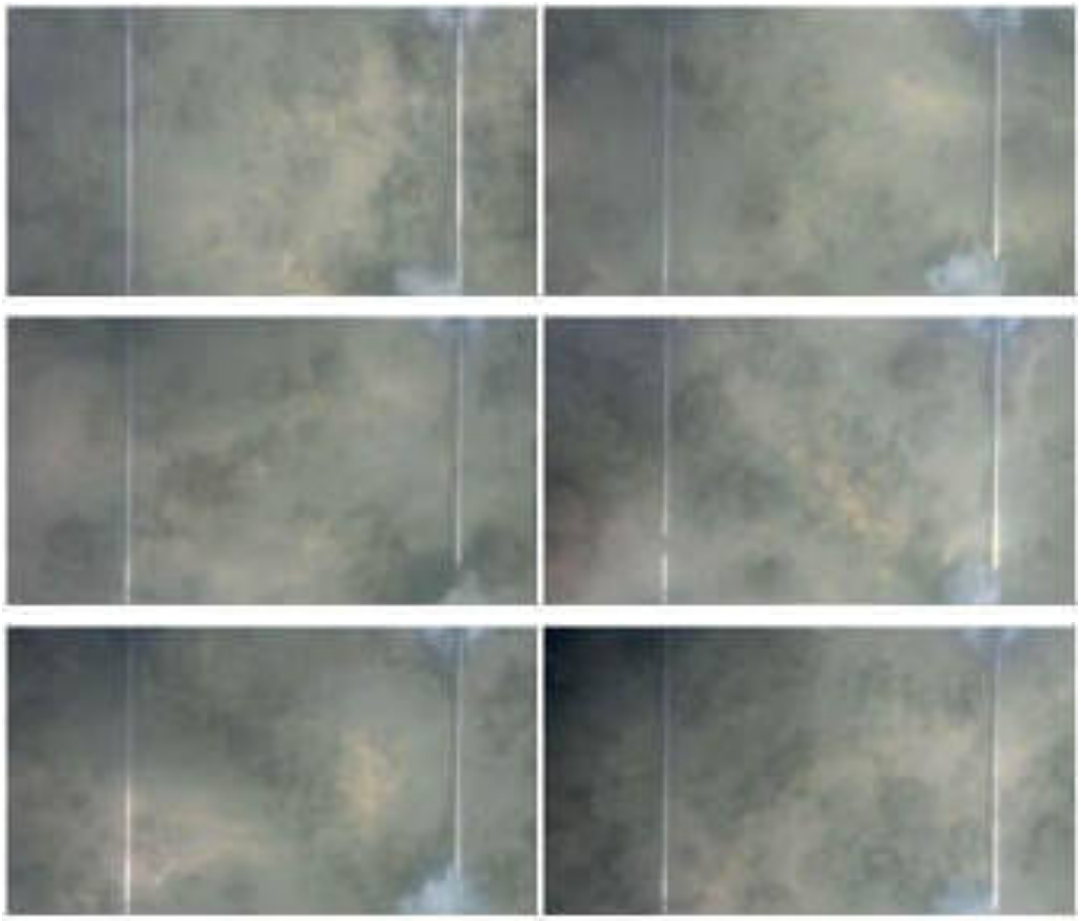


Figure P-9 Some Sample Photos of Basic Substrate at CR 04 ST 1

The observation is made at three (3) – four (4) meters depth with exposed location and the type of reefs distribution is slope. The location of observation is in the southern side of patch reefs with sand dominant substrate. The waters are clear with 70% clarity. Such basic substrate is dominated by sand and there are several rubbles.

CR 04 ST 7 (on the map is station 7)

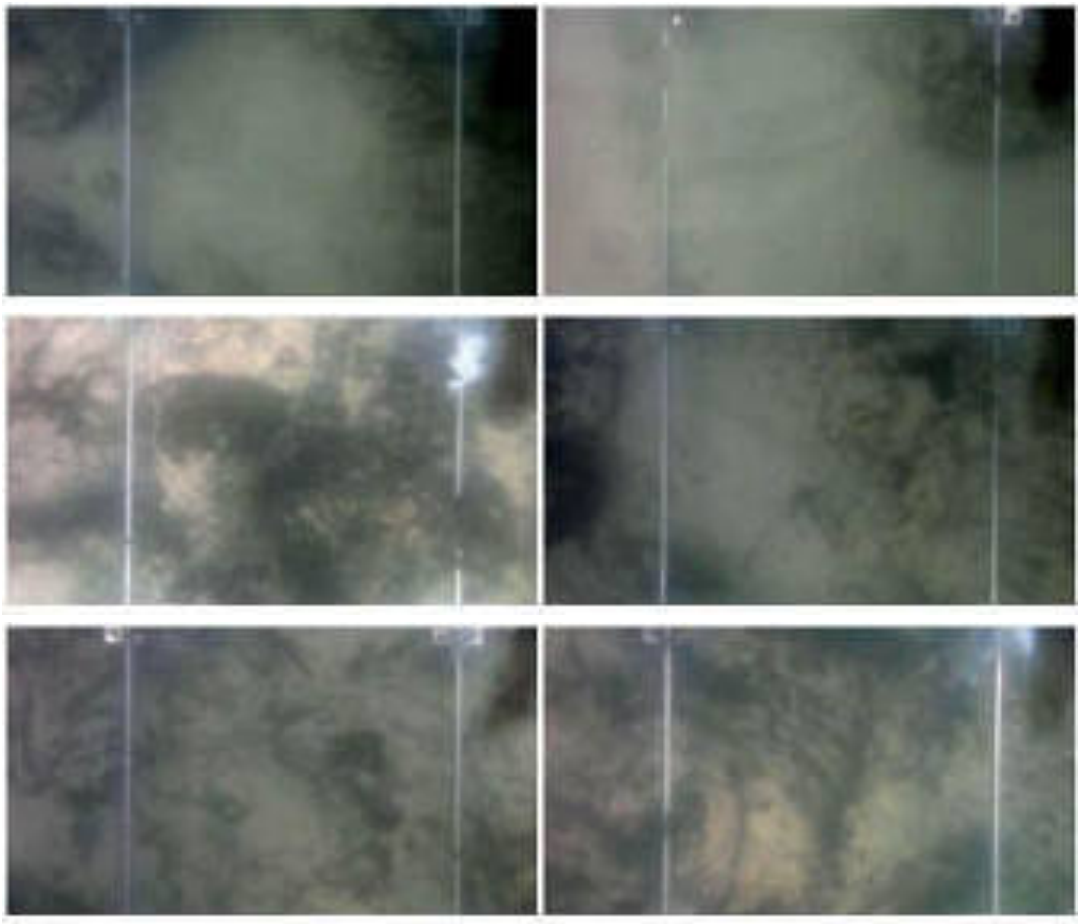


Figure P-10 Some Sample Photos of Basic Substrate at CR 04 ST 2

The observation is made at three (3) – four (4) meters depth with exposed location. The location of observation is in the northern part of patch reefs. The reefs distribution is slope with clear waters (70% clarity). At this last station, the basic substrate is dominated by sand and there are dead corals overgrown with algae.

A Coastal Survey of the Jawa Satu project Area Bekasi/Karawang/Subang and adjacent Javan Coastal Zone EBA

Report of an ornithological survey with special reference to the Javan White-eye.
12-22 May 2018
Prepared for ERM
Bas van Balen
Ikhsan Aziz
Iqrarul Fata

EXECUTIVE SUMMARY

A survey of ten days was carried out in May 2018 in the western part of the Javan Coastal Zone Endemic Bird Area (EBA) and Jawa Satu project area in the regencies of Bekasi, Karawang and Subang, West Java.

A selection was made of 13 survey localities based on the presence of habitat possibly suitable for the globally threatened Javan White-eye *Zosterops flavus*.

Three of the four species that characterise the Javan Coastal Zone EBA were found during the survey of the coastal area between Muara Gembong and Pamanukan: globally Vulnerable Javan Coucal *Centropus nigrorufus*, Near-threatened Javan Plover *Charadrius javanicus* and Vulnerable Javan White-eye *Zosterops flavus*. One Globally Endangered species: Milky Stork *Mycteria cinerea*, and one other Vulnerable species: Java Sparrow *Padda oryzivora*, respectively on CITES Appendix I and II, were found in respectively the far west and far east of our survey area. A second Near-threatened species found was the Oriental Darter *Anhinga melanogaster* with only one record.

Twelve species endemic to Indonesia, of which four exclusively endemic to Java and Bali were found in the area. Amongst the latter the White-capped Munia *Lonchura ferruginosa* in particular was abundant in the ricefields that were included in the survey area.

Seventeen species protected under Indonesian law were found during the survey, comprising only two of the above-mentioned species: Milky Stork and Oriental Darter.

The Javan White-eye was found in singletons, pairs and family groups of up to 5 birds at three main localities: (i) Muara Gembong, (ii) Tanjung Sedari, and Muara Ciasem. Its habitat appeared very specific: stands of dense Rhizophora and/or Avicennia are essential, with the potential of dispersal for feeding along corridors of mangrove bushes along pond dikes.

Javan Coucal was found only at Muara Gembong: at Pantai Bendera and south of Muara Blacan, both times single birds. Habitat of the Javan Coucal in the survey area were sedge swamps with adjacent nypah stands, and tall riverine canegrass.

Javan Plover was seen at seven localities, with up to 20 pairs or more per site, and at some high-density places ponds contained 2-3 pairs each. Typical habitat preferred by Javan Plover are dikes in fish and shrimp ponds, sand plates in low water ponds, and sand plates along the coast.

The inland transmission line area contained only urban habitat embedded in ricefields and where we sampled them no suitable habitat for any of the target species was detected. The project area north of Cilamaya, including the Pertamina built-over area and lake, was mainly grassland and ricefields of little conservation value. The project area towards the coast where the future jetty is planned, was representative of the current Javan Coastal Zone EBA with its associated fish ponds, swamps, and shrubland adjacent to inland ricefields, with only a narrow coastal fringe of 4.5m tall Avicennia.

The swampy area was moderately rich in waterbirds, Javan Plover was not uncommon (12 birds) in the pond area, but nowhere white-eyes were encountered.

Only four areas did not contain any of the EBA species: they contained either too little suitable habitat for each of the target species, or offered no good reasons could be found for the absences.

Recommendations include the restoration of natural habitat, increasing of habitat connectivity, and banning of hunting and trapping.

Background

The gas-fired power station Jawa Satu Power is planned in north western Java (regencies of Bekasi, Karawang and Subang). Its project area occurs largely within the Javan Coastal Zone Endemic Bird Area (EBA), and is adjacent to two Key Biodiversity Areas (KBA): Muara Gembong in the west and Muara Cimanuk in the east.

The International Finance Corporation (IFC) Performance Standards (PS) and specifically PS 6 outlines an assessment methodology for biodiversity. This assessment methodology has thresholds that define Critical Habitat for an area based on the presence of habitat for threatened species. The above-mentioned KBAs are within an area of assessment as required by IFC PS6 (called a "Discrete Management Unit" (DMU). The DMU is an area of contiguous habitat where biodiversity values could be considered as being of one ecological unit. The habitat surrounding the project area is highly modified shrimp ponds, coastal vegetation, rice paddies and some mangrove vegetation along the coast. The following four Globally (near-)threatened and/or so-called restricted-range bird species, with global ranges of < 50,000 km^2 (Stattersfield *et al.* 1998) are largely confined to the Javan coastal zone EBA, and all of which have been found in the DMU in historical times:

Javan Lapwing *Vanellus macropterus*
Critically Endangered (BirdLife International 2018); in the 1930s still found in the far west (Muara Gembong east to Kali Pisangan) and the far west at Muara Bobos (van Balen & Nijman 2007).

Javan Plover *Anarhynchus [Charadrius] javanicus*
Near-threatened (BirdLife International 2001, 2018); still relatively commonly distributed along the north coast of Java and now known to occur outside Java as well.

Javan Coucal *Centropus nigrorufus*
Vulnerable (BirdLife 2001, 2018); although not Restricted Range Species (Range: 146,000 km^2), habitat requirements are largely unknown, and its occurrence is extremely fragmented.

Javan White-eye *Zosterops flavus*.
The Javan White-eye *Zosterops flavus* is a coastal passerine largely restricted to the Javan coastal zone EBA which includes the coastal wetlands, grassland, mangroves, scrub, beaches and mudflats of Java and Madura, Indonesia; a population of unknown size is known from a number of coastal areas in southern Borneo. As the Javan coastal zone has been densely inhabited since centuries, little of the natural coastal wetlands and grasslands are left (Stattersfield et al. 1998). Initially the species was nominated as near-threatened, based on the paucity of records (Allport & Milton 1988, BirdLife International 2001), but in 2006 & 2009 it was found at numerous sites along the N coast of Java and Madura (van Balen et al. 2008, 2009). However, excessive bird trapping and an increased popularity of white-eyes in general amongst bird-fanciers (Eaton *et al*. 2015) urged a re-evaluation of its status, which is now Vulnerable, but surveys are badly needed to assess its present status.
A brief survey in 2016 to the Pamanukan area (where the species was still abundant in 2006) yielded not a single observation, where reportedly bird trappers had been active

in the previous years (B van Balen & S. Marsden pers. obs.). It was also not detected during a ERM survey in 2017 in the project area, but this was focussed on the immediate surroundings of five survey locations in the project area (Kurniawan 2017).

The present survey will concentrate on all habitat considered suitable for the Javan White-eye along the entire 5 km wide belt from Muara Gembong to Pamanukan.

Main aims of the survey

1. Assessment of the present status of Javan White-eye in the DMU and how this has changed over the last decade.
2. Assessment of conservation areas for Javan White-eye and associated bird assemblages, in particular Javan Plover and Javan Coucal within the DMU.

SURVEY METHODS

Target Areas
The Discrete Management Unit Area lies between the KBAs Muara Angke and Cimanuk estuary (Ujung Indramayu). Remnants of mangroves and degraded forest are scattered along the coast, adjacent to fish and shrimp ponds and sometimes to inundated rice fields. Consultation of Google Earth and maps purchased at Bakosurtanal (scale 25,000; *peta rupabumi digital Indonesia*) assisted us to retrieve areas where we expected to find suitable habitat for any of the target species, and to find access roads and trails to these places. Thirteen localities for which in particular the presence of the Vulnerable Javan White-eye was expected as they showed at least some mangrove or swamp forest on the maps were chosen for closer inspection in the field. Most estuaries and coastal forest patches were accessible by road, but some of the target locations were only accessible by boat.

Interviews
Semi-structured interviews with local villagers and bird trappers were conducted.

Bird counts
Estimates of bird numbers were made by recording encounter rates along transects. Attempts were also made to find roost sites at which more comprehensive counts could be made.

Habitat use & requirements
Numbers, plant species, behaviour, foraging height, substrate etc were recorded.

Sound Recording
Throughout the ornithological survey bird vocalisations have been made of taxa needing confirmation (e.g. unknown calls, rare and/or confusing species) and therefore useful for documentation, identification. A Marantz 660 PMD660 solid state recorder and Sennheiser MKH70 directional microphone have been used to this purpose and part of the recordings may be deposited with the xeno-canto website for bird voices

(www.xeno-canto.org/asia/). In due course, these recordings might be used for taxonomic, behavioral or other studies.

TARGET AREAS VISITED DURING 2018 SURVEY

Thirteen areas have been selected for surveys of 0,5 – 3 days in a ten-day period in May 2018 (Appendix 5). The following section gives descriptions and additional details for all 13 target areas. Photo impressions, and distribution maps for all EBA target species and globally threatened species are found in Appendix 2, to which the numbers in brackets refer.

1. Muara Gembong
Map References. – BIYONGBONG[1] lembar 1210-211 & PAKISJAYA[2] lembar 1209-533
IWA (Scott 1989), IBA (Rombang & Rudyanto 1999); 10,481 ha (undisturbed area ca 1,000 ha).
General description. – The area was diverse, open tambaks, vegetated tambaks, and waste areas, gelagah wildernesses along the rivers. In the central area the marshy lands were re-visited where Javan Lapwing was reported from a couple of years previously, and where still small amounts of presumably suitable lapwing habitat is found.
Two main localities were visited during the present survey: Muara Blacan (incl. Muara Mekar) and Muara Bendera.
Habitat. – A wide range of wetland and associated habitat has been found here, but in recent years a large part is now permanently flooded, and large parts of the wild shrubberies and swamps, as well as part of the mangroves have been cleared for road construction (Pertamina) and aquaculture.
The **Muara Blacan** protection forest [1.1.2] north of Blacan River contains nice habitat [1.1.3] but logged at east side, and intersected by a east-west road; fringing to Pertamina field [1.1.4]. Large swamps were seen south of the Blacan river [1.1.5]; further south extensive ricefields; towards the sea the Muara Mekar had some good stands of mangrove forest (1.1.1]. Two small mangrove blocks of **Muara Bendera** were found near the Citarum estuary close to the sea, one of these on the northern bank of the river was the 7 hectare Javan langur *Trachypithecus auratus* rehabilitation area ("Kawasan Satwa Endemik Lutung Jawa Muaragembong")[1.2.3, 1.2.5], the other on the south bank of the river [1.2.1, 1.2.2, 1.2.4]
Avifaunistics. – Historically a rich area with, at least historically, all four arget species have been found here. On Java it is one of the best places for Sunda Coucal, but during the survey seen here only twice. Javan White-eyes was seen very locally in small numbers in both Muara Bendera and Muara Blacan. Javan Plover was still relatively common in suitable pond areas.
Survey dates. – 12-14 May 2018.
Literature. – Bartels (1915-1931, 1938), Hadi & Djaya (1980), Bowler *et al.* (1985), Allport & Wilson (1986), Scott (1989), Sunarto & Melisch (1995), van Balen *et al.* (2006).

2. Tanjung Sedari
Map References. –CIBUAYA[3] Lembar 1209-543 & TIRTASARI lembar 1210-221.

[1] Map also known with title MEKARSARI
[2] Map also known with title MUARA GEMBONG
[3] map also known with title PEDES

Area Description. - The 8,200 ha of Tanjung Sedari is situated immediately east of Muara Gembong, and is treated separately as an IWA in Scott (1989), but as an IBA in combination with Muara Gembong in Rombang & Rudyanto (1999). A much smaller area than proposed, i.e., 57 ha, with its first stone laid by Soeharto in 1991, has been protected by Perhutani in cooperation with the local community [2.1]. Pak Wajan (mitra kehutanan) whom we met several times, was the middleman (Lembaga Masyarakat Desa Hutan). Since 2007 the area was established as recreation forest (*hutan wisata*, and since the beginning of 2018, effectively protected against hunters, who in the past used to come here in groups, bringing home up to 5 birds/hunter; it is a quite tall mangrove stand, with wooden platforms and walking boards, bordered by tambaks [2.2-2.4, 2.6]. The area outside the reserve to the north were tambaks and scattered stands of mangroves [2.5, 2.7]
Avifaunistics. - During dusk many *Nycticorax* could be seen flying east, in particular many *Ardeola speciosa* and *Egretta garzetta* as diurnal waterbirds, each with their own place in the colony, and many *Ardeola* were seen flying out in the morning. In 1984 Allport & Milton (1988) saw Javan White-eyes in the Muara Sarakan area west of Sedari, where no mangrove or coastal forest survives at present.
Survey date. – 15 May 2018.
Habitat Availability. - The forest was rather isolated from nearby mangrove stands by extensive tambak areas, where waterbirds and some waders were observed [2.4]. No white-eyes were seen in the reserve itself, but in trees along the vegetated tambaks further north [2.7].

3. Muara Bungin
Map Reference. – BIYONGBONG[4] lembar 1210-211
Area Description. - Nowhere tall mangrove was seen in the area, only low vegetation along the coast [3.1], some planted mangrove in tambaks [3.3], and trees on the quite wide tambak dikes [3.4]; at the east side of the Bungin river a Nypah stand [3.2].
Avifaunistics. – At least three pairs of Javan Plover were seen.
Survey dates. – 15 May 2018.
Target Habitat Availability. – No habitat was available for Javan White-eyes, for Plovers the tambaks offered suitable habitat

4 & 5. Tanjung Pakis & Muara Sukajaya/Sasak
Map Reference. – PAKIS lembar 1210-212
Area Description. - Tambaks were mostly without trees [4.2], but locally neglected with shrubs and grass [4.3], and some low coastal vegetation along the sea shore [4.1].
Avifaunistics. - *Charadrius javanicus* was very common, with sometimes 2-3 pairs per tambak, even two small tambaks behind the house where we parked the car had each one pair.
Survey dates. – 15 & 16 May 2018.
Target Habitat Availability. – The extensive open tambak area was densely populated with Javan Plovers, for white-eyes the narrow seaside mangrove appeared no sufficient.

[4] Map also known with title MEKARSARI

6. Kalenkalong
Map Reference. – BAROS[5] lembar 1209-542
Area Description. –The coastal area is state property (*tanah negara*) that was spontaneously regrown with Avicennia, now 4-5 m tall, and forming a front of 100+ m at the Ciderewak estuary, the bordering tambaks were small, open but also untidy; in some trunks of earlier garden trees were still seen [6.3]. We were guided by Pak Karto, one of the pond-keepers, many of which lost money when investors came with their competitive intensified shrimp ponds causing the abandoning of large pond areas [6.1, 6.2].
Avifaunistics. – Javan Plover was common.
Survey dates. – 16 May 2018.
Habitat Availability. – The mangrove stand was too small and too young for Javan White-eyes, but the open tambaks were inhabited by a fair number of Javan Plovers, represented by at least 10 pairs.

7. Parean/Tangkalok[6]
Map Reference. – CILAMAYA lembar 1209-631
Area Description. - At Parian mainly ricefields with some tambaks, with a narrow fringe of Avicennia with tambak dikes within, directly or with a narrow row of tambaks bordering the ricefields in the south; Tangkolak is situated at the other end of the mangrove fringe with narrow strip of Avicennia forest, 10-12 tall, with low dikes laid out in it [7.3, 7.6], or very low coastal vegetation [7.4]; this fringe of vegetation bordered directly to ricefields [7.5], either with a narrow belt of tambaks [7.2] or waste land [7.1] in between.
Avifaunistics. - In the ricefields White-capped Munia *Lonchura ferruginosa* was very abundant, the more than 100 birds seen were probably only a small part of what was really present; in the village a tree with *Egretta garzetta* courtshipping was evidence that local people did not disturb the birds, and we were told that in the evening many would come to the village to roost; also two swiftlet houses were built in the village.
Survey dates. – 17 May 2018.
Habitat Availability. – Both the forest and the tambaks were apparently too small to contain either Javan White-eyes or Javan Plovers.

8. Muara Ciparage
Map Reference .- BAROS LEMBAR 1209-542
Area Description. – The village of Muara (dusun Tanjungjaya) on the banks of the Cibulanbulan river was surrounded by rice fields, at the end of the track to the coast three hectares of Avicennia (local info) at Muara Ciparage; we could only walk a tambak area of about several hectares [8.1 – 8.3], as the rain had made the area inaccessible.
Avifaunistics. – None of the target species seen.
Survey dates. – 18 May 2018.
Target Habitat Availability. – The very disturbed coastal area offered little hope for any of the target species.

[5] map also known with title PURWAJAYA
[6] on the map spelled as Parian and Tengkalok

9a. Project area track (SW to NE)
Map Reference. – TANAHTIMBUL[7] lembar 1209-632 & CILAMAYA lembar 1209-631
Area Description. – South-western part (track 1) consisted of sawahs and grassfields, with taller vegetation at the edges along the sawahs in the north, a reedy swamp in the northwest. Middle part {track 2) was more or less intermediate. The north-eastern part (track 3) started in its south part with a broad track of ricefields west, grass fields east, with on the far west a fringe of banana trees [9.1]. Near the planned jetty area there was some low Avicennia vegetation of 4-5m tall at the end of the track with a more extensive tambaks [9.3 – 9.6] and associated swamp area [9.2] between this and the ricefields in the south.
Avifaunistics. – The tambaks offered habitat for at least six pairs of Javan Plover, the swamps were inhabited by a variety of the resident rail species: six species, which indicates a good quality of the habitat and apparently low hunting pressure. The ricefields in the south were visited by an abundance of White-capped Munias.
Survey dates. – 17 & 19 May 2018.
Habitat Availability. – Habitat in the jetty area for Javan Plover was sufficiently suitable, mangroves were too scattered for white-eyes.

9b. Power transmission line plots
Map Reference. – CILAMAYA lembar 1209-631
Survey dates. – 18 May 2018.
1. Sidamukti / ds Cilamaya
in Cilamaya village, road intersecting extensive ricefields with some small village areas, shade trees along the (busy) road, neglected home gardens.
2. Gebangmalang /ds Sukatani
in Sukatani village, road through ricefields at the edge of built-over area, much green in orchards with bananas, kapuk, coconut trees etc) and wide canals, Royal palms Roystonea along the road, row of bananas in the rice field.
3. Kosambilempeng / ds Sukatani
along a dirt road, ca 1 km from the main road, along two channels, with fringes of various vegetation.
Target Habitat Availability. – None of the three target species was found on or near the plots, and their presence is not expected here.

10. Muara Cilamaya
Map Reference. - TANAHTIMBUL[8] lembar 1209-632
General Area Description. - Close to the Cilamaya river bushy vegetation was found with Calliandra etc and extensive blocks of sedge swamps [10.3] with remains of brick walls of old shrimp ponds, now overgrown with Avicennia and sedge, sometimes tambaks with trunks; closer to the coast more or less active tambaks, tall, wide dikes (10.1, 10.2, 10.4], and still loser to the sea a narrow fringe of Avicennia along the tambaks; near the village of Tanahtimbul some sparse Rhizophores in tambaks and their banks.
Avifaunistics. – Fourteen Javan Plovers, representing at least seven pairs were seen.
Survey dates. – 19 May 2018.
Target Habitat Availability. – The very thin fringe of mangrove offered little habitat for white-eyes, but good habitat was available for the Javan Plovers.

[7] map also known with title SINDANGLAUT
[8] map also known with title SINDANGLAUT

11. Blanakan
Map Reference. - TANAHTIMBUL[9] lembar 1209-632 & CIASEM 1209-614
General Area Description. – The only major mangrove stand has become a tourist attraction in recent years: Pantai Wana Wisata Blanakan, a Sonneratia forest [11.1, 11.3], where *Egretta garzetta* and other herons nest and roost above enclosures with crocodiles. The tambaks adjacent to the forest [11.2] were often entirely filled with carex (used for local home industry) [11.4], shrubbery or api2 trees. The area between the Blanakan forest and coast was typically more or less neglected tambak habitat with a narrow coastal fringe of Avicennia.
Avifaunistics. - Hundreds of *Ardeola speciosa* and egrets were seen approaching the area towards dusk to roost.
Survey dates. – 19 May 2018.
Target Habitat Availability. – The thin belt of mangrove and associated tambak area were apparently not sufficient to support any of the three target species.

12. Muara Ciasem
Map Reference. - TANAHTIMBUL[10] lembar 1209-632
General Area Description. – On the map the general area is referred to as Tanjung Legokbagong. High-walled tambaks have been laid out here [12.1, 12.2, 12.4], grown over by trees, or sedges [12.5] according to local villagers no rhizophora was found here (which were found in the west), only Avicennia here [12.3].
Avifaunistics. - Javan White-eyes were observed at the tambaks with Avicennia trees; only a single Javan Plover was seen. Spenneman (1924) reports the occurrence of Javan White-eyes in the area in 1916.
References. – Spennemann (1924).
Survey dates. – 20 May 2018.
Target Habitat Availability. – Although not very extensive, the remnant mangrove and associated tree lines in the adjacent tambak area offered habitat for most likely a small population of Javan White-eyes. The tambaks appeared to be less suitable for a dense plover population (steep, overgrown tambak walls).

13. Anggasari (Pamanukan)
Map Reference.- TANAHTIMBUL[11] lembar 1209-632; IWA (Scott 1989); 1000 ha.
General Area description. – The survey area comprised the estuary of the Anggasari river in the western-most part of the Pamanukan river delta. The western as well as the eastern banks of the Anggasari were converted into large tambaks.
Avifaunistics. – In the past Javan Lapwing was reported from Poponcol in the central Pamanukan area in the 1930s (Spennemann 1915-1940; van Balen & Nijman 2007); large numbers of Javan White-eye were seen throughout the Pamanukan area during a coastal survey in 2006 (van Balen et al. 2008); Javan Coucals Coucals have not been seen here recently, but could be expected (as reported by Spenneman (1924); fewer Javan Plovers but the coastal area has not been surveyed intensively.
None of the target species was observed during the present survey, but instead several observations of the Java Sparrows were made
Survey dates. – 20 & 21 May 2018.

[9] map also known with title SINDANGLAUT
[10] map also known with title SINDANGLAUT
[11] map also known with title SINDANGLAUT

References. – Spennemann (1915-1941; 1924, 1930); van Balen et al. (2008).
Habitat Availability. - Many Rhizophore stands, also tall Avicennias (7-8+m). The east bank of the Anggasari river had taller forest, up to 15 m, but was also heavily affected, with many tambaks that were not visible on the Bakosurtanal maps, although of some of them had young trees. A large part of the eastern part of the Pamanukan area is now permanently flooded, and new tambaks have been opened in what used to be extensive mangrove and swamp forest in the past.

SELECTION OF EBA TARGET SPECIES AND OTHER NOTEWORTHY BIRD SPECIES

A total of 82 bird species have been observed during the survey (Appendix 1), amongst these 32 species warrant special mentioning because of their global conservation status, protected status under Indonesian law, migratory status, endemic status or general rareness on the island of Java. A selection of photographs made during the survey is found in Appendix 3.

EBA TARGET SPECIES

JAVAN WHITE-EYE *Zosterops flavus*

Identification. – Easily confused with either Lemon-bellied White-eye *Zosterops chloris* or Sunda White-eye *Zosterops [palpebrosus] melanurus*, but both these species are separated by their dark lores, larger size and proportionally longer tails but also by their range and by a different vocalisation, such as missing the tremolo in its contact call. In the range of the three species, and in particular our survey area, overlap is marginal, or nihil.
Distribution. Coastal N Java, Madura I, W, C and S Kalimantan, Laut I off S Kalimantan, doubtfully Sarawak (van Balen & Sharpe 2018).
VOICE. Hurried series of 6-12 call notes at different frquencies. Call notes “trrieew” and short, soft “trrip”; alarm call “wiwiwiwi” (Eaton et al. 2015; van Balen & Sharpe 2018).
Javan White-eye may stay undetected if its contact calls are missed in the field, especially when flying over at some height. Moreover, call notes of Javan Munia and even parts of the song of Horsfield’s Bronze Cuckoo, if heard from a long distance can sound misleadingly much like the contact call of the white-eye, and recording for analysis is essential.
Habitat. In Java mangrove forest and dryland forest edge along the coast, herb and shrub areas, but may be more closely associated with the remaining pieces of coastal forest than with mangrove (Java) (van Balen & Sharpe 2018).
Movements. Little known, but birds have moderate to large night roosts from which they disperse during the day (van Balen & Sharpe 2018).
Status and Conservation. Vulnerable Restricted range species: present in Javan Coastal Zone EBA and in Bornean Coastal Zone Secondary Area. Highly restricted and fragmented range along the N coast of Java and S coast of Borneo. Locally common, but rapidly declining over large parts of range. Moderate to large numbers recorded at night-time roosts, from which they disperse during day. Little known on Kalimantan. In Java and on Madura I, this species’ favoured habitat of mangroves is now much reduced and remains under continuous threat; widespread in 2006–2009, but scarcer and found in smaller flocks since. Very large numbers of white-eyes are sold in markets throughout

Indonesia, chiefly Oriental White-eye *Zosterops palpebrosus*. Formerly considered Near Threatened, it was uplisted to Vulnerable in 2016 (van Balen & Sharpe 2018)
Local Occurrence. – They were found in singletons, pairs and family groups of up to 5 birds at three main localities: (i) Muara Gembong (8 records at 3 sub-localities: Muara Bendera, Pantai Bahagia, Muara Blacan), (ii) Tanjung Sedari (two records at two sub-localities), and Muara Ciasem (3 records at two sub-localities).

JAVAN COUCAL *Centropus nigrorufus*
Status & Range. – Endemic to Java
Habitat. - Mangrove and other swamps, especially in estuaries, thickets and elephant (Imperata) grass in coastal lowlands, Nypa palm vegetation behind mangroves; possibly also inland grass swamps, at least formerly. Appears to be excluded from mature stands of Rhizophora and Bruguiera by *Centropus sinensis*, occupying fringing habitat instead. In wet season is also found in grassy fields, flooded forest edges and even sugarcane plantations, while in dry season prefers tall-grass meadows and dry marshland (Payne & Kirwan 2018).
Identification. – It could be easily confused with Greater and Lesser Coucals, with which it overlaps marginally in range.
Global Status. – Vulnerable. Population recently estimated at 2500–9999 mature individuals within overall range of 28,200 km^2 and is considered to be declining. Confined to Java, where it occurs in fragmented small local populations, and remains locally common in remnant coastal wetlands, especially on NW coast, and still occurs in suitable habitat throughout N coast, but only three records from S coast. It is possibly threatened as its habitat is being converted to fish and shrimp ponds and agricultural land, as a result of which present species is replaced by *C. bengalensis*. (Payne & Kirwan 2018).
Local Occurrence. – The only coucals that most likely referred to this species were seen in the Muaragembong area, at two occasions, during which brief glimpses were obtained of single birds, tentatively identified as this species. Habitat where it was found by us was carex swamp with adjacent nypah stands, and tall riverine canegrass, but a wider habitat choice is expected.

JAVAN PLOVER *Charadrius javanicus*
Status & Range. – From S Sumatra to Timor.
Habitat. - Coastal lowlands, on sandy and pebbly beaches and at inland fishponds and on rice fields. Recorded up to 30 km inland on Java, although this is presumably atypical.
Movements Sedentary, as far as is known, but there are records, all recent, from Sumatra, Flores and Lombok, on none of which islands has the species been yet confirmed to breed.
Status and conservation Not globally threatened. Currently considered Near Threatened, but may warrant listing as Vulnerable based on recently gathered data, despite recent expansion in range, reported increases in numbers at some sites and evidence that species is holding its own in parts of Java subject to habitat loss. Considerable scope for research into biology and ecology; extensive surveys required in order to establish conservation status and potential threats; taxonomic reappraisal highly desirable, but much more field information required (Wiersma & Kirwan 2018).
Local Occurrence. – Widespread, and readily seen mostly in pairs in most tambak areas. Often territorial calls were heard, birds chasing each other and calling; also the

typical “pwiI” call was often heard, which is described as an alarm call meant for their chicks (see Wiersma & Kirwan 2018), and thus indicate breeding.
NB The dots on the maps in Appendix 2 are clustered observations, the birds were actually observed in pairs distributed over a larger area.

OTHER GLOBALLY THREATENED SPECIES FOUND IN THE MBU

MILKY STORK *Mycteria cinerea*.
Global Range. – SE Asia.
Habitat Predominantly a coastal species, foraging on tidal mudflats, in saline pools, freshwater marshes, fishponds and rice paddies, and nesting in bordering mangroves or swamp forest.
Movements Very little known. Some seasonal movements are probable outside the breeding season. The Javan colony of Pulau Rambut (only 35 km from Muara Bendera) is probably visited irregularly by varying numbers throughout year. If necessary, breeders may commute large distances.
Status. - Endangered. CITES I. Formerly classed as Vulnerable but ongoing and severe population decline has led to its reclassification. Global population in c. 2008 numbered no more than 2200 individuals. Core populations are in Indonesia, where there were perhaps 1,600 birds on Sumatra in 2008–2009 and < 500 in W Java. Indonesian populations have suffered marked recent decline, an estimated 70% during 1986–2008 in S Sumatra, for example. Habitat loss due to conversion of tidal forests, including mangroves, for fish farming and rice cultivation is a major threat, but hunting of adults and the taking of eggs and chicks for food are also severe problems, in Indonesia and elsewhere.
Local Occurrence. – About ten birds were seen foraging along the coast and soaring above the forest at Muara Bendera.

JAVA SPARROW *Padda oryzivora*
Status & Range. – Endemic to Java and Bali, now rare and locally extinct; introduced elsewhere.
Ecology. - Open grassland and wilderness ground, cultivations (especially rice fields), open woodland; also residential areas. Mainly in lowlands.
Movements. - Resident or nomadic. Post-breeding flocks often make substantial short-distance movements in response to local food supplies and water availability.
Status and conservation Vulnerable. CITES II. Uncommon and local. Population in native range fewer than 10,000 individuals; decreasing. Has declined greatly in its original range as a result of intense trapping activity for cagebird trade and habitat changes (Payne & Sharpe 2018).
Local Occurrence. – A small flock was seen flying to its apparent roost site in the mangroves of Anggasari, 20 May; several birds were seen again in the mangroves near Anggasari village on 21 May.

SPECIES RARE ON JAVA, but not of global conservation concern

RED-BREASTED PARAKEET *Psittacula alexandri*
Status & Range. – Near-threatened; formerly locally common, but now very local and rare on Java.

Habitat. – Lightly forested lowlands.
Local Occurrence. – Recorded in the Muara Bendera mangroves, where apparently a breeding pair was present.

WHITE-CAPPED MUNIA *Lonchura ferruginosa*
Status & Range. – Endemic to Java and Bali, introduced in a few other places.
Habitat. – Ricefields during harvesting time, but seems to withdraw in more natural grass and sedge swamps for breeding and other parts of the year.
Local Occurrence. – Abundant in ricefields at different phases of ripeness.

RACKET-TAILED TREEPIE *Crypsirina temia*
Status & Range. – Scarce, but widespread in SE Asia; rather rare on Java.
Habitat. – Open, arid habitat, scrub, edge, plantation (Eaton et al. 2015); on Java and Bali also in mangroves (pers. obs.).
Local Occurrence. – A group of four was seen in the eastern, more dense mangrove and tambak area of Anggasari; a single bird at Muara Bendera.

SPECIES PROTECTED BY INDONESIAN LAW

Seventeen bird species protected by Indonesian law (Noerdjito & Maryanto 2001) have been observed in the area:

Pied Stilt *Himantopus leucocephalus*
Eurasian Whimbrel *Numenius phaeopus*
White-winged Tern *Chlidonias leucopterus*
Whiskered Tern *Chlidonias hybrida*
Oriental Darter *Anhinga melanogaster*
Milky Stork *Mycteria cinerea*
Cattle Egret *Ardea ibis*
Eastern Great Egret *Ardea modesta*
Intermediate Egret *Ardea intermedia*
Little Egret *Egretta garzetta*
Collared Kingfisher *Todiramphus chloris*
Sacred Kingfisher *Todiramphus sanctus*
Cerulean Kingfisher *Alcedo coerulescens*
Sunda Pied Fantail *Rhipidura javanica*
Brown-throated Sunbird *Anthreptes malacensis*
Copper-throated Sunbird *Leptocoma calcostetha*
Ornate Sunbird *Cinnyris ornatus*

All but two (Oriental Darter and Milky Stork) of the above-mentioned species are generally widespread and not uncommon on Java

MIGRATORY SPECIES

The coastal area between Muaragembong and Indramayu/Cirebon is well known for its large numbers of wintering shorebirds (e.g., Bowler et al. 1984, Alikodra et al. 1989, Alikodra 1999). Our survey took place in the northern spring, when most northern migratory species had left their wintering quarters for breeding in the northern

hemisphere. Nevertheless, four species of migratory shorebirds were observed: a flock of 30 Common Redshank *Tringa totanus*, several individuals of Whimbrel *Numenius phaeopus*, a single White-winged Tern *Chlidonias leucopterus*, moderate large numbers of Whiskered Tern *C. hybrida*. The latter may have belonged to the northern nominate race about to leave their wintering quarters in May, or southern race *javanicus*, which are about to arrive in May from their breeding ground in Australia. The variety of plumage coloration, from full breeding to non-breeding plumage of the birds seen suggest a mix of the two races.
Other southern migrants that were also in the area in good numbers were Horsfield's Bronze Cuckoo *Chrysococcyx basalis*, seen and/or heard in seven of the survey sites and exceptionally vocal, suggesting a recent mass arrival. Also Sacred Kingfisher *Todiramphus sanctus* was seen at seven survey sites, and their timing coincides with a mass arrival of Sacred Kingfishers in western Bali in the third week of May (van Balen & Johnstone 1997).
A fifth northern migrant was the Pallas's Grasshopper Warbler *Locustella certhiola* Scarce on Java (Eaton et al. 2015) of which its territorial song was heard and audio-recorded at four survey sites, which is rather surprising for this time of the year, when northern migrants should be on their way to their breeding grounds.

BREEDING

The breeding of a number of bird species was established, amongst most notably of the Javan White-eye with a family group with fledglings at Muara Ciasem, on 20 May, and the presence of Javan Plovers producing alarm calls aimed at alerting dependent chicks throughout the tambak areas.

POSSIBLY OVERLOOKED SPECIES

The following seven bird species were not seen by us, but were reported by Kurniawan et al. (2017), and all, with the exception of Common Kingfisher, refer to only one or two records per species.

Glossy Ibis *Plegadis falcinellus*
Pacific Reef Egret *Egretta sacra*
Rufous Night Heron *Nycticorax caledonicus*
Barred Buttonquail *Turnix suscitator*
Common Kingfisher *Alcedo atthis*
Long-tailed Shrike *Lanius schach*
Paddyfield Pipit *Anthus [novaeseelandiae] rufulus*

HUMAN IMPACTS

Habitat conversion The swampy bush areas, mangroves stand and coastal forest appeared to have disappeared from most of the area visited, and these were replaced in most cases by shrimp, fish or seaweed ponds, with or without the preservation or replanting of fringes and stands of Avicennia and Rhizophora.

Bird trapping Owners of food stalls at the peripheries of the survey areas appeared to be important sources of information. According to one at the Muara Blacan bridge no

bird trappers were active in the area; the owner of the warung at Anggasari reported there were no active bird trappers in the area, at least not by local people, who were only interested in the catching of fish. Indeed, in Tengkolak village a nest with Little Egret was left undisturbed, and hundreds of egrets and pond-herons birds had their roost in the village area.
If there were people trapping or shooting birds they come from elsewhere. Mynas were captured by trap cages, white-eyes with lime sticks (Zainudin pers.comm.), and we met three guys with guns who were clearly interested in shooting egrets (Figure 16). In Poncol (Muara Blacan) a number of people kept Javan Myna, which were captured by cage traps using decoy birds (Figure 17). However, several months ago we were told that many young egrets reportedly from M Gembong were traded. In the village of Bungin a cage with 9 *Egretta garzetta* (Figure 3) and, walking around there, a juvenile Purple Heron *Ardea purpurea* and juvenile Black-crowned Night Heron *Nycticorax nycticorax* were kept, which were said to have been found after the had been fallen from their nests and rescued from a colony at M Beting, as reported by the local RT, who was advocating the protection of herons and egrets. The captive egrets were to be released in due time, and we were told that the keepers had been upset when they knew hunters had been shooting at their birds in previous years.

Pesticides At Muara Sukajaya several men were throwing a poison against *rebon* (small shrimps) into the tambaks. In other places an herbivorous snail was killed off with pesticides in tambaks in which sea weed was grown.

Intensification of shrimp ponds The sterile environment of the intensified shrimp ponds (Figure 18), financed by wealthy people from elsewhere seemed not to support much birdlfe, but in our survey these ponds were scarce. In some cases however they had out-competed local enterprises (Pak Karto at Kalenkalong, pers. comm.). More traditional ponds seemed to sustain good numbers of Javan Plovers, which thrived in these extensively exploited environments.

Swiftlet houses. In the peripheries of most villages so-called swiftlet houses were seen (Figure 19), a booming business, where the producer of the valued white bird-nests, the Edible-nest Swiftlet *Aerodramus fuciphagus* is provided with nest facilities in often fortress-like exclusively constructed houses.

CONSERVATION AREAS and their relevance to the three target species

Four major wetland areas that lie within the DMU area and that support, or are known to have supported all three target species and that have been proposed or recommended as conservation areas (FAO 1982) are: Muara Gembong, Tanjung Sedari, Muara Bobos and Muara Cimanuk in the Indramayu area.

Muara Gembong: at Muara Bendera the 7 ha Kawasan Satwa Endemik Lutung Jawa is largely run by local volunteers, and aimed at the conservation of a surviving population of Javan langurs. We found white-eyes in this and the nearby patch of mangrove forest on the south bank of the Citarum.

Tanjung Sedari: a 57 ha patch of mangroves in the southern part of the area is home to a growing colony of egrets and herons; its role for the survival of white-eyes is unknown, but white-eyes have been found in nearby mangrove bushes.

Muara Bobos: this is situated in the general Pamanukan mangrove area, which is managed by Perhutani; recent surveys to this area failed to find white-eyes, and also our attempt to find the white-eyes in the undersurveyed western part of the area at Anggasari, with apparently sufficient suitable white-eye habitat failed to find any of the target species.

Muara Cimanuk: this area was not visited by us.

A fifth area lies in the Blanakan estuary:
Muara Blanakan: a tourist forest that supports a roost of yet unknown size, but which must be quite large, as judged from the numbers of egrets and herons flying in to roost at dusk. None of the EBA target species have been observed in this area.

DISCUSSION & CONCLUSIONS

Three of the four Restricted Range Species that characterise the Javan Coastal Zone EBA were found during the survey of the coastal area between Muara Gembong and Pamanukan: Javan Coucal *Centropus nigrorufus*, Javan Plover *Charadrius javanicus* and Javan White-eye *Zosterops flavus*. (Table 1; Appendix 1 & 3). Moderately brief (3 days) to brief (half day) surveys were paid to thirteen sample areas. The three days in Muaragembong were spent across a wide variety of habitats resulted in a substantive number of 70 species, including all target species.

	N spp	N ind	N EBA Trigger spp	Days Spent
1. Muara Gembong	70	1220	1, 2, 3	3
2. Tanjung Sedari	40	340	2, 3	0.5
3. Muara Bungin	19	157	2	0.5
4. Tanjung Pakis	13	138	-	0.5
5. Muara Sukajaya	28	258	2	0.5
6. Kalenkalong	16	1061	2	0.5
7. Parian/Tengkolak	28	378	-	0.5
8. Muara Ciparage	24	55	-	0.5
9. Planned jetty area	29	291	2	0.5
10. Muara Cilamaya	37	280	2	0.5
11. Blanakan	28	149	-	0.5
12. Muara Ciasem	39	184	2, 3	0.5
13. Muara Anggasari	41	403	-	1.0

Table 1. Bird species numbers, sample sizes, sample effort, and distribution of the three EBA target species across the survey areas: 1: Javan Coucal, 2: Javan Plover, 3: Javan White-eye.

The Vulnerable **Javan White-eye** has been found in singletons, pairs and family groups of up to 5 birds at three main localities: (i) Muara Gembong (8 records at 3 sub-localities: Muara Bendera, Pantai Bahagia, Muara Blacan), (ii) Tanjung Sedari (two records at two sub-localities), and Muara Ciasem (3 records at two sub-localities). The habitat where Javan White-eyes seem to survive appears very specific: stands of dense Rhizophora and/or Avicennia are essential, with the potential of dispersal for feeding along corridors of mangrove bushes along pond dikes, although the birds have been regularly seen flying high over the canopies of trees. It is not known how far these birds venture out as nowhere the white-eyes have been seen far away from coastal vegetation, but the local populations are likely separated from each other by large areas of unsuitable tambak areas, and clearly the existing conservation areas (Muaragembong, Tanjung Sedari, Blanakan) are far from sufficiently large and good quality to sustain viable populations. Especially habitat restoration and the creation of corridors of suitable habitat in the huge gaps between the population in the west (Muaragembong and Tanjung Sedari) and the more eastern ones (Muara Ciasem and Cimanuk) are badly needed.

Javan Coucal was found only at Muara Gembong: at Pantai Bendera and south of Muara Blacan, both times single birds. Habitat of the Javan Coucal in the survey area was carex swamp with adjacent nypah stands, and tall riverine canegrass. Data from elsewhere show a variety of habitats inhabited by the coucal and surveys comprising more habitats than the present, which was mainly targeted at the Javan White-eye, may yield observations of more birds.

Javan Plover was seen at the following localities: Muara Gembong (3 sites with 17 birds), Tanjung Sedari (1 site with 6 birds), Muara Bungin (7 birds), Muara Sukajaya (40 birds), Kalenkalong (19 birds), Muara Cilamaya (14 birds), and Muara Ciasem (1 bird). The birds were seen pair-wise in most cases, and at some high-density places ponds contained 2-3 pairs each. Typical habitat preferred by Javan Plover are the dikes in fish and shrimp ponds, sand plates in low water ponds, and sand plates along the coast. Dikes that were tall and steep, and too densely grown over with trees and shrubs (e.g., Anggasari) seemed to be avoided. Also pond areas of too small extent (Parean/Tangkolak), or too much overgrown (Blanakan) did contain no or very few plovers. We never saw them far inland, or in the ricefields (contra Wiersma & Kirwan 2018) that bordered most of our pond and swampy areas.

The inland transmission line area contained only urban habitat embedded in ricefields and where we sampled them no suitable habitat for any of the target species was detected. The project area north of Cilamaya, including the Pertamina built-over area and lake, was mainly grassland and ricefields of little conservation value. The project area towards the coast where the future jetty is planned, was representative of the current Javan Coastal Zone EBA with its associated fish ponds, swamps, and shrubland adjacent to inland ricefields, with only a narrow coastal fringe of 4.5m tall Avicennia. The swampy area was moderately rich in waterbirds, Javan Plover was not uncommon (12 birds) in the pond area, but nowhere white-eyes were encountered.

Only four areas did not contain any of the EBA species: they contained either too little suitable habitat for each of the target species (Tanjung Pakis, Parean/Tangkolak and Muara, or no good reasons could be found for the absences: Anggasari offers good

habitat for the Javan White-eye and Javan Coucal, but may be too densely vegetated with too steep tambak banks for Javan Plover.

Overlooked species The seven species seen during earlier surveys of the area but not recorded during the present survey may have been overlooked, given the smaller number of observations of the majority of these species. However, the Common Kingfisher reported as common has more likely been confused with the far morecommon and widespread Cerulean Kingfisher *Alcedo caerulescens*, which has not been reported for the survey in 2017.

Seasonal Aspects The **breeding activity** for two of the target species correspond well with breeding seasons for W Java given for Javan white-eyes: May (Hellebrekers & Hoogerwerf 1967, van Balen & Sharpe 2018) and Javan Plovers: May-August (Hellebrekers & Hoogerwerf 1967, Wiersma & Kirwan 2018). These data suggest good productivity of these species in the area, where breeding conditions are still favourable. The present survey was carried out in the **migration season** of some Australian migrants, notably Horsfield's Bronze Cuckoo and Sacred Kingfisher which were relatively common in the area. A visit between September and April would have resulted in a large number of northern migrants, mainly shorebirds, terns, bitterns and rails, according to local villages commonly found throughout the area during the northern winter.

Human Impacts Little (semi)natural habitat is left in the general area, and it was hard to find any extensive woodland and mangroves on the local maps and satellite images. The complete destruction of coastal mangroves in both Muaragembong and Pamanukan caused that large areas are now inland seas permanently inundated and rendered useless for aquaculture. The high-tech shrimp ponds left little for local wildlife, but the bankruptcy of a large number of traditionally exploited shrimp ponds caused their neglect, and rendered them in swampy areas with some interesting birdlife, or where they fell dry offered good habitat for Javan Plovers. The intensity of **bird trapping and hunting** appeared to be fluctuating much and varying locally. Where for instance in the Tanjung Sedari recreation forest hunters would come to shoot herons, nowadays the breeding and roosting colony is protected. In some places breeding colonies are robbed, at other places chicks fallen from their nest are secured and raised to be released. A visit in northern winter may have met with an increased activity amongst hunters using nets and guns, as these tambak areas are well-known for their myriads of shorebirds that winter or stopover during that period (Bowler et al. 1984). Evidence of the use of **pesticides** in local aquaculture was found at a number of occasions. The impact on the local avifauna is unclear and less severe than expected given the widespread occurrence of Javan Plovers, egrets, herons and kingfishers in and around the pond areas may suggest. The impact of the booming business of **swiftlet houses** is not known, but the exploitation of the birds is apparently done sustainably, as the swiftlets were common throughout, sometimes seen in large numbers moving towards their roosts.

RECOMMENDATIONS

Connectivity between mangrove and coastal forest areas should be improved by the local restoration of its original coastal forest and mangroves. Especially the huge gap in distribution between the western scattered populations of Muaragembong and Tanjung

Sedari, and the closest populations in the east in Muara Bobos (Pamanukan) and Indramayu (Muara Cimanuk), should initially be closed by habitat restoration by means of tree lines along tambak dikes.

Existing marshlands should be preserved as much a possible: wastelands, abandoned non-productive fish and shrimp ponds should be restored into its original swamp and mangrove forest.

Local initiatives of conservation (protection of breeding colonies and roosting sites of waterbirds) should be encouraged and assisted with for instance the provision of bill boards marking protected areas and banning all sorts of disturbances (wood cutting, shooting birds, capturing birds, disturbing birds).

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APPENDIX 1. Species found in the Jawa Satu survey areas, May 2018.

		protected status	threatened status	endemic status	migratory status	Muara Gembong	Tanjung Sedari	Muara Bungin	Tanjung Pakis	Muara Sukajaya	Kalenkalong	Parean/Tangkolak	project track 1	project area 2	project track3	CLM - Muara	project area3 swamp	Muara	Muara Cilamaya	transmission plot1	transmission plot2	transmission plot3	Blanakan	Muara Ciasem	Anggasari	
		P	**T**	**E**	**M**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	
Sunda Teal	*Anas gibberifrons*			e		6																		2	7	8
Sunda Collared Dove	*Streptopelia bitorquata*			e		62	10			2		4					1		5				5	10	44	99
Spotted Dove	*Spilopelia chinensis*					10	13	6	1	2		4	5	4	3			5	4		1	1	6	3	7	68
Pink-necked Green Pigeon	*Treron vernans*					13																		7		20
Plaintive Cuckoo	*Cacomantis merulinus*					7	1					3	2	1	1				3					2	1	20
Sunda Brush Cuckoo	*Cacomantis sepulcralis*					2												1					2	1	2	6
Horsfield's Bronze Cuckoo	***Chrysococcyx basalis***				S	4	2			1							2		1					2	3	12
Javan Coucal	***Centropus nigrorufus***		Vu	E		2																				2
Lesser Coucal	*Centropus bengalensis*					6																				6
House Swift	*Apus nipalensis*					50																				50
Linchi Swiftlet	*Collocalia linchi*			e		26	10	25	66	10	3	10	19	22	9		12	1	20	1	1	1	15	7	8	258
Edible-nest Swiftlet	*Aerodramus fuciphagus*					48	21			30	1000	2	50	18		10		1	3				3	50+	40	1186
Large-tailed Nightjar	*Caprimulgus macrurus*																								3	0
Savanna Nightjar	*Caprimulgus affinis*					20			1			1					2		1				1			26
Slaty-breasted Rail	*Lewinia striata*										?1						1		?1							1
Ruddy-breasted Crake	*Zapornia fusca*					1	2						?1				4		10				4	1	3	22
White-browed Crake	*Poliolimnas cinerea*					2											1									3
White-breasted Waterhen	*Amaurornis phoenicurus*					11	2										2	3	1				3		1	22
Purple Swamphen	*Porphyrio porphyrio*																3									3
Common Moorhen	*Gallinula chloropus*					9	1										16	1	6				10	2		45
Pied Stilt	***Himantopus leucocephal***	P					7										1		10					4		22

		P	T	E	M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Javan Plover	***Charadrius javanicus***		NT	e		17	6	6	2	40	19						12		14					1		117
Common Redshank	*Tringa totanus*				N	30																				30
Eurasian Whimbrel	*Numenius phaeopus*	P			N	4		1		1																6
White-winged Tern	*Chlidonias leucopterus*	P			N					1																1
Whiskered Tern	*Chlidonias hybrida*	P			N/S	29		8										1								38
Little Black Cormorant	*Phalacocorax sulcirostris*					10				61																71
Oriental Darter	*Anhinga melanogaster*	P	NT			1																				1
Milky Stork	*Mycteria cinerea*	P	En			10																				10
Yellow Bittern	*Ixobrychus sinensis*					4	2	1									6	2	3					2	1	20
Cinnamon Bittern	*Ixobrychus cinnamomeus*					1													1					1		3
Black Bittern	*Ixobrychus flavicollis*					2				?1							?1							?1		2
Cattle Egret	*Ardea ibis*	P				1																	1			2
Grey Heron	*Ardea cinerea*					16											1							1	1	18
Eastern Great Egret	*Ardea modesta*	P				27		1		1		2					4						30		1	65
Purple Heron	*Ardea purpurea*					3											1									4
Intermediate Egret	*Ardea intermedia*	P																					1			1
Little Egret	*Egretta garzetta*	P				159	40	50	1	3		55					23		3				200+	2	85	336
Javan Pond Heron	*Ardeola speciosa*					119	19	3		5	1	42	10				14	3	22		1	1	40+	10	25	250
Striated Heron	*Butorides striata*					32	8	3		7	3						13	3	6				1	8	20	84
Black-crowned Night Heron	*Nycticorax nycticorax*					14																			13	14
Collared Scops Owl	*Otus lempiji*						1																			1
Sunda Pygmy-woodpecker	*Picoides moluccensis*					8						1														9
Freckle-breasted Woodpecker	*Dendrocopos analis*					10	1					1		1	1				2				5	2	9	23
Collared Kingfisher	*Todiramphus chloris*	P				17	5			5	1	2	1						1				3	2	4	37
Sacred Kingfisher	*Todiramphus sanctus*	P			S		5			5							1	1	1					2	7	15
Cerulean Kingfisher	*Alcedo coerulescens*	P		e		31	6	4	2	9	2	3	1	3			5	2	6				5	4	17	83
Blue-tailed Bee-eater	*Merops philippinus*				N	11		1		1								1								14
Red-breasted Parakeet	***Psittacula alexandri***					1																				1

		P	T	E	M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Golden-bellied Gerygone	*Gerygone sulphurea*					27	26	4	3	15	2	9					8	2	7	1		1	5	5	20	115
Mangrove Whistler	*Pachycephala cinerea*																								5	0
Common Iora	*Aegithina tiphia*					2																	1			3
White-breasted Woodswallow	*Artamus leucorynchus*					5	4						2												3	11
Pied Triller	*Lalage nigra*					7	2												1				3	7	11	20
Sunda Pied Fantail	*Rhipidura javanica*	P				17	12	1			1	5					2	2	7				2	6	7	55
Racket-tailed Treepie	***Crypsirina temia***					1																			4	1
Cinereous Tit	*Parus cinereus*					2																				2
Pacific Swallow	*Hirundo tahitica*					32	11	3			4	3	1	2								1		5	1	62
Daurian Swallow	*Cecropis daurica*					1																				1
Sooty-headed Bulbul	*Pycnonotus aurigaster*					15	1		18	2			3													39
Sunda Yellow-vented Bulbul	*Pycnonotus analis*					12	7					2	2	7	2	1		3	6		1		4	9	4	56
Javan White-eye	***Zosterops flavus***		Vu	e		11	6																	6		23
Australasian Red Warbler	*Acrocephalus australis*					45	9	4		2	3						10	1	9					6	5	89
Pallas's Grasshopper Warbler	*Locustella certhiola*				N							1						1	2					1		5
Common Tailorbird	*Orthotomus sutorius*					5	2			4	4	4		1	2			1	5				1	7		36
Ashy Tailorbird	*Orthotomus ruficeps*					25	11	1		8		2					1	1	5					2	5	56
Bar-winged Prinia	*Prinia familiaris*			e		2										1										3
Yellow-bellied Prinia	*Prinia flaviventris*					4								3	2				7				2	1		19
Plain Prinia	*Prinia inornata*					4																				4
Zitting Cisticola	*Cisticola juncidis*					13	3	3		7	10	8	35	18	8		12	2	13	1	1	1	7	4	3	146
Golden-headed Cisticola	*Cisticola exilis*					2																				2
Javan Myna	***Acridotheres javanicus***			**E**		6	1					**2**												**1**	1	10
Scarlet-headed Flowerpecker	*Dicaeum trochileum*			e		14	1		4	2		4	2		1	1			3	1					2	33
Brown-throated Sunbird	*Anthreptes malacensis*	P				10	4		4							1				1	1		1		1	22
Copper-throated Sunbird	*Leptocoma calcostetha*	P				4	4																			8
Ornate Sunbird	*Cinnyris ornatus*	P				17	2			1	1	1			1		2		5			1	4	6	1	41
Scaly-breasted Munia	*Lonchura punctulata*					42	6		1	10	2	33	19	27	12	25	34	15	25	1		1	23	16	12	292
Javan Munia	*Lonchura leucogastroides*					15	16		4	2		14	10		14			1	2	1		1		8	5	88

		P	T	E	M	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
White-capped Munia	***Lonchura ferruginosa***			E								120	15	65	35		97		47		1					380
White-headed Munia	*Lonchura maja*					4							4													8
Javan Sparrow	***Lonchura oryzivora***		**Vu**	**E**																					5	**0**
Eurasian Tree Sparrow	*Passer montanus*					40	50	32	31	21	8	40	65	21	4	1		1	13	1	1	1	1	18	6	349
					Nspp	73	43	22	16	31	19	31	21	17	17	10	32	27	40	11	11	13	31	42	44	

APPENDIX 2. Habitats in the Jawa Satu survey area, May 2018.

1.1 Muara Gembong: Muara Blacan
1.2 Muara Gembong: Muara Bendera

2. Tanjung Sedari

3. Muara Bungin

4. Tanjung Pakis & Muara Sukajaya

6. Kalenkalong

7. Parean / Tangkolak

8. Muara Ciparage / Kali Bawah

9. Project area track

10. Muara Cilamaya

11. Blanakan

12. Muara Ciasem

13. Muara Anggasari

1.1 Muara Gembong: Muara Blacan

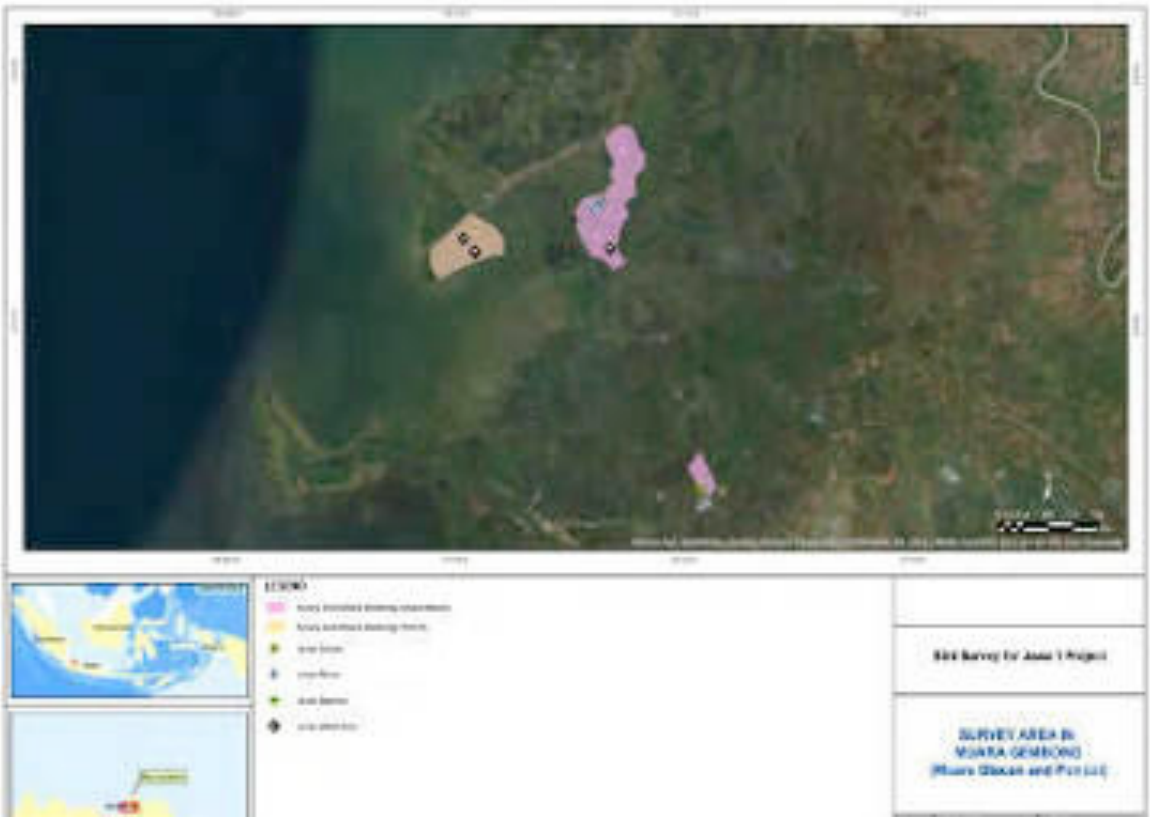

1.1.1

1.1.2

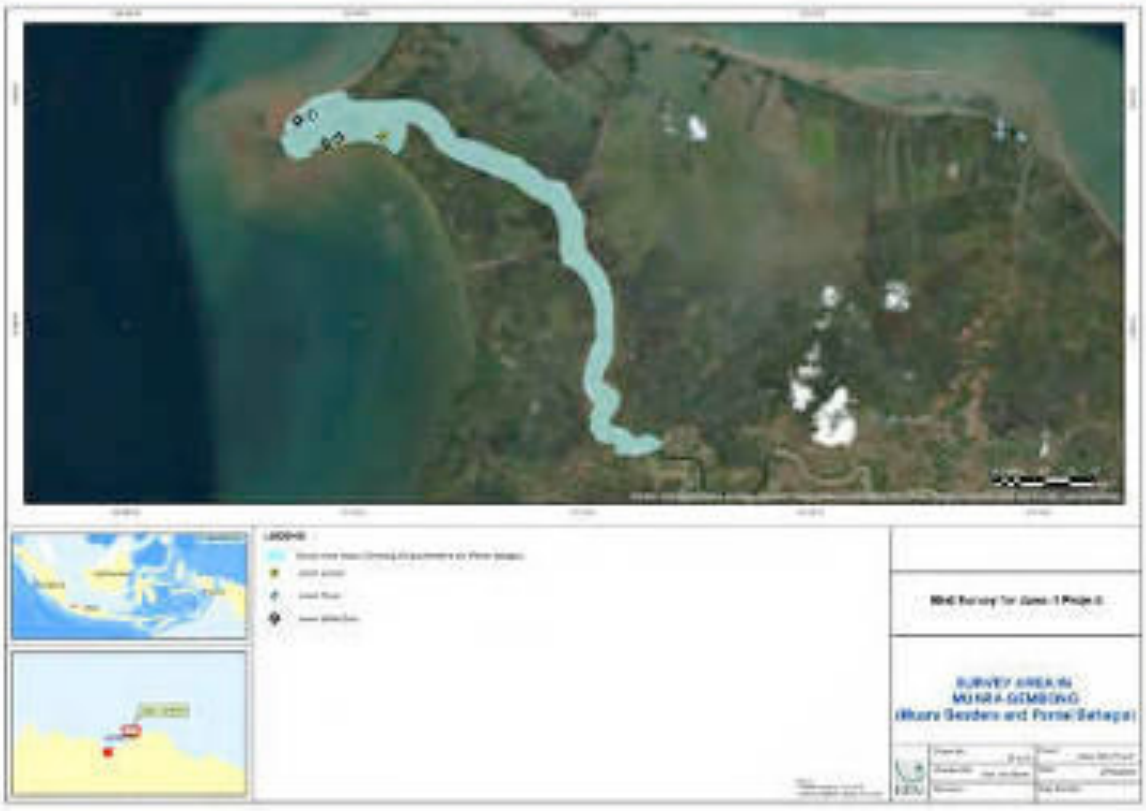

1.1.3


1.1.4


1.1.5



1.2 Muara Gembong: Muara Bendera



2. Tanjung Sedari

3. Muara Bungin

3.1

3.2

3.3

3.4

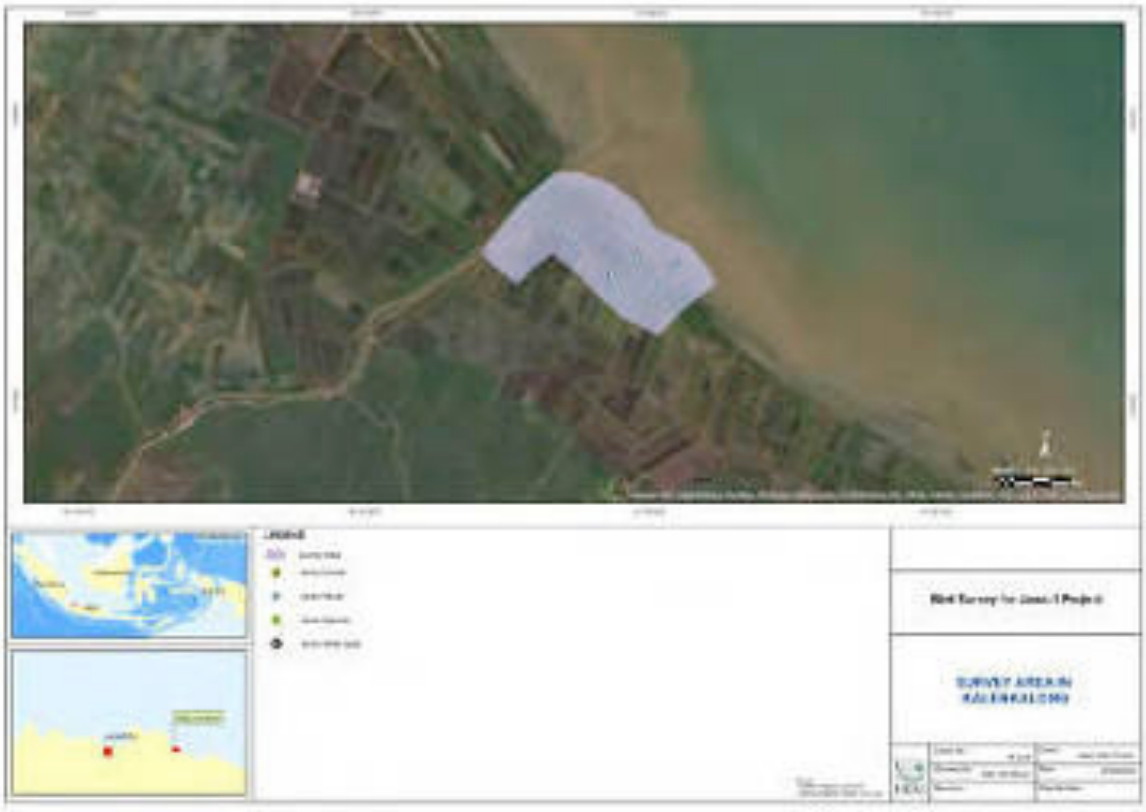
4. Tanjung Pakis & 5. Muara Sukajaya

6. Kalenkalong / Sumberjaya

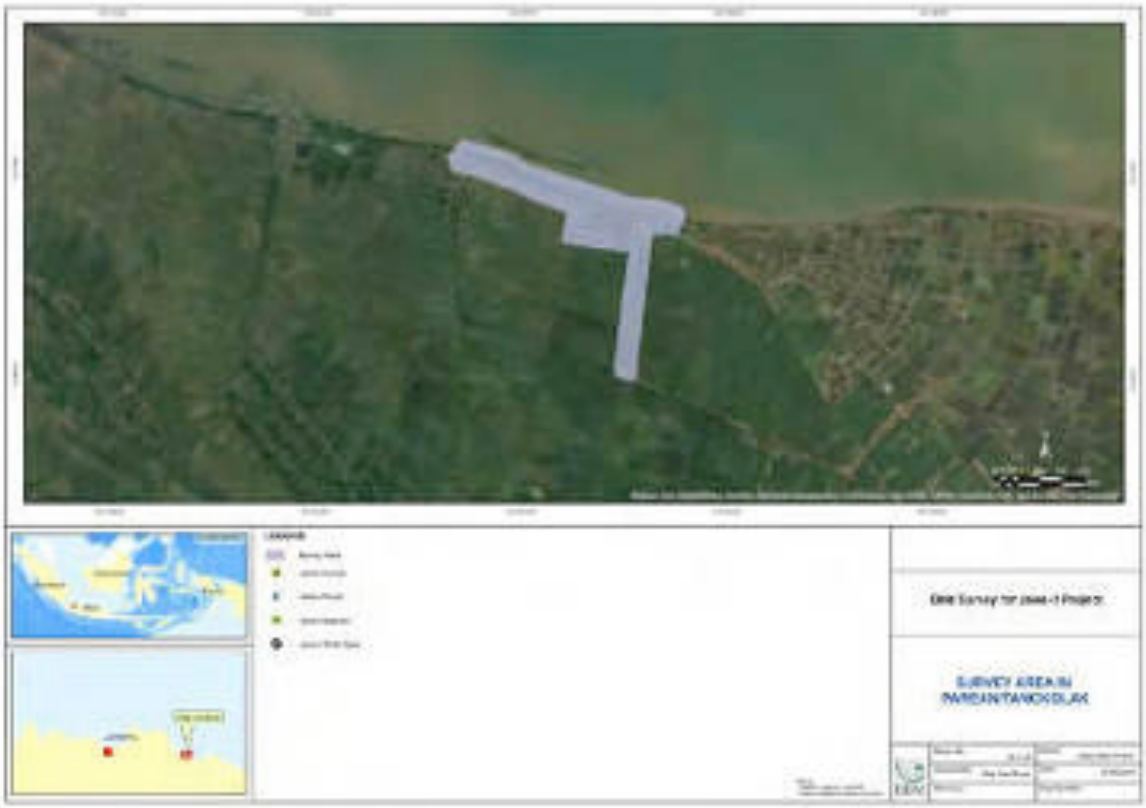

6.1


6.2

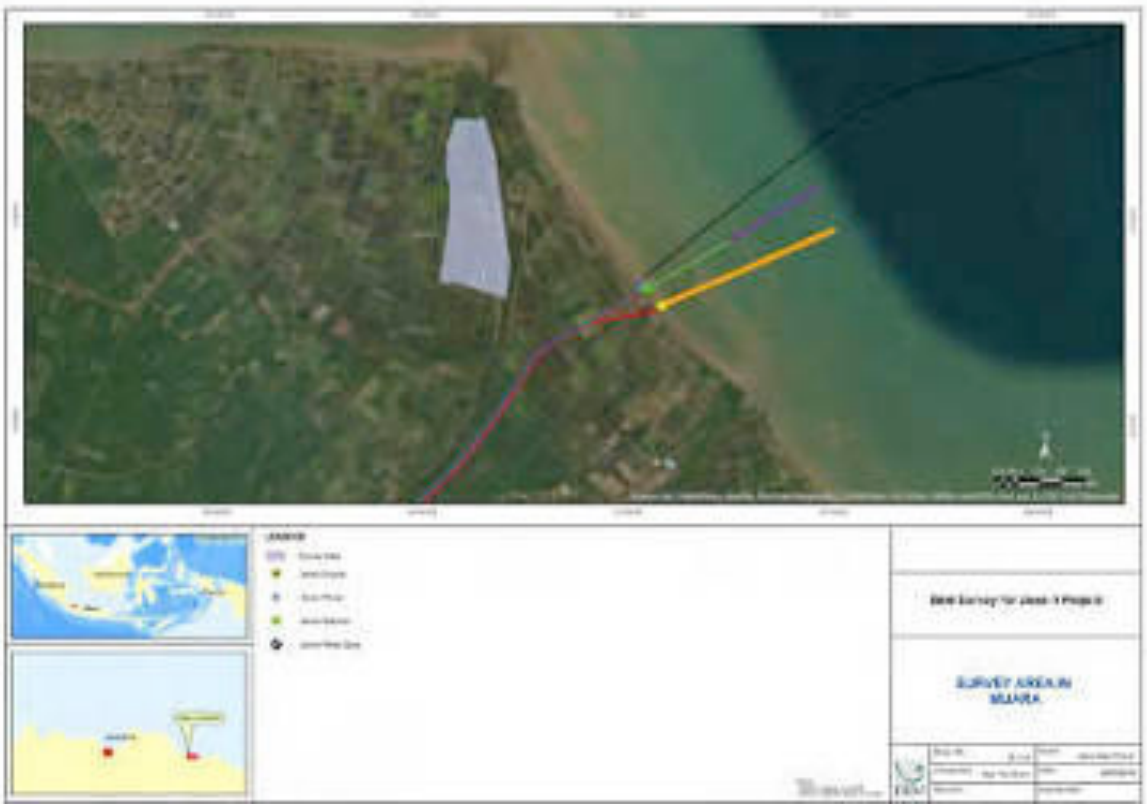

6.3



7. Parean / Tangkolak



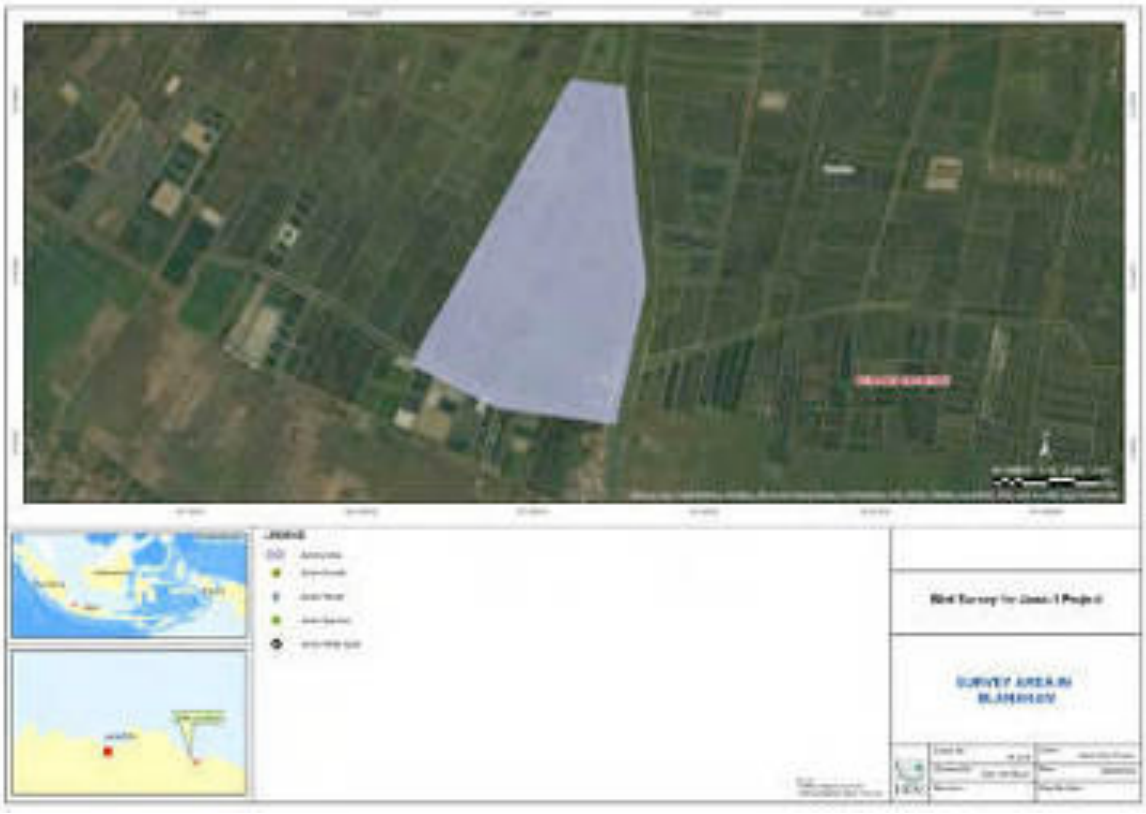
8. Muara Ciparage/ Kali Bawah



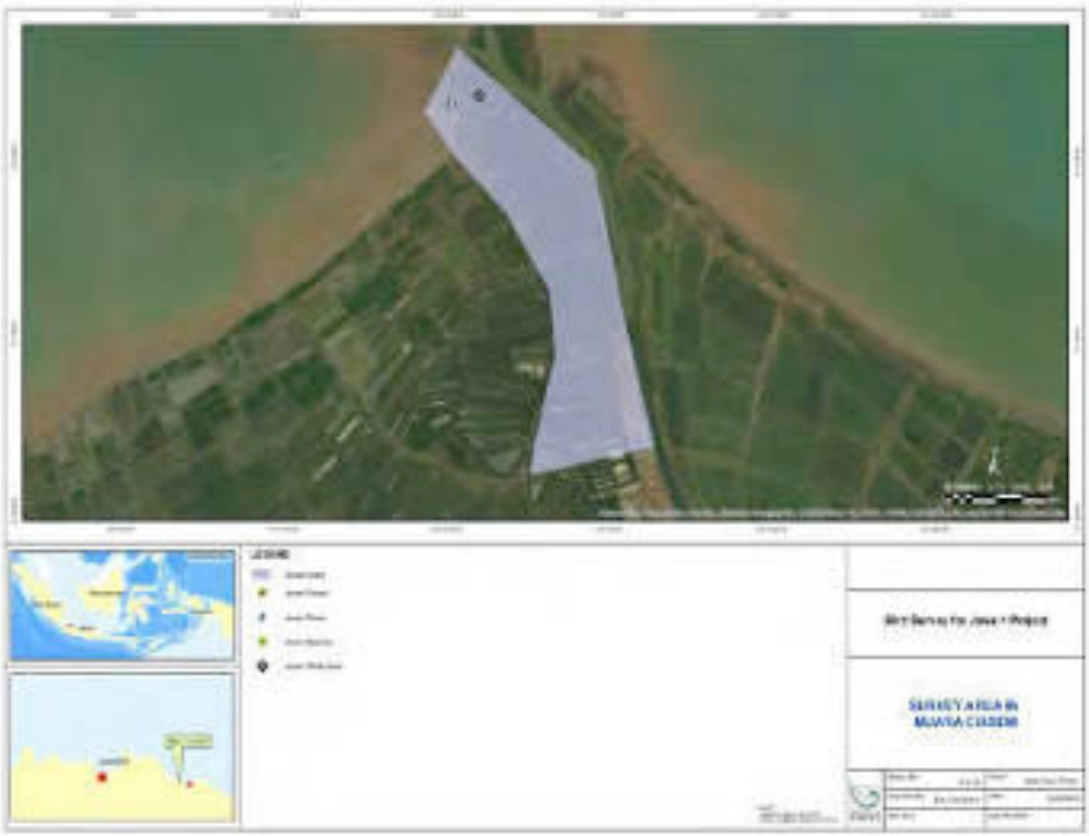
9. Project area track

10. Muara Cilamaya

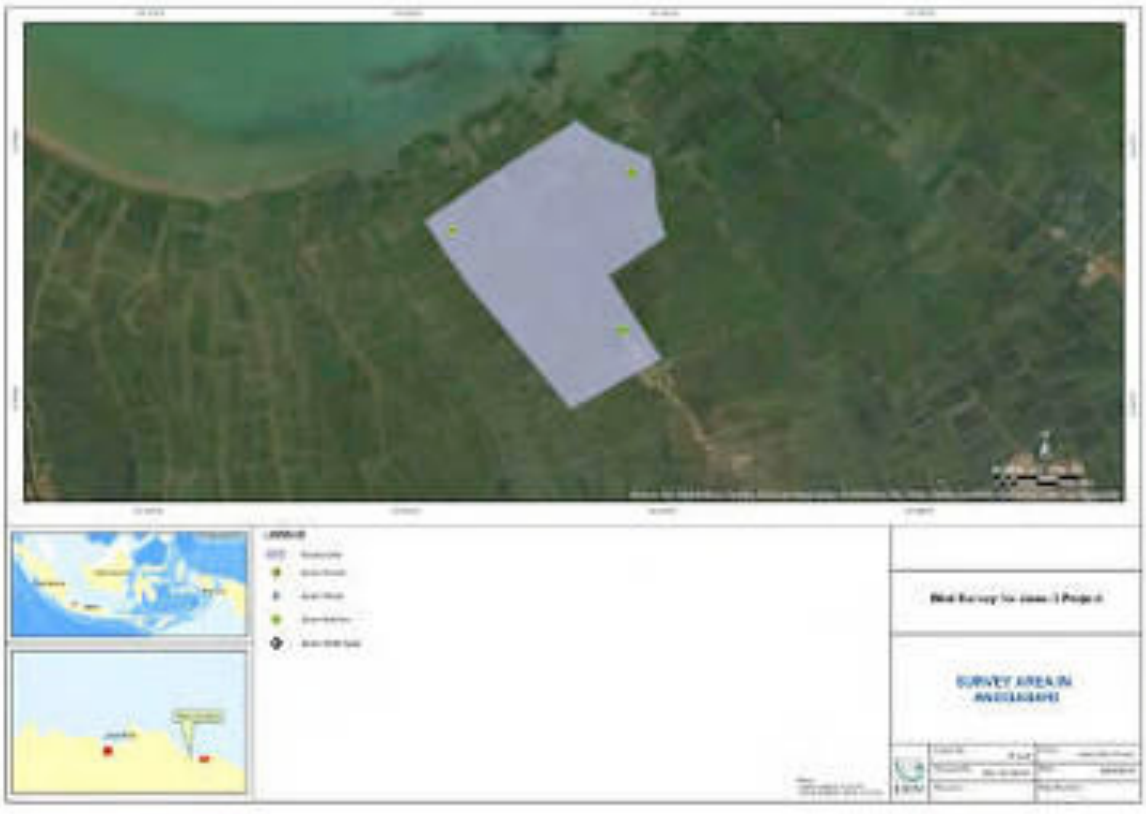
11. Blanakan



12. Muara Ciasem



13. Muara Anggasari



APPENDIX 3. Birds of Jawa Satu survey area (Photos by Ikhsan Aziz)

1. Oriental Darter *Anhinga melanogaster*, near-threatened, single bird flying over Muara Bendera.

2. Grey Heron *Ardea cinerea*, sun-bathing in the morning, more coastal than the related Purple Heron *Ardea purpurea* of which much fewer were seen in the area.

3. Great Egret *Ardea modesta*, in non-breeding plumage.

4. Little Egret *Egretta garzetta*, group of Little Egrets *Egretta garzetta* taking shelter against the very strong wing at Muara Bungin.

5. Intermediate Egret *Ardea intermedia*, the least common of the egrets.

6. Javan Pond Heron *Ardeola speciosa*, widespread in a variety of habitats.

7. Pied Stilt *Himantopus leucocephalus*, uncommon, but seen a number of times at several survey localities.

8. Javan Plover *Charadrius javanicus*, near-threatened, and possibly vulnerable, but widespread and common pair-wise in the tambak areas.

9. Horsfield's Bronze Cuckoo *Chrysococcyx basalis*, heard singing at several places in the area, known for seasonally high concentrations of this migrant from Australia

10. Sacred Kingfisher *Todiramphus sanctus*, migrant from Australia, much more silent than its congener Collared Kingfisher, but often seen flying from perch to perch.

11. Cerulean Kingfisher *Alcedo coerulescens*, an Indonesian endemic, protected under Indonesian law, occurring from S Sumatra to Flores, hyper-active and noisy kingfisher common above the fish and shrimp ponds.

12. Javan White-eye *Zosterops flavus*, one out of a flock of 4-5 foraging in tambak tree near Sedari.

13. Javan White-eye *Zosterops flavus*, adult of a family group with three fledglings at Muara Ciasem.

14. White-capped Munia *Lonchura ferruginosa*, endemic to Java, but introduced elsewhere; by far the most common munia in our survey area, found abundant in flooded ricefields in different phases of ripening, but also in the sedge swamps

15. Racket-tailed Treepie *Crypsirina temia*, a scarce bird on Java, one out of group of 4-5 noisy birds roaming the mangroves.

16 Hunters in action, Muara Gembong.

17. Cage trap with decoy, Poncol/Pantai Mekar.

18. Caged egrets, Muara Bungin.

19. Shrimp pond with swiftlet house at the background, Parian/Tengkolak.

APPENDIX 3. Photo Gallery
(Photos by Ikhsan Aziz)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APPENDIX 4. Coordinates and details of the target species seen during the Jawa Satu survey.

LOCATIONS JAVAN WHITE-EYE

	coordinates		date	time	number	habitat		
	S	E					comments	Audio Rec
Muara Blacan	06°01'24.8"	107°01'20.6"	12-mei-18	12.15	2	rhizophora bush	singing	
Muara Blacan	06°01'02.7"	107°01'15.9"	12-mei-18	15.00	6	new tambak		
Poncol	06°01'26.6"	107°00.09.6"	13-mei-18	16.32	4	tambak edge	flying over to E	
Poncol	06°01'20.3"	107°00.03.6"	13-mei-18	17.16	1	above tambak	flying over to W	
Pantai Bahagia	05°56'21.4"	107°00'14.0"	13-mei-18	06.17	1	above tambak	flying over	
Muara Bendera	05°56'22.2"	106°59'50.9"	13-mei-18	06.56	1	above sonneratia	flying over	#174
Muara Bendera	05°56'25.1"	106°59.44.2"	13-mei-18	07.30	1	above sonneratia	flying over	
Muara Bendera	05°56'13.0"	106°59'29.3"	13-mei-18	08.30	1	above sonneratia	flying over	
Muara Bendera	05°56'10.2"	106°59'36.8"	13-mei-18	08.41	2	above sonneratia	flying over	#196
Sedari	05°58'39.8"	107°18'10.9"	15-mei-18	06.20	5	tambak dike	foraging	#243
Sedari	05°58'23.3"	107°18'27.5"	15-mei-18	07.00-07.16	c 5	above tambak	flying over, N & S	#252
Muara Ciasem	06°13'32.9"	107°41'43.5"	20-mei-18	07.27	1 or 2	above tambak	flying over S & N	
Muara Ciasem	06°13'33.9"	107°41'39.9"	20-mei-18	07.50 - 08.00	5	tambak dike	family group foraging	
Muara Ciasem	06°13'33.9"	107°41'39.9"	20-mei-18	08.25	1	above tambak	flying over S & N	

LOCATIONS JAVAN PLOVER 1

Muara Gembong - Muara Blacan	06°01'02.7"	107°01'15.9"	12-mei-18	pm	9	tambak
Muara Gembong - Muara Blacan	06°01'05.0"	107°01'11.7"	14-mei-18	am	6	tambak
Muara Bendera	05°56'10.2"	106°59'36.8"	13-mei-18	am	2	

LOCATIONS JAVAN PLOVER 1

	coordinates		date	time	number	habitat
Wana Lestari Sedari	05°59'39.7"	107°17'34.1"	15-mei-18	am	6	tambak
Muara Bungin	05°56'20.5"	107°05'49.7"	15-mei-18	pm	2	tambak
Muara Bungin	05°56'18.8"	107°05'38.5"	15-mei-18	pm	2	tambak
Muara Bungin	05°56'14.1"	107°05'39.1"	15-mei-18	pm	2	sea shore
Sukajaya	05°59'16.9"	107°09'26.3"	16-mei-18	am	26	tambak
Sukajaya	05°59'25.5	107°10'07.6"	16-mei-18	am		tambak
Sukajaya	05°59'25.0"	107°10'11.6"	16-mei-18	am	14	tambak
Kalenkalong	06°08'45.0"	107°28'16.8"	16-mei-18	pm	8	along small tambaks, open with untidy
Kalenkalong	06°08'50.3"	107°28'20.9"	16-mei-18	pm	2	tambak with trunks
Kalenkalong	06°08'45.9"	107°28'24.2"	16-mei-18	pm	1	tambak
Kalenkalong	06°08'47.5"	107°28'12.4"	16-mei-18	pm	3	tambak
Kalenkalong	06°08'42.4"	107°28'06.9"	16-mei-18	pm	2	tambak
Kalenkalong	06°08'39.5"	107°28'03.0"	16-mei-18	pm	3	tambak
jetty area	06°12'17.4"	107°37'16.0"	18-mei-18	am	12	tambak with trunks
Cilamaya delta	06°13'11.6"	107°38'12.1"	19-mei-18	am	14	open tambaks
Muara Ciasem	06°13'33.9"	107°41'39.9"	20-mei-18	am	1	tambak

LOCATIONS JAVAN COUCAL

Pantai Bahagia	05°56'21.4"	107°00'14.0"	13-mei-18	11.30	1	riverine cane grass
Muara Blacan Selatan	06°03'19.3"	107°02'08.3"	14-mei-18	8.55	1	flyingfrom csedge swamp into nipa

LOCATIONS JAVA SPARROW

Anggasari	06°14'20.6	107°44'10.3"	20-mei-18	17.15	2+	mangrove fringe
Anggasari	06°14'06.8"	107°44'52.4"	21-mei-18	07.12	2+	mangrove fringe
Anggasari	06°14'43.5"	107°44'50.4"	21-mei-18	08.25	2+	mangrove fringe

APPENDIX 5. Travelling Scheme, Jawa Satu survey, May 2018.

Day #	locality
12 May	travel from Bogor to Muaragembong (Bekasi)
13 May	Muara Bendera / Muara Blacan
14 May	Muara Blacan, travel to Sedari
15 May	Tanjung Sedari, Muara Bungin (Karawang)
16 May	Muara Sasak/Sukajaya & Sumberjaya/Kalenkalong (Karawang)
17 May	Parian/Tengkolak / DMU
18 May	Muara / DMU
19 May	Muara Cilamaya / DMU / Blanakan
20 May	Muara Ciasem / M Anggasari west
21 May	M Anggasari east; return to Bogor