

# Environmental and Social Impact Assessment Report (ESIA) – Part 2

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Project Number: 51112-001  
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## INO: Jawa-1 LNG to Power Project

Prepared by ERM for PT Jawa Satu Power (JSP)

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This section presents the results of the ESIA screening and scoping exercises. The regulatory EIA (AMDAL) process also goes through a screening and scoping process that is guided by the Indonesian AMDAL regulations, however it is important to understand that there are differences in the applicable standards and level of assessment applicable to ESIA and therefore this Chapter is independent of the AMDAL screening and scoping process.

## 5.1

### OVERVIEW

Screening and scoping exercises were carried out to provide a first pass assessment of key issues and any information gaps that should be addressed in the ESIA study in order to obtain the necessary level of data required for a robust Impact Assessment (IA). The exercises were undertaken:

- To define the applicable standards for the ESIA;
- To understand the Project, boundaries of the impact assessment and conduct a high-level identification of the key issues and potential benefits;
- To consider the Project, its components and options under consideration in context of environmental, social and public health receptors;
- To examine the availability and applicability of relevant environmental, social and public health legal requirements and baseline data to support a robust impact assessment and thus identify any additional baseline data collection needs;
- To establish the ESIA scope including:
  - Definition of key Project activities;
  - Potential significant environmental, social and health impacts to the sensitive receptors/ receivers that require particular attention within the ESIA; and
  - Additional primary baseline studies to be performed to provide the data required to conduct a robust impact assessment; and
- To determine key potential stakeholder concerns with respect to environmental, social and public health impacts of the Project.

As a result, ERM uses the ESIA process to address the impacts which we have screened as being particularly relevant to the Project, or which require particular scrutiny under the IFC and ADB frameworks. Hence, this Chapter is also prepared to include the environmental and social risks and to specifically target areas which fall out of the scope of the AMDAL process.

## 5.2 SCREENING RESULTS

The Sponsors have committed to meeting the ADB SPS, Equator Principles III 2013 (EP III), JBIC and NEXI standards. Through EP III, JBIC and NEXI environmental and social standards, the 2012 IFC Performance Standards 1- 8 (IFC PS) and applicable World Bank Group EHS Guidelines are also applicable to the Project as reference international standards.

### 5.2.1 *Project Categorisation*

Under the applicable standards proposed projects are screened according to type, location, scale, and sensitivity and the magnitude of their potential environmental impacts, including direct, indirect, induced, and cumulative impacts. Projects are classified into categories in terms of the potential significance of impacts, taking into account such factors as: the sector and scale of the project, the substance, degree and uncertainty of potential environmental and social impacts considering the environmental and social context of the proposed project site and surrounding areas.

The following provides the project categorisation under the applicable standards of the lenders.

#### 5.2.1.1 ADB

ADB categorises proposed projects under the Safeguard Categories of:

- Environment;
- Involuntary Resettlement; and
- Indigenous Peoples.

The Project is considered to be categorised as:

- Environment Category A: A proposed Project is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment (EIA), including an environmental management plan (EMP), is required.
- Involuntary Resettlement Category B: The scope of land acquisition has been confirmed and only economic resettlement will occur due to the PLTGU Jawa 1 Project. This recognises a willing buyer willing seller approach is being adopted across the tower footing, substation and coastal areas and that the Project has been identified the impact through the loss of more than 10 % of their productive assets (total combined income) including those residing around the Power Plant and coastal areas is

minimal. However for a Category B projects a resettlement plan, which includes an assessment of social impacts, is required.

- Indigenous peoples Category C: Impacts to Indigenous Peoples (IP) will not occur as a result of the Project as no IP have been identified in the Project area. As a result, no further assessment is required however ethnic groups are discussed in **Chapter 7**.

#### 5.2.1.2 *EPFI (EP III)*

Under EP III project category definitions are consistent with those of the IFC. The PLTGU Jawa 1 Project is considered as Category A, defined as:

- Category A – Projects with potential significant adverse environmental and social risks and/or impacts that are diverse, irreversible or unprecedented.

For all Category A Projects, the EPFI will require the client to conduct an Assessment process to address, to the EPFI's satisfaction, the relevant environmental and social risks and impacts of the proposed Project, proposing measures to minimise, mitigate, and offset adverse impacts in a manner relevant and appropriate to the nature and scale of the proposed Project.

#### 5.2.1.3 *JBIC/NEXI*

Consistent with the approach of the ADB and EP III/IFC, JBIC and NEXI have consistent definitions for classifying the Project into categories from A to C for non-financial intermediary projects. The PLTGU Jawa 1 Project is considered as Category A, defined as:

- Projects likely to have significant adverse impact, complicated impact or unprecedented impact which are difficult to assess on the environment. The impact of Category A projects may affect an area broader than the sites or facilities subject to physical construction. Category A, in principle, includes projects in sensitive sectors (i.e., sectors that are liable to cause adverse environmental impact) or with sensitive characteristics (i.e., characteristics that are liable to cause adverse environmental impact), including large scale thermal power projects such as PLTGU Jawa 1, as well as projects located in or near sensitive areas, such as habitats with important ecological value (including mangroves as are present along the coastal area of the Project coastline).

For Category A projects, borrowers must submit an EIA report and environmental permit certificates issued by the host governments or other appropriate authority.

## 5.3

### SCOPING

#### 5.3.1

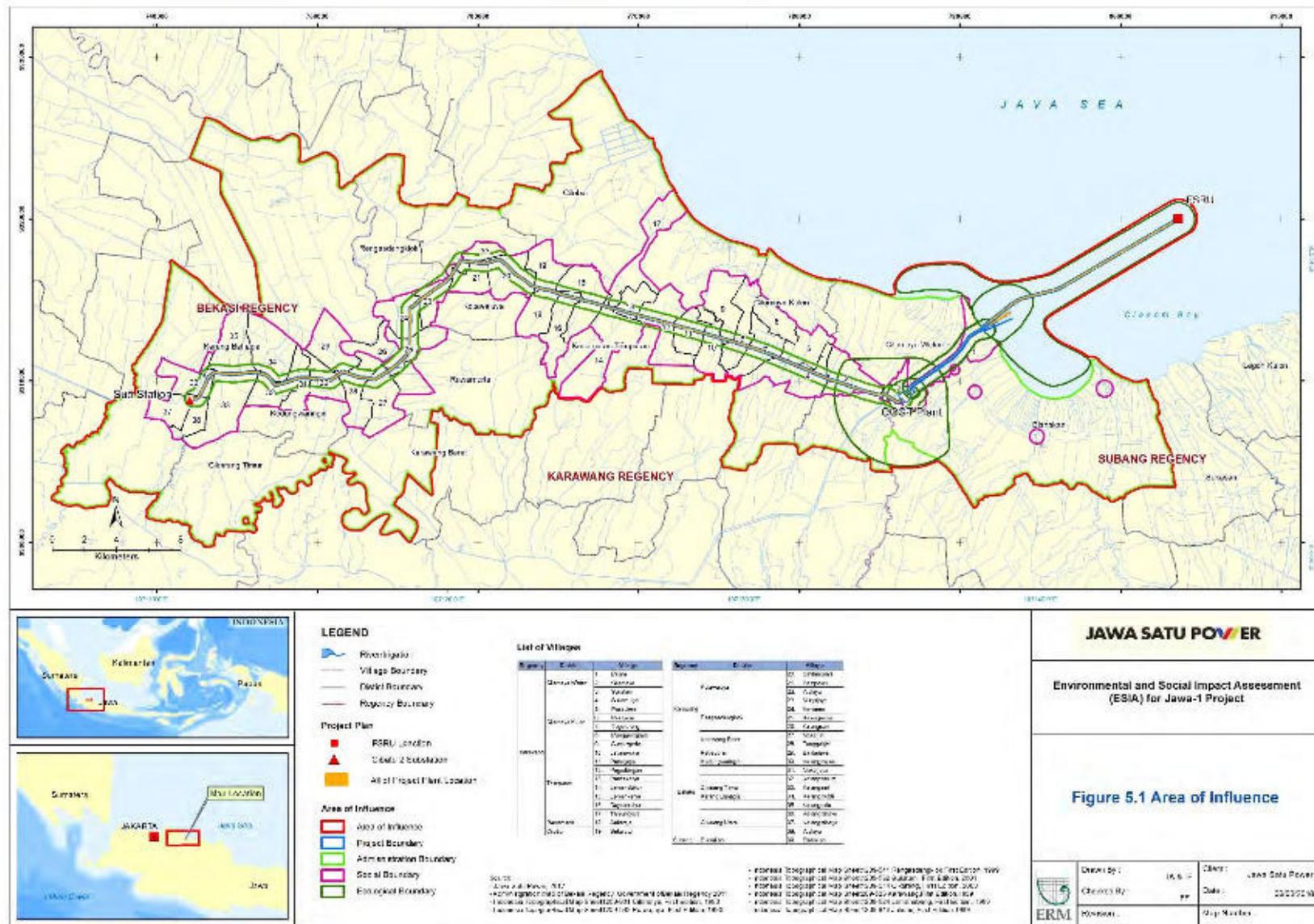
#### *Area of Influence*

Scoping was undertaken to identify potential interactions between the Project activities and resources/receptors in the Area of Influence (AoI). The AoI was defined for the Project AMDAL; and was utilised in this ESIA exercise. The AOI is defined to encompass:

- The area likely to be affected by:
  - The Project's activities and facilities that are directly owned, operated or managed (including by contractors) and that are a component of the Project; and
  - Impacts from unplanned but predictable developments caused by the Project that may occur later or at a different location.
- Indirect Project impacts on:
  - Biodiversity or on ecosystem services upon which Affected Communities' livelihoods are dependent;
  - Associated facilities, which are facilities that are not funded as part of the Project and that would not have been constructed or expanded if the Project did not exist and without which the Project would not be viable; and
  - Cumulative impacts that result from the incremental impact, on areas or resources used or directly impacted by the Project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted.

The AOI encompasses the components that the Project is developing. Furthermore, the AOI also must consider downstream impacts, normally associated with aquatic discharges and air emissions associated with the Project during construction and operations. It is good practice to keep the AOI to a reasonable distance so that the potential impact assessed can be attributed to the Project rather than being affected by influences outside of the Project. **Figure 5-1** illustrates the AoI.

Figure 5-1 Area of Influence



### 5.3.2

#### *Interactions Matrix*

As a tool for conducting scoping, the various Project features and activities that could reasonably act as a source of impact were identified, and these have been listed down the vertical axis of a Potential Interactions Matrix. The resources/receptors relevant to the Baseline environment have been listed across the horizontal axis of the matrix.

Potential impacts are identified through a systematic process whereby the features and activities (both planned and unplanned) associated with the pre-construction, construction, operation and decommissioning of the Project have been considered with respect to their potential to interact with the resources/receptors. Potential impacts have each been classified in one of two categories:

- No interaction: where the Project is unlikely to interact with the resource/receptor (e.g., wholly terrestrial projects may have no interaction with the marine environment); and
- Interaction: where there is likely to be an interaction, and the resultant impact has a reasonable potential to cause a significant effect on the resource/receptor. Potential positive as well as negative interactions were considered during this process.

Each resulting cell on the Potential Interactions Matrix represents a potential interaction between a Project activity and an environmental, social or health resource/receptor. Those cells that remain unchecked are 'scoped out' of further consideration in the IA Process (**Table 5-1**).

Table 5-1 ESIA Scoping Matrix

| Resource/Receptors  | Environment (Terrestrial) |                 |      |                            |             |            |       | Environment (Marine)     |                 |                   | Social/Cultural Structure |                           |                        |            |              |                                       | Health             |                  |                                |                      |                               |                       |  |
|---|---------------------------|-----------------|------|----------------------------|-------------|------------|-------|--------------------------|-----------------|-------------------|---------------------------|---------------------------|------------------------|------------|--------------|---------------------------------------|--------------------|------------------|--------------------------------|----------------------|-------------------------------|-----------------------|--|
|   | Ambient Air               | Noise/Vibration | Soil | Surface Water (Freshwater) | Groundwater | Vegetation | Fauna | Surface Water (Seawater) | Marine Habitats | Sediments/Benthos | Marine Fauna              | Social/Cultural Structure | Economy And Livelihood | Aesthetics | Resource Use | Marine and Terrestrial Transportation | Cultural Resources | Education/Skills | Infrastructure/Public Services | Risk To Human Health | Community Safety and Security | Environmental Quality | Communicable/ Non Communicable Disease |
| <b>Activities</b>   |                           |                 |      |                            |             |            |       |                          |                 |                   |                           |                           |                        |            |              |                                       |                    |                  |                                |                      |                               |                       |  |
| <b>CONSTRUCTION (Power Plant, Transmission Line)</b>                        |                           |                 |      |                            |             |            |       |                          |                 |                   |                           |                           |                        |            |              |                                       |                    |                  |                                |                      |                               |                       |  |
| Land acquisition  |                           |                 |      |                            |             |            |       |                          |                 |                   |                           |                           | -/+                    |            | •            |                                       | •                  |                  |                                |                      |                               |                       |  |
| Workforce mobilisation/presence/worker camps                                |                           |                 |      |                            |             |            |       |                          |                 |                   |                           | •                         | -/+                    |            | •            |                                       |                    | •                |                                |                      | •                             |                       | •                                      |
| Vehicle use/ transportation (workforce, supply and support)                 | •                         | •               |      |                            |             |            | •     |                          |                 |                   |                           |                           |                        |            |              | •                                     |                    |                  |                                |                      | •                             |                       |  |
| Power generation  | •                         | •               |      |                            |             |            |       |                          |                 |                   |                           |                           |                        |            |              |                                       |                    |                  |                                |                      |                               | •                     |  |
| Vegetation clearing and land preparation                                    | •                         | •               | •    | •                          |             | •          | •     |                          |                 |                   |                           |                           |                        | •          |              |                                       |                    | -/+              |                                |                      |                               | •                     |  |
| Equipment and material transport and supply                                 | •                         | •               |      |                            |             |            |       |                          |                 |                   |                           |                           |                        |            |              |                                       |                    |                  | •                              |                      | •                             |                       |  |
| Installation of power station structural, mechanical, electrical components | •                         | •               |      |                            |             |            |       |                          |                 |                   |                           |                           |                        |            |              |                                       |                    |                  |                                |                      | •                             | •                     |  |
| Wastes, emissions and discharges generation, handling and disposal          | •                         |                 | •    |                            | •           |            |       |                          |                 |                   |                           |                           | •                      | •          | •            |                                       |                    |                  | •                              | •                    | •                             | •                     |  |
| <b>CONSTRUCTION (FSRU &amp; Pipeline Installation)</b>                      |                           |                 |      |                            |             |            |       |                          |                 |                   |                           |                           |                        |            |              |                                       |                    |                  |                                |                      |                               |                       |  |
| Construction of jetty and nearshore facilities                              | •                         | •               | •    |                            |             |            |       | •                        | •               | •                 | •                         |                           | •                      |            |              | •                                     |                    |                  | •                              |                      | •                             | •                     |  |
| FSRU establishment and vessel presences                                     |                           |                 |      |                            |             |            |       | •                        | •               | •                 | •                         |                           | •                      |            |              | •                                     |                    |                  |                                |                      |                               |                       |  |
| Subsea pipeline construction, dredging and disposal                         | •                         | •               |      |                            |             |            |       | •                        | •               | •                 | •                         |                           | •                      |            |              |                                       |                    | -/+              | •                              |                      | •                             | •                     |  |
| Pipeline hydrostatic testing  |                           |                 |      | •                          |             |            |       | •                        |                 |                   |                           |                           |                        |            |              |                                       |                    |                  |                                |                      |                               |                       |  |
| Tie in and commissioning  | •                         | •               |      |                            |             |            |       |                          |                 |                   |                           |                           |                        |            | •            |                                       |                    |                  |                                |                      |                               |                       |  |

| Activities   | Resource/Receptors | Environment (Terrestrial) |                 |      |                            |             |            | Environment (Marine) |                          |                 | Social/Cultural Structure |              |                           |                        |            |              | Health                                |                    |                  |                                |                      |                               |                       |  |
|--|--------------------|---------------------------|-----------------|------|----------------------------|-------------|------------|----------------------|--------------------------|-----------------|---------------------------|--------------|---------------------------|------------------------|------------|--------------|---------------------------------------|--------------------|------------------|--------------------------------|----------------------|-------------------------------|-----------------------|--|
|  |                    | Ambient Air               | Noise/Vibration | Soil | Surface Water (Freshwater) | Groundwater | Vegetation | Fauna                | Surface Water (Seawater) | Marine Habitats | Sediments/Benthos         | Marine Fauna | Social/Cultural Structure | Economy And Livelihood | Aesthetics | Resource Use | Marine and Terrestrial Transportation | Cultural Resources | Education/Skills | Infrastructure/Public Services | Risk To Human Health | Community Safety and Security | Environmental Quality | Communicable/ Non Communicable Disease |
| <b>OPERATIONS (Power Plant, FSRU, Transmission Line and Gas Pipelines)</b> |                    |                           |                 |      |                            |             |            |                      |                          |                 |                           |              |                           |                        |            |              |                                       |                    |                  |                                |                      |                               |                       |  |
| Workforce presence   |                    |                           |                 |      |                            |             |            |                      |                          |                 |                           | •            | -/+                       |                        | •          |              |                                       |                    | •                |                                | •                    |                               |                       | •                                      |
| Equipment and material transport and supply                                |                    | •                         | •               |      |                            |             |            |                      |                          |                 |                           |              |                           |                        |            | •            |                                       |                    | •                |                                | •                    |                               |                       |  |
| Generation, handling and disposal of wastes                                |                    |                           |                 |      | •                          |             |            | •                    |                          |                 |                           |              |                           |                        | •          |              |                                       |                    |                  | •                              |                      | •                             |                       | •                                      |
| Power Plant, Jetty, FSRU, vessel presence and operations                   |                    | •                         | •               |      |                            |             |            | •                    |                          | •               |                           |              | •                         |                        |            | •            |                                       |                    | •                |                                | •                    | •                             |                       |  |
| Transmission line presence and operation                                   |                    |                           | •               |      |                            |             |            |                      |                          |                 |                           |              |                           |                        |            |              |                                       |                    |                  | •                              |                      |                               |                       |  |
| Operational noise  |                    |                           | •               |      |                            |             |            |                      |                          |                 |                           |              |                           |                        |            |              |                                       |                    |                  |                                |                      |                               | •                     |  |
| Operational air emissions  |                    | •                         |                 |      |                            |             | •          |                      |                          |                 |                           |              |                           |                        |            |              |                                       |                    |                  |                                |                      |                               | •                     |  |
| Operational water usage  |                    |                           |                 |      |                            |             |            |                      |                          |                 |                           |              |                           |                        | •          |              |                                       |                    |                  |                                |                      |                               |                       |  |
| <b>NON-ROUTINE EVENTS ONSHORE</b>  |                    |                           |                 |      |                            |             |            |                      |                          |                 |                           |              |                           |                        |            |              |                                       |                    |                  |                                |                      |                               |                       |  |
| Process upset/emergency flaring  |                    | •                         | •               |      |                            |             |            |                      |                          |                 |                           |              |                           |                        | •          |              |                                       |                    |                  |                                |                      |                               | •                     |  |
| Spillage of fuel, oil, chemicals and hazardous materials                   |                    |                           |                 | •    | •                          | •           |            |                      |                          |                 |                           |              | •                         | •                      | •          |              |                                       |                    |                  |                                | •                    | •                             |                       |  |
| Vehicle, accident  |                    |                           |                 |      |                            |             |            |                      |                          |                 |                           |              |                           |                        |            |              |                                       |                    |                  |                                | •                    | •                             |                       |  |
| Fire/explosion   |                    | •                         | •               |      |                            |             |            |                      |                          |                 |                           |              |                           | •                      |            |              |                                       |                    |                  |                                | •                    | •                             |                       |  |
| Transmission line break  |                    |                           |                 |      |                            |             |            |                      |                          |                 |                           |              |                           |                        |            |              |                                       |                    | •                |                                | •                    |                               |                       |  |
| Natural hazard event (flooding)  |                    |                           |                 | •    | •                          |             | •          | •                    |                          |                 |                           |              | •                         |                        |            |              |                                       |                    |                  |                                |                      |                               | •                     |  |
| <b>NON-ROUTINE EVENTS OFFSHORE</b>   |                    |                           |                 |      |                            |             |            |                      |                          |                 |                           |              |                           |                        |            |              |                                       |                    |                  |                                |                      |                               |                       |  |
| Fire/explosion   |                    | •                         |                 |      |                            |             |            | •                    |                          |                 |                           |              |                           |                        |            |              |                                       |                    |                  |                                | •                    | •                             |                       |  |
| Hydrocarbon spills or chemical release offshore                            |                    |                           |                 |      |                            |             | •          | •                    | •                        | •               |                           | •            |                           |                        |            |              |                                       |                    |                  |                                | •                    |                               |                       |  |
| Vessel accident  |                    |                           |                 |      |                            |             |            |                      |                          |                 |                           | •            |                           |                        |            |              |                                       |                    |                  |                                | •                    | •                             |                       |  |
| Dropped objects  |                    |                           |                 |      |                            |             |            |                      | •                        |                 |                           |              |                           |                        |            |              |                                       |                    |                  |                                | •                    |                               |                       |  |

The following information is provided for each of the Project activities which have been identified as potentially resulting in environmental or social impacts:

- Sources of impact: The potential causes concern, or the environmental and social receptors considered likely to be affected;
- Overview of potential impacts: Discussion of the types of impacts that could occur from construction or operation of the Project based on available information and existing environmental and social baseline data; and
- Proposed assessment approach: An outline of what will be taken into account as part of the assessment and if, for example modelling or specific data collection activities is required.

**Table 5-2** summarises the identified key environmental and social issues as being potentially significance that will be further assessed in the Impact Assessment. .

Environmental and social impacts during decommissioning of the Project have not been considered in the impact assessment, as these will depend on the options available at the time of expiry of the Project life-cycle. The options shall be conducted according to the requirements of the authorities and Best Practice Environmental Options at the time of decommissioning activities.

Table 5-2 Key Environmental, Social and Health Issues and Data Requirements

| Stages/ Activities                       | Key Issues   | Potential Impacts   | Data Requirements and Proposed Assessment  |
|--|--|---|--|
| <b>Pre-construction and Construction</b> |  |   |  |
| Land Acquisition                         | <p><b>Social</b></p> <ul style="list-style-type: none"> <li>Economy and Livelihood;</li> <li>Social/ Cultural Structure.</li> </ul>  | <ul style="list-style-type: none"> <li>The land acquisition plan will be executed with private land owners of the Tower Footing for the 500 KV Transmission Line and Cibatubaru II/ Sukatani substation. This land acquisition will refer to <i>Ministry of Energy and Mineral Resources Number 38 Year 2013 on the Land Compensation, Building and Crops that are Under The Transmission Line (SUTET and SUTT) Free Space</i>.</li> <li>Land compensation will be also conducted under the RoW of 500 kV Transmission Line. This land compensation will refer to <i>Minister of Energy and Mineral Resource Regulation No. 18 Year 2015 regarding Minimum Free Space of High-voltage Tower, Extra High-voltage Tower, and Direct Current High-voltage Tower for Electrical Power Transmission</i>.</li> <li>The proposed location of jetty and pump house is within a restricted and limited zone (daerah terbatas terlarang) owned by Pertamina Hulu Energi. Of the pipeline RoW other than the land owner by Pertamina some land is owned by the Ministry of Environment and Forestry as it is categorised as protected forest and 10.000 m2 is owned by private owners located outside of the protected forest area. The protected forest area is cultivated by number of local community members for paddy and fish ponds with no primary forest. A willing buyer willing seller approach will be adopted with these private land owners.</li> <li>PT. Pertamina Gas will transfer its land ownership to PT. Pertamina Power Indonesia, a member of PT. Jawa Satu Power consortium for the power plant.</li> <li>The areas of land subject to acquisition are being confirmed, and are generally paddy fields used for farming or fish ponds. No physical displacement is expected to occur however economic displacement will occur.</li> <li>In addition around 180,000m<sup>2</sup> will be leased for the purposes of access and temporary laydown. These land owners will be appropriately compensated based on discussions with the villages leaders.</li> <li>Impacts to vulnerable households will be assessed, in particular female headed households, elderly land owners and users and those living below the poverty line. Should impacts to these groups vulnerability be identified an LRP or CSR targeted program will be implemented.</li> </ul> | <ul style="list-style-type: none"> <li>Based on the actual areas of land to be acquired, ERM had assessed socioeconomic impacts of this and the potential for socioeconomic impacts.</li> <li>Land owner data (land ownership, assets, income and livelihoods) was gathered.</li> <li>The need for any follow-up actions or assessment had been confirmed as part of the assessment.</li> </ul>  |
| Workforce Mobilisation/ Presence         | <p><b>Social</b></p> <ul style="list-style-type: none"> <li>Economy and Livelihood (+/-);</li> <li>Social/Cultural Structure;</li> <li>Resource use; and</li> <li>Infrastructure/ Public Services</li> </ul> | <ul style="list-style-type: none"> <li>The Project has the potential to have a positive impact on the community through generation of new employment and training opportunities.</li> <li>Project opportunities should be made accessible to females and ethnic minorities. A target of 5% for female workers has been identified by the EPCs and 10% during operations.</li> <li>Improved disposable income also has the potential to improve employee lifestyles and create flow-on economic benefits in the community such as through generating greater demand for local businesses/economic activity.</li> <li>Negative impacts on the livelihoods and the economic situation of households that may not receive direct economic benefit, but are exposed to impacts often associated with economic development (e.g. increase in land prices, increases in cost of goods and services; construction impacts);</li> <li>Social/cultural tension from the introduction of workers from outside the area with different cultural values/ characteristics and the potential for increased demand in sex workers and the transmission of sexually transmitted infected (STIs);</li> <li>Forced or child labour and human trafficking by agents and the non compliance with local and international labour laws and treaties during the construction phase;</li> <li>Influx issues such as increasing demand for infrastructure and goods and services (e.g. medical, transport, business). This has the potential to negatively affect the community if it results in decreased access or quality of services and infrastructure available prior to the Project commencing.</li> </ul>   | <ul style="list-style-type: none"> <li>To undertake social surveys that includes consultation with affected communities and visual assessment of villages and existing environment.</li> <li>These would help to identify potential impacts, community concerns and to build an understanding of the areas of potential investment for the Project.</li> <li>Review of community social (demographic and economic structure) through primary and secondary sources had been conducted. This information had been used to inform the Social Impact Assessment.</li> </ul> |

| Stages/ Activities  | Key Issues  | Potential Impacts  | Data Requirements and Proposed Assessment  |
|---|---|--|--|
|   | <p><b>Health</b></p> <ul style="list-style-type: none"> <li>Communicable and Non-Communicable Diseases; and</li> <li>Community Safety &amp; Security.</li> </ul>  | <ul style="list-style-type: none"> <li>Introduction of communicable diseases from non-local workers</li> <li>Crime or sense of concern as a result of non-locals entering the community (even a perceived risk has the potential to disturb the community).</li> </ul>   | <ul style="list-style-type: none"> <li>Review of community social (demographic and economic structure) and health through primary and secondary sources had been conducted. This information had been used to inform the Social Impact Assessment.</li> <li>Assessment to be based around location of the camps and also assumptions regarding camp / worker management.</li> </ul>  |
| Vehicle use/ transportation (workforce, supply and support)   | <p><b>Environment</b></p> <ul style="list-style-type: none"> <li>Ambient Air;</li> <li>Noise/ Vibration;</li> <li>Fauna.</li> </ul> <p><b>Social</b></p> <ul style="list-style-type: none"> <li>Economic and Livelihood (+);</li> <li>Disturbance to Terrestrial Transportation.</li> </ul> <p><b>Health</b></p> <ul style="list-style-type: none"> <li>Community Safety and Security.</li> </ul> | <ul style="list-style-type: none"> <li>Access to the sites for Project facilities will be by a combination of existing and new access roads. Potential for: <ul style="list-style-type: none"> <li>Air, noise and vibration emissions; and</li> <li>Disturbance to fauna.</li> </ul> </li> <li>Deliveries of equipment and materials will utilise the existing community roads.</li> <li>The exact number of vehicle and truck movements are uncertain, however it is expected that construction would place additional strain on the local access roads. The additional vehicle movements would also contribute to existing dust and vehicle emissions within the local area &amp; disturbance to the crossing paths of terrestrial mammals.</li> <li>Vessels will be present in the nearshore area during construction and this is likely to affect local water quality and community fishing and movement patterns.</li> <li>Local communities are likely to be exposed to Environmental Noise and Air Quality impacts as a result of heavy traffic within the local area. Potential to cause interference to other road users.</li> <li>The assessment will consider the potential for the Project to significantly contribute to the existing impacts and also the potential for additional traffic congestion to occur as a result of construction traffic.</li> </ul> | <ul style="list-style-type: none"> <li>Assessment required on numbers of vehicle movements and areas of operation in relation to habitats and terrestrial fauna.</li> <li>Basic management strategies would be identified to reduce and manage the potential impacts.</li> <li>A Traffic Survey had been conducted. In addition, the assessment consisted of a qualitative appraisal of expected impacts, based on projected vehicle movements and the existing s conditions.</li> </ul>   |
| Vegetation clearing and land preparation (all Project components)   | <p><b>Environment</b></p> <ul style="list-style-type: none"> <li>Ambient Air;</li> <li>Noise/ Vibration;</li> <li>Soil;</li> <li>Surface Water;</li> <li>Terrestrial Biodiversity &amp; Vegetation; and</li> <li>Visual &amp; Aesthetics.</li> </ul> <p><b>Health</b></p> <ul style="list-style-type: none"> <li>Risk to Human Health; and</li> <li>Community Safety and Security.</li> </ul>     | <ul style="list-style-type: none"> <li>The Project components primarily occur on the locations that have been subject to past clearing and disturbance. Land preparation such as importation of fill will be required.</li> <li>Exhaust emissions and noise from the construction equipment and vehicles involved in site preparation as well as dust generation may temporarily impact Ambient Air and Noise in the immediate area.</li> <li>Surface runoff also has the potential to affect surface/river water and seawater quality as a result of sediment run-off.</li> <li>Land clearance and preparation may displace several terrestrial fauna from the proposed Project area.</li> <li>Based on publicly available localised health data, the respiratory illness is one of the most common community diseases in the area.</li> <li>Settlement areas are located close to the construction areas and particularly the CCGT site.</li> <li>An increase in dust emissions may potentially affect nearby community health while they may also be placed at risk of injury due to the presence of heavy equipment within the area.</li> <li>Movement of heavy vehicles and increased of local traffic are expected to be significant and this will pose a safety risk to local communities.</li> </ul>   | <ul style="list-style-type: none"> <li>Impacts to Ambient Air and Noise as a result of plant and equipment had been considered.</li> <li>For the Noise and Ambient Air, the ESIA identified the sensitive receptors, and provided a qualitative assessment of the predicted impacts from construction at all onshore facilities. In addition, noise baseline data had been sampled at all proposed Project area.</li> <li>Mitigation measures had been developed for implementation.</li> <li>Surface water impacts would be expected to be temporary only and construction management measures would be capable of managing this.</li> <li>Terrestrial Biodiversity Survey had been conducted to identify fauna existence within the Project area. This includes the Protected Forest, Java Coastal Zone Endemic Bird Area, Migratory Birds and Mangrove Habitat.</li> <li>The existing community health condition, particularly disease status had been considered as part of the assessment.</li> </ul> |
| Installation of (onshore) Project structural, mechanical, electrical components. (all Project components) | <p><b>Environment</b></p> <ul style="list-style-type: none"> <li>Ambient Air;</li> <li>Noise;</li> <li>Soil and Groundwater;</li> <li>Surface Water;</li> <li>Terrestrial Biodiversity &amp; Vegetation; and</li> <li>Seawater</li> </ul>   | <ul style="list-style-type: none"> <li>Construction will occur for approximately three (3) years.</li> <li>Construction activities will have potential to produce Noise, Vibration and Ambient Air impacts while run-off to the marine environment from nearshore construction may potentially affect seawater quality.</li> <li>It is expected that some basic construction management measures will be capable of managing most environmental impacts.</li> </ul>  | <ul style="list-style-type: none"> <li>Assessment to be based on the existing baseline within the Project area and surrounding the environment.</li> <li>For the Noise and Ambient Air, ESIA identified the sensitive receptors, and provided a qualitative assessment of the predicted impacts from construction at all onshore facilities. In addition, Surface Water, Soil &amp; Groundwater, Noise and Ambient Air baseline data had been sampled at all proposed Project area.</li> <li>Terrestrial Biodiversity Survey had been conducted to identify fauna existence within the Project area. This includes Protected Forest, Java Coastal Zone Endemic Bird Area, Migratory Birds and Mangrove Habitat.</li> </ul>   |

| Stages/ Activities   | Key Issues  | Potential Impacts   | Data Requirements and Proposed Assessment   |
|--|---|---|---|
|  | <p><b>Social</b></p> <ul style="list-style-type: none"> <li>Economy and Livelihood (+/-); and</li> <li>Disturbance to Marine or Terrestrial Transportation.</li> </ul> <p><b>Health</b></p> <ul style="list-style-type: none"> <li>Risk to Human Health; and</li> <li>Community Safety and Security</li> </ul>  | <ul style="list-style-type: none"> <li>Housing is located close to the construction sites and particularly the CCGT Power Plant.</li> <li>Increased in dust and noise &amp; vibration may potentially affect nearby community health while they may also be placed at risk of injury due to the presence of heavy equipment within the area and transportation.</li> <li>There is also a risk of a decline in environmental quality particularly if construction wastes are not appropriately managed.</li> </ul>   | <ul style="list-style-type: none"> <li>Review of Ambient Air and Noise impact assessment result, along with existing Community Health and Safety.</li> </ul>  |
| Construction of Jetty and nearshore facilities                       | <p><b>Environment</b></p> <ul style="list-style-type: none"> <li>Ambient Air;</li> <li>Noise &amp; Vibration;</li> <li>Soil;</li> <li>Surface Water;</li> <li>Terrestrial Biodiversity &amp; Vegetation;</li> <li>Seawater;</li> <li>Seabed;</li> <li>Benthic communities; and</li> <li>Marine Biodiversity.</li> </ul> <p><b>Social</b></p> <ul style="list-style-type: none"> <li>Economy and Livelihood;</li> <li>Disturbance to Marine or Terrestrial Transportation; and</li> <li>Social/ cultural Structure.</li> </ul> <p><b>Health</b></p> <ul style="list-style-type: none"> <li>Community Safety and Security.</li> </ul> | <ul style="list-style-type: none"> <li>Jetty construction and the access road will require nearshore land preparation and also piling to establish the jetty foundations and dredging to provide access.</li> <li>This is likely to result in a range of impacts including disturbance to marine fauna as a result of noise, reduction in surface water quality as a result of sediment mobilisation and generation of Noise and Ambient Air impacts as a result of vessel and construction equipment presence.</li> <li>No sensitive marine habitats are known to occur in close proximity to the jetty construction area. Noise &amp; Vibration impacts and Ambient Air impacts are expected to be temporary and would occur during construction only.</li> <li>In addition, the anoxic conditions in the mangrove soils can have adverse effects on growth as they facilitate the microbial conversion of sulphate, which is abundant in seawater, to sulphides, which are toxic to plants. Anthropogenic inputs of sulphur into the ecosystems and organic loads into freshwater and marine systems may lead to higher sulphide production rates.</li> <li>Community fishing and marine transport activities are likely to be affected during construction which may trigger potential community complaints, depending on the level of disturbance.</li> <li>Particularly at times when exclusion zones may be enforced. Community livelihoods are likely to be affected from the provision of goods and services to support the construction.</li> <li>The nearshore area is primarily used by smaller fishing vessels. The presence of construction equipment and vessels has the potential to result in an increased risk of collision.</li> </ul> | <ul style="list-style-type: none"> <li>Assessment to be based on studies completed in the Project area and surrounding environment in order to understand the proximity of sensitive environmental receptors.</li> <li>This had been based on the findings of the nearshore surveys for soil, surface/river water quality, seawater/sediment sampling, available historical data and published secondary data of marine biodiversity.</li> <li>Modelling of sedimentation dispersion during dredging activities had been conducted.</li> <li>For the Noise and Ambient Air, the assessment identified sensitive receptors, and provided a Qualitative Assessment of the predicted impacts from construction.</li> <li>Mitigation measures had been developed for implementation.</li> <li>The social baseline had been used to understand community livelihoods such as fishing, and also transport activities along the coastline.</li> <li>An RP is being developed to understand livelihood impacts and also a grievance mechanism has been developed to help address complaints.</li> <li>This will also be used as the basis for understanding community safety risks and developing appropriate mitigations.</li> </ul> |
| FSRU establishment and vessel presences                              | <p><b>Environment</b></p> <ul style="list-style-type: none"> <li>Seawater;</li> <li>Seabed;</li> </ul>  | <ul style="list-style-type: none"> <li>Current estimates are that 80,000m<sup>3</sup> of material will be dredged for the jetty. Significant seabed disturbance will also be required for pipeline installation.</li> </ul>   | <ul style="list-style-type: none"> <li>Assessment to be based on existing baseline from the Project area and surrounding environment as well as the results of the site visit.</li> </ul>   |
| Subsea pipeline construction, dredging and disposal.                 | <ul style="list-style-type: none"> <li>Benthic Communities; and</li> <li>Marine Biodiversity.</li> </ul>  | <ul style="list-style-type: none"> <li>Dredging and pipeline installation will result in elevated TSS levels in the surrounding seawater and will also result in impacts to underwater noise and reduction of seawater quality.</li> </ul>  | <ul style="list-style-type: none"> <li>An impact assessment had been developed around a set of agreed assumptions regarding the presence of marine habitats and the proposed extent of dredging and pipeline installation activities.</li> </ul>  |
| Pipeline hydrotesting  |   | <ul style="list-style-type: none"> <li>The dredging and pipeline installation methods are to be confirmed but it is expected that management plans and monitoring will be put in place to reduce potential environmental impacts.</li> </ul>  | <ul style="list-style-type: none"> <li>This had been based on the findings of the offshore survey for seawater/sediment sampling and available historical data and available published secondary data information on the presence of marine biodiversity within/nearby the Project area.</li> </ul>   |
| Tie-in & Commissioning   |   | <ul style="list-style-type: none"> <li>Seabed will be disturbed during the mooring of FSRU. The exclusion zones will be established around the FSRU and this will affect local fishing and transport.</li> </ul>  | <ul style="list-style-type: none"> <li>Modelling of sedimentation dispersion during dredging activities had been conducted.</li> </ul>  |
|  | <p><b>Social</b></p> <ul style="list-style-type: none"> <li>Economy and Livelihood;</li> <li>Disturbance to Marine or Terrestrial Transportation; and</li> <li>Social/ cultural Structure.</li> </ul> <p><b>Health</b></p> <ul style="list-style-type: none"> <li>Community Safety and Security; and</li> <li>Environmental Quality.</li> </ul>   | <ul style="list-style-type: none"> <li>Fishing activities are known to occur in Pamanukan Bay and these may be disturbed by dredging and other marine construction activities.</li> <li>In addition, the results of the environmental impact will also be used to consider secondary impacts to fishing areas as a result of increased TSS levels.</li> <li>Based on this information, the social assessment will consider the extent and significance of potential impacts to fisherman's livelihoods as a result of dredging and identify necessary management and mitigation measures.</li> </ul>  | <ul style="list-style-type: none"> <li>The impact to community fishing activities and potential risks had been considered as part of the social assessment.</li> <li>This had also been based around some agreed construction and management assumptions.</li> </ul>  |
| Construction wastes and wastewater generation, handling and disposal | <p><b>Environment</b></p> <ul style="list-style-type: none"> <li>Soil and Groundwater;</li> <li>Surface Water;</li> <li>Visual &amp; Aesthetics.</li> </ul>   | <ul style="list-style-type: none"> <li>Construction will generate a variety of waste products (including hazardous wastes), which will require storage and disposal.</li> <li>If not properly managed, these can lead to contamination and unnecessary impacts to surrounding communities.</li> <li>The location of waste disposal sites will need to be confirmed as part of the follow-up construction management. It is expected that impacts and risks to the community could be appropriately managed, through implementation of sound on-site waste management practices.</li> </ul>  | <ul style="list-style-type: none"> <li>Assessment of impacts to be developed based on likely waste types and volumes and also management measures which would be expected to be implemented by the Project.</li> </ul>  |

| Stages/ Activities                          | Key Issues  | Potential Impacts   | Data Requirements and Proposed Assessment   |
|---|---|---|---|
|   | <p><b>Social</b></p> <ul style="list-style-type: none"> <li>Economy and Livelihood;</li> <li>Social/ cultural Structure; and</li> <li>Resource Use.</li> </ul> <p><b>Health</b></p> <ul style="list-style-type: none"> <li>Risk to Human Health;</li> <li>Environmental quality; and</li> <li>Communicable and Non-communicable disease.</li> </ul>                           | <ul style="list-style-type: none"> <li>Settlement areas are located in close proximity to the construction sites. There is the potential for environmental quality to be affected if wastes are not properly managed and disposed of. This may also pose a risk to community safety and health. It is expected that this could be readily managed through adoption of sound waste management and storage practices.</li> </ul>  | <ul style="list-style-type: none"> <li>Assessment of impacts to be developed based on the likely waste and emission types, volumes, and disposal location, also management measures which would be expected to be implemented by the Project.</li> </ul>  |
| Power Generation                            | <p><b>Environment</b></p> <ul style="list-style-type: none"> <li>Ambient Air; and</li> <li>Noise.</li> </ul> <p><b>Health</b></p> <ul style="list-style-type: none"> <li>Environmental quality</li> </ul>   | <ul style="list-style-type: none"> <li>At this stage it is understood that diesel generators will be required to provide power during construction.</li> <li>These are likely to be a temporary source of Noise and Ambient Air emissions.</li> <li>Settlement areas are located close to the construction sites and power generation during construction will be a source of Environmental Noise and Air Quality disturbance.</li> <li>While there are other Environmental Noise generating industries currently located within the local area, impacts from the introduction of new Environmental Noise sources will need to be considered.</li> </ul>  | <ul style="list-style-type: none"> <li>Review of existing Ambient Air and Noise baseline data.</li> <li>Modelling of Noise and Ambient Air had been conducted.</li> </ul>   |
| Pipeline Hydrostatic Testing                | <p><b>Environment</b></p> <ul style="list-style-type: none"> <li>Surface/ River Water; and</li> <li>Noise &amp; Vibration.</li> </ul>   | <ul style="list-style-type: none"> <li>Pipeline hydrostatic testing will be required prior to commissioning to test the pipe network.</li> <li>The volume of water to be used is +10.038 m<sup>3</sup> of seawater and +4.148 m<sup>3</sup> of freshwater. Additives used will be the Tetrakis Hydroxymethyl Phosponium Sulphate (THPS) for biocides and Ammonium Bisulphide as the oxygen scavenger; however any discharge would need to ensure that the IFC discharge standards are met. In addition, water supply is expected to be sourced from seawater.</li> <li>This may have the potential to affect local water quality; however impacts would be temporary in nature.</li> </ul>  | <ul style="list-style-type: none"> <li>A Qualitative Assessment to be conducted based on an understanding of likely discharge volumes and discharge and their impacts on the Surface Water Quality.</li> </ul>  |
| Tie-in and Commissioning                    | <p><b>Environment</b></p> <ul style="list-style-type: none"> <li>Air;</li> <li>Noise &amp; Vibration.</li> </ul>  | <ul style="list-style-type: none"> <li>This has the potential to generate temporary Noise and Air Quality impacts while the terminal facility is tested. Impacts are likely to be temporary in nature only.</li> </ul>  | <ul style="list-style-type: none"> <li>A Qualitative Assessment to be conducted based on an understanding of likely Noise and emissions generating activities.</li> </ul>   |
| <b>Operations</b>                           |   |   |   |
| Workforce Presence                          | <p><b>Social</b></p> <ul style="list-style-type: none"> <li>Economy and Livelihood (+/-);</li> <li>Social/Cultural Structure;</li> <li>Resource use; and</li> <li>Infrastructure/ Public Services</li> </ul> <p><b>Health</b></p> <ul style="list-style-type: none"> <li>Communicable and Non-Communicable Diseases; and</li> <li>Community Safety &amp; Security.</li> </ul> | <ul style="list-style-type: none"> <li>The Project has the potential to have a positive impact on the community through generation of new employment and training opportunities.</li> <li>Improved disposable income also has the potential to improve employee lifestyles and create flow-on economic benefits in the community such as through generating greater demand for local businesses/economic activity.</li> <li>Negative impacts on the livelihoods and the economic situation of households that may not receive direct economic benefit, but are exposed to impacts often associated with economic development (e.g. increase in land prices, increases in cost of goods and services; construction impacts);</li> <li>Social/cultural tension from the introduction of workers from outside the area with different cultural values/characteristics.</li> <li>Influx issues such as increasing demand for infrastructure and goods and services (e.g. medical, transport, business). This has the potential to negatively affect the community if it results in decreased access or quality of services and infrastructure available prior to the Project commencing.</li> <li>Introduction of communicable diseases from non-local workers</li> <li>Crime or sense of concern as a result of non-locals entering the community (even a perceived risk has the potential to disturb the community).</li> </ul> | <ul style="list-style-type: none"> <li>To undertake social surveys that includes consultation with affected communities and visual assessment of villages and existing environment. These had helped to identify potential impacts, community concerns and build an understanding of the areas of potential investment for the Project.</li> <li>Review of community social (demographic and economic structure) through primary and secondary sources had also been conducted. This information had been used to inform the Social Impact Assessment.</li> <li>Review of community social (demographic and economic structure) and health through primary and secondary sources had also been conducted. This information had been used to inform the Social Impact Assessment.</li> <li>Assessment to be based around location of the camps and also assumptions regarding camp / worker management.</li> </ul> |
| Equipment and material transport and supply | <p><b>Environment</b></p> <ul style="list-style-type: none"> <li>Ambient Air; and</li> <li>Noise.</li> </ul>  | <ul style="list-style-type: none"> <li>Additional vehicle movements as part of provision of goods and services will be required during Project operations; this is likely to create expectation from local community for business opportunities.</li> </ul>   | <ul style="list-style-type: none"> <li>A Qualitative Assessment has been conducted. This has been based on the outcomes of Traffic survey.</li> </ul>   |

| Stages/ Activities  | Key Issues  | Potential Impacts   | Data Requirements and Proposed Assessment   |
|---|---|---|---|
|   | <p><b>Social</b></p> <ul style="list-style-type: none"> <li>Infrastructure and Public Services;</li> <li>Disturbance to Marine or Terrestrial Transportation; and</li> <li>Social/ Cultural Structure.</li> </ul> <p><b>Health</b></p> <ul style="list-style-type: none"> <li>Community Safety and Security.</li> </ul>   | <ul style="list-style-type: none"> <li>The number of trucks is to be confirmed and this has the potential to increase traffic congestion, along already busy local transport routes, which could increase risk to community safety and security.</li> </ul>   | <ul style="list-style-type: none"> <li>Operational traffic volumes are unlikely to significantly increase local traffic volumes.</li> </ul>   |
| Generation, handling and disposal of wastes   | <p><b>Environment</b></p> <ul style="list-style-type: none"> <li>Surface Water; and</li> <li>Seawater.</li> </ul>   | <ul style="list-style-type: none"> <li>There will be a number of sources of waste during the operational phase requiring disposal. This includes domestic waste associated with onsite workers, and general operational waste. Disposal of these in a manner that is environmental unsound could lead to impacts off site.</li> <li>Finally, marine discharges will occur as a result of cooling tower blowdown and treated wastewater discharge. This Project will use an indirect wet cooling system (cooling towers) which significantly reduces the thermal discharge to the environment compared to direct once through cooling system.</li> </ul> | <ul style="list-style-type: none"> <li>Waste inventories and disposal methods had been outlined in ESIA and assessed for their potential to impact the environment.</li> <li>Quality and volumes of wastewater streams had been assessed within the ESIA by comparing waste volumes and quality with the relevant guidelines.</li> <li>Impacts to marine benthic communities would be considered.</li> <li>Modelling of processing cooling discharges would be conducted to comply with IFC EHS guidelines which require that the temperature of cooling water discharge is within 3° Celsius of ambient temperature at the edge of the mixing zone.</li> </ul> |
|   | <p><b>Social</b></p> <ul style="list-style-type: none"> <li>Environmental quality</li> </ul>  | <ul style="list-style-type: none"> <li>Waste management, treatment and disposal could lead to impacts on the community if not properly managed. Impacts may include changes to the environment in which they live, affecting their economic livelihood and use of natural resources (e.g. impacts to water quality and effects on the fishing industry), and increasing risk to community health (e.g. through exposure to hazardous materials, and spreading disease (e.g. from sanitation).</li> </ul>  | <ul style="list-style-type: none"> <li>Undertake social surveys that include consultation with affected communities and a visual assessment of villages and existing environment.</li> <li>These helped to identify concerns associated with the Project and characteristics of each affected villages which will assist in identifying significance of impacts associated with waste.</li> </ul>   |
| Transmission line presence and operation  | <p><b>Environment</b></p> <ul style="list-style-type: none"> <li>Noise;</li> <li>Fauna.</li> </ul>  | <ul style="list-style-type: none"> <li>The operational of Transmission Line may have an impact on the existing Ambient Air, Noise and EMF radiation. The presence of physical infrastructure i.e. tower footings, cables will have visual and aesthetics impacts and may be potentially hazard to the terrestrial mammals i.e. birds, bats.</li> </ul>  | <ul style="list-style-type: none"> <li>Noise and EMF Surveys had been conducted to identify impacts of transmission line during operations.</li> <li>In addition, Terrestrial Biodiversity Survey had been conducted to identify existence of terrestrial mammals within the Project area. This includes Protected Forest, Java Coastal Zone Endemic Bird Area, Migratory Birds and Mangrove Habitat.</li> </ul>  |
|   | <p><b>Health</b></p> <ul style="list-style-type: none"> <li>Risk to Human Health.</li> </ul>  | <ul style="list-style-type: none"> <li>The Project may result in community health impacts e.g. due to EMF from the transmission lines.</li> </ul>   | <ul style="list-style-type: none"> <li>To undertake social surveys that includes consultation with affected communities and undertake EMF, noise and air sampling and assessment.</li> </ul>  |
| Power Plant, Jetty, FSRU, vessel presence and operations (including LNG Deliveries) | <p><b>Environment</b></p> <ul style="list-style-type: none"> <li>Ambient Air;</li> <li>Noise;</li> <li>Seawater;</li> <li>Sediments/Benthos; and</li> <li>Marine Biodiversity.</li> </ul>   | <ul style="list-style-type: none"> <li>Jetty and FSRU activities have the potential to affect the marine environment including introduction of IMS; decline in water quality, vessel strike and noise impacts (including those to marine fauna including marine mammals). Vessel emissions may also affect local ambient air quality.</li> <li>The presence of the jetty may also have the potential to affect nearshore sediment transport patterns.</li> </ul>  | <ul style="list-style-type: none"> <li>Marine assessment to consider Jetty and FSRU operations and activities such as vessel movements and management as well as in material unloading practices.</li> <li>The assessment had been based on baseline data collected during the field surveys and available published secondary data, including information on the likely sensitivity of the local marine environment.</li> <li>Modelling of cooling water discharge from the FSRU had been conducted.</li> </ul>  |
|   | <p><b>Social</b></p> <ul style="list-style-type: none"> <li>Economy and Livelihood i.e. fishing activities and marine tourism and recreation;</li> <li>Disturbance to Marine or Terrestrial Transportation Structure.</li> </ul> <p><b>Health</b></p> <ul style="list-style-type: none"> <li>Community Safety and Security</li> </ul> <p><b>Health</b></p> <ul style="list-style-type: none"> <li>Community Safety and Security.</li> </ul> | <ul style="list-style-type: none"> <li>Fishing occurs in the vicinity of the Jetty and in Pamanukan Bay.</li> <li>Local fishermen may be placed at risk due to vessel activities, while exclusion zones around the jetty and FSRU will be put in place which would affect local community vessel traffic.</li> <li>This has the potential to impact fishermen incomes and livelihoods.</li> </ul>   | <ul style="list-style-type: none"> <li>The social survey had been used to understand fishing activities and the potential significance of disturbance to these activities and a RP is being developed. A Grievance Mechanism will be in place to manage complaints and assess if compensation is required.</li> <li>Jetty and vessel management activities to be confirmed and assessment to be conducted in light of proposed exclusion zone provisions.</li> </ul>  |
| Operational Noise   | <p><b>Environment</b></p> <ul style="list-style-type: none"> <li>Noise; and</li> <li>Visual &amp; Aesthetics.</li> </ul> <p><b>Health</b></p> <ul style="list-style-type: none"> <li>Environmental Quality.</li> </ul>  | <ul style="list-style-type: none"> <li>The CCGT Power Plant operations will be the source of additional Noise Emissions within the local area. Receptors are located in close proximity to the CCGT Power Plant. In addition, the FSRU will also be a source of operational Noise</li> </ul>  | <ul style="list-style-type: none"> <li>Noise Modelling had been completed for the FSRU and CCGT Power Plant on the basis of considering impacts to the surrounding receptors.</li> </ul>  |

| Stages/ Activities                                       | Key Issues  | Potential Impacts   | Data Requirements and Proposed Assessment  |
|--|---|---|--|
| Operational Air Emissions                                | <p><b>Environment</b></p> <ul style="list-style-type: none"> <li>Ambient Air;</li> <li>Vegetation</li> </ul> <p><b>Health</b></p> <ul style="list-style-type: none"> <li>Environmental Quality.</li> </ul>  | <ul style="list-style-type: none"> <li>The CCGT Power Plant will be the source of air emissions. The operational emissions have the potential to negatively contribute to local air quality conditions, which may in turn affect the local community. The Project will also contribute additional GHG to the atmosphere.</li> <li>Operational Air Quality impacts are of particular concern given the size of the Power Plant. NOx has been identified as the emission of most likely concern. Exhaust emissions from operational traffic, plant and any other exhaust emitting items associated with the Project have the potential to change the local air quality. The composition of engine exhaust emissions is expected to be primarily NOx and CO with small quantities of hydrocarbons.</li> <li>Salt dispersion from the cooling towers may also affect surrounding vegetation and land uses.</li> <li>Emissions of Greenhouse Gases (GHGs) during operations have the potential to contribute to anthropogenic climate change.</li> </ul> | <ul style="list-style-type: none"> <li>Air quality modelling had been completed and to be used as the basis for assessing impacts to the community and environment.</li> <li>Assessment of predicted impacts of air pollutants will include the Nitrogen Dioxide (NO<sub>2</sub>), and Ozone (O) baseline sampling (as agreed between the Project Sponsors and Lenders).</li> <li>An appraisal of likely GHG to confirm what specific management might be required by the Project.</li> <li>Assessment of salt dispersion impacts had been conducted.</li> </ul> |
| Operational Water usage                                  | <p><b>Social</b></p> <ul style="list-style-type: none"> <li>Resource Use.</li> </ul>  | <ul style="list-style-type: none"> <li>Operational water supply will be sourced from seawater and treated prior to use.</li> <li>Operational freshwater is expected to be primarily from desalinated seawater while potable freshwater may also be trucked to site for construction.</li> <li>The bulk of the Project's water requirements would be met by seawater and as such impacts are unlikely. It is understood that no groundwater or other freshwater sources would be utilised by the Project.</li> </ul>   | <ul style="list-style-type: none"> <li>Assessment to concentrate on various alternative water supply options and the potential to the Project to place a strain on local domestic water supplies.</li> </ul>   |
| <b>Non-Routine Events (Onshore/Offshore)</b>             |   |   |  |
| Process Upset/<br>Emergency Flaring                      | <p><b>Environment</b></p> <ul style="list-style-type: none"> <li>Ambient Air;</li> <li>Noise; and</li> <li>Visual &amp; Aesthetics.</li> </ul> <p><b>Health</b></p> <ul style="list-style-type: none"> <li>Environmental quality.</li> </ul>  | <ul style="list-style-type: none"> <li>The Projects base case is that flaring will not occur at the ORF and FSRU. If required, it will release emissions to the environment and may be a significant source of Environmental Noise and light, over a temporary period only.</li> <li>This has the potential to negatively affect the local community.</li> </ul>  | <ul style="list-style-type: none"> <li>Assessment of the likely frequency of flaring events and also the extent of possible impact or disturbance caused. This had taken into account likely provisions of Emergency Response to be implemented.</li> </ul>  |
| Spillage of fuel, oil, chemicals and hazardous materials | <p><b>Environment</b></p> <ul style="list-style-type: none"> <li>Soil;</li> <li>Groundwater;</li> <li>Surface Water;</li> <li>Seawater;</li> <li>Faun;</li> <li>Marine habitats/ marine fauna</li> </ul> <p><b>Social</b></p> <ul style="list-style-type: none"> <li>Economics and Livelihood i.e. fishing activities and marine tourism and recreation.</li> </ul> <p><b>Health</b></p> <ul style="list-style-type: none"> <li>Community Safety and Security.</li> </ul> | <ul style="list-style-type: none"> <li>The Project has a range of potential spill sources during construction and operations. It is expected that smaller, land based spills could be readily contained and clean-up with appropriate equipment.</li> <li>Marine spills during vessel operations or larger scale non- containment events associated with LNG have the potential to result in more serious environmental damage and have the potential to affect the local community.</li> <li>It is expected that the Project will implement and maintain industry practice emergency response provisions and that these would be capable of readily addressing and responding to most events.</li> </ul>   | <ul style="list-style-type: none"> <li>Project to assess based on the most significant risk scenarios. This had taken into account likely provisions of Emergency Response to be implemented.</li> </ul>   |
| Accidental Events e.g. Vessel & Vehicles                 | <p><b>Environment</b></p> <ul style="list-style-type: none"> <li>Soil &amp; Groundwater;</li> <li>Surface Water;</li> <li>Seawater;</li> <li>Seabed;</li> <li>Benthic communities; and</li> <li>Marine Biodiversity</li> </ul> <p><b>Social</b></p> <ul style="list-style-type: none"> <li>Economy and Livelihood i.e. fishing activities.</li> </ul> <p><b>Health</b></p> <ul style="list-style-type: none"> <li>Community Safety and Security.</li> </ul>               | <ul style="list-style-type: none"> <li>Increased road and maritime traffic will occur as a result of the Project and particularly during operations; some of which will be transporting highly flammable substances.</li> <li>It is assumed that the Project would implement a range of operational safety measure to manage the transport of LNG and Gas during operations.</li> </ul>   | <ul style="list-style-type: none"> <li>Assessment based on an understanding of likely control and mitigation measures which would be expected to be implemented by the Project.</li> <li>This had taken into account likely provisions of Emergency Response to be implemented.</li> </ul>   |
| Fire/Explosions (Facilities)                             | <p><b>Environment</b></p> <ul style="list-style-type: none"> <li>Ambient Air;</li> <li>Noise; and</li> <li>Visual &amp; Aesthetics.</li> </ul> <p><b>Social</b></p> <ul style="list-style-type: none"> <li>Economy and Livelihood i.e. fishing activities.</li> </ul>   | <ul style="list-style-type: none"> <li>Fire or Explosion Risk at the ORF, FSRU and CCGT Power Plant have the potential to be catastrophic and it is expected that industry hazard and HAZOP studies will be developed by the Project to better understand and manage operational safety risks.</li> </ul>   | <ul style="list-style-type: none"> <li>A Quantitative Risk Assessment (QRA) for the FSRU had been conducted based on an understanding of likely control and mitigation measures which would be expected to be implemented by the Project.</li> <li>The assessment had considered the proximity of local communities to the Project.</li> <li>This had taken into account likely provisions of Emergency Response to be implemented.</li> </ul>   |

| Stages/ Activities         | Key Issues  | Potential Impacts  | Data Requirements and Proposed Assessment  |
|----------------------------|---|--|--|
|                            | <u>Health</u><br>• Community safety and security.   |  |  |
| Transmission line break    | <u>Health</u><br>Community safety and security.   | • Break in the transmission line poses an electrical and physical impact risk to individuals and community property.   | • Assessment of risk and in built controls, together with assessment of distance to local community infrastructure.                            |
| Natural hazards (flooding) | <u>Environment</u><br>• Soil;<br>• Surface water;<br>• Vegetation; and<br>• Fauna.<br><u>Social</u><br>• Economy and Livelihood.<br><u>Health</u><br>• Environmental quality. | • Elevation of the Power Plant and substation above the surrounding land for flood protection may, itself contribute to flooding of surrounding areas in the event of high rainfall, run-off of river overflow. This has the potential to submerge vegetation, affect surrounding land cultivation and reduce quality of conditions for the surrounding communities. | • Flood study to assess the flow of waters in a flood event, including the surrounding area and nearby potential reach to community receptors. |

Note: The scoping exercise was conducted in November 2017, as such any changes of Project information provided in Table 5-2 has been updated in Impact Assessment (IA) process.

## 6.1 OVERVIEW

Stakeholder engagement is the process of communicating with and seeking feedback from stakeholders. This helps to ensure that stakeholder interests are taken into consideration in the decision-making process. It typically forms an integral part of an organisation's approach to business, including the development and implementation of projects and activities.

A Stakeholder Engagement Plan (SEP) was prepared to document the methods and process by which its stakeholders and other interested parties are consulted in relation to the proposed Project.

The SEP document also outlines the Grievance Mechanism (GM), which should be adopted and implemented by JSP, the EPC and other subcontractors. The GM provides a process by which stakeholders and / or interested parties can raise their complaints, concerns and observations and for the Project to address genuine items in a timely and agreeable manner.

The SEP was developed based on the following guidelines in terms of stakeholder engagement and disclosure:

- *International Finance Corporation (IFC) – Stakeholder Engagement; A Good Practice Handbook for Companies Doing Business in Emerging Markets;*
- *Asian Development Bank (ADB, 2006 - Strengthening Participation for Development Results: A Staff Guide to Participation and Development; and*
- *World Bank EHS Guidelines for Electric Power Transmission and Distribution, 2007.*

ADB requires the Project to undertake meaningful consultation as defined under ADB Safeguard Policy Statement (SPS, 2009) as follows:

*A process that (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle; (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.*

Based on the above the ADB requires the Project to engage with communities, groups, or people affected by the proposed Project, and with civil society through information disclosure, consultation, and informed participation in a

manner commensurate with the risks to and impacts on affected communities. For projects with significant adverse environmental, involuntary resettlement, or Indigenous Peoples impacts, ADB project teams will participate in consultation activities to understand the concerns of affected people and ensure that such concerns are addressed in project design and safeguard plans.

A number of consultation activities during the Project planning phase were conducted, largely with various government agencies as well as communities in the vicinity of the Project facilities. This consultation will continue throughout the Project development.

## 6.2 *PROJECT STAKEHOLDERS*

### 6.2.1 *Project Stakeholders Identified During AMDAL and ESIA Consultation Process*

The key Project stakeholders have been identified based on several categories. The first level is government who has an important role in the approval process; the second are those that are potentially directly impacted by the Project; the third category involves any interest parties namely Non-Governmental Organisations/Community Based Organisation who can create a potential delay or raise reputation concerns related to the Project.

The two (2) principal categories of stakeholders for this Project include:

1. **Affected parties;** people / entities directly affected by the Project and / or have been identified as most vulnerable to change and who need to be engaged in identifying impacts and their significance, as well as in decision-making on mitigation and management measures, namely:
  - *Sub-District / Local Government* - This stakeholder group consists of the village head or representatives of the village government who live in the villages within the Project footprint. The area covers a total of 37 villages, considered as potentially impacted by the Project;
  - *Host Community* - This stakeholder group includes all local residents potentially exposed to significant impacts due to Project construction and operation. Mainly related to the potential construction and operational impacts onshore and offshore and the Project's need for land. A particular focus is on the community of Cilamaya considering the main Project activities and Power Plant will be located nearby which potentially can have diverse and significant impacts on the local community;
  - *Traditional Institutions* - This stakeholder group consists of individuals who live in villages within the Project footprint that have a social and cultural legitimacy and are considered influential within

the community. Of importance is the Nadran festival that is conducted in Blanakan each year. Prior to this event the Project will consult with the village authorities to agree appropriate mitigations to avoid impact to the festival;

- *Landowners* – This stakeholder group includes people affected by land acquisition process (transmission line route, pipeline right of way, access roads, water intake and jetty) for the Project and those who may be temporarily impacted by laydown areas and access routes. This will be applied for landowners impacted by the development of the substation and the 500 kV Transmission Line (52 km) in 35 villages in the Regency of Karawang and Bekasi, landowners along the onshore pipeline ROW, area to be acquired for access road and area to build the Jetty;
- *Former Cultivators of Pertamina's land (Land users)* – This stakeholder group consists of farmers or local residents who formerly conducted farming activities on the land that will be used for the Power Plant development. Pertamina has engaged with these stakeholders and requested them to stop activities on the land. As of mid-2017 no further activities have occurred. Pertamina provided the opportunity for these land users to participate in a separate CSR activity (raising sheep); some are now participating whilst others declined due to other priorities. This is further discussed in the RP and ESIA.
- *Vulnerable Groups* – This stakeholder group consists of the Skewer maker females, owners of kiosks residing next to the Project's location in Cilamaya village and groups of community residing in the protected forest. Details of this stakeholder group are discussed in separate section of this report;
- *Fishermen Groups* - This stakeholder group includes all fishermen living in the area or village of Muara and Blanakan. These fishermen will likely be impacted by the installation of the offshore facilities and operation of the FSRU, construction and operation of the seawater intake and seawater discharge pipeline and construction and operation of the jetty. These fishermen conduct their fishing activities in the waters around the Project site; fishing is their main livelihood and source of income; and/or
- *Squatters* – This stakeholder group includes people who have settled within the Project area illegally and have constructed housing, local businesses or conduct agricultural activities on land that will be acquired by the Project.

- *Private and Public Users of the Marine Environment* - The Project will construct some equipment and facilities along the coastal and sea (FSRU). During construction there will be a possibility that some Project activities may impact other marine users or those using existing transportation routes, such as oil and gas companies, shipping companies, port authorities and commercial fishing operators.
- *Road Users and Businesses in and Around Cilamaya* - In order to construct the power plant, jetty and pump house, and the access road etc. the Project will result in road traffic in and out of Cilamaya during the construction period. As such, there will be an impact on other road users and likely fuel providers and businesses along the main routes. As such, these stakeholders will be consulted with prior to heavy periods of traffic.

2. **Other interested parties;** people / entities that are interested in the Project and / or could affect the Project in some way, namely:

- *Central Government* - This stakeholder consists of the Ministry of Environmental and Forestry (MOEF) who is considered as having the most crucial role in the AMDAL approval process.
- *Provincial/Regional Government* - Agencies under the administration of West Java Province Government and Karawang, Bekasi and Subang Regency Government. These government agencies have an important role in the AMDAL approval process.
- *Law Enforcement Agency* - This includes the District Sector Police and District Military Command of Cilamaya Wetan, Cilamaya Kulon, Tempuran, Pedes, Rawamerta, Kedungwaringin, Cikarang Timur and Karang Bahagia.
- *National Level Non-Governmental Organisations* - This consists of national or local based level NGOs namely *Wahana Lingkungan Hidup* Foundation (WALHI). Through various media coverage this NGO has actively observed the development of infrastructure projects in Indonesia including the development of various power plants to ensure its development in accordance with environmental and social norms. However to date, this Project has not been identified as concerning to the NGOs.
- *Local Level Non-Governmental Organisation* - This stakeholder group consists of local-based community organisations namely Karang Taruna (Local Youth Organisation), *Gerakan Masyarakat Bawah Indonesia* (GMBI), *Badan Pembinaan Potensi Keluarga Besar Banten* (BPKB); *Ikatan Putra*

*Daerah* (IKAPUD); and *Pemuda Pancasila* (PP). These stakeholders were assessed through information provided by a number of head villages interviewed during the baseline data collection phase.

- **Private Companies** – Although not directly impacted may have a vested interest in the Project’s planned activities. This may include local contractors interested in procuring services to the Project and those potentially neighboring the site (e.g. SKG Cilamaya).
- **General Public** – This stakeholder group is wide encompassing a broad range of people largely those residing outside the Project area. Interests may be related to employment, environmental protection etc.

Based on the results of the consultations, stakeholders were analysed considering their interest, influence or power and perception in relation to the Project and whether they are a party who will be affected or who will be affecting the Project.

**Table 6-1** summarises the key Project stakeholders based on their group:

**Table 6-1** *Key Project Stakeholders*

| Item | Group                             | Stakeholders   |
|------|-----------------------------------|--|
| 1    | Central Government                | Ministry of Environmental and Forestry   |
| 2    | Provincial / Regencies Government | <ul style="list-style-type: none"> <li>• Environmental Agency (DLHK) of Karawang Regency;</li> <li>• Bekasi dan Karawang Energy and Mineral Resources Agency;</li> <li>• Kanwil BPN (National land Agency in Jawa Barat Province);</li> <li>• Development Planning Agency at Sub-National Level (BAPPEDA);</li> <li>• Department of Industry and Commerce;</li> <li>• Department of Spatial Planning;</li> <li>• Directorate of Sea Spatial Planning; and</li> <li>• Directorate General of Sea Spatial Management.</li> </ul> |
| 3    | Sub-District / Local Government   | Head of Districts of: <ul style="list-style-type: none"> <li>• Cilamaya Wetan;</li> <li>• Tempuran;</li> <li>• Cilamaya Kulon;</li> <li>• Cilebar;</li> <li>• Kutawaluya;</li> <li>• Rawamerta;</li> <li>• Rengasdengklok;</li> <li>• Karawang Barat;</li> <li>• Kedung Waringin;</li> <li>• Cikarang Timur; and</li> <li>• Karang Bahagia</li> </ul>  |

| Item | Group  | Stakeholders   |
|------|--|--|
| 4    | Law Enforcement Agency                             | District Sector Police and District Military Command of: <ul style="list-style-type: none"> <li>• Cilamaya Wetan;</li> <li>• Cilamaya Kulon;</li> <li>• Tempuran;</li> <li>• Pedes;</li> <li>• Rawamerta</li> <li>• Kedungwaringin;</li> <li>• Cikarang Timur; and</li> <li>• Karang Bahagia</li> </ul>  |
| 5    | Host Communities                                   | <ul style="list-style-type: none"> <li>• Community of Cilamaya village; and</li> <li>• Communities residing along the transmission line and substation and coastal areas.</li> </ul>   |
| 6    | Traditional Institutions                           | Community Leaders of Sub-Districts of: <ul style="list-style-type: none"> <li>• Cilamaya Wetan;</li> <li>• Cilamaya Kulon;</li> <li>• Tempuran;</li> <li>• Pedes;</li> <li>• Rawamerta</li> <li>• Kedungwaringin;</li> <li>• Cikarang Timur; and</li> <li>• Karang Bahagia</li> </ul>  |
| 7    | Landowners   | Landowners impacted by the development of the following Project's component: <ul style="list-style-type: none"> <li>• 500 KV High Voltage Transmission Line and Substation in Cibatu Baru II/Sukatani;</li> <li>• Access road;</li> <li>• Project's Jetty; and</li> <li>• Onshore pipeline.</li> </ul>   |
| 8    | Fishermen Groups                                   | <ul style="list-style-type: none"> <li>• Fishermen of Muara Village; and</li> <li>• Fishermen of Blanakan Village</li> </ul>   |
| 9    | National Level Non-Governmental Organisations      | <ul style="list-style-type: none"> <li>• Yayasan Wahana Lingkungan Hidup (WALHI)</li> </ul>  |
| 10   | Local Level Non-Governmental Organisation          | <ul style="list-style-type: none"> <li>• <i>Karang Taruna</i> (Local Youth Organisation);</li> <li>• <i>Gerakan Masyarakat Bawah Indonesia</i> (GMBI);</li> <li>• <i>Badan Pembinaan Potensi Keluarga Besar Banten</i> (BPKB);</li> <li>• <i>Ikatan Putra Daerah</i> (IKAPUD); and</li> <li>• <i>Pemuda Pancasila</i> (PP).</li> </ul>   |
| 11   | Former cultivators of Pertagas land                | <ul style="list-style-type: none"> <li>• Farmers and local residents who conducted farming activities on Pertagas land that will be used for powerplant development.</li> </ul>  |
| 12   | Vulnerable Group                                   | <ul style="list-style-type: none"> <li>• Vulnerable affected households (identified in the RP) due to Project land acquisition (elderly, female headed households with low income and those whose income is below the minimum wage of the Regency) etc;</li> <li>• Female Craftsmen; and</li> <li>• Owners of stalls located around the Project area in Cilamaya village.</li> </ul> |
| 13   | Local Small Medium Enterprises Group               | <ul style="list-style-type: none"> <li>• Local Entrepreneurs from Cilamaya Wetan and Manggung Jaya Village</li> </ul>  |
| 14   | Private and Public Users of the Marine Environment | <ul style="list-style-type: none"> <li>• Existing users of the transportation routes such as oil and gas companies, shipping companies, port authorities and commercial fishing operators.</li> </ul>  |

| Item | Group          | Stakeholders  |
|------|----------------|---|
| 15   | General Public | <ul style="list-style-type: none"> <li>A broad range of people largely those residing outside the Project area. Interests may be related to employment, environmental protection, etc.</li> </ul> |

Source: ERM, 2018d

## 6.2.2 *Potential Vulnerable Groups*

Stakeholder identification and engagement also seeks to identify any potentially vulnerable or disadvantaged individuals and groups in local communities. Vulnerable groups are those who may be differently or disproportionately affected by the Project, or whose situation may mean that special care is needed to engage them in consultation and disclosure activities. They may include female-headed houses, the elderly, disabled people or those residing below the poverty line.

The vulnerable groups' within this context were identified by ERM during fieldwork for stakeholder consultation as part of ESIA baseline data collection. The vulnerable groups include the followings:

- Skewer Maker Female Group;
- Owners of Kiosks Next to the CCGT Plant; and
- Communities Residing within the Protected Forest.

### 6.2.2.1 *Skewer Maker Female Group*

During the field assessment, ERM identified female groups in Cilamaya village working as skewer makers earn in around IDR 25,000 per day thus living below the poverty line (if only counting this activity as a the single source of income in the household).

However, most skewer makers have other members of their household who are working and generating income for the family. This group is also under represented in public activities/ consultation as their time is fully occupied with the skewer making activity and domestic chores, in addition to the fact that generally men adopt the role of representing family in public activities in this region.

### 6.2.2.2 *Owners of Kiosks Next to the CCGT Plant*

The Project is located next to the land owned by *State Water Department* (Badan Pengairan), where a group of community members reside without legal land deeds. Many of the families living in the location generate income by selling food or other daily necessities in a small kiosk in their house.

Their location is easily accessed through the existing road built by and dedicated for the Gas Compression Station. These groups will be negatively

affected if their customers decrease significantly due to impact of Project activities such as limited or restricted access to the area.

#### 6.2.2.3 *Communities Residing within the Protected Forest*

This group consists of people from Muara village who live / reside within the protected forest area. The main source of livelihood of this community is farming and fish ponds. This community will likely be impacted due to the development of Jetty and construction of the access road from the Power Plant to the jetty, ORF etc.

Further details on the vulnerable groups will be presented in the ESIA document. However, it is planned that in future Project consultation the process is inclusive of these groups; providing a channel for them to voice their concerns and perceptions as well as receives information on the Project.

#### 6.2.2.4 *Vulnerable Households Related to Project Land Acquisition Process*

The majority of vulnerable households surveyed related to Project land acquisition process are elderly people and female headed households with low incomes as well as those whose income is below the minimum wage of the Regency. Vulnerability in the regencies is typically related to a lack of education, limited employment opportunities and females having multiple household roles making it more difficult to maintain a full-time occupation. The RP sets out clearly those identified as vulnerable due to the land acquisition process; along with proposed interventions to support them further (i.e. the implementation of a LRP).

#### 6.2.3 *Key Stakeholder Issues*

To-date, JSP, through various stakeholder engagement activities namely the Public Consultation as part of AMDAL Process; the Consultation for the ESIA Development Phase; and the Consultations during the Land Acquisition Process - has helped to identify key concerns and stakeholder expectations of the Project.

The following provides a summary of the stakeholder issues identified during the ESIA Development Phase:

- Limited Project information disclosure;
- Opportunity for local workers to be employed by the Project;
- Project to support local / village infrastructure development and community empowerment through education and training;
- Project to contribute to local economic development particularly to support the development of local small medium enterprises and to provide Corporate Social Responsibility (CSR) program in general;

- Project to contribute in maintaining security within the community; to involve them in Project security;
- Disclosure of land acquisition process and compensation;
- Project to contribute in the local Environmental and Community Health and Safety;
- Project to manage environmental adverse impact adequately (i.e. waste management, dust, noise and smoke disturbance);
- Develop an Emergency Response Plan related to accident, gas leaking and explosion;
- Compensation for disruption to fishing ground areas caused by Project activities at sea;
- Sea restriction zone affecting traditional fishing lane and sea traffic signage;
- Project to ensure marine traffic safety and security for the fisherman communities;
- Livelihood Restoration and Compensation to the affected farmers and agricultural land;
- Project socialisation particularly for activities impacted fisherman communities in Muara Baru and Pasir Putih area; and
- Project to provide access to land above where the new pipeline is going to be planted to be used for livelihood purposes.

#### **6.2.4 *Community Perceptions***

As part of consultations for the ESIA process undertaken in August, November and December 2017, a survey on community perceptions on the proposed Project was conducted. The community perception survey involved 199 respondents from Karawang Regency and 30 respondents from Bekasi Regency.

The results indicated that 89% of respondents from Karawang Regency and 75% of respondents from Bekasi Regency agreed to the proposed Project. A total of 98% of respondents from Karawang Regency and 89% of respondents from Bekasi Regency stated that they were informed and aware of the Project. However, these percentages were collected only through engagement with the head of the villages and / or the village leaders.

With regard to Project employment and business opportunities, 42% of respondents from Karawang Regency and 50% of respondents from Bekasi Regency expect the Project to provide employment and business opportunities to contribute to local economic development.

Other expectations raised by respondents included the Project minimising disturbances to their day-to-day activities. This includes agricultural/farming activities as the majority of the communities work in the agriculture sector. Further, the Project is to provide adequate compensation for the impacted parties, to support local village development through its CSR program (emphasising education).

The respondents also raised concern on the adverse impact of the Project; 67% of respondents from Karawang Regency and 71% of respondents from Bekasi Regency expressed concerns related to Project impacts to community safety related to electrocution, Project related accidents e.g. short-circuits, fire and explosion, electric and magnetic radiation particularly during the operation of the transmission line.

#### *Project's Response*

The Project has provided copies of the RKL RPL to each of the impacted districts. The Project is also conducting ESIA disclosure focusing on the Project impacts and mitigation as well as presenting the schedule and the grievance mechanism. The key points raised by stakeholders in the previous discussions will be address focussing on recruitment and employment and business opportunities, the management of environmental and societal impacts onshore and offshore, the grievance mechanism and the implementation of the CSR and LRP activities.

The Project intends to continue the consultation and disclosure process throughout construction and operations ensuring it targets all those impacted (temporarily and permanently) including fisher folk in Blanakan and Muara ( in particular to discuss impacts on access, shrimp breeding grounds, mangrove clearing and construction timing). NGOs active in the area and the community of Cilamaya has been engaged with and will continue to be throughout the construction period where necessary. The Project will also engage with those identified as potentially vulnerable including the elderly, females and those considered disadvantaged.

Concerns were raised related to the permanent houses below the transmission line where rerouting is not possible (*Chapter 9*). In response, the Project undertook an engagement session inviting 10 people who had received compensation due to the right of way impact. The session was led by Kwarza explaining the compensation scheme for the free space according to the applicable regulations. The session was then followed by a question and answer period. Overall, the attendees were satisfied with the compensation received however raised concerns related to risks of electrical shock and

health issues due to magnetic fields. The H&S design mitigations were discussed and the grievance mechanism shared along with a commitment for continuing consultation during construction. Further discussion on this has been provided in Chapter 4 and 9 of this ESIA.

### 6.3 *PROJECT HISTORICAL STAKEHOLDER ENGAGEMENT ACTIVITIES*

The historical consultation outlines the main phases undertaken to date in the public consultation process prior to construction of the Projects and to date.

The main focus of the historical consultations was during the Indonesian regulatory environmental approval process, locally referred to as AMDAL, during the land acquisition phase and during the ESIA.

#### 6.3.1 *Public Consultation as Part of Regulatory Environmental Impact Assessment Process (AMDAL)*

A key aspect of the historical consultation was through the public consultation which is required as part of the Indonesian regulatory EIA (AMDAL) process.

This has included discussions and consultation meetings with the local, provincial and national level authorities, selected impacted community representatives and other relevant Project stakeholders. The consultation meeting covered aspects of the design and timeline, permitting, Project are / boundaries, negative impacts of the Project and local economic development / workforce opportunities.

JSP has also undertaken a number of consultation activities in the Project planning phase, largely with various government agencies. This consultation will continue throughout the Project preparation phase.

**Table 6-2** outlines the public consultation conducted to date as part of the AMDAL process; consultations related to the land acquisition and ESIA process are presented subsequently.

*Table 6-2 Public Consultation as part of the AMDAL Process*

| Date and Location  | Activities              | Stakeholder   | Key Message   | Issues Raised   |
|--|-------------------------|---|---|---|
| Karawang Regency   | Government Consultation | <ul style="list-style-type: none"> <li>Department of Investment and One Stop Integrated Service</li> </ul>  | <ul style="list-style-type: none"> <li>Consultation related to all permits required under the Karawang Regency administration.</li> </ul>   | -   |
| 22 February 2017; Karawang Regency                       | Government Consultation | <ul style="list-style-type: none"> <li>National Land Agency</li> </ul>  | <ul style="list-style-type: none"> <li>Application of Technical Recommendation to Land Authority</li> </ul>   | -   |
| 17 March 2017; Cilamaya Wetan District, Karawang Regency | Public Consultation     | <ul style="list-style-type: none"> <li>Environment Agency of Karawang</li> <li>Police Sector of Cilamaya Wetan and Cilamaya Kulon District</li> <li>District Command of Cilamaya Wetan and Cilamaya Kulon District</li> <li>District Head of Cilamaya Wetan, and Cilamaya Kulon District</li> <li>Village Head of Cilamaya, Sukatani, Tegal Urug, Sukamulya, and Manggung Jaya Village</li> <li>Village Representatives of Cilamaya, Sukatani, Tegal Urug, Sukamulya, and Manggung Jaya Village</li> <li>Representatives of Fisherman Forum</li> <li>Representatives of NGO</li> <li>UPTD Representatives of Cilamaya Wetan and Cilamaya Kulon District.</li> </ul> | <ul style="list-style-type: none"> <li>Project description.</li> <li>Regulations related to construction of power plant.</li> <li>Concept of Partnership offered to community and government by the project. This concept to optimise the beneficial impact such as community development as well as prioritising local worker and minimising adverse impact to both environmental and social.</li> </ul> | <ul style="list-style-type: none"> <li>Clarification on potential hazards caused by the project such as radiation due to electromagnetic fields from the Transmission Line; and</li> <li>Community accessibility to the Project site / location.</li> </ul> |

| Date and Location  | Activities              | Stakeholder  | Key Message   | Issues Raised   |
|--|-------------------------|--|---|---|
| 23 March 2017;<br>Tempuran Sub-District Office Hall,<br>Karawang Regency | Public Consultation     | <ul style="list-style-type: none"> <li>Environmental Agency (DLHK) of Karawang Regency</li> <li>Police Office (Kepolisian Sektor) of Tempuran, Pedes and Rawamerta</li> <li>District Military Command (Komando Rayon Militer) of Tempuran, Pedes and Rawamerta</li> <li>Head of Tempuran, Cilebar and Rawamerta District</li> <li>Head of Jayanegara, Pagadungan, Lemah Makmur, Mekar Pohaci, Tanjung Sari, Dayeuh Luhur, Sukaratu and Sukaraja Village</li> <li>Representatives of Jayanegara, Pagadungan, Lemah Makmur, Mekar Pohaci, Tanjung Sari, Dayeuh Luhur, Sukaratu and Sukaraja Village</li> <li>Representatives of Local Implementation Unit of Agriculture (UPTD Pertanian) of Tempuran, Cilebar and Rawamerta Village.</li> </ul> | <ul style="list-style-type: none"> <li>Project description;</li> <li>Regulations related to construction of power plant;</li> <li>Concept of Partnership offered to community and government by the project. This concept to optimise the beneficial impact such as community development as well as prioritising local worker and minimising adverse impact to both environmental and social; and</li> <li>Land acquisition process and compensation for impacted landowners.</li> </ul> | <ul style="list-style-type: none"> <li>Clarification related to potential hazards caused by the project such as radiation due to electromagnetic fields from the Transmission Line;</li> <li>Community accessibility to the Project site / location;</li> <li>Project impact on health and sanitation; and</li> <li>Project impact on water supply / availability.</li> </ul> |
| 27 March 2017;<br>Karawang Regency                                       | Government Consultation | <ul style="list-style-type: none"> <li>Department of Investment and One Stop Integrated Service</li> <li>Regent Karawang.</li> </ul>   | <ul style="list-style-type: none"> <li>Application of Location Permit</li> </ul>  | -   |
| 20 April 2017;<br>Cikarang Timur Sub-District, Bekasi Regency.           | Public Consultation     | <ul style="list-style-type: none"> <li>Environment Agency of Bekasi Regency</li> <li>Police Sector of Kedungwaringin, Cikarang Timur, and Karang Bahagia Sub District</li> </ul>   | <ul style="list-style-type: none"> <li>ANDALALIN (Traffic Impact Assessment) will be separated from the AMDAL, this is based on the government regulation;</li> </ul>   | <ul style="list-style-type: none"> <li>Compensation for land acquisition will be provided for loss of land, loss of assets including house / building and crops;</li> <li>Clarification on potential hazards caused by the project such as</li> </ul>   |

| Date and Location              | Activities  | Stakeholder   | Key Message  | Issues Raised  |
|--------------------------------|---|---|--|--|
|                                |   | <ul style="list-style-type: none"> <li>Military Rayon Command of Kedungwaringin, Cikarang Timur, and Karang Bahagia Sub District</li> <li>Sub District Head of Cikarang Timur, and Karang Bahagia</li> <li>Village Representatives of Karang Mekar, Mekarjaya, Karang Harum, Karangsari, Karang Rahayu, and Karang Setia Village</li> <li>UPTD Representatives of Kedungwaringin, Cikarang Timur, and Karang Bahagia Sub District</li> <li>Environmental activist around project (NGO)</li> </ul> | <ul style="list-style-type: none"> <li>Disclosure of project information including timeline; and</li> <li>Disclosure of land acquisition process.</li> </ul> | <ul style="list-style-type: none"> <li>radiation due to electromagnetic fields from the Transmission Line;</li> <li>Community accessibility to the Project site / location;</li> <li>Opportunity for local workforce to be involved in the Project; and</li> <li>Project impact to community health particularly related to Transmission Line.</li> </ul>  |
| 19 May 2017                    | Government Consultation                                   | <ul style="list-style-type: none"> <li>Regent of Karawang</li> </ul>  |  | <ul style="list-style-type: none"> <li>Barriers in spatial related issues need to be further discussed with the Coordinating Minister of Economy</li> </ul>  |
| 19 October 2017, South Jakarta | MoEF Meeting to Discuss KA-ANDAL (EIA Terms of Reference) | <ul style="list-style-type: none"> <li>PT Pertamina</li> <li>PHE ONWJ</li> <li>Fisheries Department of Subang Regency</li> <li>Department of Manpower and Transmigration, Energy and Mineral Resources Agency (Mining and Mineral Agency) of Subang Regency</li> <li>Fisheries Department of Karawang Regency</li> <li>Department of Industry and Commerce of Karawang Regency</li> </ul>   | <ul style="list-style-type: none"> <li>Land acquisition;</li> <li>Socio-economic and Corporate Social Responsibility program; and</li> </ul>                 | <ul style="list-style-type: none"> <li>Opportunity for local workforce to be involved in the Project;</li> <li>Project potential impact on health and safety aspect such as magnetic field, noise, vibration, traffic, and road disturbance;</li> <li>Project potential impact on environment such as flooding, dust, and decreasing availability of clean water;</li> <li>Sampling should be done in ANDAL document (aquatic biology) and provide the map of sampling point;</li> </ul> |

| Date and Location  | Activities             | Stakeholder  | Key Message  | Issues Raised  |
|--|------------------------|--|--|--|
|  |                        | <ul style="list-style-type: none"> <li>• Directorate of Sea Planning - Marine and Fisheries Ministry</li> <li>• Energy and Mineral Resources Agency of West Java Province</li> <li>• IPB (Bogor Agricultural University)</li> <li>• Environmental Health Directorate -Ministry of Health</li> <li>• Environmental Agency of West Java Province</li> <li>• Environmental Agency of Karawang Regency</li> <li>• Ministry of Energy and Mineral Resources</li> <li>• UGM (University of Gadjah Mada);</li> <li>• UI (University of Indonesia);</li> <li>• Environmental Agency of Subang Regency</li> <li>• Directorate General of Human Settlements - Ministry of Public Work</li> <li>• Regional Planning and Development Agency of Bekasi Regency</li> <li>• Regional Planning and Development Agency of West Java Province</li> </ul> |  | <ul style="list-style-type: none"> <li>• Mangrove survey should be based on reference Kep. Men LH No. 201/2004;</li> <li>• Location of development plant; Subang Regency (Blanakan, Sukasari, and Legonkulon District) should be added;</li> <li>• Jetty development should be coordinated with KKP and DKP Jawa Barat; including LNG-FSRU;</li> <li>• Should be equipped with map of existing sea utilisation;</li> <li>• Bathymetry should be checked with BIG (LIPI map) and Pushidros (Sea map) as secondary data; and</li> <li>• Impacts on fishermen communities.</li> </ul> |
| 9th November 2017;<br>Sub-District of<br>Blanakan, Subang<br>Regency | Public<br>Consultation | <ul style="list-style-type: none"> <li>• Head of Muara Village</li> <li>• Community Leaders of Muara Village</li> <li>• Fishermen Group from TPI (Fish Auction) Samudera Mina, Muara Village</li> </ul>  | <ul style="list-style-type: none"> <li>• Project to involve NGOs in Subang such as PNTI (Indonesian Association of Traditional Fishermen) to discuss issues or concerns related to fishermen.</li> </ul> | <ul style="list-style-type: none"> <li>• Project to provide compensation to fishermen should there be damage to fishing gear due to the impact of project activities;</li> <li>• Project to establish regular communication with the affected communities particularly to the</li> </ul>   |

| Date and Location | Activities | Stakeholder   | Key Message | Issues Raised  |
|-------------------|------------|---|-------------|--|
|                   |            | <ul style="list-style-type: none"> <li>• Fishermen Ponds Group of Tanah Timbul Jaya, Muara Village</li> <li>• Head of Blanakan Sub-District</li> <li>• Head of Blanakan Village</li> <li>• Blanakan Sub-District Police</li> <li>• Marine and Air Police of Cilamaya Wetan and Blanakan Sub-Districts</li> <li>• Fishermen Group of KUD Mandiri Mina Fajar Sidik, Blanakan Village</li> <li>• Fishermen Group of Mina Bahari, Muara Ciasem Village</li> <li>• Fishermen Group of Karya Baru, Cilamaya Girang Village</li> <li>• Fishermen Group of Grinting, Jayamukti Village</li> <li>• HNSI of Subang Regency</li> <li>• Community Leaders of Blanakan Sub-District</li> </ul> |             | <p>fishermen prior and during project implementation;</p> <ul style="list-style-type: none"> <li>• Construction of offshore pipelines does not interfere with the fishing activities;</li> <li>• Project to prioritise non-skilled local workforce to be employed in the project; and</li> <li>• Concerns related to impacts to the economy and livelihood of fishermen considering fishing is the key skill possessed to sustain livelihood.</li> </ul> |

### 6.3.2 *Consultations for the ESIA Process*

This section outlines one of the main phases of community consultation during the implementation of the Project's ESIA. Consultations were conducted by a team of ERM and local sub-consultants on behalf of the Project.

Activities have included consultation meetings with village government officers / authorities of the affected villages, key village figures, state security forces (police and army), local entrepreneur groups, representatives of the affected communities through household surveys, former cultivators of Pertagas land, female groups, sea fishermen groups and fishpond users, land owners and users.

**Table 6-3** provides a summary of the consultation activities undertaken during the ESIA implementation. The list of respondents consulted is presented in **Annex C** of this Report.

The issues raised in the consultations have been documented by JSP and its contractors; where required further discussion has been had on project design (e.g. rerouting the transmission line, or relocating the access road and jetty locations). The objective being to reduce impacts on the community and manage their concerns.

The mitigations set out in **Chapter 12** of this Report have been informed, in some cases, based on consultation activities undertaken. As such JSP has committed to implementing its SEP and ESMP to assist in managing community concerns raised during the consultations.

**Table 6-3 Summary of Stakeholder Consultations during ESIA Implementation**

| <b>Date &amp; Location</b>   | <b>Activity</b> | <b>Stakeholder Involved</b>  | <b>Key Message</b>               | <b>Issues Raised</b>  | <b>Sponsor Feedback</b>  |
|--|-----------------|--|----------------------------------|---|--|
| 08 – 09 August 2017, Cilamaya Kulon and Cilamaya Wetan District, Karawang Regency            | Interview       | Teacher from Muara and Pasirrukem Village  | Project Description ESIA process | <ul style="list-style-type: none"> <li>• Project support to local infrastructure development.</li> <li>• Project support to local economic development such as providing assistance on capital for small-medium enterprises and CSR program.</li> </ul>   | The Project will implement CSR programs. The Programs detail will be consulted and disclosed to the community and relevant local authorities.  |
| 09 – 11 August 2017, Cilamaya Kulon and Cilamaya Wetan District, Karawang Regency            | Interview       | Small Medium Enterprises / Local Entrepreneur from Cilamaya Wetan and Manggung Jaya Village  | Project Description ESIA process | <ul style="list-style-type: none"> <li>• Lack of socialization on project information;</li> <li>• Project support to local infrastructure development;</li> <li>• Project support to local economic development such as providing assistance on capital for small-medium enterprises and CSR program; and</li> <li>• Opportunity for local workforce to be involve in the Project.</li> </ul> | The Project has conducted several public consultation for AMDAL and will continue to consult the impacted communities throughout the Project Cycle.<br>The Project will implement CSR programs. The Programs detail will be consulted and disclosed to the community and relevant local authorities. |
| 10 – 16 August 2017, Cilamaya Kulon, Blanakan, and Cikarang Timur District, Karawang Regency | Interview       | Village Officer from:<br>1. Cilamaya Village<br>2. Pasirrukem Village<br>3. Muktijaya Village<br>4. Karang Sari Village<br>5. Blanakan Village | Project Description ESIA process | <ul style="list-style-type: none"> <li>• Opportunity for local workforce to be involve in the Project.</li> </ul>   | The Project is committed to optimize local employment and opportunity where feasible.  |

| Date & Location  | Activity     | Stakeholder Involved  | Key Message                      | Issues Raised   | Sponsor Feedback  |
|--|--------------|---|----------------------------------|---|---|
| 15 August 2017, Cilamaya Wetan District, Karawang Regency  | Interview    | Police and Army from Cilamaya Village   | Project Description ESIA process | <ul style="list-style-type: none"> <li>Lack of socialization on project information; and</li> <li>Lack of engagement and coordination with local security forces.</li> </ul>  | <p>The Project has conducted several public consultation for AMDAL and will continue to consult the impacted communities throughout the Project Cycle.</p> <p>The Project will closely coordinate with local security (as part of the District Consultation Board/ Muspika) for the security issues.</p>  |
| 09 - 18 August 2017; Cilamaya Wetan, Cilamaya Kulon, Tempuran, Cikarang Timur, Karang Bahagia District, Karawang Regency | Consultation | Village Head of: <ol style="list-style-type: none"> <li>Cilamaya,</li> <li>Sukatani,</li> <li>Tegalurung,</li> <li>Sumurgede,</li> <li>Jayanegara,</li> <li>Purwajaya,</li> <li>Pegadungan,</li> <li>Pancakarya,</li> <li>Lemahduhur,</li> <li>Dayeuhluhur,</li> <li>Muktijaya,</li> <li>Karang Sari,</li> <li>Muara Karang Satu</li> </ol> | Project Description ESIA process | <ul style="list-style-type: none"> <li>Lack of socialization on project information;</li> <li>Project support to local infrastructure development;</li> <li>Project support to local economic development such as providing assistance on capital for small-medium enterprises and CSR program; and</li> <li>Disclosure of land acquisition process</li> <li>Opportunity for local workforce to be involve in the Project.</li> </ul> | <p>The Project has conducted several public consultation for AMDAL and will continue to consult the impacted communities throughout the Project Cycle.</p> <p>The Project will implement CSR programs. The Programs detail will be consulted and disclosed to the community and relevant local authorities.</p> <p>The Project is committed to optimize local employment and opportunity where feasible.</p> <p>Land acquisition process is managed by a consultant agency and has been and will continue to coordinate</p> |

| Date & Location                                | Activity  | Stakeholder Involved                                    | Key Message                      | Issues Raised   | Sponsor Feedback   |
|--|-----------|---|----------------------------------|---|--|
|  |           |   |                                  |   | closely with the village heads.  |
| 08 – 15 August 2017; Cilamaya Wetan District   | Interview | Community Household from Cilamaya Village; Local People | Project Description ESIA process | <ul style="list-style-type: none"> <li>• Lack of socialization on project information</li> <li>• Project support to local infrastructure development; and</li> <li>• Project to support local economic development such as providing assistance on capital for small-medium enterprises and CSR program.</li> <li>• Opportunity for local workforce to be involve in the Project; and</li> <li>• Project environmental and health adverse impacts particularly on waste management, noise, dust, fire and accident caused by project activities such as gas leakage and explosion.</li> </ul> | <p>The Project has conducted several public consultation for AMDAL and will continue to consult the impacted communities throughout the Project Cycle.</p> <p>The Project will implement CSR programs. The Programs detail will be consulted and disclosed to the community and relevant local authorities.</p> <p>The Project is committed to optimize local employment and opportunity where feasible.</p> <p>AMDAL study and the ESIA is assessing the impacts resulted from the Project. The Project will develop environmental and social management plans to mitigate the potential impacts.</p> |
| 08, 13-14 August 2017; Cilamaya Wetan District | Interview | Community Leader from Cilamaya Village;                 | Project Description ESIA process | <ul style="list-style-type: none"> <li>• Project support to local infrastructure development; and</li> <li>• Project support to local economic development such as providing</li> </ul>   | The Project will implement CSR programs. The Programs detail will be consulted and disclosed   |

| Date & Location                         | Activity               | Stakeholder Involved  | Key Message                      | Issues Raised   | Sponsor Feedback   |
|---|------------------------|---|----------------------------------|---|--|
|   |                        |   |                                  | <p>assistance on capital for small-medium enterprises and CSR program.</p> <ul style="list-style-type: none"> <li>• Opportunity for local workforce to be involve in the Project.</li> </ul>  | <p>to the community and relevant local authorities. The Project is committed to optimize local employment and opportunity where feasible.</p>  |
| 12 August 2017; Cilamaya Wetan District | Focus Group Discussion | Former cultivators of Pertagas land (7 people attended the FGD) | Project Description ESIA process | <ul style="list-style-type: none"> <li>• Project to support economic development of the farmer through initiation livestock cooperative;</li> <li>• Project to support social or community events such as Independence day celebration and cultural events; and</li> <li>• Opportunity for local workforce to be involve in the Project.</li> <li>• Project to support farmer through providing land replacement for farming activities.</li> </ul> | <p>The Project will implement CSR programs. The Programs detail will be consulted and disclosed to the community and relevant local authorities. The Project is committed to optimize local employment and opportunity where feasible.</p> |
| 15 August 2017; Cilamaya Wetan District | Focus Group Discussion | Women's group (10 people attended the FGD)                      | Project Description ESIA process | <ul style="list-style-type: none"> <li>• Opportunity for local workforce to be involve in the Project.</li> </ul>   | <p>The Project will implement CSR programs. The Programs detail will be consulted and disclosed</p>  |

| Date & Location                        | Activity               | Stakeholder Involved  | Key Message         | Issues Raised   | Sponsor Feedback   |
|--|------------------------|---|---------------------|---|--|
|  |                        |   |                     | <ul style="list-style-type: none"> <li>• Project support to local infrastructure development; and</li> <li>• Project support to local economic development such as providing assistance on capital for small-medium enterprises and CSR program.</li> </ul>   | <p>to the community and relevant local authorities. The Project is committed to optimize local employment and opportunity where feasible.</p>  |
| 9 August 2017; Cilamaya Wetan District | Focus Group Discussion | Sea Fisherman Group from Muara Village (16 people attended the FGD) | Project Description | <ul style="list-style-type: none"> <li>• Limited information / socialization on Project development.</li> <li>• Sea restriction zone that could affect the fishermen fishing area hence it can decrease the catch which in turn also decrease fishermen income;</li> <li>• A clear socialization as well as a warning indicator which should or should not be passed, for example by installing buoys and lights; and</li> <li>• Project to ensure the sea traffic safety and security particularly for the local fishermen.</li> </ul> | <p>The Project has conducted several public consultation for AMDAL and will continue to consult the impacted communities throughout the Project Cycle. AMDAL and ESIA study will provide potential impacts to the social and environment including impacts to fishermen. The Project will develop environmental and social management plans to mitigate the potential impacts.</p> |

| Date & Location                         | Activity               | Stakeholder Involved                        | Key Message         | Issues Raised   | Sponsor Feedback  |
|---|------------------------|---|---------------------|---|---|
| 16 August 2017; Cilamaya Wetan District | Focus Group Discussion | Fishpond Fisherman Group from Muara Village | Project Description | <ul style="list-style-type: none"> <li>• Limited information / socialization on Project development.</li> <li>• A clear and detailed calculation of the compensation mechanisms to the farmers to maintain their livelihoods (e.g., sufficient compensation value to be used for working on other land);</li> <li>• The compensation value is calculated clearly and transparently and agreed with the fishermen;</li> <li>• Access for farmer to utilize land above the pipeline RoW for farming activities;</li> <li>• Considering the historical compensation rate of the land in order to establish the propose compensation scheme.</li> </ul> | <p>The Project has conducted several public consultation for AMDAL and will continue to consult the impacted communities throughout the Project Cycle.</p> <p>The Resettlement Plan outlines the detail compensation (in the entitlement matrix) and will be disclosed to the community.</p> <p>For the safety reason, farming activities will not be allowed on the land above the pipeline RoW.</p> |

| Date & Location                       | Activity               | Stakeholder Involved          | Key Message         | Issues Raised   | Sponsor Feedback   |
|---------------------------------------|------------------------|-------------------------------|---------------------|---|--|
| 13 August 2017; Blanakan Sub-District | Focus Group Discussion | Fisherman Group from Blanakan | Project Description | <ul style="list-style-type: none"> <li>• Limited information / socialization on Project development;</li> <li>• Sea restriction zone that could affect the fishermen fishing area hence it can decrease the catch which in turn also decrease fishermen income;</li> <li>• Sea restriction zone should be clearly socialize and equipped with signage to avoid sea traffic accident;</li> <li>• Compensation should be provided for sea restriction zone affecting the fishermen fishing ground;</li> <li>• Project to implement community development program for the affected fishermen communities / group;</li> <li>• Installation of pipeline on the seabed can be anchored. Fishermen questioned how</li> </ul> | <p>The Project has conducted several public consultation for AMDAL and will continue to consult the impacted communities throughout the Project Cycle.</p> <p>The Project will implement CSR programs. The Programs detail will be consulted and disclosed to the community and relevant local authorities. AMDAL and ESIA study will provide potential impacts to the social and environment including impacts to fishermen. The Project will develop environmental and social management plans to mitigate the potential impacts, including issues related to health and safety.</p> |

| Date & Location  | Activity                             | Stakeholder Involved  | Key Message   | Issues Raised   | Sponsor Feedback  |
|--|--------------------------------------|---|---|---|---|
|  |                                      |   |   | <p>technical the piping was; and</p> <ul style="list-style-type: none"> <li>Project to ensure the sea traffic safety and security particularly for the local fishermen.</li> </ul>  |   |
| 19 <sup>th</sup> -29 <sup>th</sup><br>December 2017<br>Cilamaya and Bekasi Districts | Focus Group Discussions & Interviews | Land owners and users of the transmission line tower footing in the 37 villages | Project Description<br>ESIA and RP process<br>Discussion of ESMP  | <ul style="list-style-type: none"> <li>Impact from radiation and the danger of the transmission line especially during the rainy season;</li> <li>Potential decrease in price of the land after the construction and electrification of the transmission line;</li> <li>Impact to agricultural activities and crops;</li> <li>Request to be allowed to continue cultivate the land after the purchase;</li> <li>Compensation price must be sufficient to at least purchase replacement land with the same size and conditions; and</li> </ul> | <p>AMDAL and ESIA study will provide the assessment of potential impacts to the social and environment including EMF issues. The government regulation provides detail measurement of safe distance to the high voltage aerial network and the Project will comply with the regulation.</p> <p>After the installation of the cable, the facilities will be managed by PLN.</p> <p>Compensation is calculated based on the replacement cost, considering the NJOP, market price and offer from the land owners. Transaction will be done only if the land owner agrees to sell the land.</p> |
| 17 <sup>th</sup> -26 <sup>th</sup><br>January 2018<br>Cilamaya and Bekasi Districts  | Focus Group Discussions & Interviews | Land owners and users of the transmission line tower footing in the 37 villages | Project Description<br>ESIA and RP process                        | <ul style="list-style-type: none"> <li>Potential decrease in price of the land after the construction and electrification of the transmission line;</li> <li>Impact to agricultural activities and crops;</li> <li>Request to be allowed to continue cultivate the land after the purchase;</li> <li>Compensation price must be sufficient to at least purchase replacement land with the same size and conditions; and</li> </ul>  |   |
| 23 <sup>rd</sup> -24 <sup>th</sup><br>January 2018<br>Cilamaya and Bekasi Districts  | ADB led Focus Group Discussions      | Land owners and users of the transmission line tower footing in two villages    | Understanding of Project Description and land acquisition process | <ul style="list-style-type: none"> <li>Impact to agricultural activities and crops;</li> <li>Request to be allowed to continue cultivate the land after the purchase;</li> <li>Compensation price must be sufficient to at least purchase replacement land with the same size and conditions; and</li> </ul>  |   |
| 16 <sup>th</sup> -21 <sup>st</sup> May 2018<br>Subang District                       | Focus Group Discussions & Interviews | Land owners and users in the coastal area                                       | Project Description<br>ESIA and RP process                        | <ul style="list-style-type: none"> <li>Impact to agricultural activities and crops;</li> <li>Request to be allowed to continue cultivate the land after the purchase;</li> <li>Compensation price must be sufficient to at least purchase replacement land with the same size and conditions; and</li> </ul>  |   |

| Date & Location                                       | Activity        | Stakeholder Involved   | Key Message  | Issues Raised  | Sponsor Feedback  |
|---|-----------------|--|--|--|---|
|   |                 |  |  | <ul style="list-style-type: none"> <li>Request for a simple process and documentation of the land acquisition.</li> </ul>  | The process of the land acquisition is designed as simple as possible yet adhere to the applicable regulations.   |
| 8 <sup>th</sup> June 2018, Kalangsuria Village Office | ESIA Disclosure | <ul style="list-style-type: none"> <li>Landowners; and</li> <li>Village and District authorities</li> </ul>  | <ul style="list-style-type: none"> <li>Project update, schedule and key parties-sponsors;</li> <li>ESIA process;</li> <li>ESIA findings;</li> <li>Mitigations proposed;</li> <li>Stakeholder consultation; and</li> <li>Grievance mechanism</li> </ul> | <ul style="list-style-type: none"> <li>Project to ensure that the land of the tower footings will not be a nesting place for rats which will destroy the rice paddy plants.</li> <li>Concerns relating to safety in the vent of a tower collapse or cable break.</li> </ul>    | <p>The tower footing land will be typically higher compared to its surrounding lands as the tower will be constructed permanently. Farmers should not worry about the tower footing lands become nesting place for rats.</p> <p>Safety mitigations have been built in to protect the nearby communities from H&amp;S issues such as tower collapse or electruction.</p> |
| 9 <sup>th</sup> June 2018, Sukamulya Village Office   | ESIA Disclosure | <ul style="list-style-type: none"> <li>Surrounding communities nearby the CCGT</li> <li>Fisherfolk; and</li> <li>Village and District authorities</li> </ul> | <ul style="list-style-type: none"> <li>Project update, schedule and key parties-sponsors;</li> <li>ESIA process;</li> <li>ESIA findings;</li> <li>Mitigations proposed;</li> <li>Stakeholder consultation; and</li> </ul>                              | <ul style="list-style-type: none"> <li>Employment opportunities to be coordinated by village authorities to avoid horizontal conflict;</li> <li>Project to be aware of flood risks given that the CCGT area is located in between two running river (Cilamaya River</li> </ul> | <p>The Project will implement CSR programs. The Programs detail will be consulted and disclosed to the community and relevant local authorities.</p> <p>The project has conducted flood study and taking the results of the study into consideration of the Project design.</p>   |

| Date & Location   | Activity        | Stakeholder Involved   | Key Message   | Issues Raised  | Sponsor Feedback  |
|---|-----------------|--|---|--|---|
|   |                 |  | <ul style="list-style-type: none"> <li>Grievance mechanism</li> </ul>   | <ul style="list-style-type: none"> <li>and the Irrigation channel);</li> <li>Project should provide a buoy to mark the construction site during the subsea pipeline laydown hence the fishermen are aware of the activities;</li> <li>The Project plan and schedule should be informed to the fishermen communities;</li> <li>Project should preserve the mangrove areas as those are important for the fishermen as the breeding ground of shrimps.</li> <li>Disturbance to fishponds from construction.</li> <li>Use of agents and headhunters for recruitment locally.</li> </ul> | <p>The Project will consult the communities prior to construction activities so that the communities are aware about the Project plan. There is a grievance mechanism as a channel for the community to submit grievances related to the Project.</p> <p>Agree to preserve the mangrove area where possible.</p> <p>The project will mitigate impacts on local fishponds through consultation, design and monitor. Should damage occur the project will compensate on a case by case basis.</p> <p>The Project will use local manpower agency and village heads to conduct recruitment.</p> |
| 30 <sup>th</sup> of July 2018; Cilamaya Village (Cilamaya Village Office) | ESIA Disclosure | <ul style="list-style-type: none"> <li>Head of village of Cilamaya and Muara;</li> <li>Sub-District Head of</li> </ul> | <ul style="list-style-type: none"> <li>Project description;</li> <li>Project schedule and timeline for</li> </ul> | <ul style="list-style-type: none"> <li>Similar socialization / disclosure of ESIA should be conducted more broader affected villages;</li> </ul>   | <ul style="list-style-type: none"> <li>The process of ESIA disclosure / socialization will be conducted gradually starting from the sub-</li> </ul>   |

| Date & Location | Activity | Stakeholder Involved   | Key Message   | Issues Raised  | Sponsor Feedback   |
|-----------------|----------|--|---|--|--|
|                 |          | <p>Cilamaya Wetan;</p> <ul style="list-style-type: none"> <li>• Head of Sub-District Police and Military Command;</li> <li>• Representative of affected community from Blanakan and Muara Village;</li> <li>• Head of Environmental Agency of Karawang Regency;</li> </ul> | <p>construction phase;</p> <ul style="list-style-type: none"> <li>• Update on the Project current activities;</li> <li>• Introduction to the EPC Contractor and their role in the Project;</li> <li>• ESIA process;</li> <li>• ESIA findings (Environmental, Health and Social Impact of the Project);</li> <li>• Impact mitigations proposed;</li> <li>• Project Grievance Mechanism and contact person for receiving community and external stakeholder grievances</li> </ul> | <ul style="list-style-type: none"> <li>• The Project must optimize the local employment opportunity particularly during the construction phase;</li> <li>• The Project should give real contribution to the communities and village development;</li> <li>• Concern related to radiation coming from the Power Plant and Transmission Line;</li> <li>• Concern on possibility of relocation of houses located alongside the irrigation channel near the Power Plant;</li> <li>• Possibility to form a communication forum to address issues related to labor and recruitment qualification;</li> <li>• Concern on wastewater and its discharge to the nearby river;</li> </ul> | <p>district level and now to the village level;</p> <ul style="list-style-type: none"> <li>• The Sponsors are committed to prioritize local people for the employment opportunities. The Sponsors and the EPC will be coordinating closely with the village authorities and relevant government entities on worker's recruitment process;</li> <li>• The project will implement social investment program / CSR program however this will be further assess and develop by the CSR team;</li> <li>• The government has issued a regulation regarding the safe distance from the transmission line network (minimum height of the lowest cable is 18 meter) and the Project will comply with the regulation;</li> <li>• There will be no relocation / resettlement of houses. The Project even avoids housing area for the</li> </ul> |

| Date & Location | Activity | Stakeholder Involved | Key Message | Issues Raised  | Sponsor Feedback  |
|-----------------|----------|----------------------|-------------|--|---|
|                 |          |                      |             | <ul style="list-style-type: none"> <li>• Concern on incompatibility between ESIA as a document and the implementation on the ground;</li> <li>• Schedule for Project construction to begin;</li> <li>• Concern on community safety due to mobilization of construction transportation; and</li> <li>• Concern on access restriction to the road between Tanggul Pertamina to Cilamaya during the construction period.</li> </ul> | <ul style="list-style-type: none"> <li>transmission line ROW;</li> <li>• The Sponsor agreed in the near future to establish such communication forum to address labour issues;</li> <li>• The wastewater will not be discharged to the nearby river. There will be processes of controlling and monitoring the waste to ensure that wastewater meets the safety standard;</li> <li>• The Project will report the implementation of the AMDAL / ESIA every 6 months to the Environmental Agency and will also be monitored by the Agency regularly;</li> <li>• Construction activities will start in August or September 2018;</li> <li>• Beside AMDAL the Project will also have ANDALALIN or the Traffic Impact Assessment. All of provisions and regulations regarding to traffic procedure will</li> </ul> |

| Date & Location  | Activity               | Stakeholder Involved  | Key Message   | Issues Raised  | Sponsor Feedback  |
|--|------------------------|---|---|--|---|
|  |                        |   |   |  | <p>be explained in ANDALALIN. It will include speed limit, providing traffic signs and officer to manage traffic; and</p> <ul style="list-style-type: none"> <li>The road will not be closed and the community still can use the road. The Project will build a new access road for heavy vehicles;</li> </ul>  |
| <p>31<sup>st</sup> of July 2018;<br/>Blanakan Village (Village Unit Cooperative Office of Fishermen Group)</p> | <p>ESIA Disclosure</p> | <ul style="list-style-type: none"> <li>Head of village of Blanakan</li> <li>Sub-District Head of Blanakan;</li> <li>Head of Sub-District Police and Military Command;</li> <li>Representative of affected fishermen community from Blanakan and Muara village.</li> </ul> | <ul style="list-style-type: none"> <li>Project description;</li> <li>Project schedule and timeline for construction phase;</li> <li>Update on the Project current activities;</li> <li>Introduction to the EPC Contractor and their role in the Project;</li> <li>ESIA process;</li> <li>ESIA findings (Environmental, Health and Social</li> </ul> | <ul style="list-style-type: none"> <li>Compensation for fishing activities and fishing area impacted by the sea pipeline laying down activities. The construction activity is feared to affect the coral reefs, water turbidity and causing noise disturbance to fish;</li> <li>The Project must optimize the local employment opportunity particularly during the construction phase;</li> <li>Concern on incompatibility between ESIA as a document and</li> </ul> | <ul style="list-style-type: none"> <li>The sea pipeline will be buried on the bottom of the sea floor, therefore it will not have any affect to the coral reefs. The project will conduct assessment / survey on fish catch by the fishermen prior the construction start and during the construction to see whether there is a significant effect to fish catch due to pipeline laying down activities. The result will be used to determine the solution and compensation to</li> </ul> |

| Date & Location | Activity | Stakeholder Involved | Key Message  | Issues Raised  | Sponsor Feedback  |
|-----------------|----------|----------------------|--|--|---|
|                 |          |                      | <p>Impact of the Project);</p> <ul style="list-style-type: none"> <li>• Impact mitigations proposed; and</li> <li>• Project Grievance Mechanism and contact person for receiving community and external stakeholder grievances</li> <li>•</li> </ul> | <p>the implementation on the ground;</p> <ul style="list-style-type: none"> <li>• Concern on possibility of fishermen net stuck in the sea pipeline;</li> <li>• The Project should give real contribution to the fishermen communities and village development;</li> <li>• Waste generated during the sea pipeline laying down activities should be properly managed and clean up from the sea. During the laying down activities a signage of mark should be placed in the construction site at sea;</li> <li>• Related to compensation scheme for the affected communities the Project can adopt the system implemented by the Pertamina;</li> <li>• Project to provide lamp / torch for prawn fishermen to increase the catch;</li> </ul> | <p>provided for the impacted fishermen;</p> <ul style="list-style-type: none"> <li>• The Sponsors are committed to prioritize local people for the employment opportunities. The Sponsors and the EPC will be coordinating closely with the village authorities and relevant government entities on worker's recruitment process;</li> <li>• The Project will report the implementation of the AMDAL / ESIA every 6 months to the Environmental Agency and will also be monitored by the Agency regularly;</li> <li>• Since the pipeline will be buried on the bottom of the sea, fisherman's net will not get stuck on the pipeline;</li> <li>• The project will implement social investment program / CSR program however this will be further</li> </ul> |

| Date & Location | Activity | Stakeholder Involved | Key Message | Issues Raised  | Sponsor Feedback   |
|-----------------|----------|----------------------|-------------|--|--|
|                 |          |                      |             | <ul style="list-style-type: none"> <li>• Similar socialization / disclosure of ESIA should be conducted more broader affected villages;</li> <li>• Related to all sea activities, the Project should coordinate with the Water Police Unit to ensure its safety and security.</li> </ul> | <ul style="list-style-type: none"> <li>• assess and develop by the CSR team;</li> <li>• Material storage and pipeline welding process will be all conducted within a ship to minimize any construction waste dispose to the sea. A mark or signage will be placed at the construction site at sea;</li> <li>• Since Pertamina is one of the shareholder of this Project, surely the Project can learn and apply Pertamina good practice related to establishing compensation scheme for the affected communities;</li> <li>• The Project will consider providing lamp / torch for prawn fishermen;</li> <li>• The process of ESIA disclosure / socialization will be conducted gradually starting from the sub-district level and now to the village level; and</li> <li>• The Project will definitely coordinate</li> </ul> |

| Date & Location   | Activity                       | Stakeholder Involved  | Key Message  | Issues Raised  | Sponsor Feedback   |
|---|--------------------------------|---|--|--|--|
|   |                                |   |  |  | closely with the Water Police Unit and other relevant parties to ensure all activities at sea are safe and secure.   |
| 31 <sup>st</sup> of July 2018;<br>Cilamaya Village (Saiyo Restaurant) | ESIA Disclosure for NGOs group | <ul style="list-style-type: none"> <li>• Gerakan Masyarakat Bawah Indonesia (GMBI);</li> <li>• Pemuda Pancasila (PP);</li> <li>• Forum Komunikasi Putra Putri Purnawirawan dan Putra Putri TNI-Polri (FKPPI);</li> <li>• Laskar Merah Putih (LMP);</li> <li>• Gabungan Inisiatif Barisan Anak Siliwangi (GIBAS);</li> <li>• BANLOK;</li> <li>• Youth Group of Cilamaya District (Karang Taruna);</li> </ul> | <ul style="list-style-type: none"> <li>• Project description;</li> <li>• Project schedule and timeline for construction phase;</li> <li>• Update on the Project current activities;</li> <li>• Introduction to the EPC Contractor and their role in the Project;</li> <li>• ESIA process;</li> <li>• ESIA findings (Environmental, Health and Social Impact of the Project);</li> <li>• Impact mitigations proposed; and</li> <li>• Project Grievance</li> </ul> | <ul style="list-style-type: none"> <li>• Concern on community safety due to mobilization of construction transportation;</li> <li>• Compensation for impacted fishermen and farmers;</li> <li>• Concern on incompatibility between ESIA as a document and the implementation on the ground;</li> <li>• With regard to building relationship with the affected communities, the Project should acknowledge local wisdom and best practices and empower the local communities;</li> <li>• The Project must optimize the local</li> </ul> | <ul style="list-style-type: none"> <li>• Beside AMDAL, the Project will also have ANDALALIN or the Traffic Impact Assessment. All of provisions and regulations regarding to traffic procedure will be explained in ANDALALIN. It will include speed limit, providing traffic signs and officer to manage traffic;</li> <li>• The Project will conduct further study / community need assessment for the affected community to ensure the social investment program will be developed or the compensation scheme will align with the community need;</li> <li>• The Project will report the implementation of the AMDAL / ESIA every 6 months to the Environmental Agency</li> </ul> |

| Date & Location | Activity | Stakeholder Involved   | Key Message   | Issues Raised  | Sponsor Feedback  |
|-----------------|----------|--|---|--|---|
|                 |          | <ul style="list-style-type: none"> <li>• BPAN;</li> <li>• Projo Karawang;</li> <li>• KOMPAK;</li> <li>• NKRI; and</li> <li>• Environmental Cadre Group;</li> </ul> | <p>Mechanism and contact person for receiving community and external stakeholder grievances</p> <ul style="list-style-type: none"> <li>•</li> </ul> | <p>employment opportunity particularly during the construction and operational phase;</p> <ul style="list-style-type: none"> <li>• Concern on potential air pollution generated by the Project that will have impact to the villagers particular to children;</li> <li>• Project to provide medical support to local communities;</li> <li>• Possibility Project to develop program in collaboration with the NGOs; and</li> <li>• Project should build good relationship with all its stakeholders and be responsible its impact mitigation program.</li> </ul> | <p>and will also be monitored by the Agency regularly;</p> <ul style="list-style-type: none"> <li>• The Sponsors are committed to prioritize local people for the employment opportunities. The Sponsors and the EPC will be coordinating closely with the village authorities and relevant government entities on worker's recruitment process;</li> <li>• One of the reasons why the power plant type is PLTGU is because it emits cleaner emission than other type of power plant. The study of air pollution is attached in AMDAL as well;</li> <li>• Health support program for the communities will be considered as part of the CSR program;</li> <li>• The Project will take into consideration collaborating with the NGOs; and</li> <li>• It is the project commitment to build good relationship with</li> </ul> |

| Date & Location | Activity | Stakeholder Involved | Key Message | Issues Raised | Sponsor Feedback  |
|-----------------|----------|----------------------|-------------|---------------|---|
|                 |          |                      |             |               | <p>all of its stakeholders and one form of good relationship will be reflected through implementing CSR program to the communities.</p> |

*Consultations during the Land Acquisition Process*

JSP has engaged a local land surveying consultant to manage all its land acquisition activities; including identification of land owners, eligibility and assets, consultation of Project activities, the compensation and disbursement process. The landowners along the transmission line and coastal area were engaged and were provided information on the Project activities and compensation discussions have taken place with compensation agreed and in some cases payment conducted. The land consultant (on behalf of JSP) has been gathering their concerns and perceptions of the Project and recording the data collected. The Resettlement Plan (RP) provides a summary of the consultation activities undertaken related to the land acquisition process as per May 2018.

Key issues discussed included:

- The intent and purpose of the Project as a government program;
- The locations for the land acquisition;
- The process for land owner identification;
- The compensation process and willing buyer willing seller negotiation;
- Schedule of the compensation process and land acquisition;
- Timing for cut off; and
- Disclosure of the grievance mechanism.

Concerns raised by the land owners were largely around:

- Land owner identification process;
- Fair compensation rates;
- Purchase of unviable land;
- Community health impacts from the operations of the transmission line;
- Environmental and H&S issues during construction;
- Cultivation period prior to construction; and
- Dissemination of appropriate information.

Further details on landowners (and land users) consulted, the landownership, degree of impact (potential displacement) and their concerns related to the land acquisition process are presented in the RP. A SEP has been prepared for the Project (**Annex C** of this ESIA Report). This outlines of public consultation conducted as part of the AMDAL process, ESIA development and during the land acquisition phase are presented in **Chapter 5** of the SEP report (*ERM, 2018d*). This report will be updated by the Sponsors annually throughout the Project development.

There are a number of key differences between the consultation required for the AMDAL and the activities required for the ESIA; in general the ESIA consultation and disclosure activities are more in depth and broad. **Table 6-4** presents the key gaps between the two processes and requirements.

**Table 6-4 Consultation Requirements and Gaps between the AMDAL and ESIA**

| AMDAL Consultation / Disclosure Requirements   | ESHIA Consultation / Disclosure Requirements   |
|--|--|
| The formal AMDAL public consultation is conducted via a public newspaper announcement followed by public consultation sessions in the key communities. | Stakeholder consultation commences during the ESHIA baseline study phase, followed by disclosure of the ESHIA.   |
| The Public consultation session are recorded, with minutes, photographs and list of attendees presented in the KA ANDAL and ANDAL.                     | All stakeholder consultation sessions are recorded in a stakeholder engagement log with meeting minutes throughout the Project lifecycle.  |
|  | The ESIA consultation is presented in the SEP and the remaining activities are recorded and tracked in the stakeholder engagement database.  |
| Consultation is required as part of the RKL RPL process on a needs basis   | Stakeholder consultation is carried out proactively throughout all the Project phases with all Project affected people   |
| No consultation plan is required   | The ESIA requires a formal Stakeholder Engagement Plan is developed and implemented by the Project.<br><br>The SEP is a live document that is regularly updated by the Project.                          |
| The public consultations are by invite only with selected government, community, NGO representatives.  | The ESIA requires consultation and disclosure activities for all Project stakeholders  |
| No specific request or guidance for consultation materials.  | The ESIA consultation materials should be culturally appropriate, developed in a clear manner and in the local language.   |
| No specification to consult with vulnerable groups   | The ESIA requires consultation with vulnerable groups (e.g. ethnic minorities), and to consider gender in all Project consultation activities.   |
| No specific requirement for community  | The Project is expected to recruit qualified community relations personnel to manage the grievances and conduct formal and informal community consultation activities through all phases of the Project. |
| No requirement for a grievance mechanism   | The Project is required to develop and implement a grievance mechanism and disclose this widely to the Project affected people.  |

## 6.4

### *STAKEHOLDER ENGAGEMENT PLANNING*

Stakeholder Engagement Plan (SEP) identifies the relevant stakeholder groups, key messages to be delivered, approach and tools of engagement, timeline and responsible parties.

The SEP is designed to include all relevant stakeholders and issues to cover the entire lifecycle of the Project. However, the plan is a dynamic tool to be periodically updated and adapted to the current social, economic and political situation of the area since the Project's stakeholders and issues / concerned raised may change over the life time of the Project.

#### 6.4.1

##### *Stakeholder Engagement Methodology*

Stakeholder engagement is an ongoing process between the Project and its stakeholders that extends throughout the life of the Project and encompasses a range of activities and approaches, from information sharing and consultation, to participation, negotiation, and information of partnerships.

Considering the social setting of the communities living around the Project area and category of stakeholders identified during the ESIA consultation, the following section sets out the strategy and approach for the Project to conduct stakeholder engagement activities in a culturally appropriate manner.

The goal is to ensure the timely provision of relevant and understandable information and to create a process that provides opportunities for all stakeholders to express their views and concerns, and allows the Project to consider and respond to them. The nature and frequency of this engagement should reflect the level of Project risks and impacts.

##### 6.4.1.1

###### *Stakeholder Engagement Materials*

Materials supporting stakeholder engagement can include printed information in the form of leaflets and posters as well as documents that form the focus of disclosure and consultation activities, including this ESIA Reports. Other materials are developed to support consultation meetings, including presentations, posters and banners illustrating aspects of the Project and the ESIA processes.

##### 6.4.1.2

###### *Communication Channels*

Feedback mechanisms are adapted to suit the needs and preferences of the different stakeholders, as well as their location. They range from comment boxes, which are used in local communities to gather feedback in written form, to web-based mechanisms that can gather feedback from more urban stakeholders who have more easy access to information technology.

The different consultation and disclosure methods, materials and communication channels that can be used to engage stakeholders are summarised in **Table 6-5**.

**Table 6-5** *Communication Channels*

| Stakeholder Category                | Disclosure Methods  | Communication Channels  |
|-------------------------------------|---|---|
| Government Authorities              | <ul style="list-style-type: none"> <li>Notification, key documents and invitations to meet with Project addressed to specific stakeholders.</li> </ul>  | <ul style="list-style-type: none"> <li>Email, telephone, post and in person.</li> <li>Meeting and correspondence with the Project representative</li> </ul>   |
| Residents of local communities      | <ul style="list-style-type: none"> <li>Paper copies of documents made available in central community location (e.g. town halls, cultural centres, village head office, traditional market, etc.)</li> </ul>   | <ul style="list-style-type: none"> <li>Email, telephone, post and in person.</li> <li>Secure comment boxes</li> <li>Community meetings and public hearings</li> </ul>   |
| Landowners                          | <ul style="list-style-type: none"> <li>Relevant information sent directly to affected peoples</li> </ul>  | <ul style="list-style-type: none"> <li>Email, telephone, post and in person.</li> <li>Meeting and correspondence with the Project representative</li> </ul>   |
| Land users and farmers              | <ul style="list-style-type: none"> <li>Paper copies of documents made available in central community location (e.g. town halls, cultural centres, village head office, traditional market, etc.)</li> <li>Notification, key documents and invitations to meet with Project addressed to specific stakeholders.</li> </ul> | <ul style="list-style-type: none"> <li>Email, telephone, post and in person.</li> <li>Secure comment boxes</li> <li>Community meetings and public hearings</li> <li>Private and roundtable meetings with the Project</li> </ul> |
| Non-government organisations (NGOs) | <ul style="list-style-type: none"> <li>Notifications, key documents and invitation to meet with the Project addressed to specific stakeholders.</li> </ul>  | <ul style="list-style-type: none"> <li>Email, telephone, post and in person.</li> <li>Meeting and correspondence with the Project representative</li> </ul>   |
| Media                               | <ul style="list-style-type: none"> <li>Press releases and media interviews regarding Project updates and disclosure periods</li> </ul>  | <ul style="list-style-type: none"> <li>Media contacts</li> </ul>  |

Source: ERM, 2017

#### 6.4.1.3 *Planned Future Stakeholder Engagement*

Based on ERM's understanding of the potential Project impacts and stakeholder consultation results, the proposed future Project stakeholder engagement activities are summarised in **Table 6-6**.

A key element of the future consultations that will be undertaken is the disclosure of the ESIA and specially the proposed management measures agreed to by JSP and its EPCs.

The Draft ESIA was disclosed on the ADB's website on 23<sup>rd</sup> March 2018 for 120 days (21<sup>st</sup> July 2018). The Final ESIA was disclosed in August 2018.

The Project has disclosed and discussed the grievance mechanism with the landowners along the transmission line since late 2017. The disclosure and communication of the project grievance mechanism was undertaken in July and August 2018.

The process was conducted in a culturally appropriate manner in the local language (the majority of the community residing around the Project site are able to speak Bahasa Indonesia fluently but the local Sundanese language is also spoken widely) and in a format that is understandable to the entire project affected peoples.

The Project is currently recruiting personnel to manage the grievance process based on ADB's requirements. The Project intends to continue consultation and disclosure activities with all the relevant stakeholders to promote awareness of the Project Grievance Mechanism during the pre and construction phase of the Project.

During these disclosure sessions, the discussion will be captured by JSP and managed in its stakeholder consultation database. Furthermore should comments be raised that are deemed applicable to the ESIA, the report will be revised based on the community feedback.

Table 6-6 PT Jawa Satu Power Stakeholder Engagement Plan (SEP)

| No. | Stakeholder Group                 | Stakeholder   | Key Issue / Message  | Approach   | Responsibility     | Timeline                                     |
|-----|-----------------------------------|---|--|--|--------------------|--|
| 1.  | Central Government                | Ministry of Environmental and Forestry  | Obtaining all regulatory permits and licensing requirements for the development of the Project mainly the AMDAL permit.  | <p><i>Approach:</i></p> <ul style="list-style-type: none"> <li>• Consultation, Collaboration and Information Disclosure</li> </ul> <p><i>Tools:</i></p> <ul style="list-style-type: none"> <li>• Direct one-on-one meeting with relevant government agencies as required</li> <li>• Focus Group Discussion at regencies level</li> <li>• Workshop.</li> <li>• Briefing and presentation</li> </ul> | PT Jawa Satu Power | Pre-Construction and Construction            |
| 2.  | Provincial / Regencies Government | <ul style="list-style-type: none"> <li>• Environmental Agency (DLHK) of Karawang Regency;</li> <li>• Bekasi and Karawang Energy and Mineral Resources Agency;</li> <li>• Kanwil BPN (National land Agency in Jawa Barat Province;</li> <li>• Development Planning Agency at Sub-National Level (BAPPEDA);</li> <li>• Department of Industry and Commerce;</li> <li>• Department of Spatial Planning;</li> <li>• Directorate of Sea Spatial Planning; and</li> <li>• Directorate General of Sea Spatial Management.</li> </ul> | Obtaining all regulatory permits and licensing requirements for the development of the PT Jawa Satu Power Plant Project mainly the Location Permit, Construction Permits and AMDAL permit. | <p><i>Approach:</i></p> <ul style="list-style-type: none"> <li>• Consultation, Collaboration and Information Disclosure</li> </ul> <p><i>Tools:</i></p> <ul style="list-style-type: none"> <li>• Direct one-on-one meeting with relevant government agencies as required</li> <li>• Focus Group Discussion at regencies level</li> <li>• Workshop</li> </ul>                                       | PT Jawa Satu Power | Pre-Construction, Construction and Operation |

| No. | Stakeholder Group           | Stakeholder   | Key Issue / Message   | Approach  | Responsibility     | Timeline                                     |
|-----|-----------------------------|---|---|---|--------------------|--|
| 3.  | District / Local Government | Sub-District Heads of: <ul style="list-style-type: none"> <li>• Cilamaya Wetan;</li> <li>• Cilamaya Kulon;</li> <li>• Tempuran;</li> <li>• Pedes;</li> <li>• Rawamerta</li> <li>• Kedungwaringin;</li> <li>• Cikarang Timur; and</li> <li>• Karang Bahagia</li> </ul>                                   | <ul style="list-style-type: none"> <li>• Project design and development, impacts and opportunities.</li> <li>• Dissemination of AMDAL and RKL RPL documents.</li> <li>• Project local labour requirements and procurement mechanism.</li> <li>• Project community Grievance Mechanism.</li> <li>• Opportunities for Project involvement in community development.</li> <li>• Disclosure of the ESIA report.</li> </ul>  | <p><i>Approach:</i></p> <ul style="list-style-type: none"> <li>• Consultation, Collaboration and Information Disclosure</li> </ul> <p><i>Tools:</i></p> <ul style="list-style-type: none"> <li>• Socialisation forum in each village or sub-district involving village governments.</li> <li>• Briefing and presentations.</li> <li>• Printed Project updates / website material.</li> <li>• Videos / Film</li> </ul> | PT Jawa Satu Power | Pre-Construction, Construction and Operation |
| 4.  | Law Enforcement Agency      | District Sector Police and District Military Command of: <ul style="list-style-type: none"> <li>• Cilamaya Wetan;</li> <li>• Cilamaya Kulon;</li> <li>• Tempuran;</li> <li>• Pedes;</li> <li>• Rawamerta</li> <li>• Kedungwaringin;</li> <li>• Cikarang Timur; and</li> <li>• Karang Bahagia</li> </ul> | <ul style="list-style-type: none"> <li>• Project design and development, impacts and opportunities.</li> <li>• Dissemination of AMDAL and RKL RPL documents.</li> <li>• Project local labour requirements and procurement mechanism</li> <li>• Opportunity for partnership related to security aspect of the Project assets and safety throughout the construction and operation of the Project.</li> <li>• Disclosure of Project Grievance Mechanism.</li> </ul> | <p><i>Approach:</i></p> <ul style="list-style-type: none"> <li>• Consultation and Information Disclosure</li> </ul> <p><i>Tools:</i></p> <ul style="list-style-type: none"> <li>• Socialisation forum in each village or sub-district involving village governments</li> </ul>  | PT Jawa Satu Power | Pre-Construction, Construction and Operation |

| No. | Stakeholder Group        | Stakeholder  | Key Issue / Message  | Approach   | Responsibility     | Timeline                                     |
|-----|--------------------------|--|--|--|--------------------|--|
| 5.  | Host Communities         | <ul style="list-style-type: none"> <li>Community of Cilamaya village; and</li> <li>Head of the 33 Project affected villages as representatives of the village residents.</li> </ul>  | <ul style="list-style-type: none"> <li>Project design and development, impacts and opportunities.</li> <li>Disclosure of the ESIA report.</li> <li>Project local labour requirements and procurement mechanism.</li> <li>Project community Grievance Mechanism.</li> <li>Opportunities for Project involvement in community development.</li> </ul>              | <p><i>Approach:</i></p> <ul style="list-style-type: none"> <li>Consultation, Collaboration and Information Disclosure</li> </ul> <p><i>Tools:</i></p> <ul style="list-style-type: none"> <li>Socialisation forum in each village.</li> <li>Posters in location where it is easily accessible to the community.</li> <li>Public Displays</li> <li>Project briefing and presentations.</li> <li>Media Coverage.</li> <li>Printed Project updates / Website Material</li> </ul> | PT Jawa Satu Power | Pre-Construction, Construction and Operation |
| 6.  | Traditional Institutions | <p>Community Leaders of Sub-Districts of:</p> <ul style="list-style-type: none"> <li>Cilamaya Wetan;</li> <li>Cilamaya Kulon;</li> <li>Tempuran;</li> <li>Pedes;</li> <li>Rawamerta</li> <li>Kedungwaringin;</li> <li>Cikarang Timur; and</li> <li>Karang Bahagia</li> </ul> | <ul style="list-style-type: none"> <li>Opportunities for Project involvement in local economy and community development.</li> <li>Opportunity for Project to support social or community events such as Independence Day celebration and cultural events.</li> <li>Disclosure of Project Grievance Mechanism.</li> <li>Disclosure of the ESIA report.</li> </ul> | <p><i>Approach:</i></p> <ul style="list-style-type: none"> <li>Consultation and Information Disclosure</li> </ul> <p><i>Tools:</i></p> <ul style="list-style-type: none"> <li>Direct one-on-one meeting as required.</li> <li>Focus Group Discussion in the village level.</li> <li>Public Displays.</li> <li>Briefing and Presentations.</li> <li>Media Coverage.</li> <li>Printed / Website Material</li> <li>Videos / Film</li> </ul>                                     | PT Jawa Satu Power | Pre-Construction, Construction and Operation |

| No. | Stakeholder Group | Stakeholder   | Key Issue / Message  | Approach   | Responsibility     | Timeline                                     |
|-----|-------------------|---|--|--|--------------------|--|
| 7.  | Fisherman Group   | Fishermen communities originated from the village of Muara and Blanakan | <ul style="list-style-type: none"> <li>• Project design and development, impacts and opportunities.</li> <li>• Marine / Sea restriction zone which will be applied by the Project during construction and operation.</li> <li>• Project Sea traffic safety and security plan.</li> <li>• Disclosure of Project Grievance Mechanism.</li> <li>• Opportunities for Project involvement in local economy and community development particularly for the fishermen group.</li> <li>• Disclosure of the ESIA report.</li> </ul> | <p><i>Approach:</i></p> <ul style="list-style-type: none"> <li>• Consultation, Collaboration and Information Disclosure</li> </ul> <p><i>Tools:</i></p> <ul style="list-style-type: none"> <li>• Socialisation and consultation forum in the village level</li> <li>• Posters in location where it is easily accessible to the fishermen community.</li> <li>• Public Displays</li> <li>• Briefing and Presentations.</li> <li>• Media Coverage.</li> <li>• Printed / Website Material</li> <li>• Videos / Film</li> </ul> | PT Jawa Satu Power | Pre-Construction, Construction and Operation |

| No. | Stakeholder Group                   | Stakeholder   | Key Issue / Message   | Approach   | Responsibility  | Timeline                                     |
|-----|-------------------------------------|---|---|--|---|--|
| 8.  | Landowners                          | Landowners impacted by the development of the following Project's component: <ul style="list-style-type: none"> <li>500 KV High Voltage Transmission Line and Substation in Cibatu Baru II/Sukatani;</li> <li>Access road;</li> <li>Project's Jetty; and</li> <li>Onshore pipeline</li> </ul> | <ul style="list-style-type: none"> <li>Land acquisition process and compensation scheme.</li> <li>Livelihood / Income Restoration program / scheme for the Project affected landowners.</li> <li>Community health and safety due to impact of transmission line; onshore pipeline instalment.</li> <li>Disclosure of Project Grievance Mechanism particularly during the land acquisition phase.</li> <li>Disclosure of the ESIA report.</li> </ul> | <p><i>Approach:</i></p> <ul style="list-style-type: none"> <li>Consultation, Collaboration and Information Disclosure</li> </ul> <p><i>Tools:</i></p> <ul style="list-style-type: none"> <li>Direct one-on-one meeting with landowner as required; and</li> <li>Socialisation forum in the village level.</li> <li>Public Displays</li> <li>Briefing and Presentations</li> <li>Media Coverage</li> </ul>                                | Local land acquisition consultant on behalf of PT Jawa Satu Power | Pre-Construction, Construction and Operation |
| 9.  | Former cultivators of Pertagas land | Farmers and local residents who conducted farming activities on Pertagas land that will be used for power plant development   | <ul style="list-style-type: none"> <li>Opportunities for Project involvement in local economy and community development particularly for the former cultivators of the Pertagas land.</li> <li>Project local labour requirements and procurement mechanism and opportunity for local workforce to be involved in the Project.</li> <li>Disclosure of Project Grievance Mechanism.</li> </ul>  | <p><i>Approach:</i></p> <ul style="list-style-type: none"> <li>Consultation and Information Disclosure</li> </ul> <p><i>Tools:</i></p> <ul style="list-style-type: none"> <li>Socialisation forum in the village level.</li> <li>Focus Group Discussion in the village level.</li> <li>Public Displays</li> <li>Briefing and Presentations</li> <li>Media Coverage</li> <li>Printed / Website Material</li> <li>Videos / Film</li> </ul> | PT Jawa Satu Power  | Pre-Construction, Construction and Operation |

| No. | Stakeholder Group                           | Stakeholder   | Key Issue / Message  | Approach   | Responsibility     | Timeline                                     |
|-----|---|---|--|--|--------------------|--|
| 10. | Vulnerable Group                            | <ul style="list-style-type: none"> <li>Female Craftsmen</li> <li>Owners of stalls located around the Project area in Cilamaya village.</li> </ul> | <ul style="list-style-type: none"> <li>Opportunities for Project involvement in local economy and community development particularly involving the identified vulnerable group.</li> <li>Project local labour requirements and procurement mechanism and opportunity for local workforce to be involved in the Project.</li> <li>Disclosure of Project Grievance Mechanism.</li> <li>Disclosure of the ESIA report.</li> </ul> | <p><i>Approach:</i></p> <ul style="list-style-type: none"> <li>Consultation and Information Disclosure</li> </ul> <p><i>Tools:</i></p> <ul style="list-style-type: none"> <li>Direct one-on-one meeting as required</li> <li>Socialisation forum in the village level.</li> <li>Focus Group Discussion in the village level.</li> <li>Public Displays</li> <li>Briefing and Presentations</li> <li>Media Coverage</li> <li>Printed / Website Material.</li> <li>Videos / Film</li> </ul> | PT Jawa Satu Power | Pre-Construction, Construction and Operation |
| 11. | National Level Non-Government Organisations | Wahana Lingkungan Hidup Foundation (WALHI)  | <ul style="list-style-type: none"> <li>Project development, impacts and opportunities.</li> <li>Management of environmental and social adverse impacts.</li> <li>Disclosure of the ESIA report.</li> </ul>   | <p><i>Approach:</i></p> <ul style="list-style-type: none"> <li>Consultation and Information Disclosure</li> </ul> <p><i>Tools:</i></p> <ul style="list-style-type: none"> <li>Direct one-on-one meeting as required</li> <li>Focus Group Discussion at regencies level</li> <li>Briefing and Presentations</li> <li>Printed / Website Material</li> </ul>  | PT Jawa Satu Power | Pre-Construction, Construction and Operation |

| No. | Stakeholder Group                        | Stakeholder   | Key Issue / Message  | Approach   | Responsibility     | Timeline                                     |
|-----|--|---|--|--|--------------------|--|
| 12. | Local Level Non-Government Organisations | <ul style="list-style-type: none"> <li>• Karang Taruna (Local Youth Organisation);</li> <li>• Gerakan Masyarakat Bawah Indonesia (GMBI);</li> <li>• Badan Pembinaan Potensi Keluarga Besar Banten (BPKB);</li> <li>• Ikatan Putra Daerah (IKAPUD); and</li> <li>• Pemuda Pancasila (PP).</li> </ul> | <ul style="list-style-type: none"> <li>• Project development, impacts and opportunities.</li> <li>• Project local labour requirements and procurement mechanism and opportunity for local workforce to be involved in the Project.</li> <li>• Project's social investment/community development programs</li> <li>• Management of environmental and social impacts.</li> <li>• Disclosure of the ESIA report.</li> </ul> | <p><i>Approach:</i></p> <ul style="list-style-type: none"> <li>• Communication and Information Disclosure</li> </ul> <p><i>Tools:</i></p> <ul style="list-style-type: none"> <li>• Direct one-on-one meeting with relevant Community Based Organisation (CBO) as required</li> <li>• Focus Group Discussion at Sub-District level</li> <li>• Briefing and Presentations</li> <li>• Printed / Website Material</li> <li>• Media Coverage</li> </ul> | PT Jawa Satu Power | Pre-Construction, Construction and Operation |
| 13. | Local Small Medium Enterprises Group     | Local Entrepreneur from Cilamaya Wetan and Manggung Jaya Village  | <ul style="list-style-type: none"> <li>• Project development, impacts and opportunities.</li> <li>• Project's social investment/local economic and community development programs.</li> <li>• Disclosure of the ESIA report.</li> </ul>  | <p><i>Approach:</i></p> <ul style="list-style-type: none"> <li>• Consultation and Information Disclosure</li> </ul> <p><i>Tools:</i></p> <ul style="list-style-type: none"> <li>• Direct one-on-one meeting as required</li> <li>• Focus Group Discussion in the village.</li> <li>• Public Displays</li> <li>• Briefing and Presentations</li> <li>• Media Coverage</li> <li>• Printed / Website Material</li> <li>• Videos / Film</li> </ul>     | PT Jawa Satu Power | Pre-Construction, Construction and Operation |

| No. | Stakeholder Group                                  | Stakeholder   | Key Issue / Message  | Approach  | Responsibility     | Timeline                                     |
|-----|--|---|--|---|--------------------|--|
| 14. | Squatters  | Owners of Kiosks Next to the CCGT Power Plant   | <ul style="list-style-type: none"> <li>• Opportunities for Project involvement in local economy and community development particularly involving the identified vulnerable group;</li> <li>• Project local labour requirements and procurement mechanism and opportunity for local workforce to be involved in the Project;</li> <li>• Disclosure of Project Grievance Mechanism.</li> </ul> | <p><i>Approach:</i><br/>Consultation and Information Disclosure</p> <p><i>Tools:</i></p> <ul style="list-style-type: none"> <li>• Direct one-on-one meeting as required;</li> <li>• Socialisation forum in the village level;</li> <li>• Focus Group Discussion in the village level</li> <li>• Public Displays</li> <li>• Briefing and Presentations</li> <li>• Media Coverage</li> <li>• Printed / Website Material</li> <li>• Videos / Film</li> </ul> | PT Jawa Satu Power | Pre-Construction, Construction and Operation |
| 15. | Private and Public Users of the Marine Environment | <ul style="list-style-type: none"> <li>• Oil and gas company;</li> <li>• Shipping companies;</li> <li>• Port authorities;</li> <li>• Tourism operator; and</li> <li>• Commercial fishing operators</li> </ul> | <p>Seeking opportunity to collaborate for supporting local economic and infrastructure development.</p> <p>Disclosure of the ESIA report.</p>  | <p><i>Approach:</i><br/>Consultation and Information Disclosure</p> <p><i>Tools:</i></p> <ul style="list-style-type: none"> <li>• Direct one-on-one meeting as required;</li> <li>• Focus Group Discussion at regencies level</li> <li>• Briefing and Presentations</li> <li>• Media Coverage</li> <li>• Printed / Website Material</li> </ul>  | PT Jawa Satu Power | Pre-Construction, Construction and Operation |

## 6.4.2

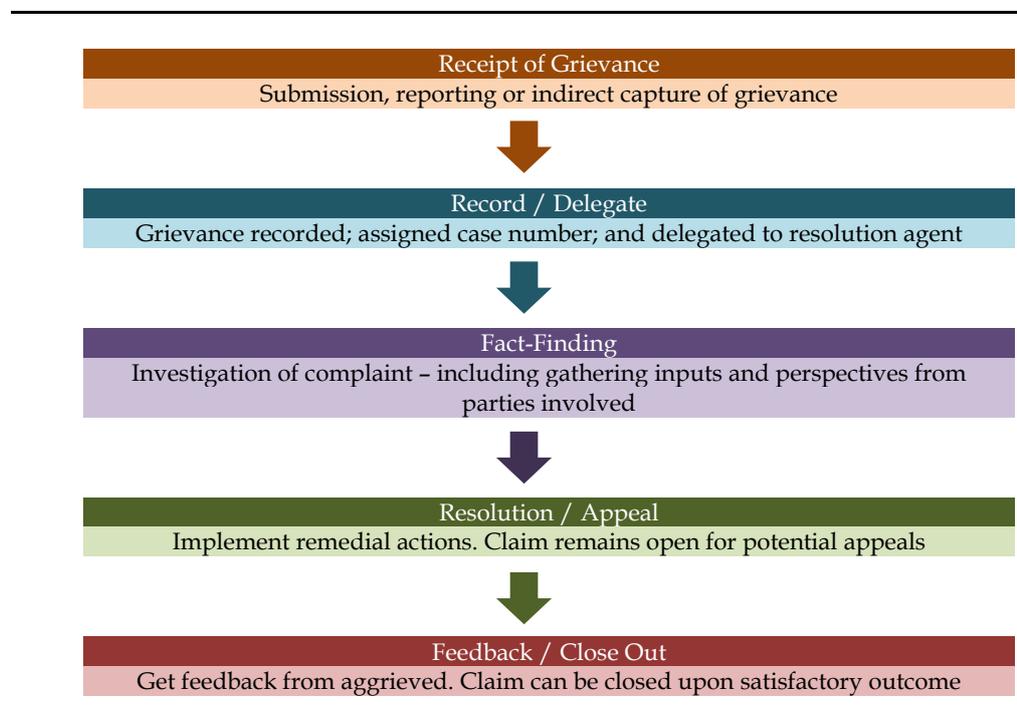
### *Community Grievance Mechanism*

A grievance mechanism for systematically receiving, investigating and responding to stakeholder complaints has been developed and is presented in **Annex C**.

The grievance mechanism has been designed as a locally based, formalised way for JSP (and its EPCs) to accept, assess, and resolve stakeholder complaints related to Project activities. It is being overseen currently by JSP's local grievance officer who has been actively disclosing the process with the landowners impacted by the land acquisition process.

The grievance process designed for the Project is characterised by five basic steps and activities, which are easy to follow and understand as illustrated in **Figure 6-1**.

**Figure 6-1** *Grievance Tracking Redress Mechanism*



A summary of the process of identifying, investigating, and resolving grievances is detailed in **Table 6-7**.

**Table 6-7 Summary of Stages of Grievance Handling**

| Stage                                   | Description   | Responsibility  | Timeline                                      |
|---|---|---|---|
| Stage 1:<br><b>Receipt of Grievance</b> | <ul style="list-style-type: none"> <li>Comments and questions are received and analysed as part of the standard feedback process. Feedback or complaints can be received through verbal and writing, follow by registering.</li> <li>All communications are subject to the feedback process, which ensures that feedback is documented, incorporated, and responded to as needed.</li> <li>When the grievance is identified, Stage 2 of the grievance procedure is initiated.</li> </ul>  | Community Liaison Officer                               | -   |
| Stage 2:<br><b>Record/ Delegate</b>     | <ul style="list-style-type: none"> <li>When a grievance is identified, it is officially registered in a grievance log (see <b>Annex C</b> for the template of grievance log) and given a unique identification number.</li> <li>It is categorised based on the type of complaint and its severity. Grievances are categorised into two (2) categories:               <ol style="list-style-type: none"> <li>Low significance grievance, with characteristics:                   <ul style="list-style-type: none"> <li>The complaints involve individual affected people only;</li> <li>One-off grievance, less probability it will attract media attention; and</li> <li>Does not require immediate intervention from managerial level</li> </ul> </li> <li>High significance grievance, indicated by the following conditions:                   <ul style="list-style-type: none"> <li>The complaints involve a large group of affected people;</li> <li>Has not been resolved during the time specified in this mechanism;</li> <li>Recurring and potentially affecting the Project activities schedule;</li> <li>Potentially attracting media attention; and</li> <li>Requiring immediate intervention from managerial level.</li> </ul> </li> </ol> </li> <li>An initial response is sent to the person(s) who raised the grievance within six (6) working days, acknowledging their feedback and describing the next steps in the grievance process, time estimates for these steps and a contact person.</li> <li>The issue will be delegated to relevant unit/department to be followed up.</li> </ul> | Community Liaison Officer                               | Three (3) days after the receipt of Grievance |
| Stage 3:<br><b>Fact Finding</b>         | <ul style="list-style-type: none"> <li>The Project will investigate grievances and their surroundings in a timely manner. Investigations may include photographs and other evidence, witness statements, interviews with affected stakeholders and other parties, review of site register, and other information gathering activities.</li> <li>The results of the investigation will be reviewed and a resolution will be proposed. The development of the resolution may involve consultation with the person(s) involved. The proposed resolution will then be formally communicated to all parties.</li> </ul>  | Community Liaison Officer and Grievance Redress Officer | Six (6) days                                  |

| Stage                                   | Description  | Responsibility                               | Timeline     |
|---|--|--|--------------|
| Stage 4:<br><b>Resolution or Appeal</b> | <ul style="list-style-type: none"> <li>• If the resolution is accepted by all parties, it will be documented, implemented and the grievance is closed.</li> <li>• If the resolution is not accepted, it will be reconsidered and the following resolution may be proposed: <ul style="list-style-type: none"> <li>- If complainant is not satisfied with the proposed resolution either party resorts to a mediator / arbitrator;</li> <li>- Mediator / Arbitrator then reviews the grievance and seeks resolution;</li> <li>- Mediator / Arbitrator then propose resolution; and</li> <li>- If both parties are satisfied with the proposed resolution it will be documented, implemented and the grievance is closed;</li> </ul> </li> <li>• If both parties are not satisfied with the proposed resolution, then the complainant or Project will resort to the courts.</li> </ul> | Stakeholder Relations Lead and EHS&S Manager | Six (6) days |
| Stage 5:<br><b>Feedback/ Close out</b>  | <ul style="list-style-type: none"> <li>• After the accepted resolution has been implemented, it will be monitored and its effectiveness will be evaluated. All parties will be notified that the resolution has been implemented and will have the opportunity to provide feedback on the grievance process and its implementation.</li> </ul>   | Stakeholder Relation Lead and EHS&S Manager  | 15 days      |

The Project is planning to disclose the mechanism via formal and informal meetings and discussions as well as via a non-technical summary. It will also prepare promotional materials that can be presented on village information boards and around the Project site.

The following information is being disclosed by the Project:

- Who can raise complaints – focusing on affected communities;
- Where, when, and how community members can log complaints;
- Who is responsible for receiving and responding to complaints, and if any external parties can receive complaints from communities;
- What type of responses complainants can expect from the Project including timing of responses; and
- The benefits that complainants can receive from using the grievance mechanism.

It is essential that the local government (and all contractors) also fully understand the mechanism to enable them to communicate the step-by-step process to the project affected people, particularly in the case where the grievances are submitted to them for resolution.

The Project has recorded (as of May 2018) 22 grievances related to the land acquisition process; these are being managed by JSP and its land consultant to effectively close these out in a timely and agreeable manner.

#### *Worker Grievance Mechanism*

The Project will also provide a grievance mechanism for workers to raise reasonable workplace concerns. The mechanism will involve an appropriate level of management and address concerns promptly, using an understandable and transparent process that provides feedback to those concerned, without any retribution.

The workers (including sub-contractors) will be informed of the grievance mechanism at the time of recruitment and provided refreshers on the process thereafter during their employment.

Similar to the affected people's mechanism appropriate resources and budget should be allocated to address these matters in a transparent and understandable process that provides feedback to the workers without any retribution. The process should be anonymous and fair. Some guiding principles set out by the IFC include:

- The company will establish a transparent process for workers to express concerns and file grievances;
- There will be no retaliation or discrimination against those that express grievances;

- Management will treat the grievances seriously and take appropriate action; and
- The company's grievance mechanism does not replace other channels as defined by law or collective bargaining agreements.

The worker grievance mechanism is being developed as part of the Project worker management plan and will be finalized prior to worker recruitment and construction activities. Once final it will be disclosed widely amongst the Project and EPC employees via the worker inductions and training and around the Project site and accommodation areas.

## 6.5

### *IMPLEMENTATION OF STAKEHOLDER ENGAGEMENT ACTIVITIES*

The SEP (and grievance mechanism) will be effective if adequate resources – people, systems and processes, and associated financial resources – are assigned to implementation, and if responsibilities are clearly defined.

Stakeholder engagement management should be recognised as a business function with clearly defined objectives, assigned responsibilities, timelines, budget, senior management oversight, and regular reporting.

Currently the Project is in the process of establishing Environmental, Social or Health and Safety (EHS&S) resources management to undertake the EHS&S activities including stakeholder engagement activities. A number of personnel from the Project have been actively conducting consultation related to the AMDAL, ESIA and land acquisition.

The project contractors for the land acquisition have been undertaking extensive consultation with the Project's landowners (and village leaders) whilst JSP's advisors have been conducting a series of consultations associated with the AMDAL and ESIA. JSP has identified two (2) local staff to take on these roles specifically to manage grievances and undertake community consultations and is recruiting further qualified personnel.

They will conduct formal and informal community consultation activities/awareness raising events associated with the Project and oversee and manage Project grievances. It is also anticipated that the EPCs will identify resources to conduct consultations and manage grievances, overseen by JSP.

In order to execute the plan throughout the Project lifecycle the key organisational structure / functions outlined in **Table 6-8** will be considered in JSP's organisation.

**Table 6-8 Key Roles and Responsibilities Required to Implement the SEP**

| No  | Roles and Responsibilities   |
|---|--|
| <b>EHS&amp;S Manager</b>  |  |
| 1   | Develop and endorse Social and Community related Policies  |
| 2   | Liaise with government stakeholders  |
| 3   | Plans, directs, manages, and coordinates community development program, projects, services, functions and activities                                     |
| 4   | Monitor and report the Project's Social performance on a regular basis to the Project Manager, and take action to address performance issues, as needed. |
| 5   | Develops, justifies, and manages the budget  |
| <b>Stakeholder Relations Lead</b>                               |  |
| 1   | Lead collaboration with Project EPC Construction HSE Team to establish and implement the Project Grievance Mechanism for construction phase.             |
| 2   | Ensure the social-related commitments in the HSE&S Policy are applied.   |
| 3   | Manage the grievance mechanism monitoring and audit as required.   |
| 4   | Report to the Top Management and Lenders on social issues and grievance resolution implementation progress.  |
| <b>Stakeholder Consultation &amp; Grievance Redress Officer</b> |  |
| 1   | To manage the implementation of the grievance mechanism as required.   |
| 2   | To collaborate with other related units or departments and external parties (e.g. Contractors) in resolving grievances.                                  |
| 3   | To coordinate the grievance team in preparing proper documentation of grievances and their resolution.   |
| 4   | Lead the grievance mechanism monitoring and report to the Stakeholder Relations Lead and other relevant parties as required.                             |
| <b>Community Liaison Officers</b>                               |  |
| 1   | To observe the steps required in tracking and handling grievances.   |
| 2   | To receive, record and log grievances properly as required.  |
| 3   | Support the Grievance Redress officer in communicating with stakeholders and complainants.   |
| 4   | Support Grievance Redress officer in coordinating with contractors and other related parties as requested.   |
| 5   | To ensure proper documentation and database update of grievance and its resolution.  |
| 6   | To prepare periodical grievance reporting.   |

These key roles and responsibilities will be employed to manage stakeholder engagement activities; with some roles concurrently undertaken by one officer.

Monitoring the stakeholder engagement activities is important to ensure that consultation and disclosure efforts are effective, and in particular, that stakeholders have been meaningfully consulted throughout the process. Monitoring also allows the Project to improve its strategies by using rigorous information acquired from the monitoring activities.

An Environmental and Social Management Plan (ESMP) will be used as a platform to monitor the stakeholder engagement activities. This is further elaborated in **Chapter 12** of this Report.

## 7.1 DATA SOURCES

### 7.1.1 Environmental Baseline

The environmental baseline for the ESIA Report is based on primary and secondary data available from the Project area and studies. This includes the following:

- *Analisis Mengenai Dampak Lingkungan (AMDAL) Report (ERM, 2018b);*
- *PLTGU Jawa 1 Independent Power Project - Integrated Environmental and Social Impact Assessment (ESIA) - Additional Baseline Surveys for ESIA (ERM, 2018c);*
- *Regulatory Environmental Monitoring (RKL and RPL) Semester 1, 2017 completed for SKG Cilamaya (SKG Cilamaya, 2017);*
- *Environmental Monitoring (RKL and RPL) Semester 2, 2016 completed for SKG Cilamaya (SKG Cilamaya, 2016);*
- *Initial Environmental Examination Report, 2016 (IEE, 2016);*
- *Geotechnical Investigation of the Jawa 1 CCGT Power Plant IPP Project, Cilamaya, West Java, 2016 (Tigenco, 2016);*
- *Cilamaya Flood Study, 2016 (Pöyry, 2016a);*
- *Bathymetric Survey and Seawater Data Collection Report, 2016 (Pöyry, 2016b);*
- *500kV Transmission Line Study For PLTGU Jawa 1 Combined Cycle IPP Project, 2016 (Pöyry, 2016c);*
- *Report of Hydrological Analysis for Feasibility Study, Gas based Combined Cycle Power Plant Project at Cilamaya, West Java - Indonesia, 2015 (Pöyry, 2015);*
- *Soil Investigation at the proposed Power Plant area for 800 to 100 MW CCGT power Plant at Cilamaya, West Java, 2015 (Soilens, 2015);*
- *Offshore Survey for LNG Floating Storage & Regasification Unit (FSRU) Site at Cilamaya, 2015 (Mahakarya, 2015a);*
- *Geotechnical Survey for the Proposed Pipeline Route & FSRU Location, 2015 (Mahakarya, 2015b);*
- *Laporan pelaksanaan RKL RPL Lapangan Migas di Blok PHE-ONWJ Semester I Tahun 2014 (RKL RPL, 2014).*

## 7.1.2

### *Social Baseline*

The primary and secondary data presented in **Chapter 7.5** provides an overview of the key social and community health receptors located within the Project area. In this case this is defined as villages along the transmission line right of way and substation, households surrounding the power plant area and residents in Cilamaya town and the coastal fishing communities surrounding the jetty. The following approaches were adopted to gather a robust social baseline:

- A thorough review of available published secondary data such as governmental statistics and existing Project information;
- A series of field surveys were also undertaken to support the ESIA including key informant interviews in villages along the transmission line, household surveys in the vicinity of the power plant and focus group discussions in the fishing communities along the coastline near to the jetty and pumping station locations. The data was gathered between July 2017 and February 2018; and
- The land acquisition process is still underway as of August 2018. All impacted land owners have been identified and compensation agreed and paid for all tower footing land owners. A number of livelihood surveys were also conducted to gain a robust understanding of the land owners and land users impacted by the Project (for the transmission line tower footings and the coastal area).
- Disclosure of the ESIA commenced in June 2018 and is continuing throughout August 2018.

#### 7.1.2.1

##### *Desktop Review*

The following documents and data were collected and reviewed for a better understanding of the social baseline conditions in the Project area:

- ESIA social baseline survey notes and records (July 2017 – February 2018) and the RP census in February and May 2018.
- Published relevant secondary data including:
  - *West Java in Figure, 2017;*
  - *Karawang Regency in Figure, 2017;*
  - *Bekasi Regency in Figure, 2017;*
  - *Subang Regency in Figure, 2017;*
  - *Cilamaya Wetan District in Figure, 2016;*
  - *Cilamaya Kulon District in Figure, 2016;*
  - *Tempuran District in Figure, 2016;*
  - *Rawamerta District in Figure, 2016;*
  - *Cilebar District in Figure, 2016;*

- Kutawaluya District in Figure, 2016;
  - Rengadengklok District in Figure, 2016;
  - Karawang Barat District in Figure, 2016;
  - Pebayuran District in Figure, 2016;
  - Kedungwaringin District in Figure, 2016;
  - Karangbahagia District in Figure, 2016;
  - Cikarang Timur District in Figure, 2016;
  - Cikarang Utara District in Figure, 2016;
  - Blanakan District in Figure, 2016; and
- Published online news.

#### 7.1.2.2 ESIA Social Baseline Consultation and Observations

##### *Household Interviews*

Household interviews were conducted in Cilamaya Village, the location of the CCGT Power Plant. The total number of respondents interviewed was 100 households representing various community livelihoods including:

- Fenceline houses surrounding the CCGT Power Plant;
- Local farmers and fishing groups;
- Roadside households along Cilamaya Village main street;
- Paddy and fish pond land owners and cultivators; and
- Land users / sharecroppers.

The household respondents were sampled using the Slovin Method, a statistical method in which different sampling numbers are selected based on the population.

In addition to the household interviews conducted in Cilamaya Village as described above, household interviews were also undertaken with farmers and fishermen in Muara and Blanakan villages as well as the farmer's groups residing in the Karawang and Bekasi Regencies.

**Table 7-1** summarises the number of households interviewed in Muara and Blanakan and within the areas of Karawang and Bekasi Regencies.

**Table 7-1 ESIA Household Survey**

| Location                         | Livelihood Category   | Number of Household | Project component likely to impact the community  | Key Messages   |
|----------------------------------|-----------------------|---------------------|---|--|
| Muara Village                    | Farmers and Fishermen | 15                  | <ul style="list-style-type: none"> <li>• Jetty, access road and onshore pipeline</li> <li>• FSRU; and</li> <li>• Transmission Line ROW</li> </ul> | <ul style="list-style-type: none"> <li>• Socio-economic and livelihood conditions of the village; and</li> <li>• Knowledge on the proposed Project, concerns and expectations related to the Project.</li> </ul> |
| Blanakan Village                 | Fishermen             | 15                  |   |  |
| Regencies of Karawang and Bekasi | Farmers               | 115                 |   |  |

In addition to these surveys, targeted surveys were conducted for the impacted land owners and users along for the transmission line tower footings, access road and jetty area. The details of this survey are presented in the RP (**Annex I**).

*Key Informant Interviews*

Key informant interviews were conducted to gather qualitative information required for the ESIA and triangulate existing secondary data. A variety of village key informants within the AoI were interviewed to gather baseline information and to obtain an overview of community perceptions, knowledge and expectations towards the Project.

The stakeholders interviewed are summarised in **Table 7-2** below.

**Table 7-2 Key Informant Interviews**

| Category   | Number of Key Informants | Description  |
|--|--------------------------|--|
| Head of Villages   | 33                       | Socio-economic condition of the village, social and cultural arrangements, the use of natural resources, and knowledge about the Project, concerns and expectations related to the Project.          |
| Customary Leaders  | One (1)                  | Ethnicity and cultural heritage and historical information.  |
| Village Doctor and Midwife                                     | 29                       | Community health and sanitation  |
| Local Village Organisation (e.g. Women and Youth Organisation) | Four (4)                 | Socio-economic condition of the village, social and cultural arrangements, women and youth role in the community, and knowledge about the Project, concerns and expectations related to the Project. |
| Fishermen, farmers and business owners                         | Six (6)                  | Community livelihood and economic conditions   |

## Focus Group Discussions

In addition to household surveys and key informant interviews, Focus Group Discussions (FGD) were also conducted. This includes five (5) to 10 participants, with an objective to map the livelihoods of the communities potentially affected by the Project; particularly from the development of the CCGT Power Plant and Project facilities at the coastal area i.e. the jetty and pipeline RoW.

The FGDs with farming and fishing groups were conducted to gather information on livelihoods and community economic conditions. In addition, the FGDs with female groups were undertaken to obtain information on the community health conditions, their role in the household and a broader community, as well as the income generating activities

The FGDs conducted as part of the baseline survey are summarised in **Table 7-3**.

**Table 7-3** *Focus Group Discussions*

| Date & Location                    | Stakeholders                           | Description  |
|------------------------------------|--|--|
| 9 August 2017 in Muara Village     | Fishermen in Muara Village             | <ul style="list-style-type: none"> <li>Village socio-economic profile;</li> <li>Fishing gears commonly used by the fishermen; and</li> <li>Income from fishing activities.</li> </ul>                                      |
| 10 August 2017 in Cilamaya Village | Farmers in Cilamaya Village            | <ul style="list-style-type: none"> <li>Agriculture / farming profile of Cilamaya Village;</li> <li>Livelihood from farming activities; and</li> <li>Concerns and expectations related to the Project.</li> </ul>           |
| 12 August 2017 in Cilamaya Village | Ex-land users of the power plant land. | <ul style="list-style-type: none"> <li>Historical land use of the power plant land;</li> <li>Current livelihood activities of the ex-land users; and</li> <li>Concerns and expectations related to the Project.</li> </ul> |
| 13 August 2017 in Blanakan Village | Fishermen in Blanakan Village          | <ul style="list-style-type: none"> <li>Village socio-economic profile;</li> <li>Fishing gear commonly used by the fishermen; and</li> <li>Income from fishing activities.</li> </ul>                                       |
| 15 August 2017 in Cilamaya Village | Female Group in Cilamaya Village       | <ul style="list-style-type: none"> <li>Socio-economic conditions of the community; and</li> <li>Knowledge, concerns and expectations related to the Project.</li> </ul>  |
| 16 August 2017 in Muara Village    | Fish pond fishermen in Muara Village   | <ul style="list-style-type: none"> <li>Livelihoods and current fishpond activities; and</li> <li>Knowledge, concerns and expectations related to the Project.</li> </ul>   |

### *Field Observations*

Field observations were carried out during the baseline survey covering the following aspects:

- Location of the proposed Project;
- Nearby communities to the Project locations;
- Use of natural resources / ecosystem services;
- Land ownership;
- Health facilities in each of the village;
- Village government facilities;
- Public transportation services and infrastructure;
- Economic facilities and infrastructures;
- Community health and sanitation;
- Public service and infrastructure; and
- Cultural heritage.

### **7.1.3** *Structure of this Chapter*

The remaining sections of the report are structured as follows:

- *Chapter 7.2* summarises the onshore and offshore physical systems;
- *Chapter 7.3* summarises the onshore and offshore biological systems; and
- *Chapter 7.4* describes the social and community health settings.

This chapter should be considered with **Annex A** and **Annex B**. **Annex A** presents the comparison of Indonesian and international standards of relevance to the Project whilst **Annex B** presents the environmental survey results onshore and offshore. A number of other technical Annexes have also been developed to support the impact assessment (**Chapter 8** and **Chapter 9**) including:

- *Annex C* *Stakeholder Engagement Plan;*
- *Annex D* *Air Quality Assessment;*
- *Annex E* *Acoustics Assessment;*
- *Annex F* *Waste Regulations;*

- Annex G Visual Impact Assessment;
- Annex H Quantitative Risk Assessment;
- Annex I Resettlement Plan;
- Annex J Biodiversity Offset Assessment;
- Annex K Electromagnetic Field Study;
- Annex L Flood Risk Studies;
- Annex M Greenhouse Gas Assessment;
- Annex N Sedimentation Modelling;
- Annex O Project RKL RPL;
- Annex P Bird and Coral Surevy Reports Modelling.

## 7.2 PHYSICAL ENVIRONMENT

### 7.2.1 General Climate and Meteorological Conditions

Indonesia is located on the southwest coast of Southeast Asia covering 1,910,931 km<sup>2</sup> of land. It consists of several large land masses e.g. Java, Sumatra and Kalimantan, and 13,667 smaller islands. Straddling the equator, Indonesia is a tropical country with a wet, hot, humid climate the entire year. Its topography is extremely varied, ranging from sea and coastal systems, to peat swamps and montane forests (*World Bank Country Adaptation Profile, 2016*).

Temperatures and rainfall vary across the country due to the elevation and monsoon patterns. The average temperatures at or near sea level range from 21.6°C to 32.2°C; the uniformly warm waters that make up 81% of Indonesia's area ensure that temperatures on land remain fairly constant. The average humidity ranges from 70% to 90% and the onshore average wind speed is 1.0 to 6.0 ms<sup>-1</sup> (*Pöyry, 2015*).

Rainfall, usually heavy and accompanied by thunder, is well distributed throughout the year. The western parts of Indonesia experience the most precipitation as a result of the northward- and westward-moving monsoon clouds that are heavy with moisture by the time they reach these more distant regions (*NEA, 2017*). The average rainfall recorded at the Project areas is 2,528.0 mm. **Table 7-4** summarises the average temperature and rainfall in the Project area.

**Table 7-4 Annual Temperature and Rainfall (1998 – 2007)**

| Month    | Temperature (°C) |         | Rainfall (mm) |                   |
|----------|------------------|---------|---------------|-------------------|
|          | Maximum          | Minimum | mm            | No. of rainy days |
| January  | 31.9             | 21.5    | 378.0         | 17                |
| February | 31.8             | 21.2    | 349.8         | 17                |
| March    | 32.2             | 21.5    | 343.3         | 16                |
| April    | 32.4             | 21.7    | 213.6         | 16                |
| Mei      | 32.4             | 21.8    | 156.4         | 13                |
| June     | 32.5             | 21.9    | 87.2          | 7                 |
| July     | 32.2             | 21.6    | 102.6         | 8                 |
| August   | 32.6             | 21.8    | 50.9          | 4                 |

| Month     | Temperature (°C) |         | Rainfall (mm) |                   |
|-----------|------------------|---------|---------------|-------------------|
|           | Maximum          | Minimum | mm            | No. of rainy days |
| September | 32.6             | 22.0    | 51.9          | 5                 |
| October   | 32.1             | 21.4    | 278.1         | 17                |
| November  | 32.0             | 21.4    | 239.3         | 18                |
| December  | 32.0             | 20.9    | 276.9         | 13                |

Source: ERM, 2018b

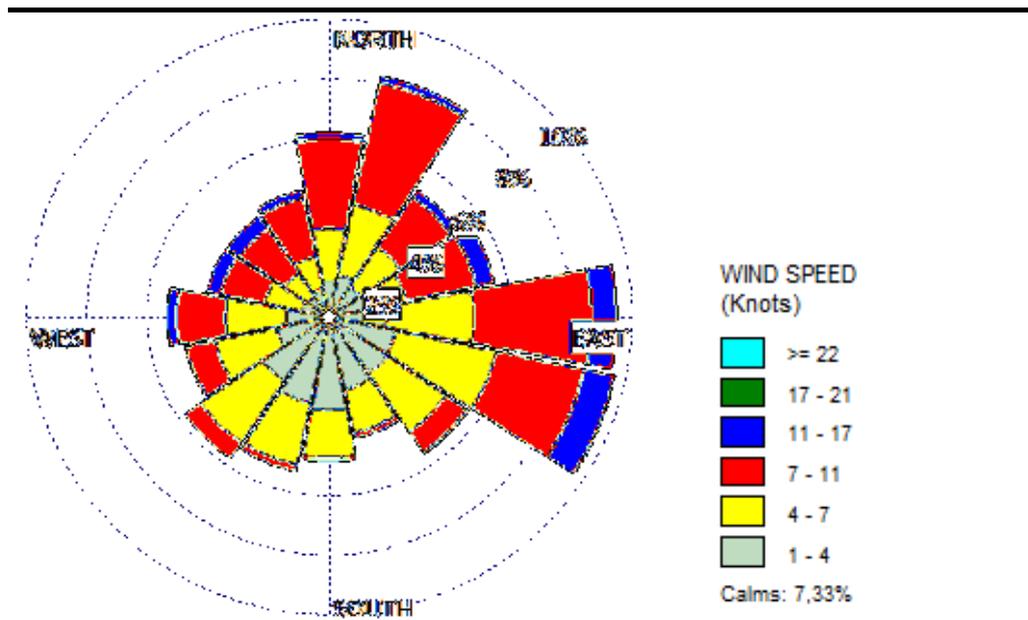
The larger islands in Indonesia have central mountain ranges rising from more or less extensive lowland and coastal plains and mountain area. The peaks rise to approximately 3,650 m in Java. Many inactive and scores of active volcanoes also dot the islands, accounting for the predominantly rich volcanic soil that is carried down by the rivers to the plains and lowlands.

Indonesia has extensive lowland plains and gently sloping cultivable mountainsides. An estimated 26% of these are devoted to various agricultural activities – of which nearly half are arable lands with approximately 40% being wetland (rice fields), 40% dry land and 15% shifting cultivation (UNFCC, 2010). As a result, Indonesia is subject to many sharp local differences in climate; temperatures are much lower in the hills, and the season and amount of maximum rainfall of each island varies with the amount of exposure they are given to the two (2) main seasonal wind systems (NEA, 2017).

From November to March, the country is dominated by the north monsoon blowing from China; while May to September is the period of the south monsoon, which blows from the Indian Ocean and Australia. The month of April and October are the transition months between the two (2) monsoon periods, during which the winds are light and variable in direction. Other than the cooler temperatures found in the mountains, Indonesia's weather and climate are typical of tropical, equatorial regions. Wind speeds are generally low ( $<4 \text{ ms}^{-1}$ , light breeze to calm). Occasionally, wind speeds increase to fresh and strong breezes (approximately  $6 - 8 \text{ ms}^{-1}$ ).

**Figure 7-1** illustrates the annual windrose at the Project area.

Figure 7-1 Annual Windrose



Source: ERM, 2018b

### 7.2.2 Effects of Climate Change

Indonesia is highly vulnerable to the impacts of climate change, with risks of increased flooding, heat-related mortality, occupational health hazards and water scarcity alongside reduced agricultural production (as was reported in 2017 by local farmers in the Project area).

Under climate change, Indonesia is predicted to experience temperature increases of approximately 0.8°C by 2030. Rainfall patterns are predicted to change, with the rainy season ending earlier and the length of the rainy season becoming shorter (IFPRI, 2011).

In addition, mangrove ecosystems are threatened by climate change. Sea level rise poses a major threat to mangrove ecosystems through sediment erosion, inundation stress and increased salinity at landward zones. The increased frequency and levels of seawater could affect the position and health of coastal ecosystems and pose a hazard to coastal development, human safety and may affect the position and health of mangroves, including through altered sediment elevation and sulphide soil toxicity (Ellison, 2003).

In addition, Indonesia is affected occasionally by tropical cyclones and also periodically experiences droughts, sometimes accompanied by devastating forest fires, caused by El Niño/ Southern Oscillation (ENSO).

Since the Project activities take place over a period of 20-25 years, changes in environmental conditions as a result of climate change may influence the options that are adopted for the activities over that period.

## 7.2.3 *Onshore Physical Environment*

### 7.2.3.1 *Topography and Geology*

In general, the morphology characteristic of the Project area is occupied by flat, swampy alluvium, sedimentation of mud tidal landforms as well as sub-recent beach ridges and swale and coastal landforms.

A topography and geological survey was undertaken for the CCGT Power Plant area and the proposed Transmission Line between November 2015 and January 2016 (*Soilens, 2015; Tigenco, 2016*).

The CCGT Power Plant will be developed on paddy field land where to the north is (brackish water) fish ponds, mangroves and swamps. The geological condition of the Project area is located within Qa (River and Coastal Deposit) or Alluvium, with a slope of 0.3% and consists of gravel, sand, silt, clay and mud. The bottom layer is assumed to be Qps (Pleistocene Sediment) consisting of conglomerate.

The surrounding of the proposed power plant area consists of sub-recent beach ridges and swales landform with a flat topography (slope of 0-3%).

The CCGT Power Plant area has a generally flat topography with an average elevation in range +3.00 to +3.50 Mean Sea Level (MSL) with some minor topography elevation at a minimum +2.50 MSL and maximum +3.75 MSL. The topography of the water and gas service corridor varies from around +2.50 MSL adjacent to the CCGT Power Plant area to around 0.0 m MSL adjacent to the Java Sea (*Soilens, 2015*). Such landform at the northern part of proposed power plant i.e. adjacent to the Java Sea, consists of mud tidal flat landforms.

Additionally, the proposed transmission line route crosses three (3) geological formations. The area is composed of Beach Ridge Deposits (Qbr), Beach Deposits (Qac), and Flood Plain Deposits (Qaf). Beach Ridge Deposits are composed of fine to coarse sand and little clay with mollusc fragments. The thickness of Qbr is about 100 m. The Beach Deposits are interfinger deposited with Beach Ridge Deposits. Beach Deposits are composed of sand and clay with mollusc shells. Flood Plain Deposits are composed of clayey sand, sandy clay and peaty clay (*Pöyry, 2016c*).

### 7.2.3.2 *Seismicity*

Indonesia is included in areas prone to earthquake disasters due to its geographical position in a very active tectonic zone. The high seismic activity is seen from the recording and historical record in the period of 1900-2009 where there were more than 50,000 earthquake events with magnitude  $M = 5.0$ .

Based on epicenter data from the main earthquakes in Indonesia the location of the power plant is not within a high seismic activity. The site is in a low

land vulnerability zone that rarely/almost never has land movements occurring.

In anticipating the dangers of the earthquake, the Government of Indonesia has a standard earthquake resistance planning regulations for building structures (SNI-03-1726-2012 on Procedures for Earthquake Resistance Planning for Building and Non Building Structure). As such the Project is adhering to this standard in the construction of the power plant. The power plant is not located in a known high seismic area based on data from the Ministry of Public Works and People's Housing (PUPR). Furthermore no tsunami have been recorded as affecting the project location over the past 20 years.

**Figure 7-2** and **Figure 7-3** illustrate the overall topographical view and distribution of soil types in the Project area.

Figure 7-2 Topography of Project Area

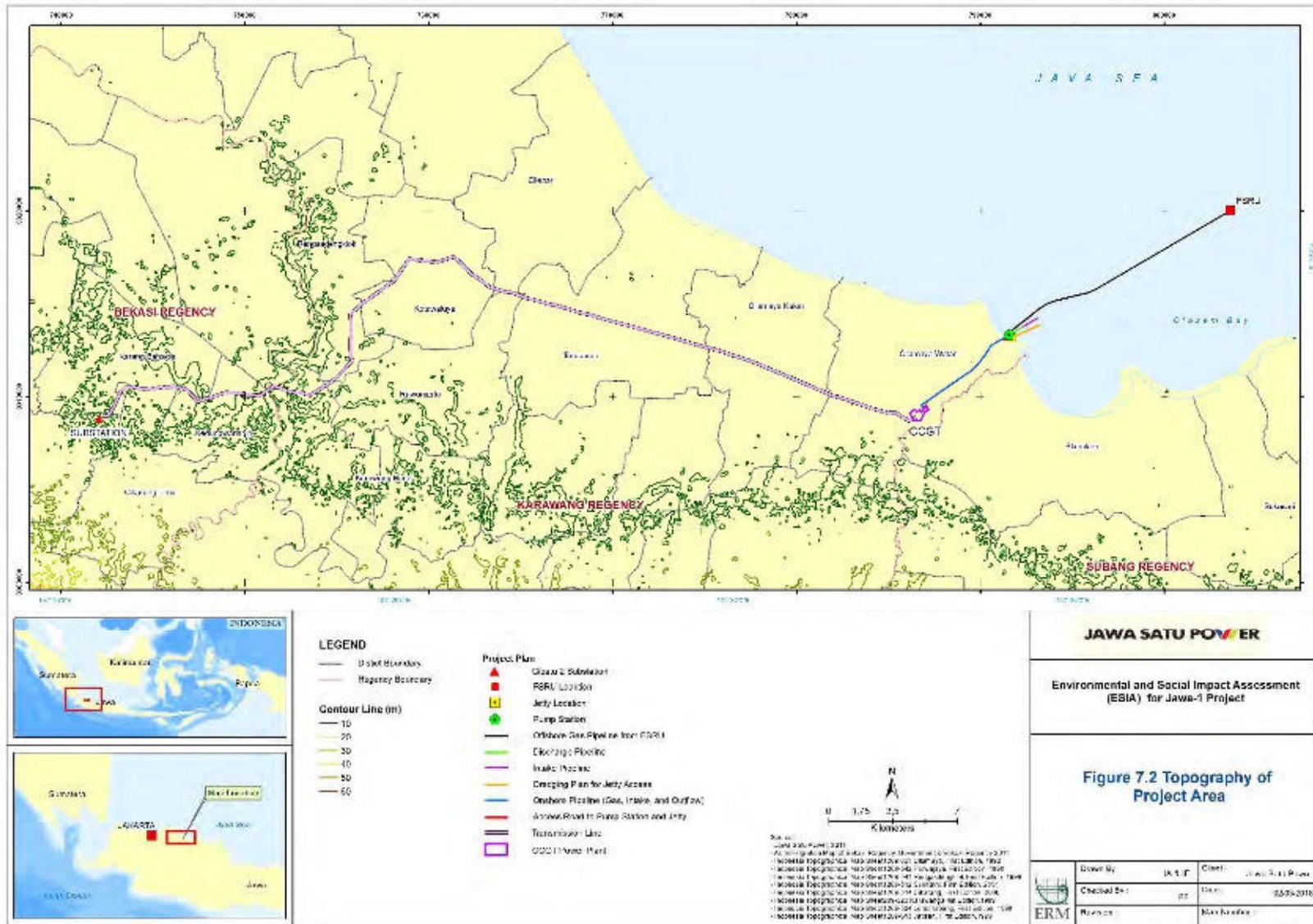
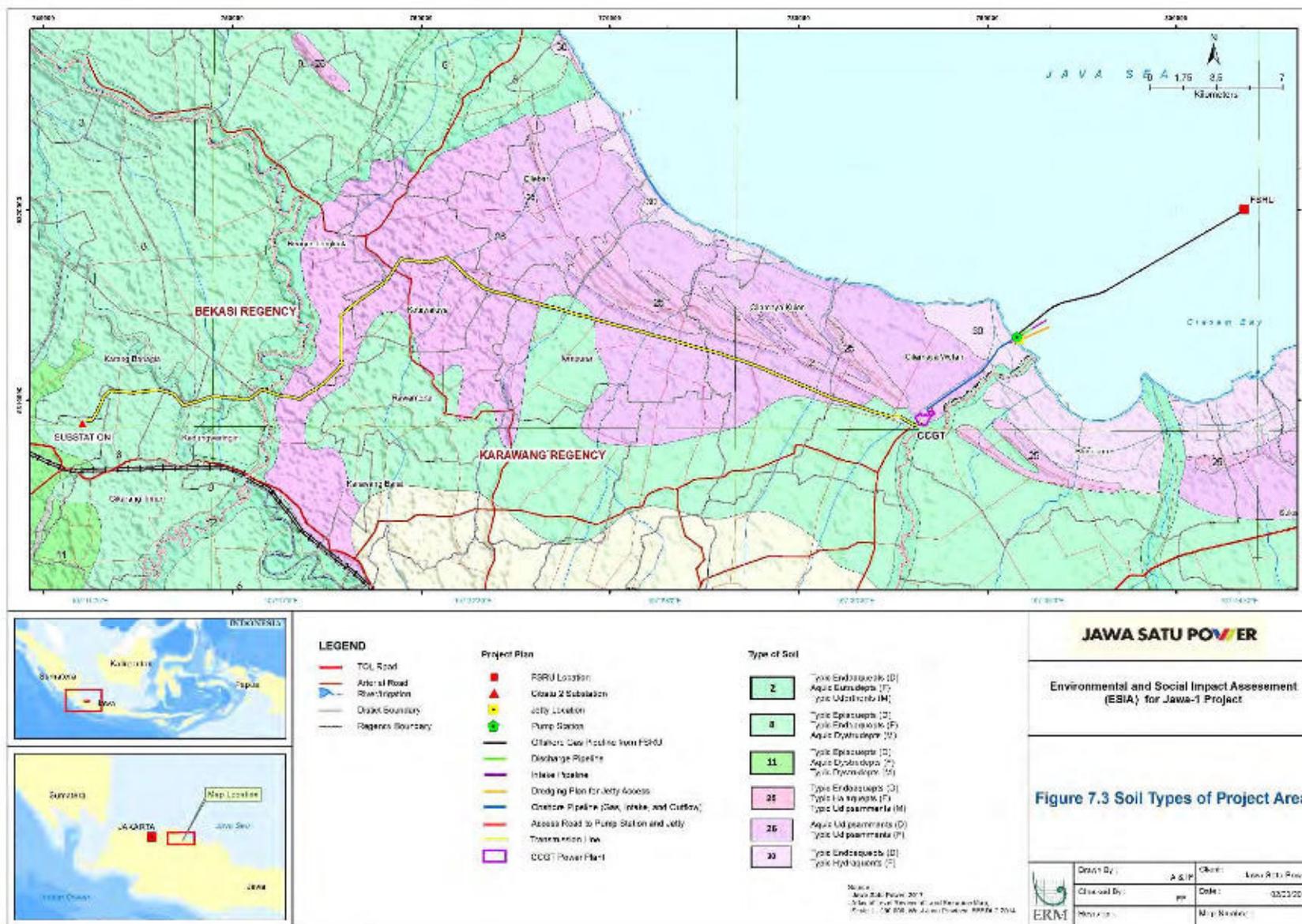


Figure 7-3 Soil Types of Project Area



The CCGT Power Plant area is situated between the Cilamaya Main River and Cilamaya Irrigation Canal. Via the Ciherang River, the Irrigation Canal receives flood flows from the upstream catchment which are diverted at the Barugbug weir. The Cilamaya River flows through four (4) regencies i.e. Subang, Karawang, Purwakarta and Bandung Barat. The recorded compositions of the Cilamaya River are alluvium, brown andosol and regosol, red to brown latosols, and laterites.

A flood study has also been undertaken for the power plant area between November 2015 and April 2016. The approach comprised 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) (Pöyry, 2016a). A 2D-hydraulic model was built from a LiDAR-based Digital Terrestrial Model (DTM), cross-sectional surveys and sea bed elevations, after ground-truthing and modifying some of the input-data.

The flood modeling study results clearly show that the implementation of the proposed dike around the Project area will have minimal impact i.e. unchanged or a decrease in flood inundation levels in the range of 1 to 15 cm) in some of the sensitive neighboring assets (including schools and residential areas) for the 100 year inland flooding and extreme coastal flooding events. **Annex L** presents the findings of the modelling.

However, agricultural regions in the vicinity of the Project area can exhibit some level of water logging (flood inundation levels in the range of 1 to 40 cm) that may not still pose any level of flood risk for the same inland and coastal flooding events.

The backfilling of the Project area within the dike does not pose any flood risk to the neighboring communities.

Tidal storm surges may significantly influence the flood situation in combination with backwater effects. Several other larger and smaller irrigation canals are operated within the CCGT Power Plant area. The discharge capacities are 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 area (Pöyry, 2016a).

Baseline data of soil and groundwater properties and quality (geotechnical, physical, chemical, and microbial contents) at the Project area were obtained in 2015, 2016 and 2017. Based on the soil and geotechnical investigations conducted in 2015 and 2016 (*Soilens, 2015*; and *Tigenco, 2016*), the proposed CCGT Power Plant is located in an area of mostly flat plains consisting of paddy fields divided by dikes. The surface soil consists of soft clay with the groundwater table in the area at 0.5 – 3.5 m bgs in boreholes.

Additionally, the proposed area of the onshore pipeline ROW, the pump house and jetty are mostly dominated by fish ponds and few mangroves. The surface soil is soft clay covered with grass. The groundwater table along the pipeline was encountered at 0.1 – 0.3 m bgs and at the jetty 10.9 m bgs (one borehole).

In identifying the properties and quality of the soil and groundwater at these locations, two (2) soil and groundwater samplings were undertaken during the soil and geotechnical investigations (*Soilens, 2015*; *Tigenco, 2016*). The sampling activities included:

- Three (3) locations and laboratory testing on soil and groundwater at borehole depth of 1.0 – 1.7 m bgs (*Soilens, 2015*); and
- Four (4) locations and laboratory testing on soil and groundwater at borehole depth of 1.0 - 4.0 m bgs (*Tigenco, 2016*).

The investigations identified the subsurface soil at all the proposed Project areas as “Medium” soil based on SPT N-value (more than 20), shear strength (more than 50 kPa) and shear velocity (about 214 m/sec). The subsurface soil profile is dominated by clay with thin lenses of sand at some depths. The surface soil is soft grey clay with a thickness between 3 – 10.5 m followed by medium-dense lenses of sand at depth and layers of medium-stiff highly plastic silt-clay to the maximum boring depth of 30 - 61 m bgs at the proposed CCGT Power Plant and to 50 m bgs in one borehole at the jetty. The soft top layer was observed from 3 m to 10.5 m bgs therefore settlement could be high.

As the soft top layer has low undrained shear strength, the maximum height of open vertical excavation is one (1) m high. The excavation must use retaining structures or slopes if it is more than one (1) m. The recommended slope is 1:3 for excavations up to five (5) m. Over the five (5) m excavation, it is recommended to use temporary sheet piles with reinforcing beams as the groundwater level is high. Rock properties were not encountered at the Project area from the borehole logs and due to properties of soft clay and dense lenses of sand encountered, liquefaction danger was not observed during the surveys.

The investigations tested for pH, sulphide and chloride levels in soil and groundwater. In soils, pH ranged from 5.9 – 8.23, sulfate ranged from 9 – 478 mg/L and chloride ranged from 78 – 14,057 mg/L, respectively. In groundwater, pH ranged from 6.73 – 8.0, sulfate ranged from 0.3 – 1,364 mg/L and chloride ranged from 28.3 to 4,253 mg/L.

The most detrimental corrosion attack to concrete construction is the presence of sulfate in soil (and groundwater). Based on the requirements for concrete exposed to sulfate-containing solutions in *Building Code Requirements for Structural Concrete* (ACI 318-95) issued by American Concrete Institute, the soil and groundwater conditions for the Project area with considerably low-medium sulfate levels are classified as “Negligible” to “Moderate” exposure to sulfate attack. Hence, normal (ordinary) cement could be used for concrete structures in contact with soil (*Soilens, 2015; and Tigenco, 2016*).

In addition, the pH of soil and groundwater are neutral, therefore no treatment needed prior to use. However, chloride content is over the required maximum content (<0.15%), therefore there is a possibility that the groundwater cannot be used for concrete; further investigation is recommended (*Tigenco, 2016*).

The soil at the Project area is not recommended to be used for the structural fill as it is highly plastic (LL = 60 – 90 %) (IP = 30 – 50), has a very high fine content (>99%), and low soaked CBR value (0.3 – 1%) as such it cannot hold the weight of machinery and compaction energy hence cannot be optimally compacted (*Tigenco, 2016*).

In addition to the investigations conducted in 2015 and 2016, two (2) additional investigations on soil and groundwater quality were conducted in 2016 and 2017. Based on reports of *Regulatory Environmental Monitoring (RKL and RPL) Semester 2, 2016; Regulatory Environmental Monitoring (RKL and RPL) Semester 1, 2017* (SKG Cilamaya, 2016; SKG Cilamaya, 2017); and *Analisis Mengenai Dampak Lingkungan (ANDAL)* (ERM, 2018b) the sampling activities include:

- One (1) location and laboratory testing on groundwater within the vicinity of Cilamaya River (SKG Cilamaya, 2016; and SKG Cilamaya, 2017); and
- Laboratory testing from six (6) soil locations from boreholes along the proposed transmission line and two (2) groundwater locations from nearby community wells located along the proposed pipeline ROW between July 2017 and August 2017 (ERM, 2018b).

Metals i.e. mercury, arsenic, chromium, copper, lead, zinc were detected at low levels in the soil and groundwater. Microbial contents i.e. Total *Coliform* and *Fecal Coliform* were detected in groundwater at lower levels at the location near the proposed CCGT Power Plant however at high levels at the locations downstream along the proposed pipeline. Total Dissolved Solid (TDS) was

detected at high levels in groundwater sampling of August 2016 and decreased significantly in the sampling activities in 2017. Soil collected along the transmission line (ERM, 2018b) comprise silt and silt loam detected with metals i.e. arsenic, chromium, copper, lead and zinc at low – moderate levels.

All soil and groundwater quality results were assessed against the relevant local regulatory standards to understand the baseline conditions at the Project area prior to construction and operation. Assessment of impacts will be discussed within **Chapter 8** of this Report. The relevant local regulatory standards are listed below:

- *Ministry of Health, Government of Indonesia Regulation No. 32 Year 2017 regarding Environmental-Health Standards and Water-Quality Requirements for Hygiene Sanitation, Swimming Pools, Spas and Public Bath (Appendix I on Water for Sanitary Hygiene Standards) (a new regulation replacing MoH 416/1990); and*
- *Government of Indonesia Regulation No. 101 Year 2014 regarding Hazardous and Toxic Waste Management (Appendix V on Quality Standard of Toxic Characteristic for the Contaminated Soil Management).*

Based on the assessment, most baseline soil and groundwater data collected in the Project area were in compliance with the relevant standards i.e. Regulation of Health Ministry 416/1990 Appendix II except:

- Total Dissolved Solids (TDS) (2,670 mg/L) in August 2016, and Potassium Permanganate (17.5 mg/L) and microbial contents i.e. Total *Coliform* (58 MPN/100 ml) both in November 2016 groundwater collected in one location in the vicinity of the Project area exceeded water quality standards (1,000 mg/L for TDS and 50 MPN/100 ml for Total *Coliform*), however the levels decreased significantly in 2017 monitoring activities and became non-exceedances (SGK Cilamaya, 2016; SGK Cilamaya, 2017); and
- Lead (Pb) (6.45 – 8.85 mg/L), Potassium Permanganate (13.9 – 15.8 mg/L) and microbial contents i.e. Total *Coliform* (920 – 1,600,000 MPN/100 ml) in 2017 groundwater samples from community wells along the proposed pipeline ROW exceeded water quality standards (0.05 mg/L for lead and 50 MPN/100 ml for Total *Coliform*) (ERM, 2018b).

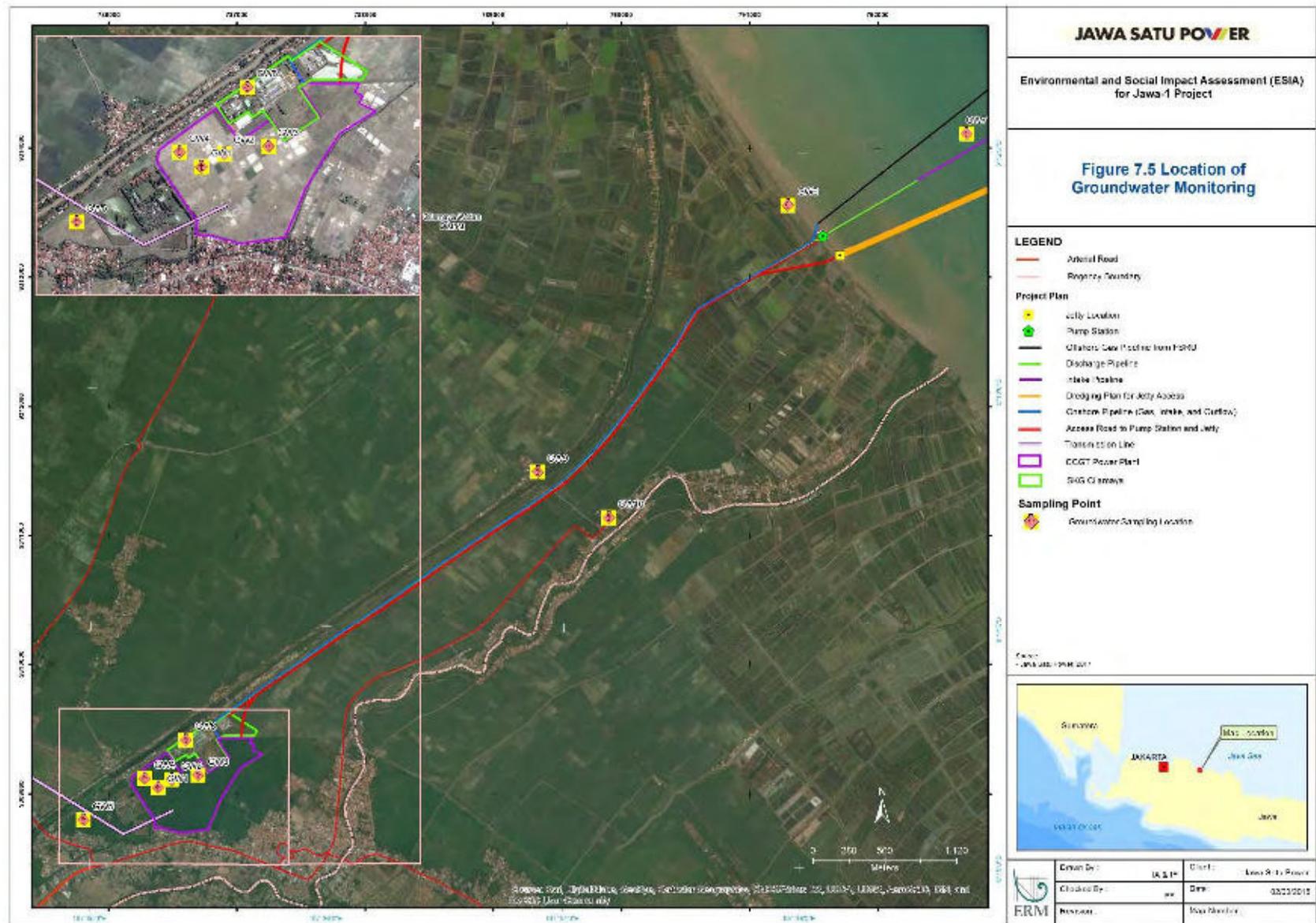
The significantly high microbial contents in the groundwater could be contributed by domestic activities such as failed sewage systems that allow coliforms in the effluent to flow; and by agriculture practices such as use of manure as fertiliser and presence of livestock in water bodies, all of which flow into the subsurface and subsequently reach the water table. The levels of metals in soil and groundwater could be naturally occurring or could be contributed by agriculture activities such as the use of fertilisers or pesticides.

The complete list of assessed parameters and results are summarised in **Annex B.1 and Annex B.2.**

The summary of the soil and groundwater monitoring locations is illustrated in **Figure 7-4** and **Figure 7-5** respectively.



Figure 7-5 Locations of Groundwater Monitoring (July 2017 – August 2017)



Baseline data of the surface water quality (physical, chemical, microbial contents and plankton type diversity) at the Project area were obtained in 2016 and 2017 (*Pöyry; 2016b; SKG Cilamaya, 2016; SKG Cilamaya, 2017; and ERM. 2018b*). The nearest surface and river water body potentially affected by the Project activities is the Cilamaya SKG irrigation channel. Surface water from the irrigation channel, Cilamaya River, and sediments were collected at a total of ten locations:

- Two (2) locations within the vicinity (upstream) of the proposed CCGT Power Plant (*Pöyry; 2016b*);
- One (1) location within the vicinity (downstream) of the proposed CCGT Power Plant. Samples from this location were taken in four events of August and November 2016, and February and May 2017 (*SKG Cilamaya, 2016; and SKG Cilamaya, 2017*); and
- Seven (7) locations were sampled between July 2017 and August 2017 including two (2) within the vicinity of the proposed CCGT Power Point, two (2) at Cilamaya River, one (1) at the proposed onshore ROW pipeline and two (2) near the jetty area (*ERM. 2018b*).

Physical properties i.e. Total Dissolved Solid (TDS) and Total Suspended Solid (TSS); organic and inorganic chemicals i.e. Biological Demand (BOD) and Chemical Oxygen Demand (COD), nitrate, oil and grease and detergent; metals i.e. arsenic, copper, zinc, manganese; and microbial content i.e. *Faecal Coliform* and *Total Coliform* were detected in the samples from all locations. Microbial contents were detected at high levels while other compounds were detected at low - moderate levels.

Surface water quality was assessed against the relevant local regulatory standards to understand the baseline conditions along the river and irrigation channel prior to construction and operation. Assessment of impacts will be discussed within **Chapter 8** of this Report.

The relevant local regulatory standard is *Government of Indonesia Regulation No. 82 Year 2014 regarding Management of Water Quality and Control on Water Pollution*, indicating four classification of water class (Class I – IV). The Cilamaya SKG irrigation channel has been identified as Class III, designated use for fresh water cultivations, cattle breeding, agricultural irrigation, and/or other purposes that require equal water quality.

Based on the assessment, most of the baseline surface water data collected along the river and irrigation channel were in compliance with the relevant standards except:

- Samples from upstream of the proposed CCGT Power Plant with TSS (450 - 500 mg/L), BOD (13 - 16 mg/L), DO (4.3 - 4.5 mg/L) and metals i.e. zinc (0.107 - 0.114 mg/L), copper (0.075 - 0.155 mg/L) and mercury (0.09 - 0.36 mg/L) as well as Sulfide (H<sub>2</sub>S) (0.019 - 0.923 mg/L) (Pöyry; 2016b) exceeded the water quality standard;
- Samples from one (1) location within the proposed CCGT Power Plant for four monitoring activities in 2016 and 2017 (SKG Cilamaya, 2016; and SKG Cilamaya, 2017): Zinc (0.254 mg/L) and COD (87 mg/L) (November 2016) exceeded water quality standard however reduced significantly in the 2017 monitoring activities. BOD (11 - 14 mg/L), COD (3.87 - 4.05 mg/L) and *Faecal Coliforms* (22000 - 280000 MPN/100 ml) exceeded water quality standard throughout 2016 and 2017; and
- Samples collected in 2017 from seven (7) locations along the irrigation channel and river (ERM. 2018b): BOD, COD, copper, lead, nitrite and Total Coliform exceeded the water quality standard in all locations. TDS and DO exceeded the water quality standard in the downstream locations near jetty.

Higher concentrations of TDS, BOD<sub>5</sub>, COD and metals could be associated with agricultural and urban land uses upstream of the channel then being mobilised to the downstream of the channel towards the jetty.

The significantly high microbial contents in the river water could be contributed by domestic activities such as failed sewage system that allow Coliforms in the effluent to flow into the nearby surface water; and by agriculture practices such as use of manure as fertilisers and livestock presence in the water bodies.

The levels of metals i.e. copper and lead could be naturally occurring or could be contributed by agriculture activities such as the use of fertilisers or pesticides.

In addition to river water sampling, plankton and benthos monitoring were conducted at two (2) locations i.e. upstream and downstream of Cilamaya River in 2016 (Pöyry; 2016b); and sediment sampling was conducted at seven (7) locations in 2017 (ERM. 2018b).

A total of 17 plankton species were found, with a number of individuals ranged between 0.780 - 0.851 individuals. A total of five (5) benthos species found with the number of individuals ranged between 36 - 39 individuals.

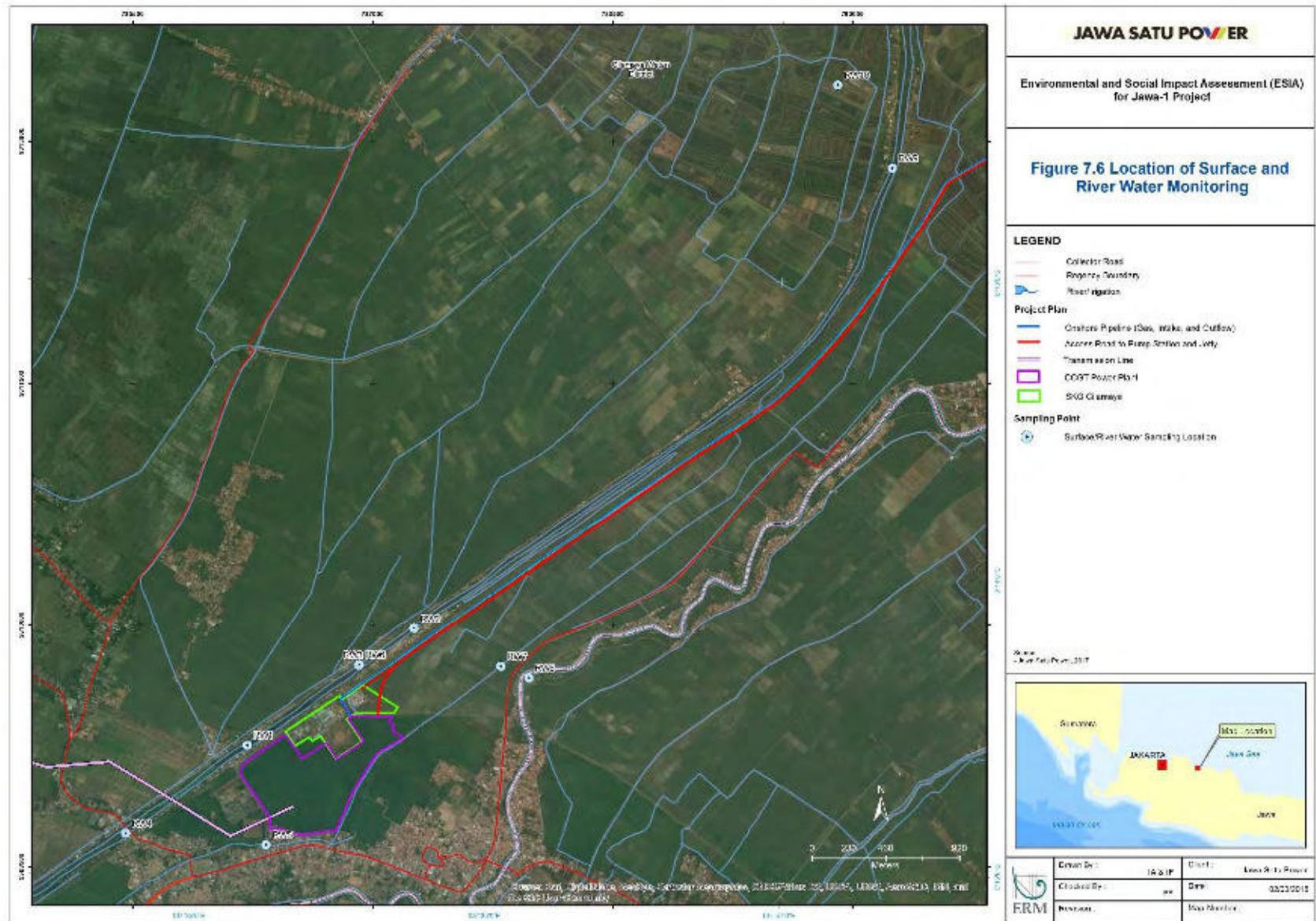
The plankton index was based on diversity ranged from > 0.6 and benthos diversity index ranged from 0.5 to 1.74. These indicate that the river water around the proposed Project area falls under medium-highly polluted categories (Pöyry, 2016b).

River sediments located at seven (7) locations in 2017 were tested for metals. Mercury, chromium, arsenic, cadmium, copper, lead, zinc and nickel were detected at low-medium levels in the sediments along the river or channel. It should be noted that no local regulatory standard is available for assessment of river sediment. However, based on the *Canadian Sediment Quality Guidelines for the Protection of Aquatic Life, 2001*, the metals detected in the samples were in compliance with the standard, with an exception of Cadmium level which exceeded the standards at all sampling locations and one (1) zinc sample located near to the proposed CCGT Power Plant area.

The summary of the surface and river water monitoring locations is illustrated in **Figure 7-6**.

The complete list of assessed parameters and results are tabulated in **Annex B.3**.

Figure 7-6 Locations of Surface and River Water Monitoring (July-August 2017)



This chapter presents the baseline findings used to inform the detailed air quality impact assessment presented in **Annex D Chapter 5.3** of this Report. Annex D should be referred to for more detailed information regarding the baseline assessment methodology where necessary.

The ambient air quality data necessary to inform the air quality impact assessment was collected by means of a 24 week Radiello diffusion tube survey and a 12 week continuous and real time monitoring survey performed with two (2) AQS Urban Air Quality Monitors (AQS1).

A summary of the diffusion tube findings are presented in **Table 7-5, Table 7-6** and **Table 7-7** and the raw results are tabulated in **Annex B.4**.

The 1-hour maximum, 24-hour maximum and 12-week average NO<sub>2</sub> data collected from the AQS1 air quality monitors is summarised in **Table 7-8**.

**Table 7-5 Indicative Annual Mean NO<sub>2</sub> Background Concentrations Estimated from Weekly Diffusion Tube Results**

| Monitoring Period                            | Date on   | Date off | Season        | AQM1a                             | AQM1b               | AQM2  | AQM3 | AQM4a | AQM4b               | AQM5 | AQM6 |
|--|---|----------|---------------|-----------------------------------|---------------------|-------|------|-------|---------------------|------|------|
|  |   |          |               | NO <sub>2</sub> µg/m <sup>3</sup> |                     |       |      |       |                     |      |      |
| Week 1                                       | 10/08/17  | 17/08/17 | Inter-monsoon | 6.00                              | -                   | 8.60  | 6.32 | 6.28  | -                   | 8.15 | 5.02 |
| Week 2                                       | 17/08/17  | 24/08/17 | Inter-monsoon | 6.49                              | -                   | 6.60  | 5.79 | 5.53  | -                   | 7.04 | 4.21 |
| Week 3                                       | 28/08/17  | 04/09/17 | Inter-monsoon | 6.28                              | -                   | 8.03  | 6.36 | 5.98  | -                   | 8.52 | 4.80 |
| Week 4                                       | 04/09/17  | 11/09/17 | Inter-monsoon | 7.17                              | -                   | 7.77  | 7.15 | 7.69  | -                   | 8.82 | 6.00 |
| Week 5                                       | 11/09/17  | 18/09/17 | Inter-monsoon | 7.41                              | -                   | 7.86  | 8.01 | 8.03  | -                   | 9.42 | 6.30 |
| Week 6                                       | 18/09/17  | 25/09/17 | Inter-monsoon | 7.71                              | -                   | 11.42 | 11.6 | 8.77  | -                   | 13.0 | 8.03 |
| Week 7                                       | 25/09/17  | 02/10/17 | Monsoon       | 6.37                              | -                   | 9.61  | 8.23 | 9.16  | -                   | 9.81 | 5.17 |
| Week 8                                       | 02/10/17  | 09/10/17 | Monsoon       | 8.95                              | -                   | 7.20  | 7.80 | 11.4  | -                   | 13.5 | 8.65 |
| Week 9                                       | 09/10/17  | 16/10/17 | Monsoon       | 8.14                              | -                   | 6.99  | 8.31 | 11.0  | -                   | 17.6 | 7.20 |
| Week 10                                      | 16/10/17  | 23/10/17 | Monsoon       | 3.57                              | -                   | 3.95  | 3.38 | 3.52  | -                   | 5.38 | 2.14 |
| Week 11                                      | 23/11/17  | 30/11/17 | Monsoon       | 2.78                              | -                   | 3.68  | 4.89 | 2.91  | -                   | 6.22 | 2.52 |
| Week 12                                      | 30/11/17  | 06/11/17 | Monsoon       | 3.31                              | -                   | 2.95  | 4.31 | 3.03  | -                   | 5.45 | 2.27 |
| Week 13                                      | 09/01/18  | 16/01/18 | Monsoon       | -                                 | 1.81 <sup>(1)</sup> | 2.20  | 1.48 | -     | 1.97 <sup>(1)</sup> | 2.29 | 2.54 |
| Week 14                                      | 16/01/18  | 23/01/18 | Monsoon       | -                                 | 4.91 <sup>(1)</sup> | 7.95  | 3.76 | -     | 5.77 <sup>(1)</sup> | 6.64 | 5.87 |
| Week 15                                      | 23/01/18  | 30/01/18 | Monsoon       | -                                 | 7.80 <sup>(1)</sup> | 8.97  | 6.37 | -     | 6.73 <sup>(1)</sup> | 8.89 | 5.96 |
| Week 16                                      | 30/01/18  | 06/02/18 | Monsoon       | -                                 | 6.67 <sup>(1)</sup> | 12.9  | 3.53 | -     | 3.18 <sup>(1)</sup> | 5.79 | 4.32 |
| Week 17                                      | 06/02/18  | 13/02/18 | Monsoon       | -                                 | 5.24 <sup>(1)</sup> | 6.50  | 2.76 | -     | 3.80 <sup>(1)</sup> | 4.40 | 3.12 |
| Week 18                                      | 13/02/18  | 20/02/18 | Monsoon       | -                                 | 4.17 <sup>(1)</sup> | 7.44  | 2.67 | -     | 3.18 <sup>(1)</sup> | 4.25 | 5.73 |
| Week 19                                      | 20/02/18  | 27/02/18 | Monsoon       | -                                 | 6.50 <sup>(1)</sup> | 7.03  | 4.96 | -     | 5.06 <sup>(1)</sup> | 5.36 | 4.40 |
| Week 20                                      | 27/02/18  | 06/03/18 | Monsoon       | -                                 | 4.70 <sup>(1)</sup> | 8.03  | 3.50 | -     | 2.16 <sup>(1)</sup> | 6.34 | 3.25 |
| Week 21                                      | 06/03/18  | 13/03/18 | Monsoon       | -                                 | 4.83 <sup>(1)</sup> | 7.95  | 6.45 | -     | 4.66 <sup>(1)</sup> | 8.67 | 0.86 |
| Week 22                                      | 13/03/18  | 20/03/18 | Monsoon       | -                                 | 3.85 <sup>(1)</sup> | 4.79  | 5.73 | -     | 4.02 <sup>(1)</sup> | 6.92 | 0.59 |
| Week 23                                      | 20/03/18  | 27/03/18 | Monsoon       | -                                 | 4.47 <sup>(1)</sup> | 9.40  | 6.07 | -     | 5.26 <sup>(1)</sup> | 7.31 | 1.00 |
| Week 24                                      | 27/03/18  | 03/04/18 | Monsoon       | -                                 | 5.96 <sup>(1)</sup> | 9.06  | 5.81 | -     | 6.34 <sup>(1)</sup> | 8.16 | 3.27 |
| 24 Week Average Concentration <sup>(2)</sup> |   |          |               | 5.36                              |                     | 6.85  | 5.56 |       | 5.37                | 7.93 | 3.97 |
| Annual Air Quality Standard <sup>(3)</sup>   |   |          |               | 100                               |                     |       |      |       |                     |      |      |
| (1)  | Median value from triplicate diffusion tube                                       |          |               |                                   |                     |       |      |       |                     |      |      |
| (2)  | Used as an indication of the annual average concentration at each monitoring site |          |               |                                   |                     |       |      |       |                     |      |      |
| (3)  | Indonesia (PP41/1999) Ambient Air Quality Standards                               |          |               |                                   |                     |       |      |       |                     |      |      |

Table 7-6 Maximum Indicative 1-Hour NO<sub>2</sub> Background Concentrations Estimated from Weekly Diffusion Tube Results

| Monitoring Period                           | Date on  | Date off | Season        | AQM1a <sup>(1)</sup>              | AQM1b <sup>(1)</sup> | AQM2 <sup>(1)</sup> | AQM3 <sup>(1)</sup> | AQM4a <sup>(1)</sup> | AQM4b <sup>(1)</sup> | AQM5 <sup>(1)</sup> | AQM6 <sup>(1)</sup> |
|---|----------|----------|---------------|-----------------------------------|----------------------|---------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
|   |          |          |               | NO <sub>2</sub> µg/m <sup>3</sup> |                      |                     |                     |                      |                      |                     |                     |
| Week 1                                      | 10/08/17 | 17/08/17 | Inter-monsoon | 12.0                              | -                    | 17.2                | 12.6                | 12.6                 | -                    | 16.3                | 10.0                |
| Week 2                                      | 17/08/17 | 24/08/17 | Inter-monsoon | 13.0                              | -                    | 13.2                | 11.6                | 11.1                 | -                    | 14.1                | 8.42                |
| Week 3                                      | 28/08/17 | 04/09/17 | Inter-monsoon | 12.6                              | -                    | 16.1                | 12.7                | 12.0                 | -                    | 17.0                | 9.60                |
| Week 4                                      | 04/09/17 | 11/09/17 | Inter-monsoon | 14.3                              | -                    | 15.5                | 14.3                | 15.4                 | -                    | 17.6                | 12.0                |
| Week 5                                      | 11/09/17 | 18/09/17 | Inter-monsoon | 14.8                              | -                    | 15.7                | 16.0                | 16.1                 | -                    | 18.8                | 12.6                |
| Week 6                                      | 18/09/17 | 25/09/17 | Inter-monsoon | 15.4                              | -                    | 22.8                | 23.1                | 17.5                 | -                    | 26.0                | 16.1                |
| Week 7                                      | 25/09/17 | 02/10/17 | Monsoon       | 12.7                              | -                    | 19.2                | 16.5                | 18.3                 | -                    | 19.6                | 10.3                |
| Week 8                                      | 02/10/17 | 09/10/17 | Monsoon       | 17.9                              | -                    | 14.4                | 15.6                | 22.8                 | -                    | 27.0                | 17.3                |
| Week 9                                      | 09/10/17 | 16/10/17 | Monsoon       | 16.3                              | -                    | 14.0                | 16.6                | 22.1                 | -                    | 35.2                | 14.4                |
| Week 10                                     | 16/10/17 | 23/10/17 | Monsoon       | 7.14                              | -                    | 7.90                | 6.77                | 7.03                 | -                    | 10.8                | 4.29                |
| Week 11                                     | 23/11/17 | 30/11/17 | Monsoon       | 5.56                              | -                    | 7.37                | 9.78                | 5.83                 | -                    | 12.4                | 5.04                |
| Week 12                                     | 30/11/17 | 06/11/17 | Monsoon       | 6.62                              | -                    | 5.90                | 8.61                | 6.05                 | -                    | 10.9                | 4.55                |
| Week 13                                     | 09/01/18 | 16/01/18 | Monsoon       | -                                 | 3.62                 | 4.40                | 2.95                | -                    | 3.95                 | 4.59                | 5.08                |
| Week 14                                     | 16/01/18 | 23/01/18 | Monsoon       | -                                 | 9.81                 | 15.9                | 7.52                | -                    | 11.5                 | 13.3                | 11.7                |
| Week 15                                     | 23/01/18 | 30/01/18 | Monsoon       | -                                 | 15.6                 | 17.9                | 12.7                | -                    | 13.5                 | 17.8                | 11.9                |
| Week 16                                     | 30/01/18 | 06/02/18 | Monsoon       | -                                 | 13.3                 | 25.8                | 7.06                | -                    | 6.36                 | 11.6                | 8.64                |
| Week 17                                     | 06/02/18 | 13/02/18 | Monsoon       | -                                 | 10.5                 | 13.0                | 5.52                | -                    | 7.60                 | 8.80                | 6.24                |
| Week 18                                     | 13/02/18 | 20/02/18 | Monsoon       | -                                 | 8.35                 | 14.9                | 5.34                | -                    | 6.35                 | 8.50                | 11.5                |
| Week 19                                     | 20/02/18 | 27/02/18 | Monsoon       | -                                 | 13.0                 | 14.1                | 9.93                | -                    | 10.1                 | 10.7                | 8.80                |
| Week 20                                     | 27/02/18 | 06/03/18 | Monsoon       | -                                 | 9.40                 | 16.1                | 6.99                | -                    | 4.32                 | 12.7                | 6.50                |
| Week 21                                     | 06/03/18 | 13/03/18 | Monsoon       | -                                 | 9.66                 | 15.9                | 12.9                | -                    | 9.32                 | 17.3                | 1.71                |
| Week 22                                     | 13/03/18 | 20/03/18 | Monsoon       | -                                 | 7.71                 | 9.59                | 11.5                | -                    | 8.05                 | 13.8                | 1.17                |
| Week 23                                     | 20/03/18 | 27/03/18 | Monsoon       | -                                 | 8.95                 | 18.8                | 12.1                | -                    | 10.5                 | 14.6                | 2.01                |
| Week 24                                     | 27/03/18 | 03/04/18 | Monsoon       | -                                 | 11.9                 | 18.1                | 11.6                | -                    | 12.7                 | 16.3                | 6.54                |
| Maximum 1-Hour Concentration <sup>(2)</sup> |          |          |               | 17.9                              |                      | 25.8                | 23.1                | 22.8                 |                      | 35.2                | 17.3                |
| Annual Air Quality Standard <sup>(3)</sup>  |          |          |               |                                   |                      |                     | 400                 |                      |                      |                     |                     |

(1) The results at each monitoring site are based on multiplying the 1-week average value from the diffusion tube data set presented in **Table 7-5** by a factor of two

(2) The indicative maximum 1 hour average concentration at each monitoring site

(3) Indonesia (PP41/1999) Ambient Air Quality Standards

Table 7-7 Maximum Indicative 24-Hour NO<sub>2</sub> Background Concentrations Estimated from Weekly Diffusion Tube Results

| Monitoring Period                            | Date on  | Date off | Season        | AQM1a <sup>(1)</sup>              | AQM1b <sup>(1)</sup> | AQM2 <sup>(1)</sup> | AQM3 <sup>(1)</sup> | AQM4a <sup>(1)</sup> | AQM4b <sup>(1)</sup> | AQM5 <sup>(1)</sup> | AQM6 <sup>(1)</sup> |
|--|--|----------|---------------|-----------------------------------|----------------------|---------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
|  |  |          |               | NO <sub>2</sub> µg/m <sup>3</sup> |                      |                     |                     |                      |                      |                     |                     |
| Week 1                                       | 10/08/17   | 17/08/17 | Inter-monsoon | 7.08                              | -                    | 10.1                | 7.46                | 7.41                 | -                    | 9.62                | 5.92                |
| Week 2                                       | 17/08/17   | 24/08/17 | Inter-monsoon | 7.66                              | -                    | 7.79                | 6.83                | 6.53                 | -                    | 8.3                 | 4.97                |
| Week 3                                       | 28/08/17   | 04/09/17 | Inter-monsoon | 7.41                              | -                    | 9.48                | 7.50                | 7.06                 | -                    | 10.1                | 5.66                |
| Week 4                                       | 04/09/17   | 11/09/17 | Inter-monsoon | 8.46                              | -                    | 9.17                | 8.44                | 9.07                 | -                    | 10.4                | 7.08                |
| Week 5                                       | 11/09/17   | 18/09/17 | Inter-monsoon | 8.74                              | -                    | 9.3                 | 9.5                 | 9.5                  | -                    | 11.1                | 7.43                |
| Week 6                                       | 18/09/17   | 25/09/17 | Inter-monsoon | 9.10                              | -                    | 13.5                | 13.65               | 10.3                 | -                    | 15.3                | 9.48                |
| Week 7                                       | 25/09/17   | 02/10/17 | Monsoon       | 7.52                              | -                    | 11.3                | 9.7                 | 10.8                 | -                    | 11.6                | 6.10                |
| Week 8                                       | 02/10/17   | 09/10/17 | Monsoon       | 10.6                              | -                    | 8.50                | 9.21                | 13.4                 | -                    | 15.9                | 10.2                |
| Week 9                                       | 09/10/17   | 16/10/17 | Monsoon       | 9.61                              | -                    | 8.25                | 9.81                | 13.0                 | -                    | 20.7                | 8.50                |
| Week 10                                      | 16/10/17   | 23/10/17 | Monsoon       | 4.21                              | -                    | 4.66                | 3.99                | 4.15                 | -                    | 6.34                | 2.53                |
| Week 11                                      | 23/11/17   | 30/11/17 | Monsoon       | 3.28                              | -                    | 4.35                | 5.77                | 3.44                 | -                    | 7.34                | 2.97                |
| Week 12                                      | 30/11/17   | 06/11/17 | Monsoon       | 3.90                              | -                    | 3.48                | 5.08                | 3.57                 | -                    | 6.43                | 2.68                |
| Week 13                                      | 09/01/18   | 16/01/18 | Monsoon       | -                                 | 1.36                 | 3.36                | 5.43                | -                    | 4.58                 | 3.63                | 2.97                |
| Week 14                                      | 16/01/18   | 23/01/18 | Monsoon       | -                                 | 1.22                 | 3.42                | 5.71                | -                    | 4.85                 | 3.65                | 2.88                |
| Week 15                                      | 23/01/18   | 30/01/18 | Monsoon       | -                                 | 1.26                 | 3.77                | 6.07                | -                    | 4.64                 | 3.93                | 2.91                |
| Week 16                                      | 30/01/18   | 06/02/18 | Monsoon       | -                                 | 1.26                 | 3.42                | 5.43                | -                    | 4.64                 | 3.65                | 2.91                |
| Week 17                                      | 06/02/18   | 13/02/18 | Monsoon       | -                                 | 1.53                 | 5.54                | 6.24                | -                    | 8.98                 | 4.53                | 5.18                |
| Week 18                                      | 13/02/18   | 20/02/18 | Monsoon       | -                                 | 1.03                 | 2.62                | 4.43                | -                    | 2.46                 | 1.92                | 1.86                |
| Week 19                                      | 20/02/18   | 27/02/18 | Monsoon       | -                                 | 1.45                 | 4.11                | 4.69                | -                    | 2.21                 | 2.65                | 2.30                |
| Week 20                                      | 27/02/18   | 06/03/18 | Monsoon       | -                                 | 1.37                 | 3.46                | 4.42                | -                    | 2.39                 | 2.65                | 2.15                |
| Week 21                                      | 06/03/18   | 13/03/18 | Monsoon       | -                                 | 1.26                 | 4.02                | 4.89                | -                    | 2.11                 | 2.75                | 2.21                |
| Week 22                                      | 13/03/18   | 20/03/18 | Monsoon       | -                                 | 1.37                 | 4.02                | 4.69                | -                    | 2.21                 | 2.65                | 2.21                |
| Week 23                                      | 20/03/18   | 27/03/18 | Monsoon       | -                                 | 1.60                 | 4.62                | 6.19                | -                    | 4.03                 | 3.06                | 2.96                |
| Week 24                                      | 27/03/18   | 03/04/18 | Monsoon       | -                                 | 1.77                 | 4.08                | 4.15                | -                    | 3.01                 | 2.17                | 3.99                |
| Maximum 24-Hour Concentration <sup>(2)</sup> |  |          |               | 10.6                              |                      | 13.5                | 13.7                | 13.4                 |                      | 20.7                | 10.2                |
| Annual Air Quality Standard <sup>(3)</sup>   |  |          |               |                                   |                      |                     |                     | 150                  |                      |                     |                     |
| (1)  | The 24-hour average concentrations have been derived by multiplying the concentrations in Table 7-6 by a factor of 0.59. |          |               |                                   |                      |                     |                     |                      |                      |                     |                     |
| (2)  | The indicative maximum 24 hour average concentration at each monitoring site   |          |               |                                   |                      |                     |                     |                      |                      |                     |                     |
| (3)  | Indonesia (PP41/1999) Ambient Air Quality Standards  |          |               |                                   |                      |                     |                     |                      |                      |                     |                     |

Table 7-8 AQS1 - NO<sub>2</sub> Monitoring Summary

| Monitoring Site                     | NO <sub>2</sub> Results (µg/m <sup>3</sup> ) |                 |                 |
|-------------------------------------|--|-----------------|-----------------|
|                                     | Maximum 1-hour                               | Maximum 24-Hour | 12 Week Average |
| AQM1b (AQS657)                      | 66.9   | 27.7            | 12.2            |
| AQM4b (AQS-658)                     | 61.7   | 21.5            | 8.44            |
| Air Quality Standard <sup>(1)</sup> | 400  | 150             | 100             |

(1) Regulation of the Republic of Indonesia Number 41 (1999) regarding Air Pollution Control (PP41/1999).

The results of the ambient air quality assessment indicates that the ambient concentrations of NO<sub>2</sub> in the study area are below the relevant air quality standards for the protection of human health in Indonesia. On this basis the receiving airshed is considered non-degraded.

The air quality monitoring locations are illustrated in **Figure 7-7**.

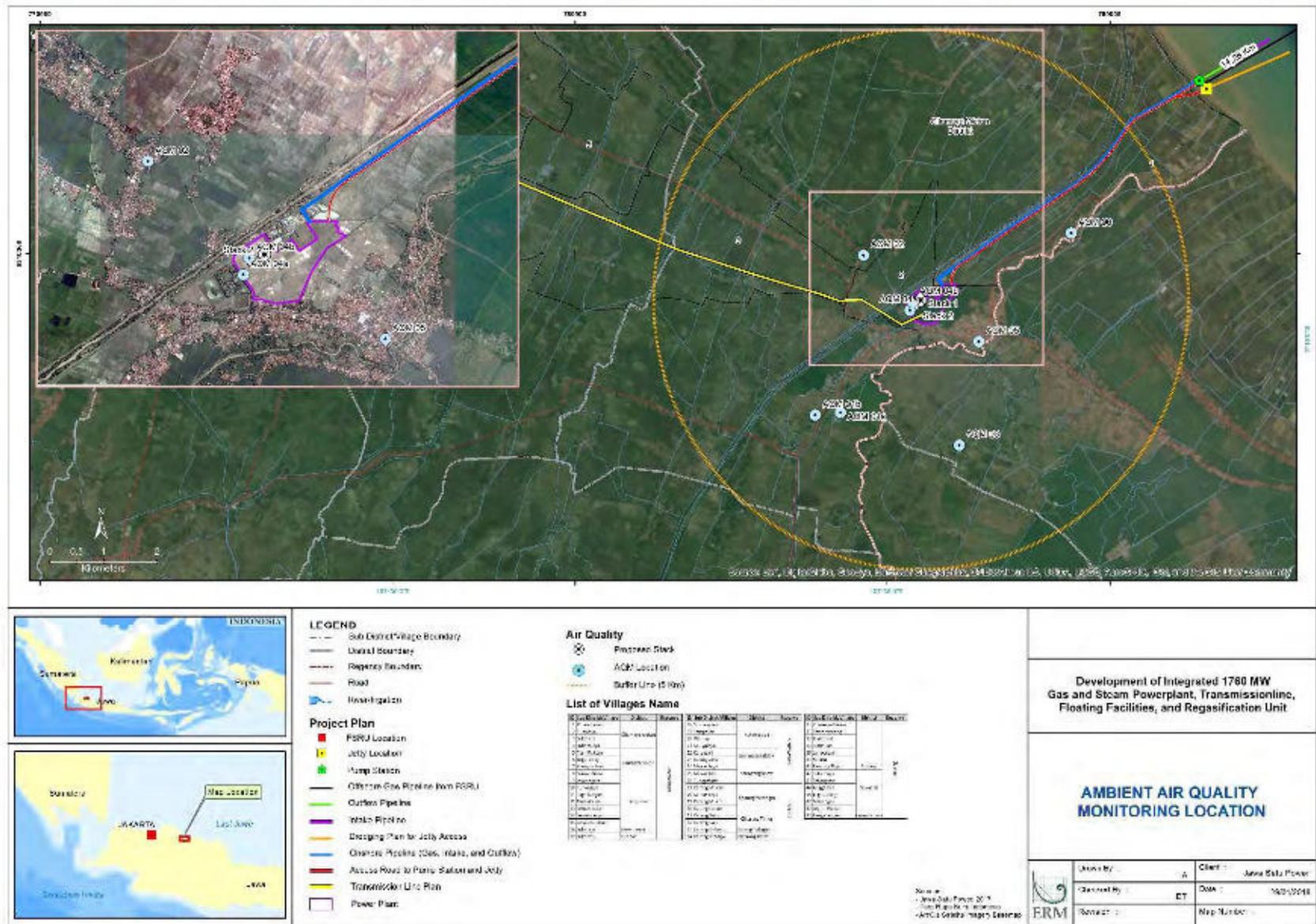
The assessment of potential air quality impacts associated with the Project includes the qualitative assessment of construction phase impacts. This comprises a base case modelling scenario, which considered a stack height of 60 m and a NO<sub>x</sub> emission rate based on the IFC NO<sub>x</sub> emission limit value and turbine NO<sub>x</sub> concentration manufacture guaranteed of 51mg/Nm<sup>3</sup>. The resulting ground level concentrations indicate that the maximum one (1)-hour PC results in minor impact on air quality and therefore exceeded 25% of the NO<sub>2</sub> one (1)-hour Indonesian air quality standard and is not compliant with the relevant criteria.

In order to facilitate the decision making process, this air quality impact assessment presents the findings from a number of additional modelling scenarios based on varying stack heights and reduced NO<sub>x</sub> concentration. This approach was undertaken to determine the Project design which is necessary to achieve compliance with the air quality criteria.

The air dispersion modelling was conducted to assess potential impacts to sensitive receptors from the stack emissions from the CCGT Power Plant. The dispersion model used in the assessment was the USEPA AERMOD dispersion model version 16216r. AERMOD is a state of the art detailed dispersion model that can be used to represent complex multiple emission sources and predict air quality at receptor locations taking into account meteorology.

**Annex D** provides the Air Quality Assessment Report and should be referred to for more detailed information regarding the quantitative assessment methodology, where necessary.

Figure 7-7 Locations of Air Quality Monitoring Stations



Existing ambient and background noise levels were measured for this assessment such that existing noise levels can be quantified and a description of the existing acoustics environment can be described, as summarised below.

Baseline environmental noise monitoring was conducted to measure ambient noise levels, this was completed during November 2015 at five (5) locations (IEE, 2016). At two (2) measurement locations (1) Cilamaya IV State Primary School and (2) a paddy field in Cilamaya village, the existing measured levels exceeded the applicable thresholds and limits for noise, particularly at night-time. This was due to the influence of vehicle movements on public roads (general road traffic) and natural sounds such as insects i.e. crickets (*Gryllidae*) and Tonggerets (*Tettigarctidae*) that were observed during both the evening and night time.

In addition, bi-annual noise monitoring were conducted in November 2015 and July 2017 by Pertagas compressor turbine (source) located in SGK Cilamaya (SGK Cilamaya, 2016; SGK Cilamaya, 2017). Monitoring was conducted at five (5) points i.e. at the source and at distances of 100 m, 200 m, 300 m and 400 m from the source using Sound Level Meter for 24-hrs. The results showed that the main contributors to the existing noise conditions during the monitoring activities were from the generator sets and from the moving vehicles of nearby road traffic (SGK Cilamaya, 2016; SGK Cilamaya, 2017).

Baseline environmental noise monitoring was also conducted at seven (7) measurement locations surrounding the CCGT Power Plant area in July 2017 for a period of 48 hours (ERM, 2017). Measured existing noise levels above the Indonesian regulatory standards were frequently recorded during normal business hours (09.00 – 22.00). This is likely due to the high level of community activities, particularly road traffic, at and near the measurement locations. Measured existing noise levels above the IFC thresholds and limits were also frequently recorded, particularly at night-time.

Additional noise studies were also conducted in January 2018 at two (2) locations at the proposed Jetty and then at 10 measurement locations along the proposed Transmission Line alignment. The noise measurement completed at each location was conducted over a 48-hour period. Noise levels were recorded using a Sound Level Meter (SLM) equipped with features to integrate the Leq noise level in dBA i.e. the A-weighted equivalent sound energy level for the measurement duration. The results of this monitoring identified that all existing Lm (Leq Night-time) and 11 locations of Ls (Leq Day-time) exceeded the local and IFC thresholds and limits at 11 out of 12 locations.

Based on the information presented above it is evident that existing ambient (Leq) and background (L90) noise levels vary significantly across the broader Project area and between daytime and night time periods.

Based on the most recent data in January 2018, ambient (Leq) daytime noise levels varied between 53 and 72 dBA and night time levels varied between 45 and 74 dBA; resulting in a logarithmic average  $L_{eq, 24 \text{ hour}}$  value of approximately 65 dBA.

Background (L90) noise levels (24-hour data only) varied between 39 and 54 dBA; resulting in median L90 value of approximately 46 dBA. For the purpose of Reporting, the median L90 value of 46 dBA has been adopted as a representative background noise level by which potential IFC 1.7 Noise "Amenity" impacts may be estimated.

Existing vibration levels are less significant to the evaluation of baseline conditions (and to the broader assessment) as it is assumed that in the absence of the Project, ambient vibration is imperceptible at the closest and/or potentially most affected receptors situated within the potential area of influence of a Project. Regardless, a vibration survey was conducted in 2017 at two (2) locations in Cilamaya and Karang Rahayu Villages, both will be used as the locations of CCGT Power Plant and Transmission Line.

The monitoring results identified that existing levels were below the thresholds and limits (ERM, 2018b) established with regard to:

- The *Department of Environment and Conservation NSW (DECC, Australia) – Assessing Vibration: a Technical Guideline, 2006* (DECC Guideline, 2006) which is based on British Standards 6472, 1992 and presents preferred and maximum vibration values for assessing human responses to vibration.
- The German Institute for Standardisation – DIN 4150 (1999-02) Part 3 (DIN4150-3) – *Structural Vibration - Effects of Vibration on Structures* which presents safe limit guideline values for assessing potential damage to buildings.

Additionally, the key features of the quantitatively assessed noise and acoustical feature and project components/phases were assessed. This includes:

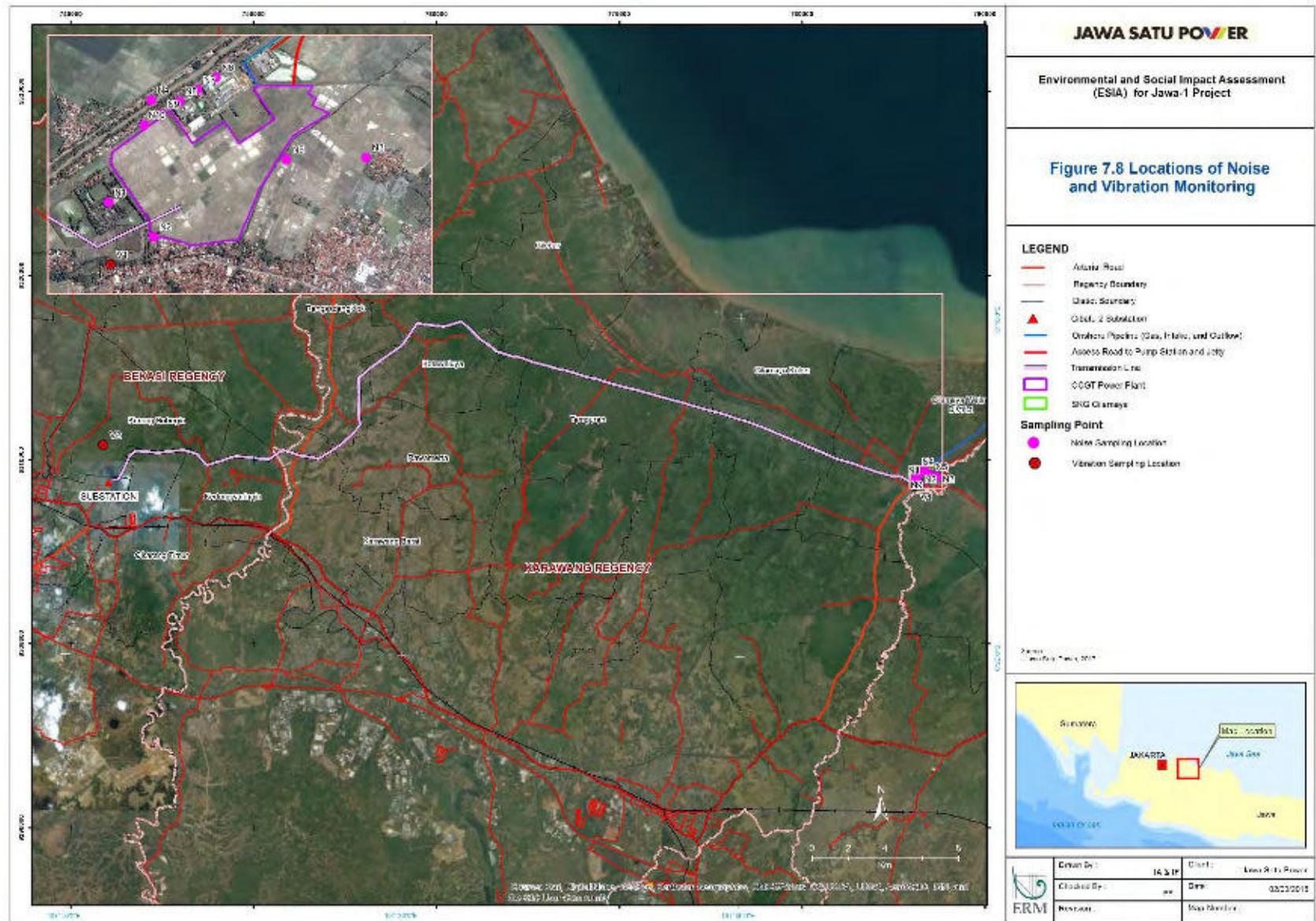
- CadnaA (Version 4.5) and Brüel and Kjær Predictor noise modelling software packages are utilised to calculate construction and operational noise levels using the ISO9613:2 and CONCAWE, 1981 noise propagation algorithms (international method for general purpose, 1/1 octaves). For sound calculated using ISO9613:2, the indicated accuracy is  $\pm 3$  dBA at source to receiver distances of up to 1,000 metres and unknown at distances above 1000 metres;

- All noise modelling takes into consideration the sound power level of the proposed site operations, activities and equipment, and applies adjustments for attenuation from geometric spreading, acoustic shielding from intervening ground topography, ground effect, meteorological effects and atmospheric absorption. A mixture of point sources, area sources, emitting facades and roofs, line sources and moving point sources have been adopted to accurately represent project emissions; and
- A ground factor of 0.7 was adopted for the modelling domain: 0.0 is hard and 1.0 is soft as well as the meteorological factors have been incorporated into the noise models based on representative conditions of the region, including an average temperature of 25° Celsius and a relative humidity of 80%. Modelling was undertaken for neutral (Class D) atmospheric stability conditions, nil winds.

The complete list of assessed baseline parameters and modelling results are presented in **Annex B.5** and **Annex E** of this Report respectively. Additionally, **Annex E** should be referred to for more detailed information regarding the quantitative assessment methodology, where necessary.

The summary of the noise monitoring locations is illustrated in **Figure 7-8**.

Figure 7-8 Locations of Noise and Vibration Monitoring (July 2017 and January 2018)



Static magnetic field is a field or area generated from electrical current movement. Magnetic field radiation is one of physical factors at working place which standards are determined as per Indonesian regulations i.e. *Annex I Minister of Manpower and Transmigration Regulation No 13 Year 2011 regarding Physical and Chemical Factors Threshold Values Permitted at Working Place.*

An Electromagnetic Field survey was conducted in 2017 at two (2) locations in Cilamaya and Karang Rahayu Villages, which both will be used as the locations of CCGT Power Plant and Transmission Line. Additionally, Electromagnetic Field (EMF) monitoring studies were also conducted at two (2) additional locations at the proposed Jetty location and 10 points along the proposed Transmission Line in January 2018.

Magnetic field results were also analysed against the SNI 04-6950-2003 regarding the High Voltage Transmission (SUTT) and Extra High Voltage Transmission (SUTET) – Electromagnetic Fields Standards. The standards (refer to **Table 7-9**). The local standard for public exposure limit of 24-hours/day draw on the guidelines set by the International Commission on Non-Ionising Radiation Protection (ICNIRP) i.e. 0.1 mT.

**Table 7-9** *Magnetic Field Standards as per SNI 04-6950-2003*

| Exposure Type                       | Magnetic Field Limit (mT) |
|-------------------------------------|---------------------------|
| <b>Occupational Exposure Limits</b> |                           |
| All day                             | 0.5 <sup>(1)</sup>        |
| Short term                          | 5.0                       |
| <b>Public Exposure Limit</b>        |                           |
| 24 hours/day <sup>(2)</sup>         | 0.1                       |
| Few hours/day <sup>(3)</sup>        | 1.0                       |

Source: ERM, 2018b

Note: mT = micro Tesla

The monitoring result indicates that the magnetic field at all monitoring locations met the standard limits i.e. 0.1 mT (ERM, 2018c). The complete list of results is tabulated in **Annex B.6**.

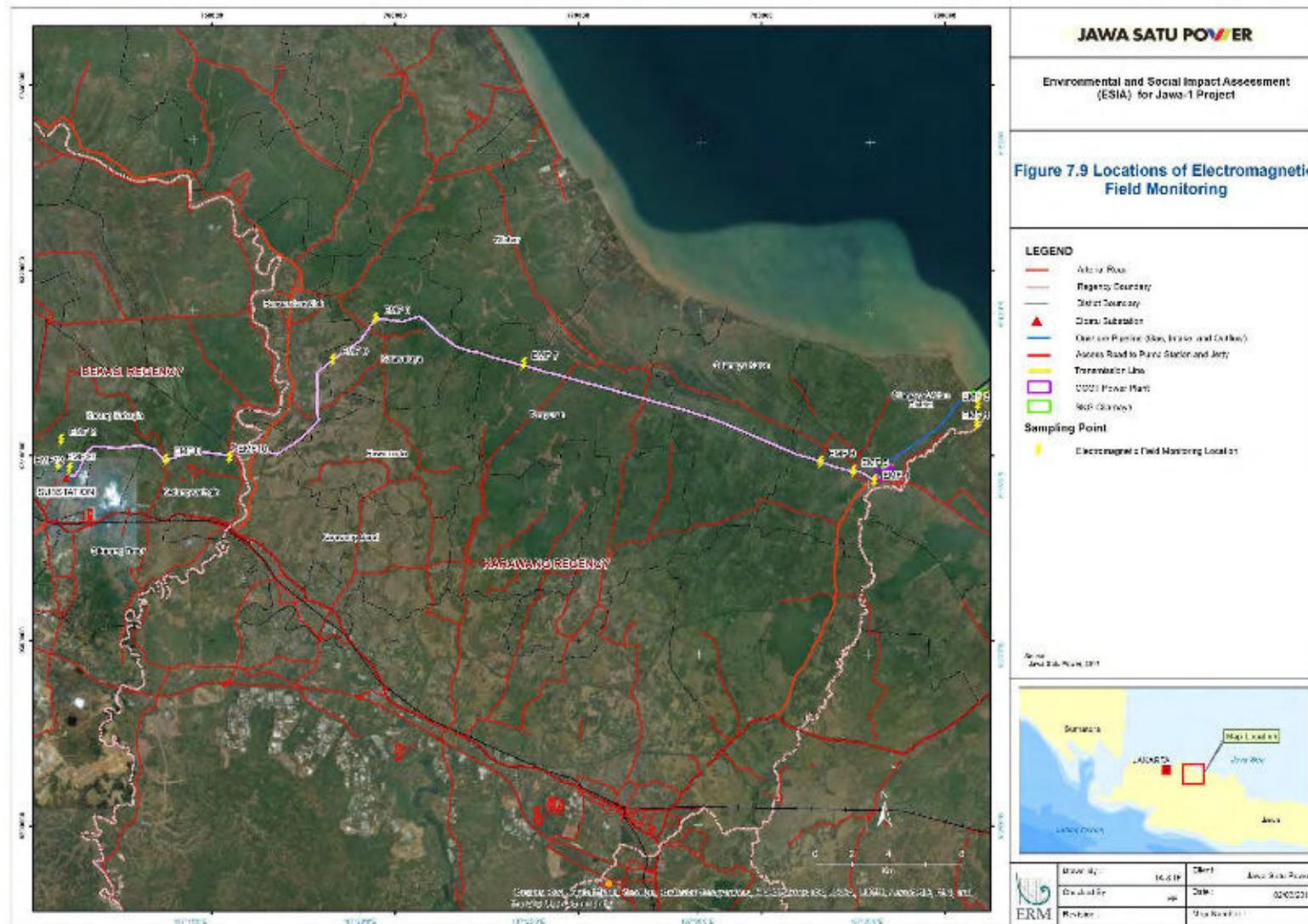
The summary of the EMF locations is illustrated in **Figure 7-9**.

(1) Maximum exposure duration is two hours per working day.

(2) This limitation is valid for public daily activities at open spaces.

(3) Electromagnetic fields force values are tolerated for few minutes/day duration, as long as pre-cautions are taken into considerations to prevent indirect coupling effect.

Figure 7-9 Locations of Electromagnetic Field Monitoring (July 2017 and January 2018)



## 7.2.4 Offshore Physical Environment

### 7.2.4.1 Bathymetry

A bathymetry survey was conducted between 17<sup>th</sup> and 22<sup>nd</sup> of November 2015. The results showed that the deepest water depth is six (6) meters with a gently sloping seabed. The water depth at the near shore (approximately 600 m from shoreline) ranges between one (1) to two (2) meters during high tide (Pöyry, 2016b) (Figure 7-10).

Another bathymetry survey was conducted at the proposed offshore pipeline route and FSRU locations. The water depths within the whole survey area vary between 0.03 m and 24.75 m (Mahakarya, 2015a). The FSRU, located north of Pamunakan Bay in Subang Regency, is at a sea depth of 16 m, whilst the intake and outfall pipelines will be located at a sea depth of 5 -6 m (Figure 7-11).

### 7.2.4.2 Hydro oceanography

#### Tides

Tides at the offshore pipeline and FSRU location are mixed; mainly diurnal. Based on the surveys conducted in 2015 and 2017. The tidal levels are presented in Table 7-10 and Table 7-11 and refer to Mean Sea Level (MSL) and Lowest Astronomical Tide (LAT). The Relative Mean Absolute Error (RMAE) value of analytical tide simulation is 0.20 (reasonable).

Table 7-10 Tidal Level (2015)

| Related Datum                   | Refer to MSL | Refer to LAT |
|---------------------------------|--------------|--------------|
| Mean Sea Level (MSL)            | 0.00         | 0.64         |
| Mean Higher High Water (MHHW)   | 0.49         | 1.13         |
| Mean Lower High Water (MLHW)    | 0.19         | 0.83         |
| Mean Higher Low Water (MHLW)    | -0.19        | 0.45         |
| Mean Lower Low Water (MLLW)     | -0.49        | 0.16         |
| Highest Astronomical Tide (HAT) | 0.59         | 1.23         |
| Lowest Astronomical Tide (LAT)  | -0.64        | 0.00         |

Source: Mahakarya, 2015a

Table 7-11 Tidal Level (2017)

| Related Datum                   | Refer to MSL | Refer to LAT |
|---------------------------------|--------------|--------------|
| Mean Sea Level (MSL)            | 0.00         | 0.59         |
| Mean Higher High Water (MHHW)   | 0.20         | 0.79         |
| Mean Lower High Water (MLHW)    | 0.11         | 0.70         |
| Mean Higher Low Water (MHLW)    | -0.11        | 0.48         |
| Mean Lower Low Water (MLLW)     | -0.20        | 0.38         |
| Highest Astronomical Tide (HAT) | 0.59         | 1.18         |
| Lowest Astronomical Tide (LAT)  | -0.59        | 0.00         |

Source: ERM, 2018b

## Currents

The maximum nearshore current speed during observation was  $0.12\text{ms}^{-1}$ ; of which the pattern of current direction follows the tide direction (Pöyry, 2016b).

The average current recorded at various locations along the offshore pipeline and FSRU recorded a reading between  $0.03$  and  $0.21\text{ms}^{-1}$  (Mahakarya, 2015a). The surface current was concluded to be independent from tidal stream and suspiciously controlled by the wind and waves. In 2017, the current measurements were recorded in the range of  $2.6 - 40.6\text{cms}^{-1}$  (ERM, 2018b).

Based on water column or vertical profile measurements, the maximum current speed corresponds to high water conditions, while the minimum speed tends to occur during mean water level conditions (Mahakarya, 2015a).

## Waves

During the offshore observation survey period in 2015, the recorded significant wave height was between  $0.49$  m and  $0.53$  m. In July 2017, wave heights were recorded in the range of  $0.3$  m to  $0.9$  m (ERM, 2018b). Waves were dominated from the northeast and northwest. Furthermore, storm surges occurred in the South China Sea spreading to the Java Sea within a range of  $0.05$  to  $0.13$  m (Mahakarya, 2015a).

## Wind Conditions

Based on historical data from 2000 to 2009, dominant winds blow from southeast and east. A 100 years return period of hourly, one (1) minute, and three (3) seconds extreme wind speed are  $18.4\text{ms}^{-1}$ ,  $16.1\text{ms}^{-1}$  and  $19.1\text{ms}^{-1}$  respectively (Mahakarya, 2015a). The observed average wind speed at offshore locations conducted in the 2015 survey recorded a wind speed between  $3.8\text{ms}^{-1}$  and  $4.9\text{ms}^{-1}$  (Mahakarya, 2015a).

## Weather and Temperature

A summary of historical (offshore) weather analysis is summarised in **Table 7-12**.

**Table 7-12** Statistical Description of Weather

| Parameter                                | Observed |         |       | Historical |        |       |
|--|----------|---------|-------|------------|--------|-------|
|  | Average  | Max     | Min   | Average    | Max    | Min   |
| Temperature (°C)                         | 27.5     | 31.8    | 23.9  | 24.1       | 26.9   | 21.6  |
| Humidity (%)                             | 82.21    | 94.42   | 57.17 | 90.75      | 97.22  | 68.55 |
| Precipitation<br>(mm/hour &<br>mm/month) | 1.30     | 1647.00 | 0.00  | 170.23     | 425.98 | 1.22  |

Source: Mahakarya, 2015a

Measurements of sea temperature were conducted between 18<sup>th</sup> and 21<sup>st</sup> of November 2015. The measurements of sea temperatures were taken at three (3) different depths (0.2 m, 0.6 m and 0.8 m). Temperature ranges were between 28°C and 32°C (*ERM, 2017; IEE, 2016; Pöyry, 2016b*). During the survey conducted in January 2018, the seawater temperatures ranged between 31°C and 32.8 °C (*ERM, 2018c*) at a depth of 0.2 m – 2.0m; slightly higher than in 2015.

Figure 7-10 Nearshore Bathymetry and Hydro-oceanography Observation Points

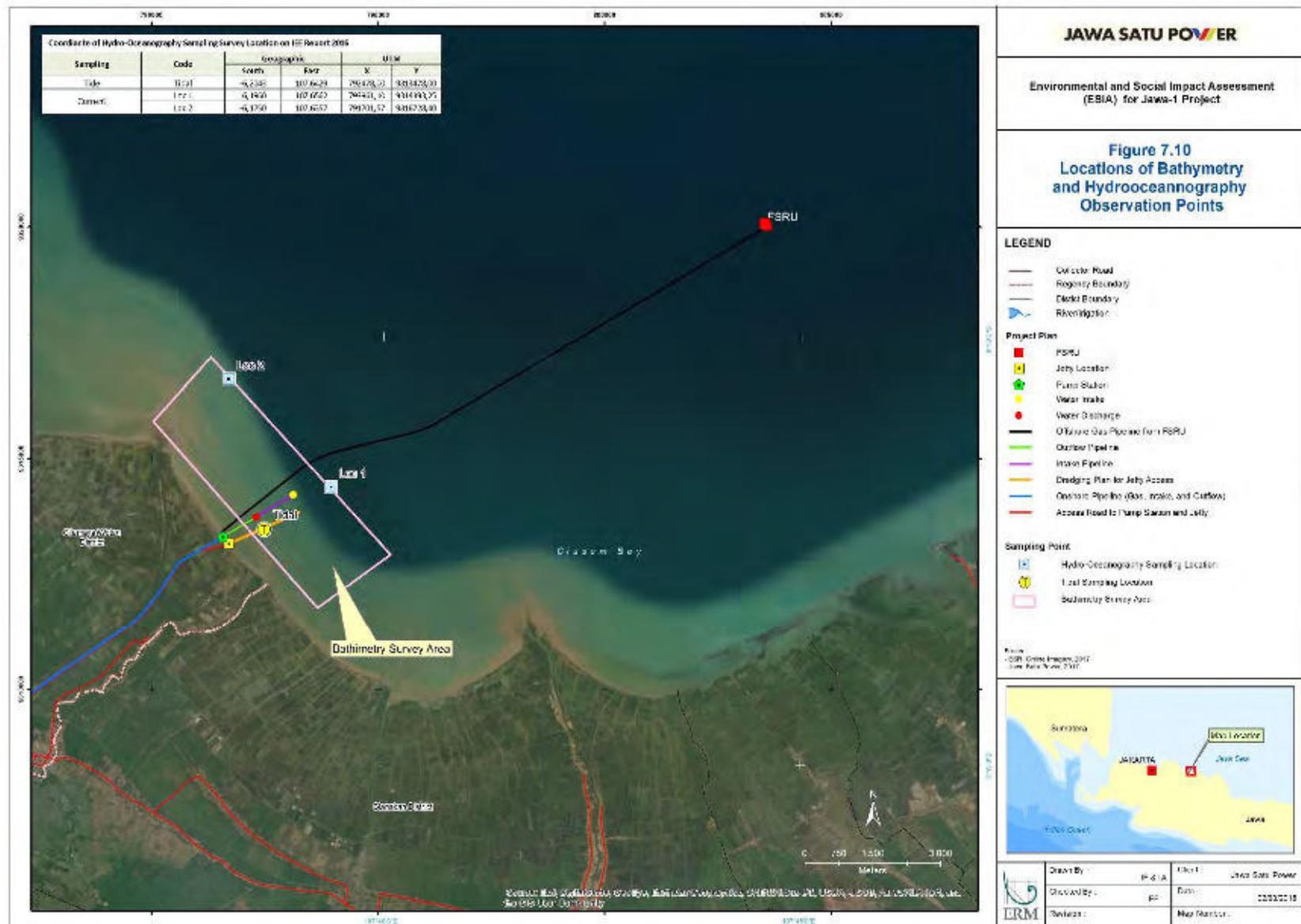
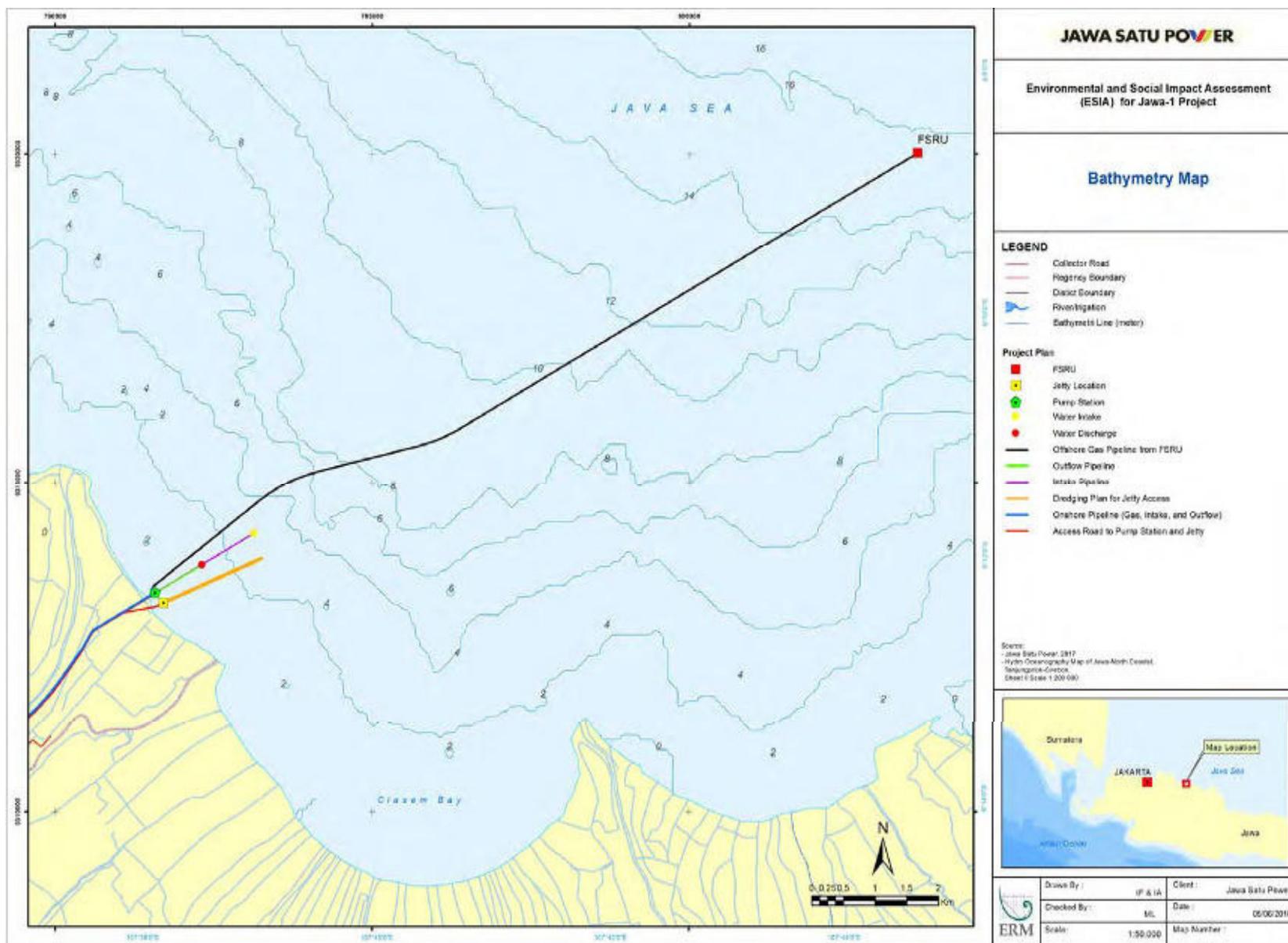


Figure 7-11 Bathymetry for FSRU and Offshore Pipeline



Marine water quality monitoring was conducted at 23 locations within the vicinity of the seawater intake and outfall facilities, along the proposed offshore pipelines and at the proposed FSRU location (ERM, 2017; ERM, 2018b; IEE, 2016; Pöyry, 2016b). Relatively high turbidity was recorded at the survey locations and an exceedance of the Indonesian Standard i.e. Decree of Environmental Ministry No. 51/2004 in Appendix III was recorded at several monitoring locations i.e. MW2, MW9-MW13 and MW18-MW19. This is likely to be a result of estuary discharges into the nearshore area.

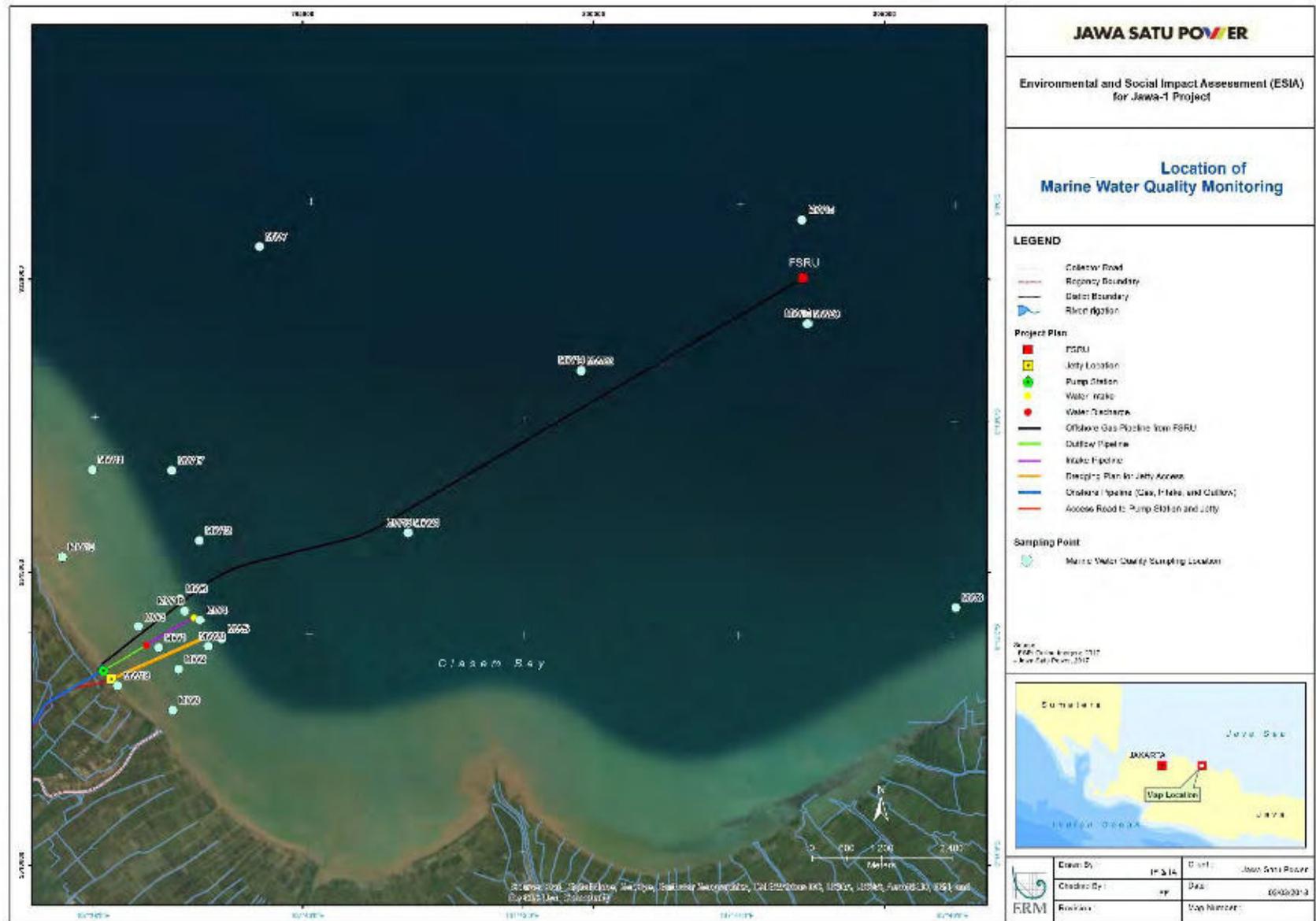
The chemical analysis results indicate a high influence of organic matter on nearshore water quality. This is likely to be attributed to discharges from nearby rivers and streams. Total Organic Matter (measured by  $BOD_5$ ) exceeded the quality standard at MW1-MW6 sampling locations with significant exceedances measured at most locations. Other exceedances for parameters such as ammonia and nitrates were also recorded (ERM, 2017; IEE, 2016; Pöyry, 2016b). Additionally, total coliform and fecal coliform levels at MW8 were detected to exceed the local quality standards at all sampling locations (ERM, 2018b).

Exceedances in many cases (such as for oil and grease, mercury, iron, zinc and copper) were significant. The cause of this is likely to be attributed to discharges from nearby rivers and streams and possibly associated with the proximity of the Project area to DKI Jakarta.

An additional marine water study was conducted in December 2017 to January 2018 at six (6) locations including four (4) along the proposed subsea pipeline. The analysis indicated the levels of turbidity at two (2) locations i.e. MW18 and MW 19 and the phosphate and Nitrate ( $NO_3-N$ ) (nitrate as nitrogen) levels at MW18-MW23 exceeded the quality standards.

The complete list of assessed parameters and results is tabulated in **Annex B.7**. The summary of the marine seawater quality locations is illustrated in **Figure 7-12**.

Figure 7-12 Locations of Marine Water Quality Monitoring



From the survey conducted in 2016, the characteristics of soil at the nearshore location i.e. at the proposed intake and outlet pipeline are very soft clay to firm sandy silt. The soil on top of the seabed is mostly soft clay on the intake side while at the outlet area the top sandy soil is stiff (*Tigenco, 2016*).

In addition, seabed sediment monitoring was conducted at 60 locations for two (2) days in 2015. Suspended sediment and bedload sediment samplings were conducted at three (3) locations. The results show that the sediment at proposed pipelines and FSRU locations is dominated by soft clay and silty clay with coarser sediment and rock exposure / outcrops. Meanwhile, at a greater depth the soil still contains stiff clay (CH) and sand (SP) (*Mahakarya, 2015a*).

Additionally, marine sediment sampling was conducted at near the shoreline, at the FSRU location and along the proposed offshore pipeline (*ERM, 2018b*). The majority of the sediment composition at all sampling sites were muds. The chemical analysis indicated that sediment quality were below the Probable Effect Level (PEL).

An additional marine sediment quality study was also conducted in December 2017 to January 2018 including at six (6) locations including four (4) along the proposed. All parameters at all sampling locations were recorded to be within the limit of Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMANZ 2000).

The summary of the sediment quality locations is illustrated in **Figure 7-13**.

In understanding impacts of seabed and sediment disturbance of the construction phase of the marine facilities, sediment dispersion modelling was conducted. The sediment transport model used is the Community Sediment Transport Modelling System (CSTMS) package. The model was designed for realistic simulations of processes causing sediment transport in the coastal ocean (estuaries, nearshore regions, and the continental shelf). The model assesses two (2) phases for the sediment i.e. 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 sampling, 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.

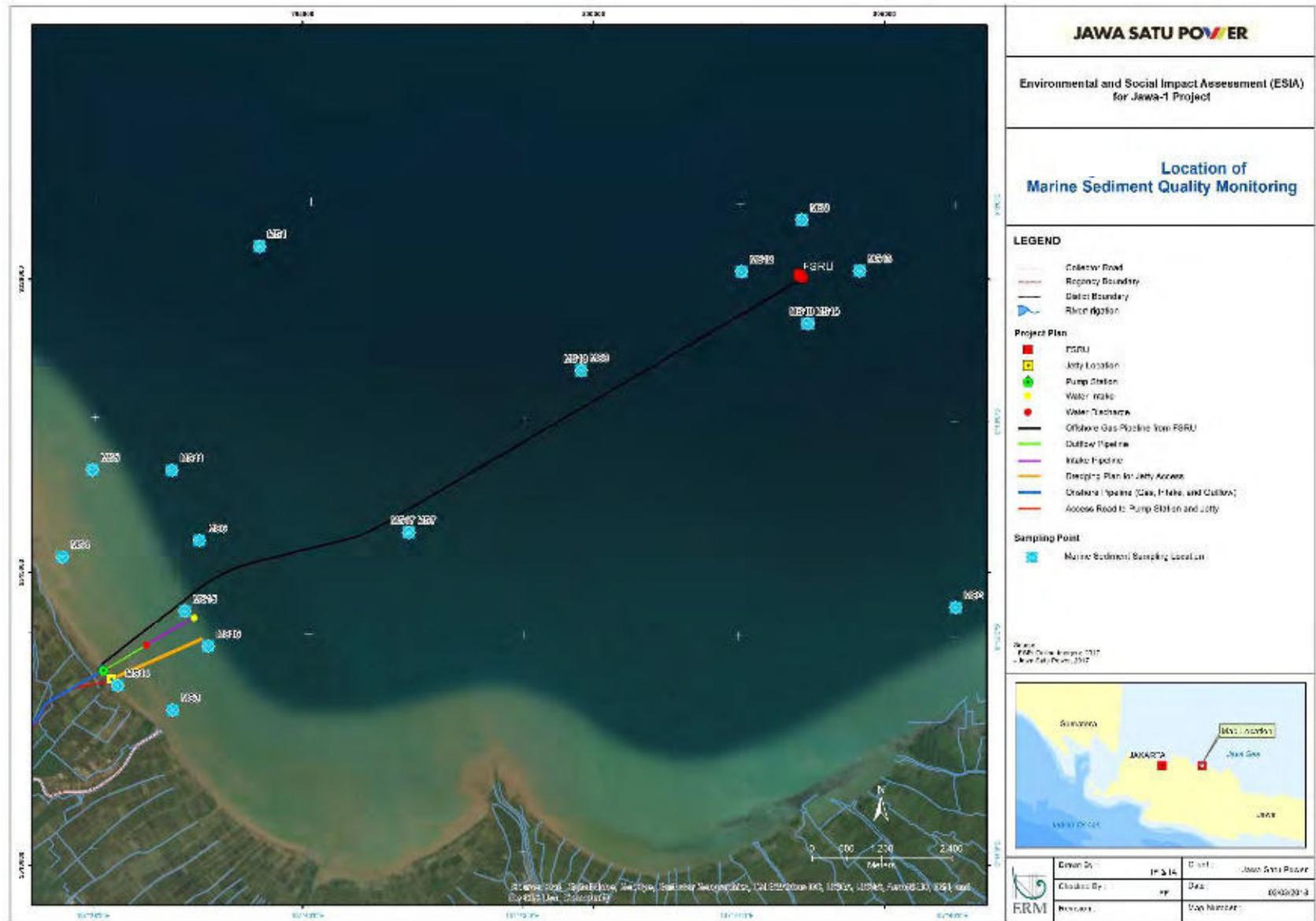
For the Jetty and Acces Channel Dredging, the dispersion modelling was conducted for both the wet season and the dry season to estimate the

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.

Sediment dispersion modelling at the seawater intake and wastewater Discahrge Pipeline was also 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 complete list of assessed parameters and results is tabulated in **Annex B.8** and **Annex N** provides the detailed Sediment Modelling Report.

Figure 7-13 Locations of Marine Sediment Quality Monitoring



## 7.3 TERRESTRIAL AND MARINE BIODIVERSITY

ERM has used the Asian Development Bank (ADB) Safeguard Policy and Statement (SPS) Biodiversity Conservation and Sustainable Natural Resource Management and also with guidance from the International Finance Corporation (IFC) Performance Standard 6 Biodiversity Conservation and Sustainable Management of Living Natural Resources (PS6) for this assessment.

### 7.3.1 Background Assessment

#### 7.3.1.1 EcoRegion Description

The Project Study Area resides within the Western Java Rain Forests [IM0168] EcoRegion. This ecoregion represents the lowland moist forests (less than 1,000 m elevation).

The natural forests in the lowlands of western Java once included several forest subtypes, including extensive evergreen rain forest, semi-evergreen rain forest, moist deciduous forest along the northern coast, and dry deciduous forest, also along the northern coast of the island.

The most common species in the rain forests of Java are *Artocarpus elasticus* (Moraceae), *Dysoxylum caulostachyum* (Meliaceae), *Lansium domesticum* (Meliaceae), and *Planchonia valida* (Lecythidaceae).

The larger mammals historically found in this ecoregion have been extirpated. Wildlife found in the protected areas includes medium and small mammals. Of interest is the large number of endemic or restricted range birds that are present within the EcoRegion. The EcoRegion is currently classified as Critical/Endangered.

#### 7.3.1.2 Regional Marine Environment Description

The Project Area is located within the Java Sea an extensive shallow sea situated on the Sunda Shelf. The Java Sea lies between the Indonesian Islands of Borneo to the north, Java to the south, Sumatra to the west, and Sulawesi to the east (Nagara, 2007).

The Sunda Shelf supports a relatively flat and shallow marine environment. Sea depths over the shelf rarely exceed 50 metres and extensive areas are less than 20 metres deep. The seafloor is relatively uniform, and tends to slope with the deepest part lying in the East. The Java Sea is considered a warm body of water as the average temperature throughout the year is 29°C (Nagara, 2007).

The nearshore environment of the Java Sea is mainly represented by sandy mudflats and estuarine beaches, and is characterised by low productivity and biodiversity (Hutomo & Mohammad, 2004).

A notable feature in the Java Sea is the Thousand Islands, a chain of islands to the north of the Jakarta coastline located approximately 25 km from the Project Area. It consists of 108 islands stretching 45 km into the Java Sea and supports a diverse marine ecosystem.

### 7.3.1.3 Key Biodiversity Areas

In Indonesia, Key Biodiversity Areas (KBAs) fall in different land management categories including protected areas, conservation area, protected forests, reserve forests and other resource and land use areas. Therefore, they accommodate different management systems such as government, private, community-led and joint management.

It should be noted that the Project area is within the Java-Madura Coastal Zone EBA. The location of the KBA in relation to the Project Area is shown in Figure 7-14.

A brief summary of the three KBA is presented in Table 7-13.

**Table 7-13 Summary of Key Biodiversity Area within 100km of the Project Area**

| No | Name of KBA                                    | Distance to Project Area  | Summary  |
|----|--|---|--|
| 1. | Muara Angke Conservation area                  | 70 km East  | Location: 106° 43"-106° 48" E and 6° 06"-6° 10" S<br>Type: Sanctuary<br>Function: Mangrove and estuary conservation area<br>Habitat of bird species: Javan Coucal ( <i>Centropus nigrorufus</i> ), and Milky Stork ( <i>Mycteria cinerea</i> ).  |
| 2. | Muara Gembong Tanjung Sedari Conservation area | 67 km West  | Location: 107° 0'52.77" E 5°56'32.01"S<br>Type: Sanctuary<br>Function: Mangrove and estuary conservation area.<br>Habitat of bird species: Oriental Darter ( <i>Anhinga melanogaster</i> ), Javan Coucal ( <i>Centropus nigrorufus</i> ) Milky Stork ( <i>Mycteria cinerea</i> ), Java sparrow ( <i>Lonchura oryzivora</i> ) and Lesser Adjutant ( <i>Leptoptilos javanicus</i> ). |
| 3. | Muara Cimanuk                                  | 95 km West  | Location: 108°13'35.82" E 6°16'4.13"S<br>Type: Sanctuary<br>Function: Mangrove and estuary conservation area<br>Habitat of birds species: Javan Coucal ( <i>Centropus nigrorufus</i> ), and Milky Stork ( <i>Mycteria cinerea</i> ).   |
| 4. | Javan Coastal Zone                             | Along the coastal line of Java Island, including the Project area | Location Along the coastal line of Java Island<br>Type: Endemic Bird Area - High priority<br>Habitat of birds species: Javan Coucal ( <i>Centropus nigrorufus</i> ), Javan Plover ( <i>Charadrius javanicus</i> ),   |

| No | Name of KBA | Distance to Project Area | Summary  |
|----|-------------|--------------------------|--|
|    |             |                          | Javan Lapwing ( <i>Vanellus macropterus</i> ), and Javan White-eye ( <i>Zosterops flavus</i> ) |

#### 7.3.1.4

#### Protected Areas

ERM identified eleven nationally protected/conservation areas located within the radius of 100 km from the proposed Project area, the protected area are outlined in **Table 7-14**. No protected areas are located within or adjacent to the Project area.

The location of the protected area close to the Project area is shown in **Figure 7-15**.

**Table 7-14 Summary of Protected Areas within 100km of the Project Area**

| No | Name of Protected Area         | Distance to Project Area | Summary  |
|----|--------------------------------|--------------------------|--|
| 1. | Pulau Biawak Conservation area | 95 km                    | <ul style="list-style-type: none"> <li>• Location: 108°22'015''E 06°56'022''S ;</li> <li>• Type: IUCN Management Category VI ; and</li> <li>• Function: Nature Recreation Park - Mangrove and estuary conservation area.</li> </ul>  |
| 2. | Pulau Rambut Protection Forest | 95 km                    | <ul style="list-style-type: none"> <li>• Location: 106,5o 41' 30" E 5,5o 57' S;</li> <li>• Function: Sanctuary ;</li> <li>• Function: Mangrove and estuary conservation area</li> <li>• Pulu rambut is widely known as a migratory hot spot for a group of migratory species from Australia, migrant bird species visit the island between March and September; and</li> <li>• Key species: Christmas Island Frigatebird; Aleutian Tern; Milky Stork; Glossy Ibis; Black-headed Ibis; Javan Plover; Javan Myna (<i>Burung-nusantara.org, 2018</i>).</li> </ul> |
| 3. | Gunung Mega Mendung            | 81 km                    | <ul style="list-style-type: none"> <li>• Location: 107o 00' 30" E 6o 40' S ;</li> <li>• Type: IUCN Management Type Ia ;</li> <li>• Function: Nature Reserve ; and</li> <li>• Management Authority: Balai Besar KSDA Jawa Barat</li> <li>• Key species: Javan Gibbon (<i>Nijman V, 2004</i>).</li> </ul>  |
| 4. | Gunung Pancar                  | 81 km                    | <ul style="list-style-type: none"> <li>• Location: 106°54'33.73"E 6°35'32.25"S ;</li> <li>• Type: IUCN Management Type V ;</li> <li>• Function: Natural Recreation Park ;</li> <li>• Management Authority: Balai Besar KSDA Jawa Barat ; and</li> <li>• Key species: <i>Presbytis comata</i> and <i>Trachypithecus auratus</i> (<i>MacKinnon et.al. 1982, Nijman 1997</i>).</li> </ul>   |
| 5. | Gunung Gede Pangrango          | 85 km                    | <ul style="list-style-type: none"> <li>• Location: 6°46'0"S 106°56'0"E ;</li> <li>• Type: IUCN Management Type II ;</li> <li>• Function: National Park ;</li> <li>• Management Authority: Balai Besar Taman Nasional Gede Pangrango ;</li> <li>• In 1977 UNESCO declared it part of the World Network of Biosphere Reserves ; and</li> </ul>   |

| No  | Name of Protected Area  | Distance to Project Area | Summary  |
|-----|-------------------------|--------------------------|--|
|     |                         |                          | <ul style="list-style-type: none"> <li>• Key species : Javan Gibbon (<i>Nijman V., 2004</i>), Javan surili and Javan lutung. Other mammals include Javan leopard, leopard cat, Indian muntjac, Java mouse-deer, Sumatran dhole, Malayan porcupine, Sunda stink badger, yellow-throated marten, and Bartels's rat, Javan hawk-eagle and the Javan scops owl.</li> </ul>   |
| 6.  | Gunung Burangrang       | 54 km                    | <ul style="list-style-type: none"> <li>• Location: 107°35'3.45"E 6°43'58.84"S ;</li> <li>• Type: IUCN Management Type Ia ;</li> <li>• Function: Nature Reserve ;</li> <li>• Management Authority: Balai Besar KSDA Jawa Barat ; and</li> <li>• Key species: Javan Gibbon (<i>Nijman V., 2004</i>)</li> </ul>   |
| 7.  | Yunghun                 | 65 km                    | <ul style="list-style-type: none"> <li>• Location: 107°37'16.49"T 6°48'29.56"S ;</li> <li>• Type: NA ; and</li> <li>• Function: Nature Reserve.</li> </ul>   |
| 8.  | Gunung Tangkuban Perahu | 59 km                    | <ul style="list-style-type: none"> <li>• Location: 107°36'50.56"E 6°45'40.39"S ;</li> <li>• Type: IUCN Management Type V ;</li> <li>• Function: Natural Recreation Park ;</li> <li>• Management Authority: Balai Besar KSDA Jawa Barat ; and</li> <li>• Key species : Surili (<i>Presbytis aygula</i>), Lutung (<i>Trachypitechusaururus</i>), Leopard (<i>Panthera pardus</i>), Kijang (<i>Muntiacus muntjak</i>), Pangolin (<i>Manis javanica</i>), Jelarang (<i>Ratufabicolor</i>), Tando (<i>Petaurista elegans</i>).</li> </ul> |
| 9.  | Gunung Tampomas         | 70 km                    | <ul style="list-style-type: none"> <li>• Location: 6,77°S 107,95°E ;</li> <li>• Type: IUCN Management Type V ; and</li> <li>• Function: National Park; and</li> <li>• Management Authority: Balai KSDA Jawa Barat.</li> </ul>  |
| 10. | Gunung Masigit Kareumbi | 88 km                    | <ul style="list-style-type: none"> <li>• Location: 107°57'27.57"T 6°55'12.86"S ;</li> <li>• Type: IUCN Management Type VI ;</li> <li>• Function: National Park;</li> <li>• Management Authority: Balai KSDA Jawa Barat ; and</li> <li>• Key species: Javan Gibbon (<i>Nijman V., 2004</i>).</li> </ul>   |

### 7.3.2

#### *National Laws on Forest Protection*

The Project Area is within an area of Protection Forest as listed under a Forestry Minister Decree (dated 2003). Protection Forest under the Indonesian Forestry Law (No. 40/1999) is not classified as an IUCN management classification.

Permissible activities under the Law include ecosystem service protection and conservation as well as human uses. Removal of timber for commercial purposes is prohibited. The Protection Forest located within the Project area is outlined in **Table 7-15**.

**Table 7-15 Protection Forest within the Vicinity of Project Area**

| No | Name of Protected Area                        | Distance to Project Area                          | Summary  |
|----|---|---|--|
| 1. | Hutan Lindung Blanakan including Hutan Ciasem | Within the Project area (0 km-Jetty and pipeline) | <ul style="list-style-type: none"> <li>Location: 107°37'55.59"E 6°12'44.69"S; and</li> <li>There is very limited information available to be review according to this protection forest. It was appointed based on <i>Forestry Minister Decree No 195 year 2003</i>. Based on <i>Minister of Forestry Decree No 351 Year 2017</i>, this area is also included in PIPPIB map (Indicative map for new permit suspend) Revision No. 12<sup>th</sup>.</li> </ul> |

### 7.3.3 Species of Conservation Significance

A secondary data gathered from Integrated Biodiversity Assessment Tool (IBAT) listed 12 Critically Endangered and 31 Endangered species around the proposed Project area. The species are consisted of 11 birds, four (4) mammals, one (1) reptile, 15 fish and 12 invertebrates.

Data on the KBas within proximity to the Project area indicates that nine (9) endemic and restricted-range lowland bird species may be present (*Stattersfield et al. 1998; MacKinnon and Phillipps 1993*).

Regarding migratory bird species, there are 13 species considered to inhabit the Javan coastal zone. A total of 70 conservation significance terrestrial and marine species were identified to potentially occur within the Project Area and AoI.

The list of conservation significant species that may occur within the vicinity of the Project area are outlined in **Table 7-16**. These species are considered in the Critical Habitat screening assessment, considering their likelihood of occurrence and data obtained from the baseline assessment.

**Table 7-16 Species of Conservation Significance**

| No | Taxonomic group | Species                          | Common name                  | IUCN | Endemic/<br>Restricted<br>to Java | Migratory<br>Species |
|----|-----------------|----------------------------------|------------------------------|------|-----------------------------------|----------------------|
| 1. | Birds           | <i>Acridotheres melanopterus</i> | Black-winged Myna            | CR   | -                                 | -                    |
| 2. | Birds           | <i>Alcedo euryzona</i>           | Javan Blue-banded Kingfisher | CR   | -                                 | -                    |
| 3. | Birds           | <i>Bulweria fallax</i>           | Jouanin's Petrel             | NT   | -                                 | X                    |
| 4. | Birds           | <i>Calidris tenuirostris</i>     | Great Knot                   | EN   | -                                 | -                    |
| 5. | Birds           | <i>Calonectris leucomelas</i>    | Streaked Shearwater          | LC   | -                                 | X                    |
| 6. | Birds           | <i>Centropus nigrorufus</i>      | Sunda coucal                 | VU   | X                                 | -                    |
| 7. | Birds           | <i>Charadrius javanicus</i>      | Javan plover                 | NT   | X                                 | -                    |

| No  | Taxonomic group | Species                              | Common name                     | IUCN | Endemic/<br>Restricted<br>to Java | Migratory<br>Species |
|-----|-----------------|--------------------------------------|---------------------------------|------|-----------------------------------|----------------------|
| 8.  | Birds           | <i>Fregata andrewsi</i>              | Christmas<br>Frigatebird        | CR   | -                                 | -                    |
| 9.  | Birds           | <i>Fregata andrewsi</i>              | Christmas Island<br>Frigatebird | CR   | -                                 | X                    |
| 10. | Birds           | <i>Gracula robusta</i>               | Nias Hill Myna                  | CR   | -                                 | -                    |
| 11. | Birds           | <i>Gracula venerata</i>              | Tenggara Hill<br>Myna           | EN   | -                                 | -                    |
| 12. | Birds           | <i>Gracupica jalla</i>               | Javan Pied<br>Starling          | CR   | -                                 | -                    |
| 13. | Birds           | <i>Hydrobates<br/>matsudairae</i>    | Matsudaira's<br>Storm-Petrel    | DD   | -                                 | X                    |
| 14. | Birds           | <i>Hydrobates<br/>monorhis</i>       | Swinhoe's Storm-<br>Petrel      | LC   | -                                 | X                    |
| 15. | Birds           | <i>Macronous<br/>flavicollis</i>     | Grey-cheeked tit-<br>babbler    | -    | X                                 | -                    |
| 16. | Birds           | <i>Meiglyptes tristis</i>            | White-rumped<br>Woodpecker      | EN   | -                                 | -                    |
| 17. | Birds           | <i>Mycteria cinerea</i>              | Milky Stork                     | EN   | -                                 | -                    |
| 18. | Birds           | <i>Numenius<br/>madagascariensis</i> | Far Eastern<br>Curlew           | EN   | -                                 | -                    |
| 19. | Birds           | <i>Papasula abbotti</i>              | Abbott's Booby                  | EN   | -                                 | X                    |
| 20. | Birds           | <i>Pavo muticus</i>                  | Green Peafowl                   | EN   | -                                 | -                    |
| 21. | Birds           | <i>Phaethon lepturus</i>             | White-tailed<br>Tropicbird      | LC   | -                                 | X                    |
| 22. | Birds           | <i>Phaethon<br/>rubricauda</i>       | Red-tailed<br>Tropicbird        | LC   | -                                 | X                    |
| 23. | Birds           | <i>Pterodroma barau</i>              | Barau's Petrel                  | EN   | -                                 | X                    |
| 24. | Birds           | <i>Spizaetus bartelsi</i>            | Javan hawk-eagle                | -    | X                                 | -                    |
| 25. | Birds           | <i>Stachyris<br/>grammiceps</i>      | White-breasted<br>babbler       | NT   | X                                 | -                    |
| 26. | Birds           | <i>Stachyris<br/>melanothorax</i>    | Crescent-chested<br>babbler     | LC   | X                                 | -                    |
| 27. | Birds           | <i>Stachyris thoracica</i>           | White-bibbed<br>babbler         | LC   | X                                 | -                    |
| 28. | Birds           | <i>Sula dactylatra</i>               | Masked Booby                    | LC   | -                                 | X                    |
| 29. | Birds           | <i>Sula leucogaster</i>              | Brown Booby                     | LC   | -                                 | X                    |
| 30. | Birds           | <i>Sula</i>                          | Red-footed Booby                | LC   | -                                 | X                    |
| 31. | Birds           | <i>Thalasseus<br/>bernsteini</i>     | Chinese Crested<br>Tern         | CR   | -                                 | X                    |
| 32. | Birds           | <i>Vanellus<br/>macropterus</i>      | Sunda lapwing                   | CR   | X                                 | -                    |
| 33. | Birds           | <i>Zosterops flavus</i>              | Javan white-eye                 | Vu   | X                                 | -                    |
| 34. | Mammals         | <i>Balaenoptera<br/>borealis</i>     | Sei Whale                       | EN   | -                                 | -                    |
| 35. | Mammals         | <i>Balaenoptera<br/>musculus</i>     | Blue Whale                      | EN   | -                                 | X                    |
| 36. | Mammals         | <i>Hylobates moloch</i>              | Javan gibbon                    | EN   | X                                 | -                    |
| 37. | Mammals         | <i>Manis javanica</i>                | Sunda Pangolin                  | CR   | -                                 | -                    |
| 38. | Mammals         | <i>Nycticebus<br/>javanicus</i>      | Javan Slow Loris                | CR   | -                                 | -                    |

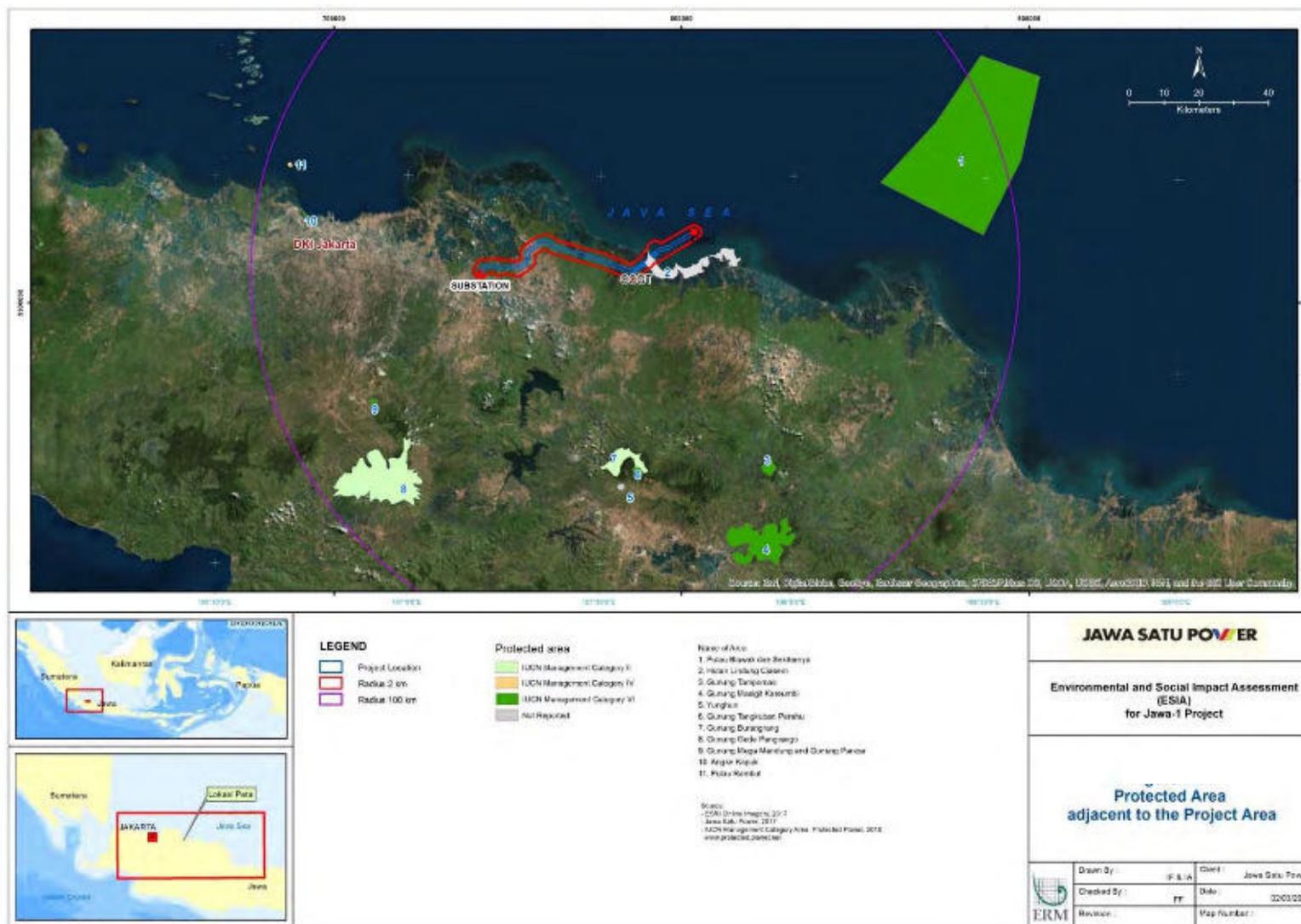
| No  | Taxonomic group | Species                        | Common name            | IUCN | Endemic/<br>Restricted<br>to Java | Migratory<br>Species |
|-----|-----------------|--------------------------------|------------------------|------|-----------------------------------|----------------------|
| 39. | Mammals         | <i>Otomops formosus</i>        | Java Giant Mastiff Bat | DD   | X                                 | -                    |
| 40. | Mammals         | <i>Rhinolophus canuti</i>      | Canut's Horseshoe Bat  | Vu   | X                                 | -                    |
| 41. | Mammals         | <i>Sundamys maxi</i>           | Javan Sundamys         | EN   | X                                 | -                    |
| 42. | Mammals         | <i>Sus verrucosus</i>          | Javan warty pig        | EN   | X                                 | -                    |
| 43. | Reptiles        | <i>Chelonia mydas</i>          | Green Turtle           | EN   | -                                 | X                    |
| 44. | Fishes          | <i>Carcharhinus hemiodon</i>   | Pondicherry Shark      | CR   | -                                 | -                    |
| 45. | Fishes          | <i>Pristis pristis</i>         | Largetooth Sawfish     | CR   | -                                 | -                    |
| 46. | Fishes          | <i>Pristis zijsron</i>         | Green Sawfish          | CR   | -                                 | -                    |
| 47. | Fishes          | <i>Urolophus javanicus</i>     | Java Stingaree         | CR   | -                                 | -                    |
| 48. | Fishes          | <i>Aetomylaeus maculatus</i>   | Mottled Eagle Ray      | EN   | -                                 | -                    |
| 49. | Fishes          | <i>Aetomylaeus vespertilio</i> | Ornate Eagle Ray       | EN   | -                                 | -                    |
| 50. | Fishes          | <i>Anoxypristis cuspidata</i>  | Narrow Sawfish         | EN   | -                                 | -                    |
| 51. | Fishes          | <i>Carcharhinus borneensis</i> | Borneo Shark           | EN   | -                                 | -                    |
| 52. | Fishes          | <i>Eusphyra blochii</i>        | Winghead Shark         | EN   | -                                 | -                    |
| 53. | Fishes          | <i>Lamiopsis temminckii</i>    | Broadfin Shark         | EN   | -                                 | -                    |
| 54. | Fishes          | <i>Pristis clavata</i>         | Dwarf Sawfish          | EN   | -                                 | -                    |
| 55. | Fishes          | <i>Rhincodon typus</i>         | Whale Shark            | EN   | -                                 | X                    |
| 56. | Fishes          | <i>Sphyrna lewini</i>          | Scalloped Hammerhead   | EN   | -                                 | -                    |
| 57. | Fishes          | <i>Stegostoma fasciatum</i>    | Zebra Shark            | EN   | -                                 | -                    |
| 58. | Fishes          | <i>Urogymnus polylepis</i>     | -                      | EN   | -                                 | -                    |
| 59. | Invertebrates   | <i>Millepora boschmai</i>      | -                      | CR   | -                                 | -                    |
| 60. | Invertebrates   | <i>Alveopora excelsa</i>       | -                      | EN   | -                                 | -                    |
| 61. | Invertebrates   | <i>Alveopora minuta</i>        | -                      | EN   | -                                 | -                    |
| 62. | Invertebrates   | <i>Anacropora spinosa</i>      | -                      | EN   | -                                 | -                    |
| 63. | Invertebrates   | <i>Holothuria lessoni</i>      | Golden Sandfish        | EN   | -                                 | -                    |
| 64. | Invertebrates   | <i>Holothuria scabra</i>       | Golden Sandfish        | EN   | -                                 | -                    |
| 65. | Invertebrates   | <i>Lobophyllia serratus</i>    | -                      | EN   | -                                 | -                    |
| 66. | Invertebrates   | <i>Montipora setosa</i>        | -                      | EN   | -                                 | -                    |
| 67. | Invertebrates   | <i>Pectinia maxima</i>         | -                      | EN   | -                                 | -                    |
| 68. | Invertebrates   | <i>Porites eridani</i>         | -                      | EN   | -                                 | -                    |
| 69. | Invertebrates   | <i>Porites ornata</i>          | -                      | EN   | -                                 | -                    |
| 70. | Invertebrates   | <i>Thelenota ananas</i>        | Prickly Redfish        | EN   | -                                 | -                    |

Notes:

CR : Critically Endangered; EN : Endangered; VU : Vulnerable; NT: Near Threatened; DD : Data Deficient; NA : Not Assessed; LC: Least Concern



Figure 7-15 Protected Areas Adjacent to the Project Area



### 7.3.4

#### *Invasive Species*

Invasive species are any species that are –non-native to a particular ecosystem and whose introduction and spread causes, or are likely to cause, socio-cultural, economic or environmental harm or harm to human health (FAO, 2013). Invasive species are naturalised species that reproduce often in large numbers and are spread over a large area, damaging native species (FAO, 2005).

According to the Global Invasive Species Database (GISD) (2017), 174 species have been identified as invasive species in Indonesia and 36 species which listed as invasive species in Java Island. Java Island presented in **Table 7-17**.

No records were returned for the marine area although there is potential for unreported invasive species to be present.

This information has been used when screening the baseline information to identify invasive species occurring within the Project area.

**Table 7-17** *Invasive Species in Java Islands*

| No  | Taxonomic group | Species                               | Habitat     | Status                 |
|-----|-----------------|---------------------------------------|-------------|------------------------|
| 1.  | Animalia        | <i>Anoplolepis gracilipes</i>         | Terrestrial | Native to Indonesia    |
| 2.  | Animalia        | <i>Cervus timorensis russa</i>        | Terrestrial | Native to Indonesia    |
| 3.  | Animalia        | <i>Cipangopaludina chinensis</i>      | Freshwater  | Native to Indonesia    |
| 4.  | Animalia        | <i>Columba livia</i>                  | Terrestrial | Native to Indonesia    |
| 5.  | Animalia        | <i>Oreochromis mossambicus</i>        | Freshwater  | Introduced             |
| 6.  | Animalia        | <i>Pomacea canaliculata</i>           | Freshwater  | Introduced             |
| 7.  | Animalia        | <i>Pterygoplichthys disjunctivus</i>  | Freshwater  | Introduced             |
| 8.  | Animalia        | <i>Pterygoplichthys multiradiatus</i> | Freshwater  | Introduced             |
| 9.  | Animalia        | <i>Pterygoplichthys pardalis</i>      | Freshwater  | Introduced             |
| 10. | Animalia        | <i>Pterygoplichthys spp.</i>          | Freshwater  | Introduced             |
| 11. | Animalia        | <i>Pycnonotus jocosus</i>             | Terrestrial | Native to Indonesia    |
| 12. | Animalia        | <i>Python bivittatus</i>              | Terrestrial | Native to Indonesia    |
| 13. | Animalia        | <i>Rattus exulans</i>                 | Terrestrial | Native south East Asia |
| 14. | Animalia        | <i>Scyphophorus acupunctatus</i>      | Terrestrial | Introduced             |
| 15. | Animalia        | <i>Viverricula indica</i>             | Terrestrial | Native to Indonesia    |
| 16. | Animalia        | <i>Xenopus laevis</i>                 | Brackish    | Introduced             |
| 17. | Animalia        | <i>Xylosandrus compactus</i>          | Terrestrial | Native to Indonesia    |
| 18. | Animalia        | <i>Xylosandrus mutilatus</i>          | Terrestrial | Native to Asia         |
| 19. | Plantae         | <i>Acacia confusa</i>                 | Terrestrial | Introduced             |
| 20. | Plantae         | <i>Alternanthera philoxeroides</i>    | Terrestrial | Introduced             |
| 21. | Plantae         | <i>Angiopteris evecta</i>             | Terrestrial | Native to Indonesia    |
| 22. | Plantae         | <i>Austroeupatorium inulifolium</i>   | Terrestrial | Introduced             |
| 23. | Plantae         | <i>Chromolaena odorata</i>            | Terrestrial | Introduced             |
| 24. | Plantae         | <i>Epipremnum pinnatum</i>            | Terrestrial | Native to Indonesia    |
| 25. | Plantae         | <i>Lespedeza cuneata</i>              | Terrestrial | Native to Indonesia    |
| 26. | Plantae         | <i>Leucaena leucocephala</i>          | Terrestrial | Introduced             |
| 27. | Plantae         | <i>Macfadyena unguis-cati</i>         | Terrestrial | Introduced             |
| 28. | Plantae         | <i>Merremia tuberosa</i>              | Terrestrial | Introduced             |
| 29. | Plantae         | <i>Mikania micrantha</i>              | Terrestrial | Introduced             |

| No  | Taxonomic group | Species                       | Habitat     | Status              |
|-----|-----------------|-------------------------------|-------------|---------------------|
| 30. | Plantae         | <i>Mimosa pigra</i>           | Terrestrial | Introduced          |
| 31. | Plantae         | <i>Myriophyllum aquaticum</i> | Terrestrial | Introduced          |
| 32. | Plantae         | <i>Neyraudia reynaudiana</i>  | Terrestrial | Native to Indonesia |
| 33. | Plantae         | <i>Nypa fruticans</i>         | Terrestrial | Native to Indonesia |
| 34. | Plantae         | <i>Psidium guajava</i>        | Terrestrial | Introduced          |
| 35. | Plantae         | <i>Syzygium cumini</i>        | Terrestrial | Native to Indonesia |
| 36. | Plantae         | <i>Verbena brasiliensis</i>   | Terrestrial | Introduced          |

Source: Global Invasive Species Database

### 7.3.5

#### *Area of Influence for Biodiversity Value*

The Project AoI was defined based on a two (2) km radius of the Project area. The radius was determined based on the nature of the activities of the Project during construction and operation as well as identified natural areas within the vicinity of the Project area and is consistent with the Project Study Area defined earlier in this Chapter.

From satellite imagery interpretation, the Project area is generally defined as agriculture land classes consisting mainly as paddy fields. Surrounding the Project areas are also human settlements. Specifically to the jetty area and offshore pipeline, the Project crosses fish ponds and mangrove vegetation. The ponds and mangroves area may contain habitat for species with significant conservation value.

The Area of Influence for biodiversity values is shown in **Figure 7-16**.

### 7.3.6 *Biodiversity Field Surveys*

A number of biodiversity surveys have been conducted in the Project area and vicinity since 2016. These surveys were conducted for the Initial Environmental Examination (IEE) in 2016 and more recently by ERM's sub-contractors.

A terrestrial biodiversity survey was undertaken between 10-15 August 2017 focussing on flora, mammals, birds and Herpetofauna. These surveys were conducted to determine the location of any priority biodiversity values within the Project Area and Area of Influence including coastal area, riverside, and agriculture area along transmission line.

These priority values focused on Critical Habitat<sup>(1)</sup> triggers as well as species of conservation significance. The surveys consisted of a desktop assessment to identify species and habitats to be prioritised for survey; identification of sampling locations; field surveys targeting major flora and fauna groups; and taxonomy and mapping of flora and fauna records identified. Habitat assessments were also undertaken to inform Natural Habitat<sup>(2)</sup> and Modified Habitat<sup>(3)</sup> mapping as required by IFC PS6.

**Figure 7-17** shows the areas where surveys were conducted. As the additional data, ERM also reviewed the preliminary environmental examination report which then included in this baseline report.

### 7.3.7 *Pre-Field Desktop Assessment*

Publicly available sources of information were analysed to determine likely priority biodiversity values within the Project area and Area of Influence. Aerial imagery was used to provide a spatial understanding of the pattern of vegetation communities and human uses on the area, and to map access routes and internal tracks.

Consultation occurred with local ecologists with experience of the Area of Influence to obtain information about species known to be present or

<sup>(1)</sup> Critical Habitats are areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregator species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes.

<sup>(2)</sup> Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition.

<sup>(3)</sup> Modified habitats are areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition.

previously recorded from the area, and other ecological values considered to be relevant.

Interviews undertaken with fishermen (cross reference with social baseline) included questions about the occurrence of marine fauna.

#### 7.3.7.1

##### *Sampling Sites*

The site reconnaissance targeted the following specific ecological and objectives:

- To name, describe and map vegetation communities and habitats present within the Project area at a suitable scale, using existing community nomenclature where possible;
- To identify, describe and map other ecologically sensitive areas within the Project area such as mangrove forest, riverside vegetation and water bodies;
- To the extent possible within the survey time frame and season, determine if species of conservation significance known or predicted likely to be present in the study area are actually present within the Project area; and
- To identify opportunities for future ecological monitoring and enhancement within the framework of the proposed Project.

#### 7.3.7.2

##### *Land Class Mapping*

Satellite imagery was used to map the land classes identified within the Project area and Area of Influence. These land classes were field verified during the field visit. The major land classes identified include paddy field, fishpond, settlement area, mangrove forest, bush, and water body. Land class descriptions identified are described in **Table 7-18** below. **Figure 7-18** shows the distribution of the land classes within the AoI and Project area.

Table 7-18 Descriptions of Land Classes within the Project AoI

| No | Land Class          | Description   | Photographs  |
|----|---------------------|---|--|
| 1. | Paddy Field         | <p>Paddy field is the dominant agriculture land in the Project area and AoI. In this area the paddy field is located in flat area with irrigation.</p> <p>Key species:<br/>                     Mahogany (<i>Swietenia mahagoni</i>), listed EN (introduced);<br/>                     Burmese Rosewood (<i>Pterocarpus indicus</i>), listed VU; Great Egret (<i>Ardea alba</i>), Protected and Migratory species; Javan Pond Heron (<i>Ardeola speciose</i>), Protected; Cattle Egret (<i>Bubulcus ibis</i>) Protected and Migratory species; Rufous Night Heron (<i>Nycticorax caledonicus</i>), Protected and; and Glossy Ibis (<i>Plegadis falcinellus</i>), protected.</p> |   |
| 2. | Dryland agriculture | <p>Dryland agriculture is mostly located between river side and paddy field area. This area is usually planted with food crops and fruits such as beans, vegetables, banana and etc.</p> <p>Key species:<br/>                     Big Leaf Mahogany (<i>Swietenia macrophylla</i>) listed VU; Burmese Rosewood (<i>Pterocarpus indicus</i>) listed VU (introduced); Brown-throated Sunbird (<i>Anthreptes malacensis</i>), Protected; White-headed Stilt (<i>Himantopus leucocephalus</i>), Protected; Pied Fantail (<i>Rhipidura javanica</i>) Protected; and Glossy Ibis (<i>Plegadis falcinellus</i>), protected.</p>  |  |

| No | Land Class | Description  | Photographs  |
|----|------------|--|--|
| 3. | Fish Pond  | <p>Fish pond is located in the coastal area behind the mangrove formation. Some ponds are directly adjacent to the marine area. Mangrove vegetation occurs along the edges of some ponds with some water birds species.</p> <p>Key species:<br/>           Big Leaf Mahogany (<i>Swietenia macrophylla</i>) listed VU; Great Egret (<i>Ardea alba</i>) Protected and Migratory species; Javan Pond Heron (<i>Ardeola speciose</i>), Protected; Little Egret (<i>Egretta garzetta</i>), Protected; White-headed Stilt (<i>Himantopus leucocephalus</i>), Protected; and Collared kingfisher (<i>Todirhamphus chloris</i>), Protected.</p> |   |
| 4. | Scrub      | <p>Scrub area was found in some parts of the riverside and some parts around the ponds area.</p> <p>The vegetation consists of low plants and regrowth vegetation.</p>   |   |
| 5. | Bare land  | <p>Bare land is an area that has little or no vegetation and has been historically been cleared. The area is not used for agricultural purposes and may have been used for grazing previously. The area may also be fallow land used for rice or crop production. This land class type was found along the existing pipeline.</p> <p>Key species:<br/>           Big Leaf Mahogany (<i>Swietenia macrophylla</i>) listed Vu; Burmese Rosewood (<i>Pterocarpus indicus</i>) listed VU.</p>  |  |

| No | Land Class    | Description   | Photographs  |
|----|---------------|---|--|
| 6. | Marine        | <p>The marine habitat is located in Ciasem bay, in close proximity to the coast. The marine area has a shallow seabed.</p> <p>The predominant benthic habitat is mud but there are also small coral patches close to the shore. The water column is highly turbid.</p>  |   |
| 7. | Riparian Zone | <p>The riparian area is mostly used by the community as an agriculture area or planted with trees species that have economic value.</p> <p>Key species:<br/>           Big Leaf Mahogany (<i>Swietenia macrophylla</i>) listed Vu; Great Egret (<i>Ardea alba</i>) Protected and Migratory species; Javan Pond Heron (<i>Ardeola speciose</i>), Protected; Little Egret (<i>Egretta garzetta</i>), Protected; Pacific Reef Egret (<i>Egretta sacra</i>); White-headed Stilt (<i>Himantopus leucocephalus</i>), Protected.</p> |   |
| 8. | Roads         | <p>Roads consist of bare areas that have been cleared of vegetation to facilitate the movement of vehicles. Some parts of the road side is planted with trees that have some function such as shade or land boundary.</p> <p>Key species:<br/>           Mahogany (<i>Swietenia mahagoni</i>) listed EN; Burmese Rosewood (<i>Pterocarpus indicus</i>) listed VU; and Brown-throated (<i>Anthreptes malacensis</i>), Protected; Olive-backed sunbird (<i>Nectarinia jugularis</i>), Protected.</p>                            |  |

Figure 7-16 Biodiversity Area of Influence

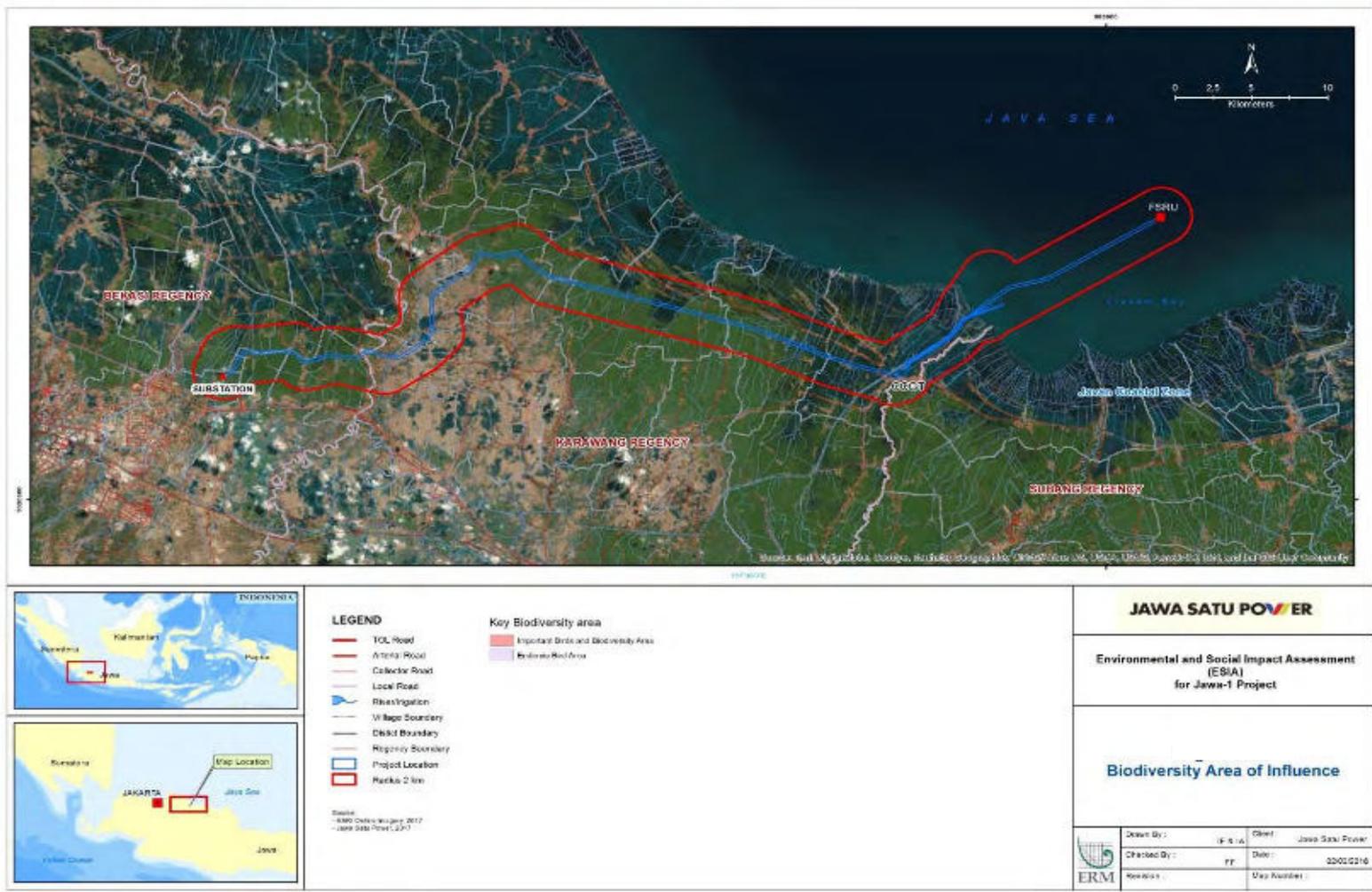
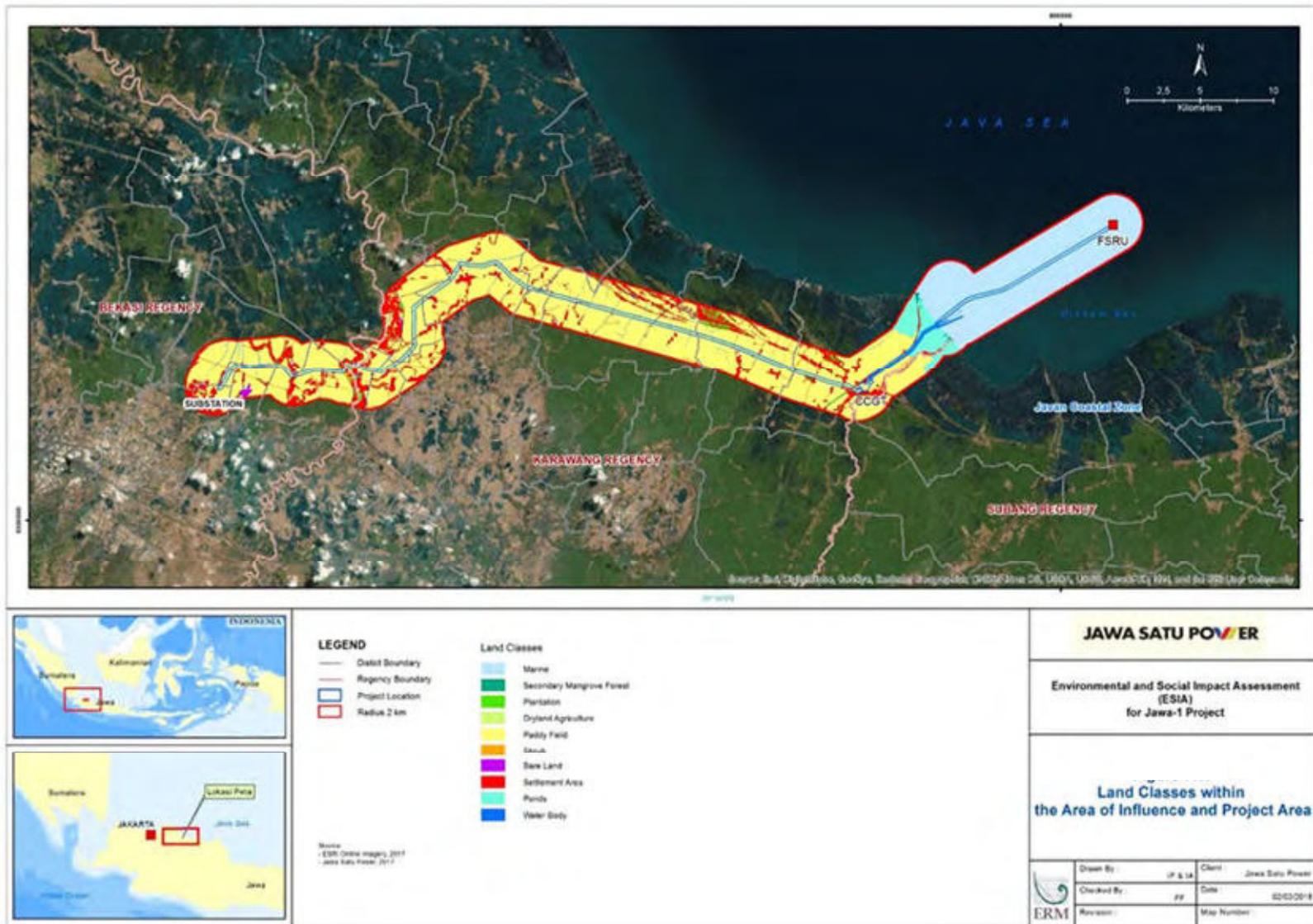


Figure 7-17 Survey Area



Figure 7-18 Land Classes within the Area of Influence and Project Area



**Table 7-19 Areas of Land Class within the Project Area and Project Area of Influence**

| No           | Land Class                | Natural/Modified | Area of Influence (ha) | Project Area (ha) |
|--------------|---------------------------|------------------|------------------------|-------------------|
| 1.           | Fresh water               | Natural          | 38.29                  | 3.69              |
| 2.           | Secondary mangrove Forest | Natural          | 34.52                  | 0.33              |
| 3.           | Dryland agriculture       | Modified         | 137.05                 | 0.21              |
| 4.           | Settlement                | Modified         | 3,202.30               | 0.78              |
| 5.           | Bareland                  | Modified         | 70.84                  | 2.81              |
| 6.           | Plantation                | Modified         | 383.25                 | 0.84              |
| 7.           | Paddy field               | Modified         | 18,754.56              | 214.61            |
| 8.           | Shrub                     | Modified         | 167.06                 | 0.71              |
| 9.           | Ponds                     | Modified         | 966.37                 | 9.8               |
| <b>Total</b> |                           | -                | <b>23,754.24</b>       | <b>233.78</b>     |

### 7.3.8 Natural Habitat and Modified Habitat

IFC PS6 requires the assessment of the distribution of Natural Habitat and Modified Habitat in order to identify risks and mitigations to biodiversity values during the impact assessment phase. There is currently no methodology within IFC PS6 and the associated Guidance Note (GN) on the approach to assess the distribution of these habitat types.

Habitat classification has been made based on understanding of land cover classification and species assemblages within each habitat. Each land class has been assigned habitat classifications according to the definitions of IFC PS6. The justification for the classification is shown in **Table 7-20** below. The areas of Natural Habitat and Modified Habitat within the AoI and Project area are shown in **Table 7-21**.

**Table 7-20 Natural and Modified Habitats within the Project Area and Area of Influence**

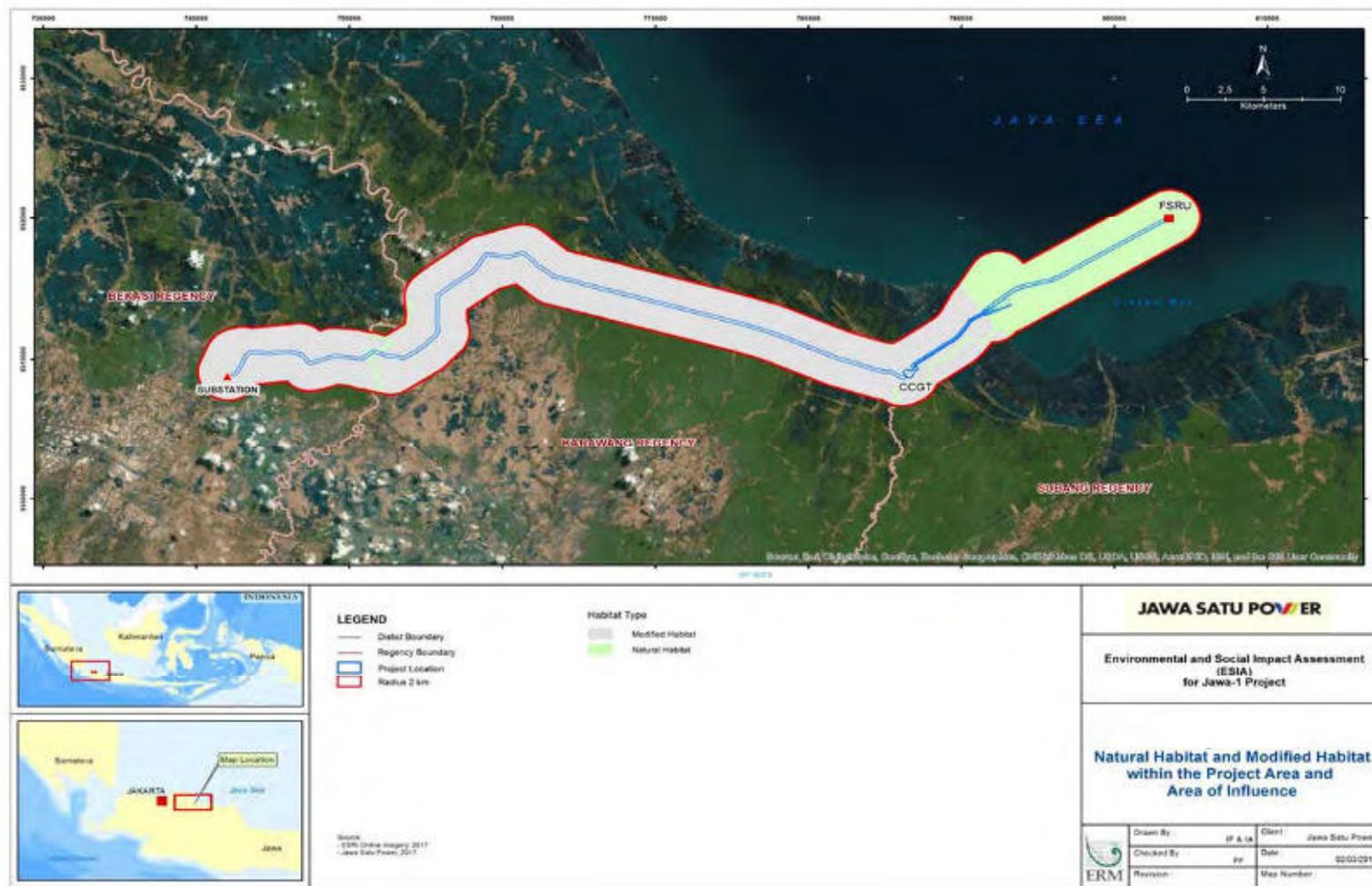
| No | Land Class                | IFC PS Habitat Classification | Justification  |
|----|---------------------------|-------------------------------|--|
| 1. | Fresh water               | Modified Habitat              | The irrigation canal is considered to be modified habitat. To support paddy field agriculture, the irrigation channel has been constructed across the paddy field. Human use has substantially modified the condition of the irrigation canal. |
|    |                           | Natural Habitat               | The two rivers around the Project are considered to be Natural habitat. Both rivers are not in a substantially modified state, the aquatic ecosystem contains naturally occurring species.   |
| 2. | Secondary mangrove Forest | Natural Habitat               | Secondary mangrove forest is considered to be Natural habitat. Sedimentation formed along the coast where activity has been triggered the growth of mangrove plants naturally.   |

| No  | Land Class          | IFC PS Habitat Classification | Justification   |
|-----|---------------------|-------------------------------|---|
| 3.  | Dryland agriculture | Modified Habitat              | Dry land agriculture considered to be modified habitat. Human use has substantially modified the condition of the habitat.  |
| 4.  | Settlement          | Modified Habitat              | Settlement areas are considered as modified habitat. Human use has substantially modified the condition of the settlement area  |
| 5.  | Bareland            | Modified Habitat              | Bare land is considered as modified habitat. No natural vegetation remains in this area. Human use has substantially modified the condition of the habitat  |
| 6.  | Marine              | Natural Habitat               | Marine areas are considered to be natural habitat. Marine ecosystem contains naturally occurring species and is not in a substantially modified state despite impacts of human activities impacting these waters such as sedimentation, fishing ground and etc. |
| 7.  | Plantation          | Modified Habitat              | Plantations are considered to be modified habitat. Natural vegetation has been replaced by monocultures. Little remaining natural vegetation remains.   |
| 8.  | Paddy field         | Modified Habitat              | Paddy field is considered modified habitat. Intensive paddy agriculture in this Project area has been replaced by monoculture of rice paddy vegetation.   |
| 9.  | Shrub               | Modified Habitat              | Shrub land is considered to be modified habitat. Clearing of the mid storey and canopy has removed the forest structure. The habitat is in a substantially modified state.  |
| 10. | Ponds               | Modified Habitat              | Ponds are considered to be modified habitat. Human activity has been change the mangrove into a ponds system used for the growth of fish and shrimps.   |

**Table 7-21** *Areas of Natural Habitat and Modified Habitat within the Project Area and AoI*

| Habitat Type     | Area of Influence (ha) | Project Area (ha) |
|------------------|------------------------|-------------------|
| Modified Habitat | 23,681.43              | 229.76            |
| Natural Habitat  | 36.40                  | 4.02              |
| Total            | 23,717.83              | 233.78            |

Figure 7-19 Natural Habitat and Modified Habitat within the Project Area and Area of Influence



### 7.3.9 *Flora*

#### 7.3.9.1 *Methods*

Data collection for vegetation survey was conducted using transect and exploration method by following natural path access of the survey location. This method was determined due to most of the survey area has been using by local community as crops land (predominantly paddy field) with limited access and or highly disturbed area with fragmented vegetation in a small area.

The Survey location was divided into several transects which was adjusted with field terrain and situation and the available observation area on site. The observation area during the survey was classified as courtyard, paddy field, dry land agriculture, mangrove, riparian.

In each observation area, encountered flora species was recorded by determines its local/scientific name, habitus and sub plot location. Picture of each encountered species was also taken for further analyses. All species of flora found in the field verified later with flora guide books such as Flora of Java (*Backer & Bakhuizen, 1968*).

#### 7.3.9.2 *Flora Species of Conservation Significance*

A total of 286 vegetation species were recorded to be present within the study area including the 251 species observed during ERM survey. Predominantly bush and tree, the encountered species is dominated by the member of Vitaceae family (67 species).

Of which three (3) species are known listed in IUCN Red List, the *Swietenia mahagoni* listed as Endangered (introduced) and *Pterocarpus indicus* (native but planted) and *Swietenia macrophylla* (introduced) which listed Vulnerable. None of the recorded species are listed as endemic to Java or the Indonesia.

According to Indonesian regulation GR N0 7 199, none of the encountered species listed as protected. The list of conservation significant flora identified is shown in **Table 7-22**.

By combining ERM survey results and the previous initial environmental examination (IEE) conducted by proponent, it is noted that there were total 288 species of flora species that have been identified within the study area.

**Table 7-22** *List of Flora Species of Conservation Significance found during Survey*

| No | Local Name                            | Scientific name            | Habitat |    |    |    |    | IUCN Red List | Indonesian listing |
|----|---------------------------------------|----------------------------|---------|----|----|----|----|---------------|--------------------|
|    |                                       |                            | DLA     | PF | CY | MA | RV |               |                    |
| 1. | Burmese Rosewood (native but planted) | <i>Pterocarpus indicus</i> | X       | X  |    |    |    | VU            | -                  |

| No | Local Name                     | Scientific name              | Habitat |    |    |    |    | IUCN Red List | Indonesian listing |   |
|----|--------------------------------|------------------------------|---------|----|----|----|----|---------------|--------------------|---|
|    |                                |                              | DLA     | PF | CY | MA | RV |               |                    |   |
| 2. | Big Leaf Mahogany (introduced) | <i>Swietenia macrophylla</i> | X       |    |    |    |    | X             | VU                 | - |
| 3. | Mahogany (introduced)          | <i>Swietenia mahagoni</i>    |         | X  |    |    |    |               | EN                 | - |

Notes:  
CR : Critically Endangered; EN : Endangered; VU : Vulnerable; NT: Near Threatened; DD : Data Deficient; NA : Not Assessed; LC: Least Concern

### 7.3.9.3

#### *Vegetation Class Survey Results*

Among all the classified coverage area, paddy field area which is the dominant land cover of the survey area has the largest number encountered species with records of 157 species, detailed observation records based on the classified vegetation types is presented as follows:

#### *Secondary Mangrove forest*

The observation record from Mangrove vegetation type includes the secondary mangrove forest and the fishponds area was 44 species from 21 families. Dominant habitus was tree, shrub, and liana. At the sapling and pole of the vegetation community, the vegetation is dominated by *Avicennia marina*.

According to IUCN Red List, nine (9) species are listed Least Concern (LC) and none of the species listed protected under Indonesia regulation. Detailed observation list is presented in the **Annex J**.

Mangrove vegetation type is highly disturbed area due to the present of the fishponds. Naturally this vegetation type can be considered as natural habitat; however the long history of fishponds activities in this area has formed the vegetated area as modified habitat.

Some of the remaining mangrove has been re-planted by fisherman. Only four mangrove species are naturally occurring: *Avicennia marina*, *Sonneratia*, *Sonneratia caseolaris*, and *Rhizophora apiculata*. *Avicennia marina* is the most abundant mangrove in the study area. None of these species are considered to be conservation significant species.

#### *Courtyard*

A total of 25 species of flora from 17 families were observed in the courtyard land class type. Species form Fabaceae family dominated the floral composition with five (5) species, followed by Euphorbiaceae with three (3) species. Two (2) species are listed as Least Concern (LC) and two (2) species are listed as Data Deficient according to IUCN Red List. None of the species are listed protected under Indonesia regulation.

Courtyard vegetation type related to the villages and flora in this area is usually planted by the local community as alternative food sources, traditional medical source or ornamental plants. This type of vegetation considered as modified habitat. Vegetation diversity in this area is considered as poor. Species such as *Parkia speciose*, *Manihot esculenta*, usually planted as alternative food source with high economic value. *Euphorbia milii* is planted as ornamental plant, and *Acalypha indica* is often to be used as traditional medicinal plant. Detailed of recorded flora species is presented in **Annex J**.

#### *Dry Land Agriculture*

A total of 45 species of flora was encountered in the dry land agriculture vegetation type. It is considered as modified habitat. Most of the vegetation in dry land agriculture is cover tree, fruit tree, and bushes.

Two (2) species are listed as Vulnerable (VU) and four (4) species are listed Least Concern according to IUCN Red List. None of the species are listed protected under Indonesia regulation.

Flora diversity is relatively low which is mostly due to selective planting by local people based on their needs.

Tree species in this area are usually being used as cover plants, and planted in between of riparian and the paddy field. While the shrub is usually grown under the canopy and space between the plants. Detailed observed flora is presented in **Annex J**.

#### *Riparian*

The survey in the riparian vegetation type observed 116 species from 46 families. Fabaceae is the dominant family with 17 species, followed by Poaceae with 11 species.

One (1) species is listed as Vulnerable (VU) and 17 species are listed as Least Concern and two (2) species are listed as data deficient according to the IUCN Red List. None of the species are listed as protected under Indonesia regulation.

This land class is dominated with *Axonopus compressus*, *Chloris barbata*, *Cymbopogon*, *Echinochloa colona*, *Eleusine indica*, *Imperata cylindrica* and *Ischaemum ciliare*.

In the area adjacent to the dry land agriculture land class, it is dominated by *Acacia auriculiformis*, *Calopogonium mucunoides*, *Centrosema molle*, *Crotalaria pallida*, *Falcataria moluccana*, *Flemingia lineata*, *Gliricidia sepium*, *Indigofera hirsuta*, *Leucaena leucocephala*, *Mimosa diplotricha*, *Mimosa pigra*, *Mimosa pudica*, *Pueraria phaseoloides*, and *Senna occidentalis*.

The detailed list of observed flora is presented in **Annex J**.

### *Paddy Field*

Paddy fields are the dominant vegetation cover of the study area; it has the highest number of species encountered among all the surveyed locations. It has 157 species of flora from 50 families. The land class is dominated by vegetation from family Fabaceae (20 species), Poaceae (19 species), and Asteraceae (12 species). In total there were 17 species listed as Least Concern (LC) and one (1) species listed as Data Deficient according to IUCN Red List. No species are listed as protected under Indonesia regulation.

The three plant families identified contain species that are mostly classified as weeds, which are commonly found in the paddy field. The observed flora species identified in the paddy field area is presented in **Annex J**.

#### 7.3.9.4 *Flora Identified in IEE Study*

Additional flora species were identified during the IEE study that were not identified during the study undertaken by ERM. None of these species are of conservation significance or endemic to Java or Indonesia. These species are summarised in **Annex J**.

### 7.3.10 *Terrestrial Fauna*

#### 7.3.10.1 *Birds (April and October 2017 Survey)*

##### *Methods*

A bird survey was conducted using the Reconnaissance Survey method (Moheb & Mostafawi, 2011). The surveys were conducted through direct and indirect observation along the path within the survey area, data of species encounter was developed based on visual and/or auditory detection. Target species included endemic bird species triggered by the Javan Coastal Zone EBA, including: Javan Coucal (*Centropus nigrorufus*), Javan Plover (*Charadrius javanicus*), Javan Lapwing (*Vanellus macropterus*), and Javan White-eye (*Zosterops flavus*).

The surveys were conducted in six (6) locations around proposed Project area:

- Station 1: station close to the Cilamaya River estuary, the area represents river estuary, shrimp pond mangrove near to the existing river and is located in the Java Coastline EBA;
- Station 2: Area around the irrigation channel and paddy field in Pancakarya and Lemahduhur Village;
- Station 3: Paddy field and dry land crops area in Sindangsari Village;
- Station 4: Transmission line area around Citarum River;

- Station 5: Paddy field and riparian area around proposed transmission line and substation locations; and
- Brine Line/CCGT Power Plant area, Pipe deployment area.

The encountered bird species was recorded with detail information, including species name and number of individuals. The location of the encountered species was also marked using a GPS to obtain an overview of relative local distribution of the species.

To determine the National and International conservation status of individual encountered species, each identified species was verified with the IUCN Red List of Threaten Species and Indonesian Law for Protected Species (Government Decree No. 7/1999)

### Results

A total of 53 bird species were recorded within the proposed Project area; this includes 41 species of 24 families throughout 5 stations and brine line/CCGT Power Plant area. Additionally, 11 bird species were reported in the preliminary environmental and social study report. These species were not observed during the ERM study.

According to IUCN Red List, 49 species are listed as Least Concern (LC) and one (1) species is listed as Near Threatened (NT), which is *Charadrius javanicus*. According to the checklist of Indonesia endemic species, two (2) species are known endemic to Indonesia, being *Lonchura ferruginosa* and *Lonchura leucogastroides*. *L. ferruginosa* is listed as LC on the IUCN Red List and is endemic to Java and Bali Island. The population is suspected to be stable in the absence of evidence for any declines or substantial threats (*Birdlife International, 2016*). *L. leucogastroides* is listed LC in IUCN Red List and this species is endemic to the Southern part of Sumatra, Java, Bali and Nusa Tenggara. The population is suspected to be stable in the absence of evidence for any declines or substantial threats (*Birdlife International, 2016*).

According to Government Regulation of Indonesian No. 7/1999, 14 Species are listed as protected. The species are: *Alcedo atthis*, *Halcyon chloris*, *Ardea alba*, *Ardeola speciose*, *Bubulcus ibis*, *Egretta garzetta*, *Egretta sacra*, *Nycticorax caledonicus*, *Anthreptes malacensis*, *Himantopus leucocephalus*, *Nectarinia jugularis*, *Rhipidura javanica*, *Todirhamphus chloris* and *Plegadis falcinellus*. Four (4) species of the listed protected are known as migrant birds, which are: *Ardea alba*, *Bubulcus ibis*, *Egretta sacra*, and *Plegadis falcinellus*.

Five (5) species, which are *Gerygone sulphurea*, *Streptopelia chinensis*, *Passer montanus*, *Cisticola juncidis*, and *Pycnonotus goiavier* identified as relatively common species. Detailed bird survey records are presented in **Annex J**.

The presence of birds is highly depends on the habitat quality, therefore the more diverse the habitat type of the area will usually trigger more abundance

of the species encountered. Station 1 has several habitat types including paddy field, bushes, fish ponds, and secondary mangrove forest. Therefore, station 1 showed more abundance compared with other observation area with 24 species of birds encountered.

The survey encountered seven (7) species of Ardeidae family. This family belongs to the Order Pelecaniformes, and includes herons, egrets, bitterns, night-herons and allies. These birds live in all kinds of wetlands, from open marshlands with shallow water to coastal areas, through tidal flats and mangroves (Hoyo, Elliott, Sargatal, & Collar, 2002).

Indonesian listed and conservation significant bird species assessed in the Critical Habitat assessment are listed in **Table 7-23** below.

**Table 7-23 Indonesian Listed and Conservation Significant Bird Species Identified within the Study Area during Survey**

| No  | Scientific Name                 | Common Name            | Data Source |           | IUCN | Ind. Listing | Migrant | Endemic |
|-----|---------------------------------|------------------------|-------------|-----------|------|--------------|---------|---------|
| 1.  | <i>Alcedo atthis</i>            | Common Kingfisher      | ERM, 2017   | -         | LC   | X            | -       | -       |
| 2.  | <i>Anthreptes malacensis</i>    | Brown-throated Sunbird | ERM, 2017   | IEE, 2017 | LC   | X            | -       | -       |
| 3.  | <i>Ardea alba</i>               | Great Egret            | ERM, 2017   | -         | LC   | X            | X       | -       |
| 4.  | <i>Ardeola speciosa</i>         | Javan Pond Heron       | ERM, 2017   | IEE, 2017 | LC   | X            | -       | -       |
| 5.  | <i>Bubulcus ibis</i>            | Cattle Egret           | ERM, 2017   | -         | LC   | X            | X       | -       |
| 6.  | <i>Egretta garzetta</i>         | Little Egret           | ERM, 2017   | IEE, 2017 | LC   | X            | -       | -       |
| 7.  | <i>Egretta sacra</i>            | Pacific Reef Egret     | ERM, 2017   | -         | LC   | X            | X       | -       |
| 8.  | <i>Halcyon chloris</i>          | Collared Kingfisher    | ERM, 2017   | -         | LC   | X            | -       | -       |
| 9.  | <i>Himantopus leucocephalus</i> | White-headed Stilt     | ERM, 2017   | -         | LC   | X            | -       | -       |
| 10. | <i>Lonchura ferruginosa</i>     | White-capped Munia     | ERM, 2017   | -         | LC   | -            | -       | X       |
| 11. | <i>Lonchura leucogastroides</i> | Javan Munia            | ERM, 2017   | IEE, 2017 | LC   | -            | -       | X       |
| 12. | <i>Nectarinia jugularis</i>     | Olive-backed sunbird   | -           | IEE, 2017 | LC   | X            | -       | -       |
| 13. | <i>Nycticorax caledonicus</i>   | Rufous Night Heron     | ERM, 2017   | -         | LC   | X            | -       | -       |
| 14. | <i>Plegadis falcinellus</i>     | Glossy Ibis            | ERM, 2017   | -         | LC   | X            | X       | -       |
| 15. | <i>Rhipidura javanica</i>       | Pied Fantail           | ERM, 2017   | -         | LC   | X            | -       | -       |

| No   | Scientific Name             | Common Name         | Data Source | IUCN | Ind. Listing | Migrant | Endemic |
|--|-----------------------------|---------------------|-------------|------|--------------|---------|---------|
| 16.  | <i>Todirhamphus chloris</i> | Collared kingfisher | - IEE, 2017 | LC   | X            |         | -       |
| Notes:   |                             |                     |             |      |              |         |         |
| CR : Critically Endangered; EN : Endangered; VU : Vulnerable; NT: Near Threatened; DD : Data Deficient; NA : Not Assessed; LC: Least Concern |                             |                     |             |      |              |         |         |

### 7.3.10.2 Birds (Endemic Bird Species, April 2018)

#### Methods

ERM contracted Dr Bas Van Balen to conduct a bird survey within the portion of the Javan Coastal Zone Endemic Bird Area within the Discrete Management Unit (DMU), and searches within the Project area. The objectives of the survey were to confirm the presence of the Javan White Eye (*Zosterops flavus*) within the DMU; map habitat for the Javan White Eye; confirm presence of other endemic bird species (Javan Plover, *Charadrius javanicus*; Javan Coucal, *Centropus nigrorufus*; and Javan Sparrow, *Lonchura oryzivora*) within the DMU; and record incidental sightings of other bird species in the area surveyed.

A desktop assessment of potential habitat for the target species was undertaken to determine the potential distribution within the DMU. Areas targeted for survey included: mangrove forests; extant areas of natural vegetation, dykes and fish ponds; swamp forest and wetlands.

A total of 10 days of survey occurred within the target areas. Surveys occurred at dawn and dusk with habitat searches occurring during the day time. A total of seven survey locations were completed during the survey at areas of potential habitat for the target species.

#### Results

The results of the survey detected three of the four endemic bird species within the Javan Coastal Zone EBA, including the Javan Coucal *Centropus nigrorufus*, Javan Plover *Charadrius javanicus* and Javan White-eye *Zosterops flavus*.

The Javan White Eye was found in singles, pairs and family groups of up to five 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). No records were found within the Project Area. It was observed that the mangrove stand in the Project Area was not dominated by *Avicinnia spp.*, which is the preferred habitat for the Javan White Eye.

Javan Coucal was found only at Muara Gembong: at Pantai Bendera and south of Muara Blacan.

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 habitat survey of the Project Area towards the coast (where the jetty is planned) was representative of the current Javan Coastal Zone EBA, consisting of remnant mangroves, fish ponds and disturbed areas. The wetland area was moderately rich in waterbirds, including the Javan Plover. Javan White Eyes were not encountered in this area, probably due to the degraded nature of the mangroves within this area. The transmission line area contained only urban habitat embedded in ricefields and no suitable habitat for any of the target species. No target species were detected along the transmission line route.

The incidental bird survey also recorded the Milky Stork (*Mycteria cinerea*) IUCN EN. This species however was recorded outside of the DMU to the West.

The species list for the targeted survey is shown in **Table 7-24**. The location of records for the Javan Coastal Zone EBA species within the DMU is shown in **Figure 7-19** and in relation to the jetty area in **Figure 7-20**.

It should be noted that habitat for the Javan Plover and Javan White-Eye is easily defined, however habitat for the Javan Coucal within the Javan Coastal Zone EBA is less definable and hence has not been mapped in the figures.

**Table 7-24 Results of Endemic Bird Survey (April 2018)**

| Common Name               | Scientific Name                 | Protected Status | Endangered Status | Endemic Status | Migratory Status | Number Observed |
|---------------------------|---------------------------------|------------------|-------------------|----------------|------------------|-----------------|
| Sunda Teal                | <i>Anas gibberifrons</i>        |                  |                   | E              |                  | 8               |
| Sunda Collared Dove       | <i>Streptopelia bitorquata</i>  |                  |                   | E              |                  | 99              |
| Horsfield's Bronze Cuckoo | <i>Chrysococcyx basalis</i>     |                  |                   |                | S                | 12              |
| Javan Coucal              | <i>Centropus nigrorufus</i>     |                  | VU                | E              |                  | 2               |
| Linchi Swiftlet           | <i>Collocalia linchi</i>        |                  |                   | E              |                  | 258             |
| Pied Stilt                | <i>Himantopus leucocephalus</i> | P                |                   |                |                  | 22              |
| Javan Plover              | <i>Charadrius javanicus</i>     |                  | NT                | E              |                  | 117             |
| Common Redshank           | <i>Tringa totanus</i>           |                  |                   |                | N                | 30              |
| Eurasian Whimbrel         | <i>Numenius phaeopus</i>        | P                |                   |                | N                | 6               |
| White-winged Tern         | <i>Chlidonias leucopterus</i>   | P                |                   |                | N                | 1               |
| Whiskered Tern            | <i>Chlidonias hybrida</i>       | P                |                   |                | N/S              | 38              |
| Oriental Darter           | <i>Anhinga melanogaster</i>     | P                | NT                |                |                  | 1               |
| Milky Stork               | <i>Mycteria cinerea</i>         | P                | EN                |                |                  | 10              |
| Cattle Egret              | <i>Ardea ibis</i>               | P                |                   |                |                  | 2               |
| Eastern Great Egret       | <i>Ardea modesta</i>            | P                |                   |                |                  | 65              |
| Intermediate Egret        | <i>Ardea intermedia</i>         | P                |                   |                |                  | 1               |

|                              |                               |    |   |     |
|------------------------------|-------------------------------|----|---|-----|
| Little Egret                 | <i>Egretta garzetta</i>       | P  |   | 336 |
| Collared Kingfisher          | <i>Todiramphus chloris</i>    | P  |   | 37  |
| Sacred Kingfisher            | <i>Todiramphus sanctus</i>    | P  | S | 15  |
| Cerulean Kingfisher          | <i>Alcedo coerulescens</i>    | P  | E | 83  |
| Blue-tailed Bee-eater        | <i>Merops philippinus</i>     |    | N | 14  |
| Sunda Pied Fantail           | <i>Rhipidura javanica</i>     | P  |   | 55  |
| Javan White-eye              | <i>Zosterops flavus</i>       | VU | E | 23  |
| Pallas's Grasshopper Warbler | <i>Locustella certhiola</i>   |    | N | 5   |
| Bar-winged Prinia            | <i>Prinia familiaris</i>      |    | E | 3   |
| Javan Myna                   | <i>Acridotheres javanicus</i> |    | E | 10  |
| Scarlet-headed Flowerpecker  | <i>Dicaeum trochileum</i>     |    | E | 33  |
| Brown-throated Sunbird       | <i>Anthreptes malacensis</i>  | P  |   | 22  |
| Copper-throated Sunbird      | <i>Leptocoma calcostetha</i>  | P  |   | 8   |
| Ornate Sunbird               | <i>Cinnyris ornatus</i>       | P  |   | 41  |
| White-capped Munia           | <i>Lonchura ferruginosa</i>   |    | E | 380 |
| Javan Sparrow                | <i>Lonchura oryzivora</i>     | VU | E | 0   |

Notes:

CR : Critically Endangered; EN : Endangered; VU : Vulnerable; NT: Near Threatened; DD :

Data Deficient; NA : Not Assessed; LC: Least Concern

P: Protected; E: Endemic; N: North Monsoon; S: South Monsoon

Figure 7-20 Habitat for the Javan Plover and Javan White Eye within the DMU

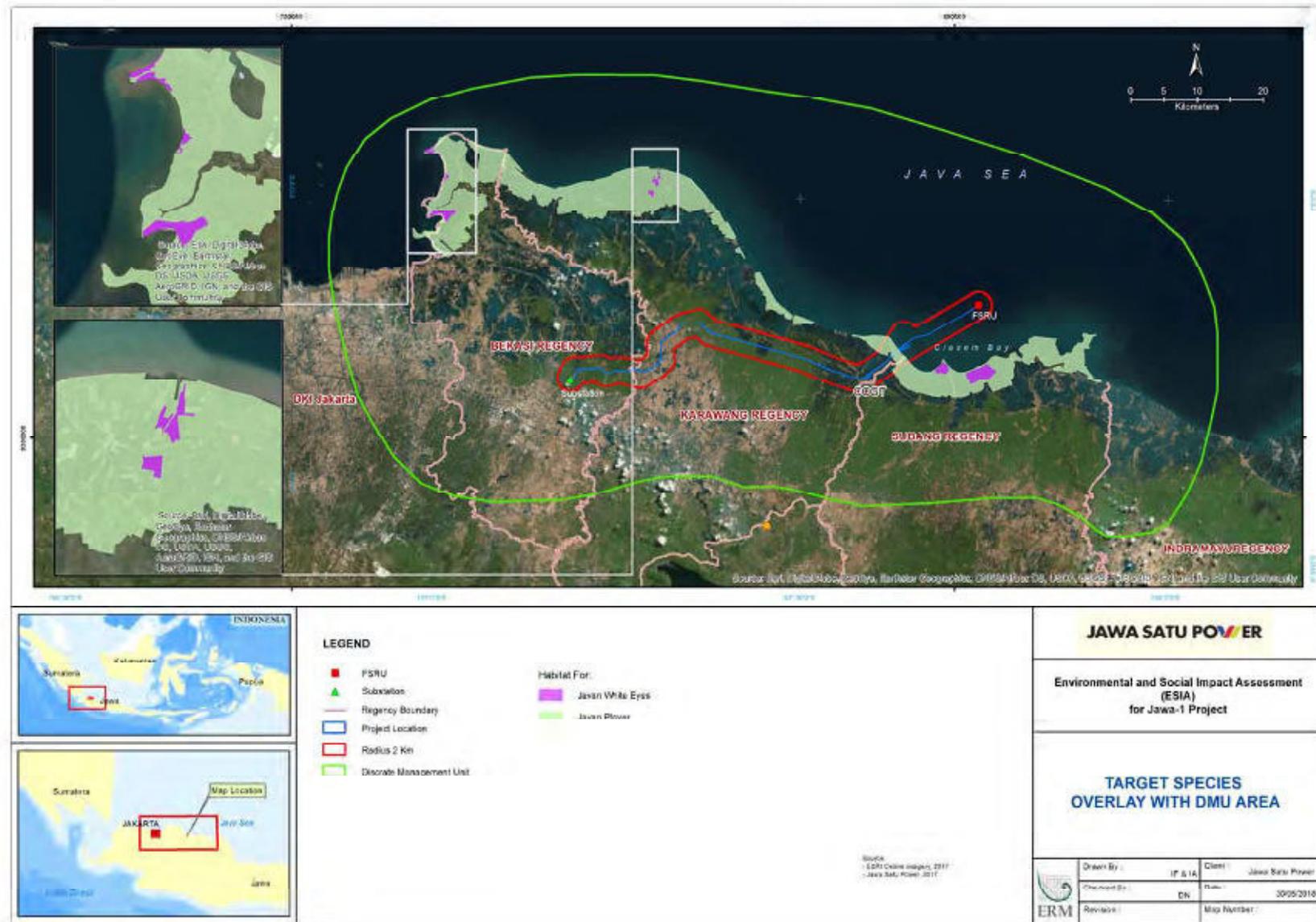
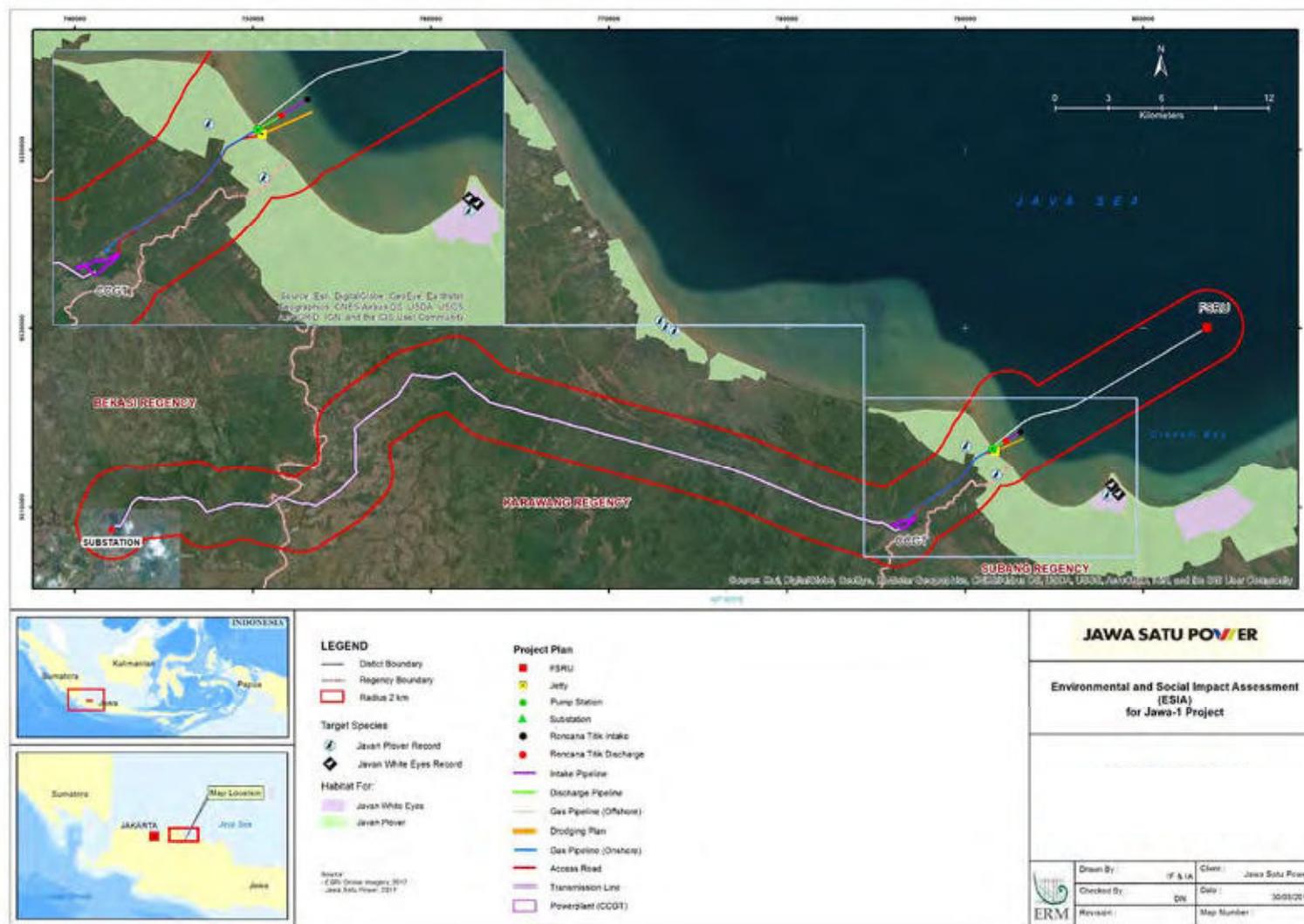


Figure 7-21 Location of Habitat and Records for the Javan Plover and Javan White Eye within the DMU



### 7.3.10.3 *Mammals*

#### *Methods*

The mammal survey was conducted in accordance with the Reconnaissance Survey method (Moheb & Mostafawi, 2011). The survey was conducted through direct and indirect observation along the path within the survey area; data of species encounter was developed based on visual encounter and the available identified traces and or footprints on site.

The encountered mammal species were recorded with detailed information, including species name and number of individuals. The location of the encountered species was also marked using a GPS to obtain an overview of relative local distribution of the species.

To determine the National and International conservation status of individual encountered species, each identified species was verified with the IUCN Red List of Threaten Species and Indonesian Law for Protected Species i.e. Government Decree No. 7/1999.

#### *Results*

The total number of encountered mammal species within the Project area are 12 species, The ERM survey noted three (3) mammal species were identified throughout all sampling locations. The previous environmental study noted 11 mammal species present in the Study Area.

During ERM survey, *Rattus argentiventer* was the only species among the mammals that was observed in all sampling locations. This species was observed through direct encounter, while the other two species was identified through its footprint.

All identified mammals are listed as Least Concern according to the IUCN Red List. None of the species are listed as protected under Indonesian regulation. None of these species are listed as endemic to Java or Indonesia. Details of encountered mammals are presented in **Annex J**.

### 7.3.10.4 *Herpetofauna*

#### *Methods*

A diurnal herpetofauna survey was conducted in accordance with the Reconnaissance Survey (Moheb & Mostafawi, 2011) method. Additional nocturnal survey was conducted by Visual Encounter Survey (VES). VES is an efficient tool to collect data of reptile and amphibian species over diverse habitats (Manley, et al., 2004). The data obtained for each species

encounter was based on visual encounters and the identification of specimens that were collected from the site.

The encountered herpetofauna species were recorded with detailed information, including species name, number of individuals. The location of the encountered species was also marked using GPS to obtain an overview of relative local distribution of the species.

To determine the National and International conservation status of individual encountered species, each identified species was verified with the IUCN Red List of Threaten Species and Indonesian Law for Protected Species i.e. Government Decree No. 7/1999.

### *Results*

A total of 17 herpetofauna species is present in the study area. ERM noted 13 species of seven (7) families encountered. The results consist of three (3) species of amphibian and 10 species of reptile. The previous environmental study noted total 11 herpetofauna species are present in the proposed Project area.

Referring to IUCN Red List, 10 species (three (3) reptiles and amphibian) is listed as Least Concern (LC); seven (7) species of reptiles are listed NE or Not Evaluated. None of the reptile and amphibians species are listed protected under Indonesian law. No endemic species to Java or Indonesia were identified. The results of the survey(s) are outlined in **Annex J**.

## **7.3.11 Marine Biodiversity**

### *7.3.11.1 Benthic Communities*

A range of infauna and epifauna were identified in the nearshore area, including species of Polychaeta, Crustaceae, Pelecypoda, Nemertina, Oligochaeta, Sipuncula, Anthozoa and Echinodermata (ERM, 2018b). The ecological quality status of benthic communities in the Project area is classified as undisturbed to slightly disturbed.

Additionally, an abundance of *Nauplius sp.* was also recorded to be several locations within the Project area namely at Cimalaya River estuary, nearshore and to the west of proposed gas pipeline. Crustaceans were very well represented within the surveyed mangrove area and other species are expected to occur widely in sediment throughout the region.

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several locations within the Project area namely at Cilamaya River estuary, nearshore and to the west of proposed offshore pipeline.

The area is characterised by extensive shrimp and fish farms from the intertidal area and out to sea for two (2) km. These ecosystem services are discussed further in the social baseline (refer to **Chapter 7**).

Three (3) species of sea cucumber are classified as Endangered by the IUCN were identified as potentially occurring in the Project Area. Two (2) of these species (*holothuria lessoni* and *holothuria scabra*) are known by the colloquial name Golden Sandfish and are distributed mainly in low energy environments behind fringing reefs or within protected bays and shores. Individuals prefer to inhabit intertidal seagrass beds close to mangroves at depths of up to 25 m. Golden Sandfish are also found along inner reef flats and lagoons (*Hamel et.al, 2013*). The other identified species (*Thelenotia ananas*), otherwise known as the Prickly Redfish, is distributed mainly in shallow coral reef areas, on reef flats, reef slopes and near passes on sandy or hard bottoms with large rubble and coral patches. It is common in shallow waters of reef bottom where there is no terrigenous action, at depths from 0 to 20 m (*Conand et.al, 2013*). Based on the current habitat in the project area it is unlikely that these sea cucumber will be present.

Based on the AZTI Marine Biotic Index (AMBI) (*Borja et.al, 2000*), the ecological quality status of benthic communities in the area is classified as undisturbed to slightly disturbed (from the samples taken at the two (2) locations along the offshore pipeline) (*ERM, 2018b*).

The locations of surveyed area are mapped in **Figure 7-22**.

#### 7.3.11.2 *Coral Reefs*

The distribution and extent of coral reef ecosystem on the north coast of West Java is limited to only a few places, such as in Karawang and Subang regencies (*SLHD, 2008*). Hence, a coral survey was conducted in July 2017 to support the AMDAL.

The nearest of these locations is approximately five (5) km from the outfall pipeline location. From the total survey area, only 2% of these corals are considered to be in general good condition. It was also recorded that more than half of the coral reef ecosystem found within Pasir Putih, Desa Sukajaya in Cilamaya and Cicparage in Tempuran and surrounding Cilamaya Wetan Beaches had undergone bleaching events (*ERM, 2018b*). Additionally, no coral or seagrass community within the areas surveyed was identified. The absence of these habitats is likely to be associated with the high sediment and nutrient loads within the nearshore environment (*ERM, 2018b*).

### 7.3.11.3 *Plankton*

Phytoplankton is often the main primary producer in the offshore marine environment and therefore can be a key indicator of the productivity of a local ecosystem.

Marine plankton i.e. phytoplankton and zooplankton monitoring was conducted at six (6) locations in 2016. The amount of all plankton found was 65 species, with the number of species ranged from 19 species (zooplankton)-46 species (phytoplankton) and number of individuals ranged between 0.716 – 0.865 individuals. The index was based on diversity ranged from < 0.6 and indicated that the waters around the proposed Project area is heavily polluted (Pöyry, 2016b).

Monitoring was also conducted at 13 locations in July 2017. The survey detected that diatoms (*Bacillariophyceae sp.*) and cyanobacterias (*Cynophyceae sp.*) dominated the phytoplankton in the marine environment of Project area. They generally remain in the upper water layers (<50 m water depth) in order to receive light from the sun, while zooplankton are distributed throughout the water column on the continental shelf. The detected zooplankton was the heterotrophic (sometimes detritivorous) plankton and the dominant marine zooplankton species included *Protozoa*, *Crustaceae*, *Pelecypoda*, *Gastropoda*, *Nematoda*, *Polychaeta* and *Urochordata* (ERM, 2018).

### 7.3.11.4 *Benthos*

Benthos found in the study site as a whole consisted of 8 classes and 38 taxa which included *Polychaeta* (19 taxa), *Crustaceae* (10 taxa), *Pelecypoda* (1 taxa), *Nemertina* (1 taxa) and 1 taxa each from *Oligochaeta Class*, *Sipuncula*, *Anthozoa*, and *Echinodermata*. The benthos density was found to be relatively moderate with the smallest amount of 30 ind/m<sup>2</sup> and the largest of 148 ind/m<sup>2</sup> ie *Terebellides sp.* at MP-10 locations. The sampling sites of MP-6 and MP-7 are locations with identified benthos numbers of at least 1 species, while the most benthos species are in MP-8.

Borja et.al (2000) classifies benthos organisms into 5 Ecological Group (EG) groups:

- EG I consists of sensitively sensitive taxa;
- EG II is a common type;
- EG III is a tolerant type of disorder;
- EG IV is a second-class opportunist species; and
- EG V is a first-rate opportunist species.

The assessment of ecological pressures in the form of disturbances to benthic environmental habitats and the determination of the status of environmental conditions based on the level of disturbance and macrozoobenthos community structure can be done through calculations using the AZTI Marine Biotic Index (AMBI) method. The value of AMBI calculation indicates the level of benthic environmental disturbance that becomes the habitat of its life. After obtaining an AMBI score, a multivariate analysis (M-AMBI) can be performed to measure the ecological status of the benthic environment (Muxika et al., 2007). The calculation results of AMBI (Azti Marine Biotic Index), show that MP-1, MP-3, MP-7, and MP-11 locations are considered as "undisturbed", while other locations are considered as "slightly disturbed". Commonly undisturbed locations are dominated by *benthos* from the Ecological Group (EG) I and II, which are sensitive and common types. The types of *benthos* from the Ecological Group (EG) I found in undisturbed locations are *Terebellides sp.* (Polychaeta), *Photis sp.* (Crustaceae) and *Hormathia sp.* (Anthozoa). Specifically, at SW-7 location, there is only one *benthos* organism, *Ptilanthura sp* of Crustaceae class. *Ptilanthura sp* is not included in AMBI database (June 2017 version), but the genus *Ptilanthura* is only listed as *Ptilanthura tenuis* that classified as *benthos* with EG I.

There are several adjustments needed in the AMBI calculation, if the identification organism at research site is not included in AMBI ecological group database, which has so far been available as many as 8,400 species. Meanwhile, based on data and several supporting literature, in this calculation *Ptilanthura sp* is categorized into EG I. However, although considered as undisturbed in ecological status calculation based on M-AMBI value, SW-7 location is merely a "moderate" ecological status. This condition is caused by M-AMBI calculation that involving diversity index value, dominance index value, and AMBI value. Thus, since there is only 1 type of *benthos* found in MP-7 location, which is categorized into EG I, then M-AMBI calculation resulting "moderate" ecological status. Relatively, there is a wide range categories found for ecological status, "high" at MP-1 and MP-8 locations; "Good" at MP-2, MP-4, MP-5, MP-9, MP-10, MP-11, MP-12, MP-13 locations; "moderate" at MP-3 and MP-7 locations; and "bad" at MP-6 location. Similar condition to MP-7 location, there is only 1 type of *benthos* identified in MP-6 location, namely *Nuculana sp* (Pelecypoda/Shell).

Since the identification of genus level (*sp*) is not listed in AMBI database, then it is replaced with another *Nuculana* genus which has been identified to species level. In AMBI database, there are 12 *Nuculana* species that have been listed based on its sensitivity, they are divided into EG I of 7 species and EG II of 5 species. Since there are no other *benthos* organisms identified at MP-6 location, then in AMBI calculation, *Nuculana sp* is categorized as EG II or common type.

The locations of the surveyed area are mapped in **Figure 7-24**.

*Marine turtles*

Six (6) of the world's seven turtle species are found in Indonesia: leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), olive ridley (*Lepidochelys olivacea*), loggerhead (*Caretta caretta*) and flatback (*Natator depressus*). Indonesia hosts the largest rookery for green turtles recorded in Southeast Asia, in the Berau Islands, East Kalimantan, and the largest nesting rookery for leatherback turtles, located along the northern coast of Papua.

The nearest marine turtle nesting sites to the Project Area are Kepulauan seribu (islands more than 100 km west of Project area) and Kepulauan Karimun Jawa (an archipelago more than 250 km east of Project area) where green and hawksbill nesting areas have been identified. Both areas are protected (Manansang *et al*, 1997).

Important marine turtle habitats such as nesting beaches are not associated with the coastline at the Project area, which was confirmed by the fishing communities consulted during the AMDAL process. Further, surveys conducted within the Project area have not identified the presence of marine turtles.

*Dugongs*

Dugongs (*Dugong dugon*) inhabit coastal and inland waters between East Africa and Vanuatu. Dugongs prefer shallow coastal areas with warm ocean temperatures, similar to those in the Java Sea. Dugongs are listed as Vulnerable on the IUCN Red List (Marsh, H. & Sobotzick, 2015).

The size of the dugong population in Indonesia remains unknown. Estimates in the 1970s and in 1994 respectively suggested that the Indonesian dugong population comprised 10,000 and 1,000 individuals; however, these figures are considered little more than guesses, and very little scientific data is available on dugong distribution and abundance in Indonesian waters. Aerial surveys have been conducted in parts of Indonesia, especially the Raja Ampat Islands and the Lease Islands, but most information on dugong numbers is based on anecdotal records.

The nearest location where dugongs have been identified is more than 150 km to the west of the Project Area in Cilegon in West Java. No dugongs have been identified in areas near the Project Area. The lack of seagrass suggests that the area is not of suitable habitat for dugongs.

*Whales*

It is unlikely that any of the whales listed by the iBAT search would occur in the Project Area. Indo-Pacific beaked (*Indopacetus pacificus*), blue (*Balaenoptera*

*musculus*) and sei (*Balaenoptera borealis*) whales all inhabit deep offshore waters. The shallow waters of the Project area are unsuitable as habitat or a migratory corridor. None of these animals have been identified in areas near the Project Area.

### *Dolphins*

Interviews with local fishermen have indicated that dolphins may sometimes occur in the area. The only known records of dolphins in the general area is from a study that was undertaken at the Thousand Islands National Marine Park. The species recorded were common (*Delphinus delphis*), spinner (*Stenella longirostris*) and bottlenose (*Tursiops* sp.) dolphins. Of these, the most likely species to occur at the study area at the bottlenose dolphins as they utilise shallow, nearshore areas while the others do not. Spinner dolphins are known to rest in shallow bays adjacent to deep water areas during the day in some areas of the world. The waters of the Project area do not provide such habitat.

Differentiation between Indo-Pacific (*T.aduncus*) and common (*T.truncatus*) bottlenose dolphins can be difficult and it is possible for either of these species to occur in the general area. Indo-Pacific dolphins are listed as Data Deficient whereas common bottlenose dolphins are listed as Least Concern.

Although they were not listed by the iBAT search, based on their ranges provided by the IUCN Red List, it is possible that Indo-Pacific humpback (*Sousa chinensis*) or Irrawaddy (*Orcaella brevirostris*) could occur in the area. The Indo-Pacific humpback dolphin is listed as Vulnerable and the Irrawaddy dolphin is listed as Endangered, based on threats and small population sizes encountered elsewhere. In Indonesia, both species have been recorded in shallow, turbid environments near river mouths. Both species are non-migratory and have high site fidelity.

In addition, despite the IUCN map shows the Irrawaddy dolphin to have a broad range, they do not have a continuous distribution but occur in fragmented and patchily distributed subpopulations. There are long stretches of coastline where they are absent due to lack of freshwater input or have become locally extirpated. There are no records of this species from around the Project area.

#### 7.3.11.6

### *Fish*

The most frequently recorded group of fish that are considered most economical among the fishermen communities within the Project area are pelagic and semi pelagic species. This includes the Snappers (*Lates* sp. & *Lutjanus* sp); Anchovy (*Stelophorus* sp.); Mackerel (*Thunnus* sp.) and Pomfret (*Pampus* sp) (ERM, 2018b).

The iBAT search suggested that the Pondicherry shark (*Carcharhinus hemiodon*), large tooth sawfish (*Pristis pristis*), green sawfish (*Pristis zijsron*) and

Java stingaree (*Urolophus javanicus*), all of which are Critically Endangered, could occur in the area.

The Pondicherry shark is very rare, known from 20 museum specimens that were obtained from incidental take by artisanal fishermen. From Indonesia, they are only known from Kalimantan. The Java stingaree is only known from the type specimen and has not been recorded again since its discovery 150 years ago. Neither of these species are likely to inhabit the Project Area.

Sawfish are cryptic species with a lack of distribution data available. Sawfish inhabit estuarine environments, utilising mangrove at early stages of development and nearshore turbid areas as adults.

In approximately eleven years of market surveys prior to 2010 (over 160 visits to 11 market sites) in various parts of Indonesia, only two individual sawfish (both Large tooth Sawfish were recorded which were caught in the Arafura/Banda Sea region (*W. White pers. comm. 2012 in Kyne et al 2012*) and possibly came from illegal fishing in Australian waters.

Based on available information, it appears that the species are rare in Indonesia. Data for the species indicates that the Large Sawfish (*Pristis pristis*) is listed as being “presence uncertain” within Indonesia meaning that the species did occur in this area but due to no recent sightings its occurrence is unknown<sup>1</sup>. Consultation regarding the current status of the species indicates that the species has been extirpated from the Java Sea (*W. White, Pers Comms 2018*<sup>2</sup>).

The Green Sawfish (*Pristis zijsron*) also has not been recorded from Indonesia for twenty years, including from the surveys that occurred in 2010. Consultation regarding the current status of the species indicates that the species has been extirpated from the Java Sea (*W. White, Pers Comms 2018*).

<sup>1</sup> Harrison, L.R. and Dulvy, N.K. (eds). 2014. Sawfish: A Global Strategy for Conservation. IUCN Species Survival Commission’s Shark Specialist Group, Vancouver, Canada.

<sup>2</sup> W White Pers. Comms (2018). William White, Ichthyologist and Taxonomist CSIRO Australia.

Figure 7-22 Benthos Survey Sampling Points

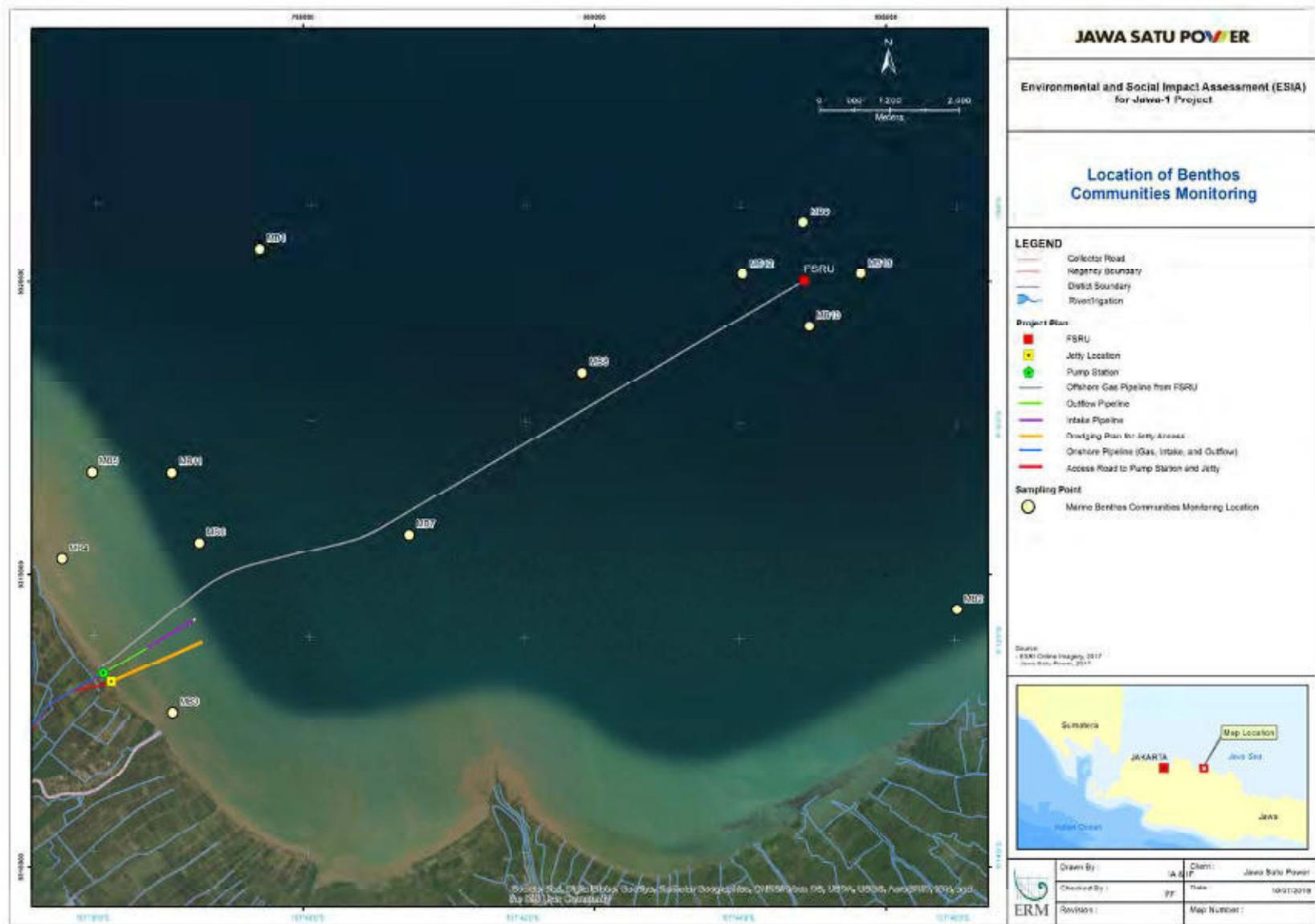
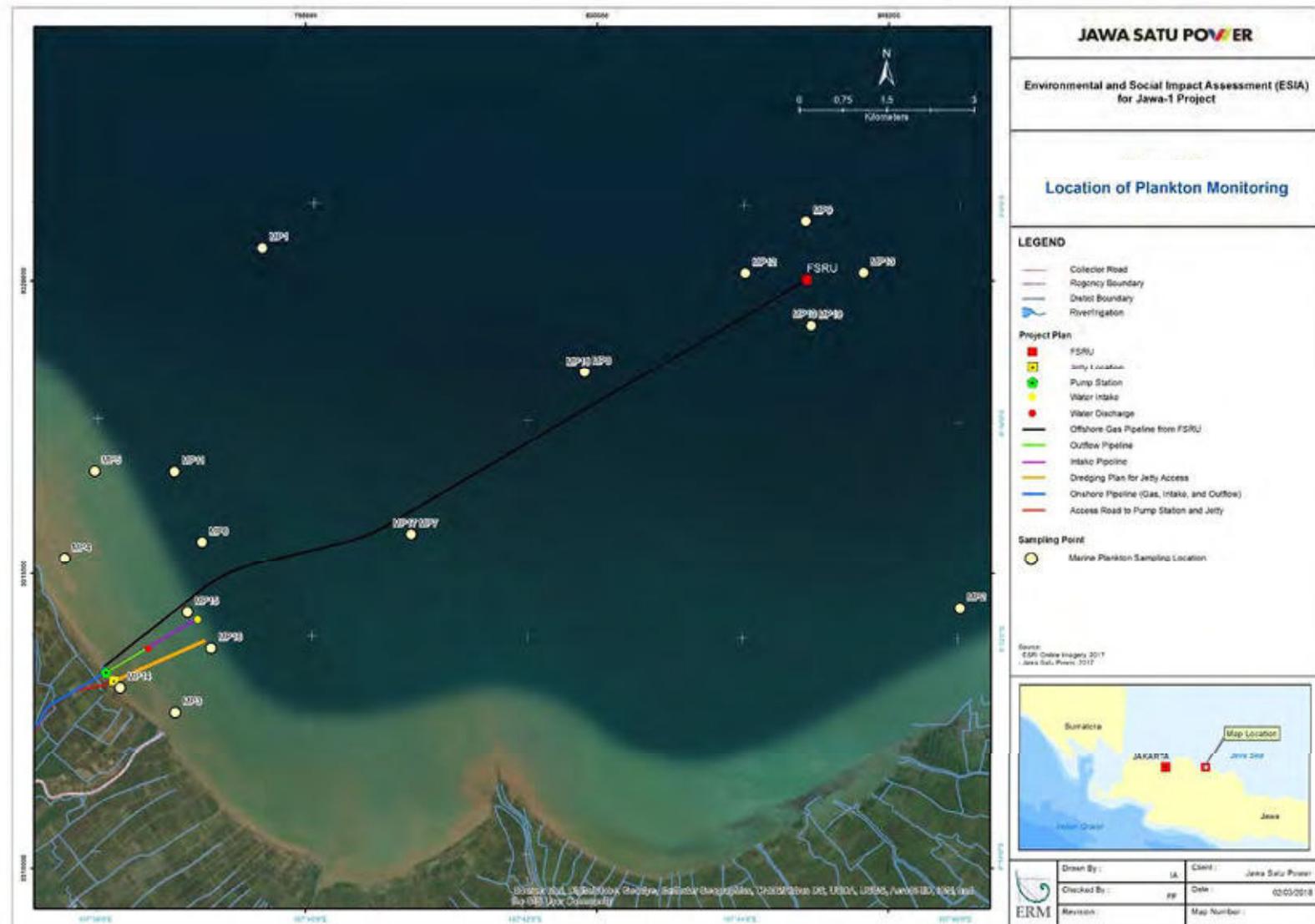




Figure 7-24 Locations of Plankton Monitoring



### 7.3.12 *Invasive Species*

The invasive species identified during survey are outlined in **Table 7-25**.

**Table 7-25** *Invasive Species Identified at the Project Area*

| No | Taxonomic group | Species                            | Habitat     | Status              | Location in Project Area |
|----|-----------------|------------------------------------|-------------|---------------------|--------------------------|
| 1. | Animalia        | <i>Cipangopaludina chinensis</i>   | Freshwater  | Native to Indonesia | BL/PL                    |
| 2. | Plantae         | <i>Alternanthera philoxeroides</i> | Terrestrial | Introduced          | 3,4,5, and BL/PL         |
| 3. | Plantae         | <i>Chromolaena odorata</i>         | Terrestrial | Introduced          | BL/PL                    |
| 4. | Plantae         | <i>Leucaena leucocephala</i>       | Terrestrial | Introduced          | 1,2,5, and BL/PL         |
| 5. | Plantae         | <i>Mikania micrantha</i>           | Terrestrial | Introduced          | BL/PL                    |
| 6. | Plantae         | <i>Mimosa pigra</i>                | Terrestrial | Introduced          | 2,4, and BL/PL           |
| 7. | Plantae         | <i>Psidium guajava</i>             | Terrestrial | Introduced          | 5                        |
| 8. | Plantae         | <i>Syzygium cumini</i>             | Terrestrial | Native to Indonesia | 3 and BL/PL              |

### 7.3.13 *Critical Habitat Screening Assessment*

Determination of Critical Habitat is a process that usually follows determination as to whether the habitat area in question is Natural or Modified. Natural habitats are generally of higher biodiversity value than Modified Habitats, although both can still support species that trigger Critical Habitat (as regularly happens in man-made wetland habitats which support large assemblages of migratory birds).

The determination of Critical Habitat is also not completely limited to Criteria 1-5 and other recognised high biodiversity values may also qualify for Critical Habitat designation which is carried out on a case by case basis.

Examples may include but not be limited to: areas of high scientific value; concentrations of Vulnerable species (under the IUCN Red List of Threatened Species) where there is uncertainty regarding their listing; and landscape and ecological processes (e.g. water catchment areas, areas which prevent flooding or fire).

The following Critical Habitat assessment utilises the assessment methodology as outlined in the IFC Performance Standard 6 and associated Guidance Note. The ADB SPS however has minor differences in terms of definitions and outcomes (in terms of requiring no-net-loss outcomes for Critical Habitat whilst PS6 requires a Net Gain). ERM has referred to the ADB SPS where relevant in the assessment.

Based on IFC PS 6 Guidance Note 6, the Project is required to 'determine a sensible ecological or political boundary that defines the area of habitat to be considered for the Critical Habitat assessment'. Termed as a Discrete Management Unit (DMU), this is an area with a 'definable boundary within which the biological communities and/or management issues have more in common with each other than they do with those in adjacent areas'. DMUs may hence be defined using ecological boundaries such as rivers and mountain ridges/valleys where wildlife is determined to be unable to cross, management boundaries such as a Protected Area, or an artificial barriers to movement such as roads and urban areas.

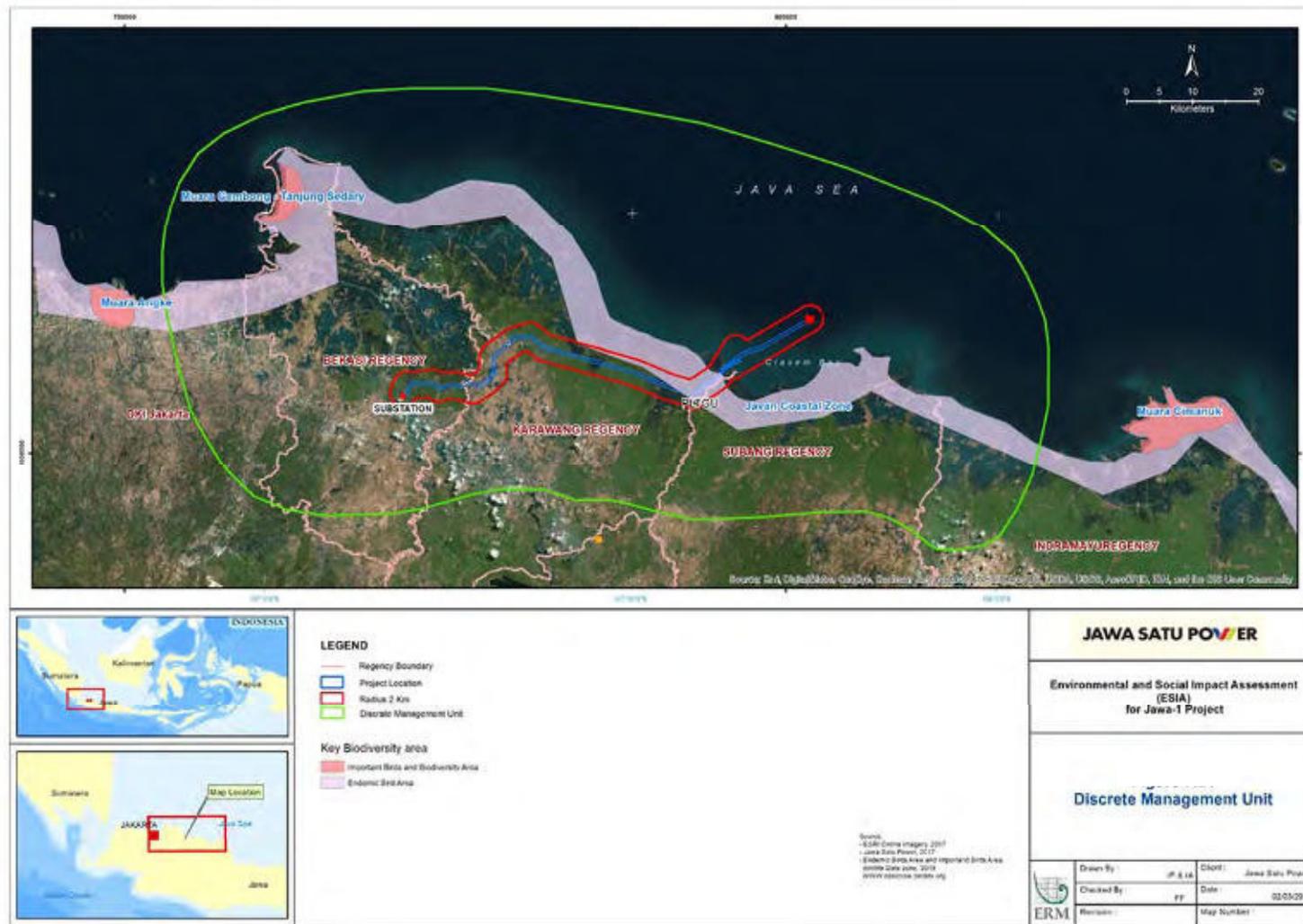
DMUs do not imply management control or responsibility by the Project, and often include areas outside of their control. The DMU also does not indicate Project footprint or impacted area, and in most cases is larger than either of these. This ensures impacts on biodiversity values in the larger landscape are adequately considered.

For this Project, the DMU has been defined as immediate areas of modified habitats to the South of the Project footprint approximately 20km South of the closest extent of the Project area; the coastal zone and associated Javan Coastal Zone EBA, including west towards the Muara Gembong-Tanjing Sedary IBA (20km North West of the closest extent of the Project Area); East towards but not including the Muara Cimanuk IBA (approximately 20km from the closest extent of the Project Area) and the immediate coastal and open sea area 40km from the North of the Project footprint.

It should be noted that there are no clear ecological boundaries that are associated with the Project footprint given the disturbed nature of the Project area and surrounds. Remnant mangrove forests are the only remaining natural habitat identified. The species assessed are generally wide ranging (apart from endemic bird species). ERM has therefore estimated the likely ecological unit of the surrounding habitat based on the species that occur in the area, including migratory marine and terrestrial species that are wider ranging that are likely to inhabit the project area and immediate surrounds.

The DMU for this Project is outlined in **Figure 7-25**.

Figure 7-25 Discreet Management Unit



The Critical Habitat assessment comprised an analysis of biodiversity values within the Project area and area of influence, habitats of high biodiversity value, species of conservation concern and general flora and fauna assemblages. This involved GIS analysis; desk based data collection including a review of previous EIAs, and targeted field surveys.

Critical Habitat criteria are defined in PS6 Guidance Note 6 (GN6), Paragraphs GN69 to 97. **Table 7-26** provides detail of the qualifying requirements for Criteria 1 to 3 (i.e. thresholds), while details of the likely qualifying interests for Criterion 4 and 5 will be defined based on research and expert opinion. The criteria listed have been used to complete this assessment.

**Table 7-26** *Criteria Habitat Criteria*

| Criteria  | Tier 1(1)  | Tier 2(1)   |
|---|--|---|
| Criterion 1: Critically Endangered (CR) / Endangered (EN) species:  | <p>a) Habitat required to sustain <math>\geq 10\%</math> of the global population of a CR or EN species /sub /species and where there known regular occurrences of the species and where habitat could be considered a discrete management unit for the species.</p> <p>b) Habitat with known, regular occurrences of CR or EN species where that habitat is one of 10 or fewer discrete management sites globally for that species.</p> | <p>c) Habitat that supports the regular occurrence of a single individual of a CR species and/or habitat containing regionally- important concentrations of Red-listed EN species where that habitat could be considered as a discrete management unit for the species/subspecies.</p> <p>d) Habitat of significant importance to CR/EN species that are wide-ranging and/or whose population distribution is not well understood and where the loss of such a habitat could potentially impact the long-term survivability of the species.</p> <p>e) As appropriate, habitat containing nationally/regionally important concentrations of an EN, CR or equivalent national/regional listing.</p> |
| Criterion 2: Habitat of significant importance to endemic and/or restricted-range species;                            | <p>a) Habitat known to sustain <math>\geq 95\%</math> of the global population of an endemic or restricted-range species where that habitat could be considered a discrete management unit for that species.</p>   | <p>b) Habitat known to sustain <math>\geq 1\%</math> but <math>&lt; 95\%</math> of the global population of an endemic or restricted-range species where that habitat could be considered a discrete management unit for that species, where data are available and/or based on expert judgment.</p>  |
| Criterion 3: Habitat supporting globally significant concentrations of migratory species and/or congregatory species; | <p>(a) Habitat known to sustain, on a cyclical or otherwise regular basis, <math>\geq 95\%</math> of the global population of a migratory or congregatory species at any point of the species' lifecycle where that habitat could be considered a discrete management unit for that species.</p>   | <p>(b) Habitat known to sustain, on a cyclical or otherwise regular basis, <math>\geq 1\%</math> but <math>&lt; 95\%</math> of the global population of a migratory or congregatory species at any point of the species' lifecycle and where that habitat could be considered a discrete management unit for that species, where data are available and/or based on expert judgment.</p>  |

| Criteria  | Tier 1(1)   | Tier 2(1)  |
|---|---|--|
|   |   | (c) For birds, habitat that meets BirdLife International's Criterion A4 for congregations and/or Ramsar Criteria 5 or 6 for Identifying Wetlands of International Importance.<br><br>(d) For species with large but clumped distributions, a provisional threshold is set at ≥ 5 % of the global population for both terrestrial and marine species.<br><br>(e) Source sites that contribute ≥ 1 % of the global population of recruits. |
| Criterion 4: Highly threatened and/or unique ecosystems; and/or   | Criterion 4 has no tiered system although recent publication (Keith et al, 2013) may introduce this. This criterion must include one of the following<br>a) the ecosystem is at risk of significantly decreasing in area or quality;<br>b) has a small spatial extent; and /or<br>c) Contains unique assemblages of species including assemblages or concentrations of biome-restricted species.<br>Highly threatened or unique ecosystems are defined by a combination of factors which may include long-term trend, rarity, ecological condition, and threat. |  |
| Criterion 5: Areas associated with key evolutionary processes   | The criterion is defined by:<br>a) the physical features of a landscape that might be associated with particular evolutionary processes; and/or<br>b) Sub-populations of species that are phylogenetically or morphogenetically distinct and may be of special conservation concern given their distinct evolutionary history. The latter includes evolutionarily significant units and evolutionarily distinct and globally endangered species.  |  |
| Notes:  |   |  |
| <ul style="list-style-type: none"> <li>• No Tier system is in place for Criterion 4 and Criterion 5.</li> <li>• With regard to Criterion 2, it should be noted that an endemic and restricted range species is defined by the IFC as one that possesses an extent of occurrence of 50,000 km<sup>2</sup> (pers. comms). Plant species may qualify as endemic if has ≥95% of its global range inside the country or region of analysis.</li> </ul> |   |  |

### 7.3.13.3

#### *Critical Habitat Triggers (Criterion 1-3)*

The five(5) criteria are 'triggers' in that if an area of habitat meets any one of the criteria, it will be considered Critical Habitat irrespective of failing to meet any other criterion(1). Therefore, Critical Habitat can be determined through a single criterion or where a habitat holds biodiversity meeting all five criteria. This approach is generally more cautious but is used more widely in conservation (2). Critical Habitat criteria therefore have two distinctive characteristics. First, components of biodiversity are essentially assigned to only two (2) levels of conservation significance, those that trigger Critical Habitat and those that do not (Tier considerations being secondary to this primary Critical Habitat determination). Second, each criterion is applied

(1) The Biodiversity Consultancy (TBC) (2013) getting through PS6: Critical Habitat and its requirements. Case Studies from Guinea and Mongolia. Whitmore, T.C. (1984) Tropical Rain Forests of the Far East. Oxford University Press. Second Edition.

(2) McDonald-Madden, E. Gordon, A. Wintle, B. Walker, S. Grantham, H. Carvalho, S. Bottrill, M. Joseph, L. Ponce, R. Stewart, R. & Possingham, H. P. (2009). "True" Conservation Progress. Science 323: 43-44.

separately and not in combination, meaning that the scores are not cumulative.

#### 7.3.13.4 Candidate Critical Habitat Summary

The species identified in this assessment that are candidates for Critical Habitat are listed in **Table 7-27** below. These species have been determined from the desktop assessment and surveys undertaken at the Project area and AoI.

**Table 7-27 Critical Habitat Candidate Species**

| No  | Species                          | Common name                  | IUCN | Source                | Criterion 1 | Criterion 2 | Criterion 3 |
|-----|----------------------------------|------------------------------|------|-----------------------|-------------|-------------|-------------|
| 1.  | <i>Acridotheres melanopterus</i> | Black-winged Myna            | CR   | iBAT                  | X           | X           |             |
| 2.  | <i>Alcedo euryzona</i>           | Javan Blue-banded Kingfisher | CR   | iBAT                  | X           | X           |             |
| 3.  | <i>Ardea alba</i>                | Great Egret                  | LC   | ERM Survey            |             |             | X           |
| 4.  | <i>Bubulcus ibis</i>             | Cattle Egret                 | LC   | ERM Survey            |             |             | X           |
| 5.  | <i>Bulweria fallax</i>           | Jouanin's Petrel             | NT   | iBAT                  |             |             | X           |
| 6.  | <i>Calidris tenuirostris</i>     | Great Knot                   | EN   | iBAT                  | X           |             | X           |
| 7.  | <i>Calonectris leucomelas</i>    | Streaked Shearwater          | LC   | iBAT                  |             |             | X           |
| 8.  | <i>Centropus nigrorufus</i>      | Javan Coucal                 |      | EBA                   | X           |             |             |
| 9.  | <i>Charadrius javanicus</i>      | Javan Plover                 |      | EBA                   | X           |             |             |
| 10. | <i>Egretta sacra</i>             | Pacific Reef Egret           | LC   | ERM Survey            |             |             | X           |
| 11. | <i>Fregata andrewsi</i>          | Christmas Frigatebird        | CR   | iBAT                  | X           |             | X           |
| 12. | <i>Gracula robusta</i>           | Nias Hill Myna               | CR   | iBAT                  | X           |             |             |
| 13. | <i>Gracula venerata</i>          | Tenggara Hill Myna           | EN   | iBAT                  | X           |             |             |
| 14. | <i>Gracupica jalla</i>           | Javan Pied Starling          | CR   | iBAT                  | X           |             | X           |
| 15. | <i>Hydrobates matsudairae</i>    | Matsudaira's Storm-Petrel    | DD   | iBAT                  |             |             | X           |
| 16. | <i>Meiglyptes tristis</i>        | White-rumped Woodpecker      | EN   | iBAT<br>BVB<br>Survey | X           |             | X           |
| 17. | <i>Mycteria cinerea</i>          | Milky Stork                  | EN   | iBAT                  | X           |             |             |
| 18. | <i>Numenius madagascariensis</i> | Far Eastern Curlew           | EN   | iBAT                  | X           |             | X           |
| 19. | <i>Pavo muticus</i>              | Green Peafowl                | EN   | iBAT                  | X           |             | X           |
| 20. | <i>Phaethon lepturus</i>         | White-tailed Tropicbird      | LC   | iBAT                  |             |             | X           |
| 21. | <i>Phaethon rubricauda</i>       | Red-tailed Tropicbird        | LC   | iBAT                  |             |             | X           |
| 22. | <i>Plegadis falcinellus</i>      | Glossy Ibis                  | LC   | ERM Survey            |             |             | X           |
| 23. | <i>Stachyris grammiceps</i>      | White-breasted babbler       | NT   | iBAT                  | X           |             |             |
| 24. | <i>Stachyris melanothorax</i>    | Crescent-chested babbler     | LC   | iBAT                  | X           |             |             |
| 25. | <i>Stachyris thoracica</i>       | White-bibbed babbler         | LC   | iBAT                  | X           |             |             |
| 26. | <i>Vanellus macropterus</i>      | Sunda lapwing                | CR   | iBAT;<br>EBA          | X           |             |             |

| No  | Species                        | Common name            | IUCN | Source                        | Criterion 1 | Criterion 2 | Criterion 3 |
|-----|--------------------------------|------------------------|------|-------------------------------|-------------|-------------|-------------|
| 27. | <i>Zosterops flavus</i>        | Javan White-eye        | VU   | iBAT;<br>EBA<br>BVB<br>Survey |             | X           | X           |
| 28. | <i>Aetomylaeus maculatus</i>   | Mottled Eagle Ray      | EN   | iBAT                          | X           |             |             |
| 29. | <i>Aetomylaeus vespertilio</i> | Ornate Eagle Ray       | EN   | iBAT                          | X           |             |             |
| 30. | <i>Anoxypristis cuspidata</i>  | Narrow Sawfish         | EN   | iBAT                          | X           |             |             |
| 31. | <i>Carcharhinus borneensis</i> | Borneo Shark           | EN   | iBAT                          | X           |             |             |
| 32. | <i>Carcharhinus hemiodon</i>   | Pondicherry Shark      | CR   | iBAT                          | X           |             |             |
| 33. | <i>Eusphyra blochii</i>        | Winghead Shark         | EN   | iBAT                          | X           |             |             |
| 34. | <i>Lamiopsis temminckii</i>    | Broadfin Shark         | EN   | iBAT                          | X           |             |             |
| 35. | <i>Pristis clavata</i>         | Dwarf Sawfish          | EN   | iBAT                          | X           |             |             |
| 36. | <i>Pristis</i>                 | Largetooth Sawfish     | CR   | iBAT                          | X           |             |             |
| 37. | <i>Pristis zijsron</i>         | Green Sawfish          | CR   | iBAT                          | X           |             |             |
| 38. | <i>Rhincodon typus</i>         | Whale Shark            | EN   | iBAT                          | X           |             |             |
| 39. | <i>Sphyrna lewini</i>          | Scalloped Hammerhead   | EN   | iBAT                          | X           |             |             |
| 40. | <i>Stegostoma fasciatum</i>    | Zebra Shark            | EN   | iBAT                          | X           |             |             |
| 41. | <i>Urogymnus polylepis</i>     |                        | EN   | iBAT                          | X           |             |             |
| 42. | <i>Urolophus javanicus</i>     | Java Stingaree         | CR   | iBAT                          | X           |             |             |
| 43. | <i>Alveopora excelsa</i>       |                        | EN   | iBAT                          | X           |             |             |
| 44. | <i>Alveopora minuta</i>        |                        | EN   | iBAT                          | X           |             |             |
| 45. | <i>Anacropora spinosa</i>      |                        | EN   | iBAT                          | X           |             |             |
| 46. | <i>Holothuria lessoni</i>      | Golden Sandfish        | EN   | iBAT                          | X           |             |             |
| 47. | <i>Holothuria scabra</i>       | Golden Sandfish        | EN   | iBAT                          | X           |             |             |
| 48. | <i>Lobophyllia serratus</i>    |                        | EN   | iBAT                          | X           |             |             |
| 49. | <i>Millepora boschmai</i>      |                        | CR   | iBAT                          | X           |             |             |
| 50. | <i>Montipora setosa</i>        |                        | EN   | iBAT                          | X           |             |             |
| 51. | <i>Pectinia maxima</i>         |                        | EN   | iBAT                          | X           |             |             |
| 52. | <i>Porites eridani</i>         |                        | EN   | iBAT                          | X           |             |             |
| 53. | <i>Porites ornata</i>          |                        | EN   | iBAT                          | X           |             |             |
| 54. | <i>Thelenota ananas</i>        | Prickly Redfish        | EN   | iBAT                          | X           |             |             |
| 55. | <i>Balaenoptera borealis</i>   | Sei Whale              | EN   | iBAT                          | X           |             |             |
| 56. | <i>Balaenoptera musculus</i>   | Blue Whale             | EN   | iBAT                          | X           |             |             |
| 57. | <i>Manis javanica</i>          | Sunda Pangolin         | CR   | iBAT                          | X           |             |             |
| 58. | <i>Nycticebus javanicus</i>    | Javan Slow Loris       | CR   | iBAT                          | X           |             |             |
| 59. | <i>Otomops formosus</i>        | Java Giant Mastiff Bat | DD   | iBAT                          | X           |             |             |
| 60. | <i>Rhinolophus canuti</i>      | Canut's Horseshoe Bat  | VU   | iBAT                          | X           |             |             |
| 61. | <i>Chelonia mydas</i>          | Green Turtle           | EN   | iBAT                          | X           |             |             |
| 62. | <i>Crocodylus siamensis</i>    | Siamese Crocodile      | CR   | iBAT                          | X           |             |             |
| 63. | <i>Eretmochelys imbricata</i>  | Hawksbill Turtle       | CR   | iBAT                          | X           |             |             |
| 64. | <i>Orcaella brevirostris</i>   | Irrawaddy dolphin      | EN   | IUCN                          | X           |             |             |

Notes:

CR : Critically Endangered; EN : Endangered; VU : Vulnerable; NT: Near Threatened; DD : Data Deficient; NA : Not Assessed; LC: Least Concern

ERM Survey: Conducted by Mr Erry Kurniawan in July and October 2017

BVB Survey: Conducted by Dr Bas van Balen in April 2018

#### 7.3.13.5

##### *Critical Habitat Criterion 1-3*

The results of the Critical Habitat screening assessment for species according to Criterion 1-3 is outlined in **Annex J** of this Report.

The screening assessment has identified that one (1) species may trigger Critical Habitat under Criterion 2, Tier 2b for endemic/restricted range species.

The species was not identified during survey, however habitat is present within the Project Area and it may be expected to occur. The species is also a trigger species for the Javan Coastal Zone EBA, which is present within the Project Area.

The species is the Javan White Eye (*Zosterops flavus*). The species is no longer abundant at any location and has declined or disappeared from multiple locations across its highly restricted and fragmented range. The population on Java is restricted in range and highly localised. This species occurs in mangroves, coastal scrub, relict coastal forest and scattered trees. The estimated extent of occurrence is 17,700km<sup>2</sup>

The species range meets the restricted range criteria under Tier 2b of Criterion 2 (Habitat known to sustain  $\geq 1\%$  but  $< 95\%$  of the global population of an endemic or restricted-range species). Historic records for this species are noted within 10km to the East of the Project area (*HBW Alive, 2018*) and are within similar habitat to the Project Area. The species is likely to occur within the DMU and hence is likely to trigger Critical Habitat.

Surveys conducted in April 2018 confirmed the presence of the species at several locations within the DMU, however not within the Project area. The most recent records are located approximately 5km east of the Project Area within remnant mangrove forest. The location of the identified Critical Habitat for the Javan White-Eye is shown in **Figure 7-19**.

#### 7.3.13.6

##### *Critical Habitat Criterion 4*

IFC PS6 describe this Criterion to be one of the following: ecosystem is at risk of significantly decreasing in area or quality; small spatial extent; and /or contains unique assemblages of species including assemblages or concentrations of biome-restricted species.

Highly threatened or unique ecosystems are defined by a combination of factors which may include long-term trend, rarity, ecological condition, and threat. The Javan Coastal Zone EBA would be considered as a candidate for Critical Habitat Criterion 4 as has been significantly decreasing over a very long period in area and quality; and contains unique assemblages of range restricted species, including the Javan Coucal (*Centropus nigrorufus*), Javan Plover (*Charadrius javanicus*), Javan Lapwing (*Vanellus macropterus*), and Javan White-eye (*Zosterops flavus*).

These species are also not restricted to the DMU, but found more broadly within suitable habitat in the EBA (B. van Balen, Pers Comms 2018).

Although the Javan Coastal Zone within the DMU contains range restricted species, it is not considered small in extent (it is approximately 11,000km<sup>2</sup>). The current condition is much degraded and is not projected to decrease further in quality further given its existing degraded state. The land use of the EBA consists of rice paddies, agriculture, fisheries and coastal plantations. This land use is currently stable with no projected major changes in quality or extent expected in the short to mid-term. Although the EBA contains range restricted species, it is not considered that the area will continue to reduce in area and quality Bas van Balen, (Pers Comms 2018).

The EBA is therefore not considered to be Critical Habitat under Criterion 4.

#### 7.3.13.7 *Critical Habitat Criterion 5*

Criterion 5 has no tiered system though IFC PS6 describes this Criterion to be one of the following: physical features of a landscape that might be associated with particular evolutionary processes (for example isolated areas, areas of high endemism, spatial heterogeneity, environmental gradients, edaphic interfaces, biological corridors or sites of demonstrated importance to climate change adaptation); and/or subpopulations of species that are phylogenetically or morphogenetically distinct and may be of special conservation concern given their distinct evolutionary history. The latter includes evolutionarily significant units and evolutionarily distinct and globally endangered species.

There are no physical features within the AoI that are known to be associated with evolutionary processes. When considering the habitat within the AoI, the natural habitat areas would not be considered to substantially contribute to the biological values of the DMU that may sustain endemic populations (if present). Similarly, the species assessments did not identify any species subpopulations known to be phylogenetically or morphogenetically distinct to be relying the habitat of the AoI.

As a result it not considered likely that the Project Area and AoI would be considered important in the conservation of Key Evolutionary Processes.

Ecosystem services are defined as the benefits that people, including businesses, derive from ecosystems (IFC 2012). These services are substantial and varied, underpinning basic human health and survival needs as well as supporting economics activities, the fulfillment of people's potential, and enjoyment of life.

In order to provide a uniform basis to assess the status of all major global habitat across all of the world's bioregions, the United Nation's Millennium Ecosystem Assessment (UN 2005) combine diverse Ecosystem Services typologies into a consistent classification scheme.

There are four (4) categories of ecosystem services defined in Millennium Ecosystem Assessment as outlined in IFC Performance Standard 6:

- **Provisioning Services;** these services that can be extracted from ecosystem to support human needs. This term is more or less synonymous with the term " **Ecosystem Goods**" that was used in some prior classification schemes, including such tangible assets as fresh water, food, fiber, timber and medicinal plants;
- **Regulating Services;** the benefit obtained from an ecosystem's control of the natural environment, including of the regulation of surface water purification, carbon storage, and sequestration, climate regulation, protection from natural hazard, air quality, erosion and pests;
- **Cultural Services;** non-material benefits including diverse aspect of aesthetic, spiritual, recreational, and others cultural value;
- **Supporting services;** the natural process essential to the maintenance of the integrity, resilience, and functioning of ecosystem, thereby supporting the delivery of all other benefits. They include soil formation, nutrient cycling, and primary production.

#### 7.4.1

##### *Applicable Standards and Guidelines*

The ADB SPS requires that ecosystem services are assessed when determining whether a project triggers the requirements for Critical Habitat. The definition of Critical Habitat under the SPS (Clause 151 of the ADB Source Book) specifically references ecosystem services as a component of Critical Habitat. Clause 183 of the ADB Source Book also identifies ecosystem services as a component necessary for assessment in relation to sustainable natural resource management (ADB 2012).

The International Finance Corporation's (IFC) performance standards require projects to assess and preserve the benefits from ecosystem services. The IFC also requires that the environmental and social risks and impacts identification process considers a project's dependence on ecosystem services. A fundamental

component is to apply the mitigation hierarchy to determine measures to limit impacts on ecosystem services.

ERM has utilized the WRI Guidelines: *Weaving Ecosystem Service into Impact Assessment* to guide the approach used to assess ecosystem services in relation to the project. The ecosystem services review was undertaken following a five-stage approach (WRI 2014):

- **Screening assessment** to Identify Ecosystem Services that may occur within the study area;
- **Data Collection and prioritization** for 'screened in' Ecosystem Services;
- **Scoping**; to refine the list of ecosystem services based on those identify in the study area and potentially impacted by the project;
- **Prioritisation** to identify Ecosystem services importance to beneficiaries; and;

**Impact Assessment** to identify the impacts to ecosystem services and their human beneficiaries as a result of the project

## 7.4.2 *Ecosystem Services Screening Assessment*

### 7.4.2.1 *Approach*

An ecosystem services screening assessment was undertaken to determine the likely ecosystem service values that could be potentially important to affected communities.

The scoping exercise was undertaken in order to refine the list of Ecosystem Services that:

- **Potential Beneficiaries:** Known and potential beneficiaries for a service were identified and where possible identifying people at the local, national, and / or global level;
- **Sources of Impact:** Potential sources of impact were considered based on the social data obtained for the site;
- **Project Dependence:** IFC PS-6 requires that the Ecosystem Services assessment take into consideration any services that the Project may rely upon during construction, operation and/or decommissioning. Therefore all services for which there is a potential project dependency were scoped into the prioritisation stage.

The goal of the scoping exercise was to identify a list of Ecosystem Services to be assessed during through the surveys.

### 7.4.3 *Results*

This assessment was done using existing sources of data, including information gleaned during the scoping visit.

The results of the scoping assessment are contained in **Table 7-28**.

Table 7-28 Ecosystem Services Screening Assessment

| Ecosystem Service Type   | Description, Examples  | Current Known Ecosystem Services  | Screened in? |
|--|--|---|--------------|
| <b>Provisioning Services</b>   |  |   |              |
| <ul style="list-style-type: none"> <li>Food: wild-caught fish and shellfish &amp; aquaculture</li> </ul> | <ul style="list-style-type: none"> <li>Fish caught for subsistence or commercial sale; Fish, shellfish, and/or plants that are bred and reared in ponds, enclosures, and other forms of fresh- or salt-water confinement for harvesting</li> </ul> | <ul style="list-style-type: none"> <li>Ciasem bay within the Subang Regency is the fishing ground for fisherman communities from Blanakan and Muara Village. The communities also utilize the bay as a travel route to their fishing ground outside the regency.</li> </ul> | Yes          |
| <ul style="list-style-type: none"> <li>Food: wild meat</li> </ul>  | <ul style="list-style-type: none"> <li>Animals hunted for primarily for food (recreational hunting covered under cultural services)</li> </ul>   | <ul style="list-style-type: none"> <li>No hunting identified within the AoI.</li> </ul>   | No           |
| <ul style="list-style-type: none"> <li>Food: cultivated crops</li> </ul>                                 | <ul style="list-style-type: none"> <li>Annual and permanent crops grown for subsistence use and commercial sale</li> </ul>   | <ul style="list-style-type: none"> <li>Rice farming is one of the main livelihoods in the three regencies. The farming system applied technical irrigation system.</li> </ul>   | Yes          |
| <ul style="list-style-type: none"> <li>Food: herbs and plants</li> </ul>                                 | <ul style="list-style-type: none"> <li>Herbs and plants collected for food by local people</li> </ul>  | <ul style="list-style-type: none"> <li>There is no activities of collecting plants and herbs by the community. Some people consume traditional drink called "jamu" however already in a form of a ready to drink (instant package)</li> </ul>                               | No           |
| <ul style="list-style-type: none"> <li>Livestock farming</li> </ul>                                      | <ul style="list-style-type: none"> <li>Sedentary and nomadic livestock farming</li> </ul>  | <ul style="list-style-type: none"> <li>Some of the community members own livestock (mainly goats) in front of their house or in their backyard. Nomadic livestock farming is no longer a common practice in the area.</li> </ul>  | No           |
| <ul style="list-style-type: none"> <li>Biomass fuel</li> </ul>   | <ul style="list-style-type: none"> <li>Wood, dung and plant matter collected for charcoal, fuel</li> </ul>   | <ul style="list-style-type: none"> <li>No biomass fuel is used in the AoI.</li> </ul>   | No           |
| <ul style="list-style-type: none"> <li>Timber and wood products</li> </ul>                               | <ul style="list-style-type: none"> <li>Wood collected for local use or for sale as timber, wood pulp and paper</li> </ul>  | <ul style="list-style-type: none"> <li>No use of timber was identified within the AoI.</li> </ul>   | No           |
| <ul style="list-style-type: none"> <li>Non-Timber Forest Products (NTFP)</li> </ul>                      | <ul style="list-style-type: none"> <li>Non-timber products collected from the forest. For example, cane, palm, straw, cotton, hemp, twine and rope, natural rubber</li> </ul>  | <ul style="list-style-type: none"> <li>No use of non-timber products was identified within the AoI.</li> </ul>  | No           |
| <b>Regulating Services</b>   |  |   |              |
| <ul style="list-style-type: none"> <li>Freshwater</li> </ul>   | <ul style="list-style-type: none"> <li>Freshwater for bathing, drinking, irrigation, laundry, household and industrial use</li> </ul>  | <ul style="list-style-type: none"> <li>Kali Alen River in Cilamaya is utilized for irrigation for agriculture.</li> </ul>   | Yes          |
| <ul style="list-style-type: none"> <li>Biochemical, natural</li> </ul>                                   | <ul style="list-style-type: none"> <li>Natural medicines, biocides, food additives, pharmaceuticals and other biological material for commercial or domestic use. For example, pelts,</li> </ul>   | <ul style="list-style-type: none"> <li>No use of natural medicines was identified within the AoI.</li> </ul>  | No           |

| Ecosystem Service Type  | Description, Examples  | Current Known Ecosystem Services   | Screened in? |
|---|--|--|--------------|
| medicines, pharmaceuticals  | carved or decorative animal products, live animal trade  |  |              |
|   | <ul style="list-style-type: none"> <li>Genes and genetic information used for animal breeding, plant improvement, and biotechnology</li> </ul>   | <ul style="list-style-type: none"> <li>There is no animal husbandry practiced within the AoI</li> </ul>  | No           |
| <ul style="list-style-type: none"> <li>Ecosystem functions</li> </ul> | <ul style="list-style-type: none"> <li>The influence ecosystems have on air quality by extracting chemicals from the atmosphere (i.e., serving as a “sink”) or emitting chemicals to the atmosphere (i.e., serving as a “source”)</li> </ul> | <ul style="list-style-type: none"> <li>The AoI is not an important influence on the atmosphere.</li> </ul>   | No           |
|   | <ul style="list-style-type: none"> <li>Carbon sequestration (impacts on global climate change) regulation of temperature, shade air quality by vegetated areas</li> </ul>  | <ul style="list-style-type: none"> <li>The AoI does not play an important role in carbon sequestration, temperature regulation of shade</li> </ul>   | No           |
|   | <ul style="list-style-type: none"> <li>Influence ecosystems have on the timing and magnitude of water runoff, flooding, and aquifer recharge</li> </ul>  | <ul style="list-style-type: none"> <li>The AoI does not affect the timing and magnitude of water runoff, flooding or aquifer recharge</li> </ul>   | No           |
|   | <ul style="list-style-type: none"> <li>Role played by vegetation and bacteria in the filtration and decomposition of organic wastes and pollutants and the assimilation and detoxification of compounds.</li> </ul>                          | <ul style="list-style-type: none"> <li>The AoI does not play a role in the filtration and decomposition of organic wastes and pollutants and the assimilation and detoxification of compounds.</li> </ul>            | No           |
|   | <ul style="list-style-type: none"> <li>Role of natural habitats (e.g. wetlands, beaches, reefs) in protecting crops, buildings, recreation areas from waves, wind and flooding from coastal storms.</li> </ul>                               | <ul style="list-style-type: none"> <li>The AoI does not play host to important natural habitats that protect against waves, wind and flooding. Some small mangrove communities exist along the shoreline.</li> </ul> | No           |
|   | <ul style="list-style-type: none"> <li>Regulation of fire frequency and intensity (e.g. dense forest can provide firebreaks)</li> </ul>  | <ul style="list-style-type: none"> <li>The AoI does not play a significant role in the regulation of fire frequency and intensity.</li> </ul>  | No           |
|   | <ul style="list-style-type: none"> <li>Predators from forests, grassland areas, etc. may control pests attacking crops or livestock</li> </ul>   | <ul style="list-style-type: none"> <li>The AoI does not play a role in managing predators and pests.</li> </ul>  | No           |
|   | <ul style="list-style-type: none"> <li>Influence ecosystems have on the incidence and abundance of human pathogens</li> </ul>  | <ul style="list-style-type: none"> <li>The AoI does not influence the incidence and abundance of human pathogens.</li> </ul>   | No           |
|   | <ul style="list-style-type: none"> <li>Role of vegetation in regulating erosion on slopes and riparian areas</li> </ul>  | <ul style="list-style-type: none"> <li></li> </ul>   |              |
|   | <ul style="list-style-type: none"> <li>Birds, insects and some small mammals pollinate certain flora species, including some agricultural crops</li> </ul>   | <ul style="list-style-type: none"> <li>Pollination of crops occurs in the AoI, however the presence of pollinators is not considered to be significant.</li> </ul>   | No           |
| <b>Cultural Services</b>  |  |  |              |

| Ecosystem Service Type   | Description, Examples  | Current Known Ecosystem Services   | Screened in? |
|--|--|--|--------------|
| <ul style="list-style-type: none"> <li>Spiritual, religious or cultural value</li> </ul> | <ul style="list-style-type: none"> <li>Natural spaces or species with spiritual, cultural or religious importance</li> </ul>   | <ul style="list-style-type: none"> <li>Cultural ceremonies called Nadran to thank the sea on behalf of the villagers in Blanakan Village occur within the AoI. It is recorded that hundreds of people and traditional ships parade for some days each year (usually October-December) along the along the Blanakan coast. Another cultural ceremony is Babaritan, conducting by farmers' community as an act of gratitude to the earth after harvesting and before the planting season in Karawang and Bekasi Regency. During the event, the community members gather and eat together to pray for a good planting and harvest.</li> </ul> | Yes          |
|  | <ul style="list-style-type: none"> <li>Cultural value placed on traditional practices such as hunting, fishing, crafts and use of natural resources.</li> </ul>            | <ul style="list-style-type: none"> <li>The Project AoI is not considered important areas for cultural value on traditional practices.</li> </ul>   | No           |
|  | <ul style="list-style-type: none"> <li>Use of natural spaces and resources for tourism and recreation (e.g. swimming, boating, hunting, bird-watching, fishing)</li> </ul> | <ul style="list-style-type: none"> <li>Green think tourism located in Cilamaya Girang village, Blanakan district. Green Think development is carried out on cooperation of PT PHE ONWJ (Pertamina) with Perhutani (state forest enterprise). The area used by community for vacation and natural learning media especially for students.</li> <li>Crocodile Tourism (Crocodile Breeding) located in Blanakan District, characterized as ecotourism site and Ekowisata Tambak alas (ecotourism Pond) Blanakan located in Blanakan District.</li> </ul>  | Yes          |
|  | <ul style="list-style-type: none"> <li>Cultural value placed on the aesthetic value provided by landscapes, natural landmarks</li> </ul>                                   | <ul style="list-style-type: none"> <li>The AoI is not considered as important aesthetic value provided by landscapes, natural landmarks.</li> </ul>  | No           |
|  | <ul style="list-style-type: none"> <li>Information derived from ecosystems used for intellectual development, culture, art, design, and innovation.</li> </ul>             | <ul style="list-style-type: none"> <li>The AoI is not considered important for information derived from ecosystems used for intellectual development, culture, art, design, and innovation.</li> </ul>   | No           |
|  | <ul style="list-style-type: none"> <li>Ornamental resources</li> </ul>   | <ul style="list-style-type: none"> <li>The AoI is not considered important ornamental resources.</li> </ul>  | No           |
| <b>Existence Values</b>  |  |  |              |
| <ul style="list-style-type: none"> <li>Non-use value of biodiversity</li> </ul>          | <ul style="list-style-type: none"> <li>Species and areas valued globally as of high conservation value</li> </ul>  | <ul style="list-style-type: none"> <li>The AoI contains the Javan Coastal Endemic Bird Area which is an internationally recognised area for the protection of endemic bird species.</li> </ul>   | Yes          |

| Ecosystem Service Type          | Description, Examples   | Current Known Ecosystem Services   | Screened in? |
|---------------------------------|---|--|--------------|
| (e.g. existence, bequest value) | <ul style="list-style-type: none"> <li>Formation of biological material by plants through photosynthesis and nutrient assimilation.</li> </ul>                                      | <ul style="list-style-type: none"> <li>The AoI does not play an important role in the formation of biological material by plants through photosynthesis and nutrient assimilation</li> </ul>   | No           |
|                                 | <ul style="list-style-type: none"> <li>Flow of nutrients (e.g., nitrogen, sulfur, phosphorus, carbon) through ecosystems.</li> </ul>  | <ul style="list-style-type: none"> <li>The AoI does not play an important role in the flow of nutrients through ecosystems.</li> </ul>   | No           |
|                                 | <ul style="list-style-type: none"> <li>Flow of water through ecosystems in its solid, liquid, or gaseous forms.</li> </ul>  | <ul style="list-style-type: none"> <li>The Kali Alen River flows through the AoI however this is not considered to be of high biodiversity or existence value.</li> </ul>  | No           |
|                                 | <ul style="list-style-type: none"> <li>Natural soil-forming processes throughout vegetated areas.</li> </ul>  | <ul style="list-style-type: none"> <li>The AoI does not play a role in the natural formation of soil forming processes.</li> </ul>   | No           |
|                                 | <ul style="list-style-type: none"> <li>Natural spaces that maintain species populations and protect the capacity of ecological communities to recover from disturbances.</li> </ul> | <ul style="list-style-type: none"> <li>The AoI does occur within the Javan Coastal Endemic Bird Area and close to several protected areas. The species populations of these area are unknown, however several species of endemic bird are recorded present.</li> </ul> | Yes          |

## 7.4.4 *Ecosystem Services Prioritisation*

### 7.4.4.1 *Approach*

The WRI guidelines and IFC PS6 requires that priority ecosystem services are identified, and impacts to those services are assessed (IFC 2012). The prioritization process is aimed at identifying those services for which Project impacts would be most likely to result in adverse impacts on project affected communities and other beneficiaries. Using the information collected through the baseline data collection and stakeholder engagement processes, Ecosystem Services were prioritized according to a priority matrix ranking two criteria:

- Importance of the ecosystem service to the beneficiary which considers the intensity of use, degree of dependence and the importance expressed by the project affected communities; and
- Irreplaceability of the ecosystem service, which refers to the availability of alternatives, the accessibility, cost and appetite for those alternatives as discussed with the beneficiary.

### 7.4.5 *Results*

After compiling baseline information on the importance and irreplaceability of each service, these ratings were combined to assign a priority rating to the service grading from *Low* to *Major* as shown in the ecosystem service prioritization matrix.

Ecosystem services identified as *High* priority or *Major* priority were considered Priority Ecosystem Services. The weight given to each of these components varied slightly depending upon the service, but stakeholder values were given precedence over other criteria where the rating was not clear.

In addition to the above, according to the IFC definition of priority ecosystem services, all services for which project dependencies are identified are considered priority services. The importance and irreplaceability of services relied upon by the Project was assessed through the same prioritization process outlined above, with the Project filling the role of the beneficiary.

In addition to the prioritization exercise, the baseline data collection process provided the opportunity to collect information on the status, trends and sustainability of resource use as they pertain to the habitats and species that support Ecosystem Services. This information was gathered through secondary sources and field studies by the environment team and where appropriate through engagement with local stakeholders. This information is important for the assessment of impacts on Ecosystem Services and therefore on local people as the final receptors of these changes.

**Table 7-29** outlines the beneficiaries, potential sources of impact and project dependence for each service, and whether the service was scoped into or out of the Ecosystem Services assessment.

This chapter provides an assessment of the potential Project impact to ecosystem services using the criteria provided.

**Table 7-29 Ecosystem Service Prioritisation Matrix**

| Importance to Beneficiaries        |  | Irreplaceability  |                   |                   |
|------------------------------------|--|-------------------|-------------------|-------------------|
|                                    |  | High              | Moderate          | Low               |
| Low                                | The service is used and valued by parts of the community, but it is not important in maintaining quality of life or livelihoods of Project Affected Communities.   | Low Priority      | Low Priority      | Moderate Priority |
| Medium                             | The service is readily used by some members of the Project Affected Communities for income or subsistence, but they are not dependent upon the service for their livelihoods, and not everyone utilises the service. | Low Priority      | Moderate Priority | High Priority     |
| High                               | The service is highly important in maintaining the livelihoods of the Project Affected Communities, and is used by most of the community regularly.  | Moderate Priority | High Priority     | Major Priority    |
| Essential                          | The service is essential to maintain the health of the Project Affected Communities, and the service is used by all members of the community.  | High Priority     | Major Priority    | Major Priority    |
| <b>Irreplaceability definition</b> |  |                   |                   |                   |
| <b>High</b>                        | Many spatial alternatives exist that are readily available to the Project Affected Communities, and there are no major impediments to their usage.   |                   |                   |                   |
| <b>Moderate</b>                    | Spatial alternatives exist but are either less accessible than the affected service, or there are other barriers to their use such as distance, cost and skills required to access the service.                      |                   |                   |                   |
| <b>Low</b>                         | There are few to no spatial alternatives available to the Project Affected Communities.  |                   |                   |                   |

Table 7-30 Results of Prioritisation

| Ecosystem Services  | Trends and Sustainability  | Beneficiaries  | Importance to Beneficiaries  | Irreplaceability  | Potential Alternatives   | Priority?          |
|---|--|--|--|---|--|--------------------|
| <b>Provisioning Services</b>  |  |  |  |   |  |                    |
| Food: wild-caught fish and shellfish & aquaculture  | There is no current data available on the sustainability of the fishery.   | Local people are the beneficiaries of the fishery.   | It is likely that the fish caught are sold at local markets and used for consumption.  | It is considered that fish caught can be replaced by alternate sources of protein. Income of local fishermen may be replaced by alternative work (if available) | Protein from other livestock. Alternative livelihoods for fishermen.   | High Priority      |
| Food: cultivated crops  | There is no current data on the crop yield or sustainability of agriculture within the AoI.  | Local people are the beneficiaries of the agricultural produce, however some may be sold to other villages.                | Cultivated crops are important to local people as a food source and also as income.  | Cultivated land is considered irreplaceable, however the crops may be replaced by the purchasing of alternative food sources.                                   | Alternative food sources may be purchased by local people.   | Moderate Priority  |
| <b>Regulating Services</b>  |  |  |  |   |  |                    |
| Freshwater  | There is currently not current data on the availability of freshwater within the project area for local people.  | Local people depend on freshwater for drinking and agricultural uses.  | The local people depend on clean freshwater for use.   | The availability of freshwater is irreplaceable.  | Bottled or trucked water may be available for household use. There would be no readily available replacement available for irrigation water. | High Priority      |
| <b>Cultural Services</b>  |  |  |  |   |  |                    |
| Natural spaces or species with spiritual, cultural or religious importance  | Local people undertake ceremonies within the AoI. This is a practice that has historic and spiritual meaning and will be ongoing.  | Local people benefit from the ceremonies.  | The ceremonies are important to local people.  | The ceremonies are irreplaceable.   | There are no alternatives to conducting the ceremonies.  | Moderate Priority  |
| Use of natural spaces and resources for tourism and recreation (e.g. swimming, boating, hunting, bird-watching, fishing)          | Some local businesses have been created reliant on natural spaces.   | Local people benefit through income sources.   | The income sources derived from the businesses are important to local people.  | The income sources are replaceable if alternative livelihoods are established.  | Alternative businesses are available to replace the incomes if the service was lost.   | Moderate Priority. |
| Species and areas valued globally as of high conservation value   | The Javan Coastal Zone EBA is located within the AoI.  | There is little benefit to local people, however the EBA plays a role the conservation of endemic bird species in Java.    | There are no direct benefits to beneficiaries, however the conservation of the species has regional and global significance. | The endemic species would be irreplaceable if they were to become extinct.  | There are no alternatives to conservation within the EBA.  | High Priority      |
| Natural spaces that maintain species populations and protect the capacity of ecological communities to recover from disturbances. | The Javan Coastal Zone EBA is located within the AoI. The EBA however is degraded and it is uncertain as to whether it plays host to and can maintain species populations. | There is little benefit to local people, however the EBA plays a role in the conservation of endemic bird species in Java. | There are no direct benefits to beneficiaries, however the conservation of the species has regional and global significance. | The endemic species would be irreplaceable if they were to become extinct.  | There are no alternatives to conservation within the EBA.  | High Priority      |

## 7.4.6 *Priority Ecosystem Services*

The following priority ecosystem services shown in **Table 7-31** have been identified and will be assessed against the impact assessment procedures.

**Table 7-31** *Priority Ecosystem Services*

| Priority Ecosystem Service  |
|---|
| <ul style="list-style-type: none"><li>• Food: wild-caught fish and shellfish &amp; aquaculture</li><li>• Freshwater</li><li>• Species and areas valued globally as of high conservation value</li><li>• Natural spaces that maintain species populations and protect the capacity of ecological communities to recover from disturbances.</li></ul> |

## 7.5 *SOCIAL AND COMMUNITY HEALTH*

This chapter describes the socioeconomic, sociocultural and community health conditions of the potentially impacted villages around the Project facilities. Based on the Project scoping there are 39 impacted villages within 14 districts of Karawang, Subang and Bekasi Regencies (refer to **Table 7-32**). These villages were identified as within the impacted area during the ESIA scoping due to their proximity to the Project area.

Data gathered during the social baseline surveys and consultation activities included demographics, socioeconomics, sociocultural and public health. This data was gathered to support the both AMDAL and ESIA and to better understand the baseline social, economic and health conditions within the Project AoI. This allows a robust SIA (refer **Chapter 9** of this Report) to be prepared and to enable any changes due to the Project to be appropriated understood.

### 7.5.1 *Socioeconomic*

The Project area is largely surrounded by flat agricultural land with the village of Cilamaya located adjacent to the CCGT Power Plant area. The transmission line right of way is routed largely through paddy fields close to some residential areas, whilst the onshore pipeline corridor and access road traverse through paddy fields and fish ponds. Meanwhile, the nearshore areas where the jetty and ORF will be located are currently used for fishing by nearby communities.

**Figure 7-26** illustrates the location of the potentially impacted villages in relation to the Project components; these are also listed in. These villages were identified based on their proximity to the site facilities and sensitivity.

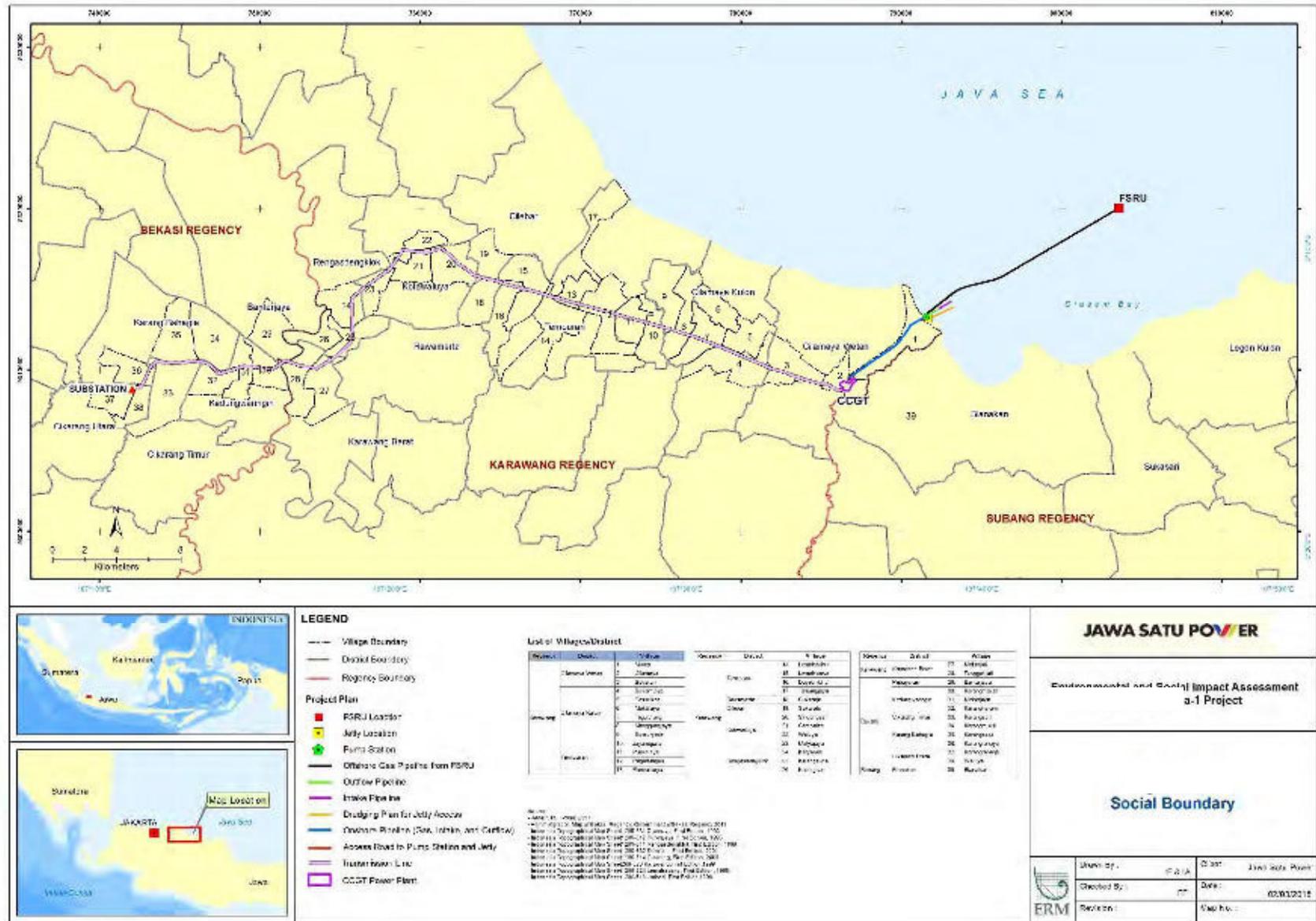
**Table 7-32 List of Villages within the Study Boundary**

| Regency          | District          | Village           | Project Source of Impact  |
|------------------|-------------------|-------------------|---|
| Karawang         | Cilamaya Wetan    | 1. Muara          | <ul style="list-style-type: none"> <li>• FSRU;</li> <li>• Jetty;</li> <li>• Onshore Pipeline RoW; and</li> <li>• Access Road</li> </ul> |
|                  |                   | 2. Cilamaya       | <ul style="list-style-type: none"> <li>• Power Plant; and</li> <li>• Transmission Line.</li> </ul>                                      |
|                  |                   | 3. Sukatani       | Transmission Line   |
|                  | Cilamaya Kulon    | 4. Sukamulya      | Transmission Line   |
|                  |                   | 5. Pasiruken      | Transmission Line   |
|                  |                   | 6. Muktijaya      | Transmission Line   |
|                  |                   | 7. Tegalurung     | Transmission Line   |
|                  |                   | 8. Manggungjaya   | Transmission Line   |
|                  |                   | 9. Sumurgede      | Transmission Line   |
|                  | Tempuran          | 10. Jayanegara    | Transmission Line   |
|                  |                   | 11. Purwajaya     | Transmission Line   |
|                  |                   | 12. Pagadungan    | Transmission Line   |
|                  |                   | 13. Pancakarya    | Transmission Line   |
|                  |                   | 14. Lemahduhur    | Transmission Line   |
|                  |                   | 15. Lemahkarya    | Transmission Line   |
|                  |                   | 16. Dayeuhluhur   | Transmission Line   |
|                  |                   | 17. Tanjungjaya   | Transmission Line   |
| Rawamerta        | 18. Sukaraja      | Transmission Line |   |
| Cilebar          | 19. Sukaratu      | Transmission Line |   |
| Kutawaluya       | 20. Sindangsari   | Transmission Line |   |
|                  | 21. Sampalan      | Transmission Line |   |
|                  | 22. Waluya        | Transmission Line |   |
|                  | 23. Mulyajaya     | Transmission Line |   |
| Rengasdengklok   | 24. Karyasari     | Transmission Line |   |
|                  | 25. Kalangsuria   | Transmission Line |   |
|                  | 26. Kalangsari    | Transmission Line |   |
| Karawang Barat   | 27. Mekarjati     | Transmission Line |   |
|                  | 28. Tunggakjati   | Transmission Line |   |
| Bekasi           | Pebayuran         | 29. Bantarjaya    | Transmission Line   |
|                  | Kedungwaringin    | 30. Karangmekar   | Transmission Line   |
|                  |                   | 31. Mekarjaya     | Transmission Line   |
|                  |                   | 32. Karangharum   | Transmission Line   |
|                  | Cikarang Timur    | 33. Karangsari    | Transmission Line   |
|                  | Karang Bahagia    | 34. Karangmukti   | Transmission Line   |
| 35. Karangsatu   |                   | Transmission Line |   |
| 36. Karangrahayu |                   | Transmission Line |   |
| Cikarang Utara   | 37. Karangraharja | Transmission Line |   |
|                  | 38. Waluya        | Transmission Line |   |
| Subang           | Blanakan          | 39. Blanakan      | FSRU  |

Source: PT JSP, 2017

The following baseline chapters are sub-divided into the three districts where the Project is administratively located; namely Karawang, Bekasi and Subang Regencies. As discussed village level data has been gathered through field surveys and consultation activities supported by secondary district data where applicable.

Figure 7-26 Social Boundary



*Karawang Regency*

The CCGT Power plant, ORF, nearshore infrastructure (such as the jetty, and seawater intake and discharge pipelines) and the Towers T. 001 to T.092 of the transmission line are located within the Karawang Regency (refer to **Figure 7-27**).

Based on Karawang Regency in Figure 2017, the population of Karawang Regency was 2,295,778 with a population growth rate of 0.98% per year. The sex ratio population of Karawang Regency is 105.26, which means there are more males than females in Karawang. The male population is 1,177,310 people while the female population is 1,118,468 people.

The population composition by age group in 2016 is summarised as follows:

- The total number of non-productive age or age 0-14 years is 620,024 people (27%);
- The total number of productive age or age 15-64 years is 1,570,527 people (68 %); and
- The total number of non-productive age or age 65 and above years is 105,227 (5%).

The majority of the regency population are of a productive age group. **Table 7-33** provides further demographic detail on each of the potentially impacted villages in Karawang. Tunggakjaya village has the highest population and household numbers with more males than females in the population, while Sukaraja village has the lowest population with an equal gender ratio. There is no data available on the average number of family members per household in Karawang Regency.

Based on **Table 7-33** the male population is higher than the female population in twelve villages; however, the gender ratio is relatively balanced. Kalangsari village has the highest population density with the population of 13,432 people residing in a relatively small area within 3.3  $km^2$ .

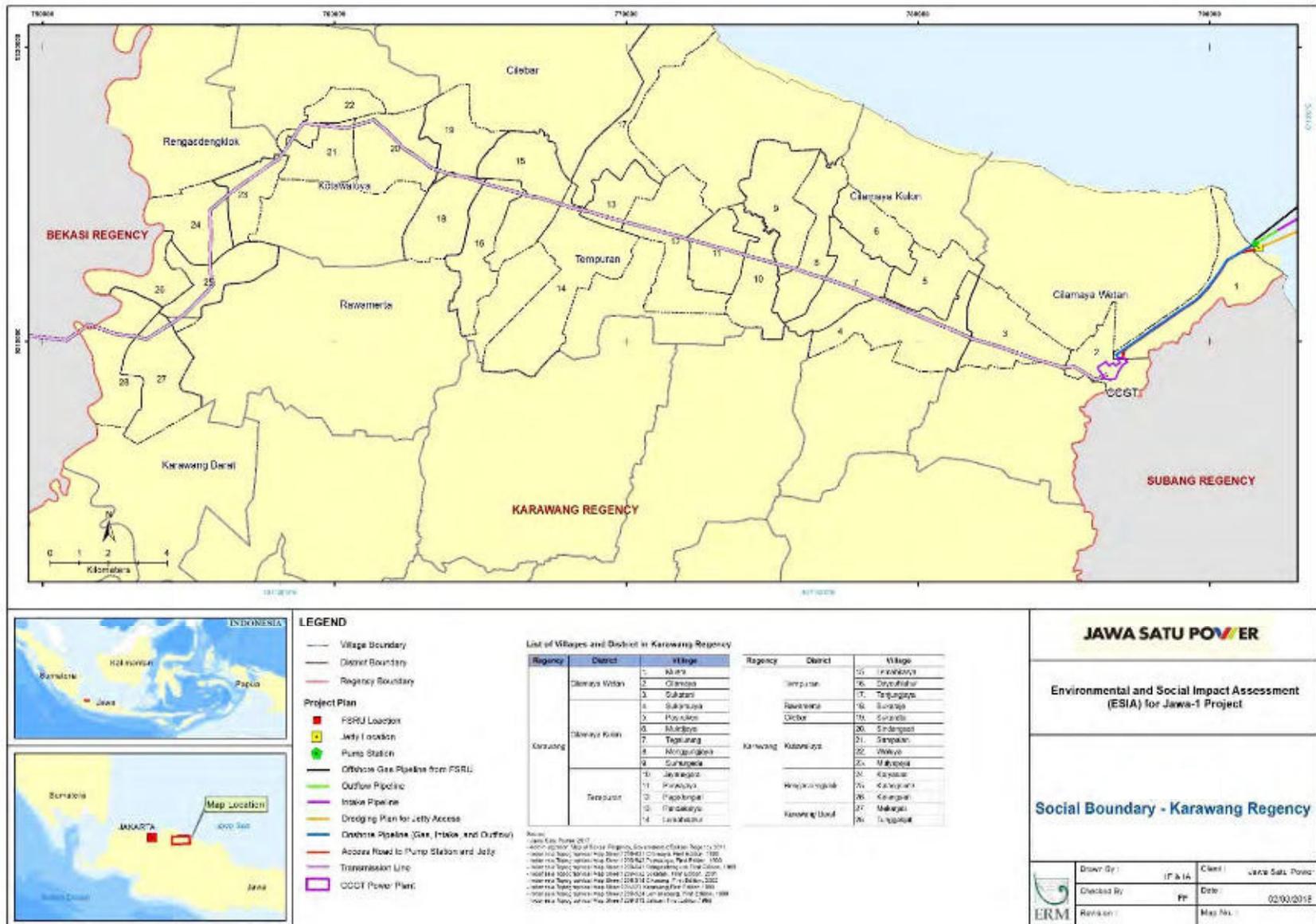
While Muara village has the lowest population density. Kalangsari and Cilamaya villages are transmigration destination villages; this is likely the reason for the high population in both villages. The population density in Cilamaya, Karyasari, Karyasuria, Kalangsari, Mekarjati and Tunggakjati village is higher than the population density of Karawang Regency (1,300 person/ $km^2$ ).

Table 7-33 Population in Karawang Regency

| District       | Village         | Household (HH) | Male          | Female        | Ratio    | Total          | Population Density (per km <sup>2</sup> ) |
|----------------|-----------------|----------------|---------------|---------------|----------|----------------|---|
| Cilamaya Wetan | 1. Muara        | 1,328          | 2,284         | 2,475         | 92.28    | 4,759          | 337                                       |
|                | 2. Cilamaya     | 4,306          | 6,932         | 6,500         | 106.64   | 13,432         | 3,544                                     |
|                | 3. Sukatani     | 2,737          | 4,178         | 4,190         | 99.71    | 8,368          | 1,058                                     |
| Cilamaya Kulon | 4. Sukamulya    | 2,219          | 3,581         | 4,108         | 87.17    | 7,689          | 1,022                                     |
|                | 5. Pasiruken    | 1,103          | 2,604         | 2,651         | 98.22    | 5,255          | 1,003                                     |
|                | 6. Muktijaya    | 1,631          | 3,264         | 3,310         | 98.61    | 6,247          | 1,165                                     |
|                | 7. Tegalurung   | 1,764          | 1,652         | 1,913         | 86.36    | 3,565          | 1,652                                     |
|                | 8. Manggungjaya | 1,982          | 2,223         | 2,396         | 92.78    | 4,619          | 1,066                                     |
| Tempuran       | 9. Sumurgede    | 2,315          | 4,077         | 4,109         | 99.22    | 8,180          | 1,009                                     |
|                | 10. Jayanegara  | 748            | 1,322         | 1,397         | 94.63    | 2,719          | 607                                       |
|                | 11. Purwajaya   | 1,191          | 1,937         | 1,818         | 106.55   | 3,755          | 457                                       |
|                | 12. Pagadungan  | 3,343          | 2,497         | 2,597         | 96.15    | 5,094          | 849                                       |
|                | 13. Pancakarya  | 1,474          | 2,130         | 2,100         | 101.43   | 4,230          | 1,002                                     |
|                | 14. Lemahduhur  | 1,494          | 2,388         | 2,421         | 98.64    | 4,809          | 675                                       |
|                | 15. Lemahkarya  | 1,237          | 1,878         | 1,839         | 102.12   | 3,717          | 634                                       |
|                | 16. Dayeuhluhur | 2,873          | 3,156         | 3,392         | 93.04    | 6,548          | 980                                       |
|                | 17. Tanjungjaya | 1,512          | 3,008         | 2,856         | 105.32   | 5,864          | 582                                       |
| Rawamerta      | 18. Sukaraja    | 807            | 1,227         | 1,207         | 101.66   | 2,434          | 526                                       |
| Cilebar        | 19. Sukaratu    | 878            | 1,228         | 1,282         | 95.79    | 2,510          | 555                                       |
| Kutawaluya     | 20. Sindangsari | 1,689          | 2,753         | 2,835         | 97.11    | 5,588          | 1,070                                     |
|                | 21. Sampalan    | -              | 3,238         | 3,151         | 102.76   | 6,389          | 1,847                                     |
|                | 22. Waluya      | 1,192          | 1,895         | 1,709         | 97.11    | 3,604          | 819                                       |
| Rengasdengklok | 23. Mulyajaya   | 999            | 1,379         | 1,367         | 100.88   | 2,746          | 1,189                                     |
|                | 24. Karyasari   | 4,594          | 7,290         | 7,329         | 99.47    | 14,619         | 2,372                                     |
|                | 25. Kalangsuria | 2,486          | 4,125         | 3,875         | 106.45   | 8,000          | 2,122                                     |
| Karawang Barat | 26. Kalangsari  | 4,263          | 6,342         | 6,020         | 105.35   | 12,362         | 3,746                                     |
|                | 27. Mekarjati   | 4,291          | 6,675         | 6,353         | 105.07   | 13,028         | 2,105                                     |
|                | 28. Tunggakjati | 6,596          | 7,891         | 7,653         | 103.11   | 15,544         | 3,134                                     |
| <b>TOTAL</b>   |                 | <b>59,861</b>  | <b>93,154</b> | <b>92,853</b> | <b>-</b> | <b>185,674</b> | <b>-</b>                                  |

Source: District in Figure, 2016

Figure 7-27 Social Boundary - Karawang Regency



## *Bekasi Regency*

The substation and western section of the transmission line from Tower T.093 to T.112 will be located within the Bekasi Regency (refer to **Figure 7-28**).

Based on Bekasi Regency in Figure 2017, the population of Bekasi Regency is 3,371,691 people. The sex ratio of Bekasi Regency is 104 with a preference towards males and a population density of 2.647 people/km<sup>2</sup>. The male population is 1,177,783 people and female population is 1,653,908 people. The population composition by age group in 2016 is summarised as follows:

- The total number of non-productive age or age 0-14 years is 921,479 people (27.33%);
- The total number of productive age or age 15-64 years is 2,424,708 people (71.91 %); and
- The total number of non-productive age or age 65+ years is 25,504 (0.76%).

Contrary to Karawang, the population of Bekasi Regency is concentrated in urban areas and along the western corridor of Cikarang Selatan, Cikarang Utara, Cibitung, Tambun Selatan Sub district, as well as in the sub districts adjacent to Bekasi and *Daerah Khusus Ibukota* (DKI) Jakarta such as Tambun Utara, Tarumajaya and Babelan. The population of the ten villages in the Project AoI is presented in **Table 7-34**. Karangraharja has the highest population with more males than females, while Karangharum village has the lowest population.

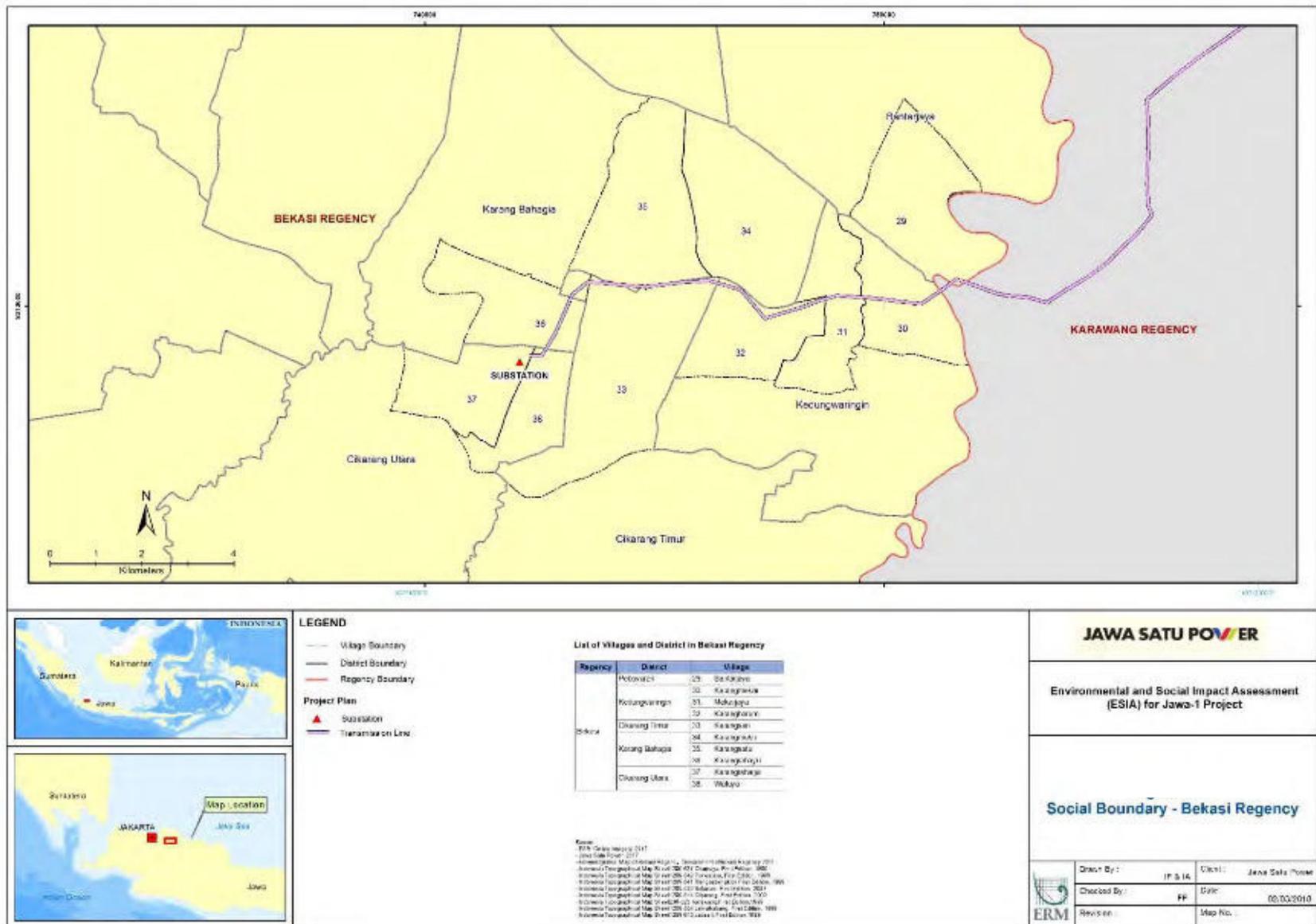
Based on **Table 7-34**, the male population is higher than female population in all the villages. Waluya village has the highest number of households and Karangharum has the lowest number of households. The average of family numbers in each household is more than three people in the Bekasi Regency, with some villages having larger family member numbers such as Karangmekar, Mekarjaya, and Karangrahayu Village.

**Table 7-34** *Population in Bekasi Regency*

| District       | Villages         | HH            | Average<br>(person/HH) | Male          | Female        | Ratio  | Total          | Population<br>Density<br>(per km <sup>2</sup> ) |
|----------------|------------------|---------------|------------------------|---------------|---------------|--------|----------------|---|
| Kedungwaringin | 1. Karangmekar   | 1,927         | 4.30                   | 4,326         | 3,956         | 109.35 | 8,282          | 1,845   |
|                | 2. Mekarjaya     | 1,734         | 4.29                   | 3,919         | 3,519         | 111.37 | 7,438          | 1,435   |
|                | 3. Karangharum   | 1,196         | 3.67                   | 2,273         | 2,119         | 107.27 | 4,392          | 1,296   |
| Cikarang Timur | 4. Karangsari    | 2,869         | 3.99                   | 5,875         | 5,596         | 104.99 | 11,453         | 1,360   |
| Karang Bahagia | 5. Karangmukti   | 2,415         | 3.84                   | 4,655         | 4,618         | 100.80 | 9,273          | 1,390   |
|                | 6. Karangsatu    | 2,198         | 3.86                   | 4,266         | 4,220         | 101.09 | 8,486          | 1,150   |
|                | 7. Karangrahayu  | 2,479         | 4.25                   | 4,655         | 4,618         | 100.80 | 9,273          | 1,390   |
| Cikarang Utara | 8. Karangraharja | 5,051         | 3.59                   | 9,369         | 8,758         | 106.98 | 18,127         | 4,648   |
|                | 9. Waluya        | 5,180         | 3.42                   | 9,278         | 8,431         | 110.05 | 17,709         | 5,713   |
| Pebayuran      | 10. Bantarjaya   | 3,806         | 3.99                   | 7,845         | 7,340         | 106.88 | 15,185         | 2,887   |
| <b>TOTAL</b>   | -                | <b>27,660</b> | -                      | <b>56,461</b> | <b>53,175</b> | -      | <b>109,618</b> | -   |

Source: District in Figure, 2016

Figure 7-28 Social Boundary - Bekasi Regency



## Subang Regency

The FSRU offshore infrastructure are located within the Subang Regency. The area surrounding the FSRU is used for fishing and transportation routes; there are also a number of Pertamina PHE ONWJ gas producing platforms. The primary fishing villages utilise the areas from the shoreline to the FSRU location and beyond namely Blanakan Village at Blanakan District, Subang Regency and Muara Village at Cilamaya Wetan District, Karawang Regency (refer to **Figure 7-29**).

Based on Bekasi Regency in Figure 2017, the population of the Subang Regency was 1,546,000 people with a population growth rate of 0.99% per year. The sex ratio population of the Karawang Regency is 102.203 (towards males). The male population was 780,776 and female population 765,224. The population composition by age in 2016 is summarised as follows:

- The total number of non-productive age or age 0-14 years is 374,342 people (24.21%);
- The total number of productive age or age 15-64 years is 917,319 people (59.33 %); and
- The total number of non-productive age or age 65+ years is 254,339 (16.45%).

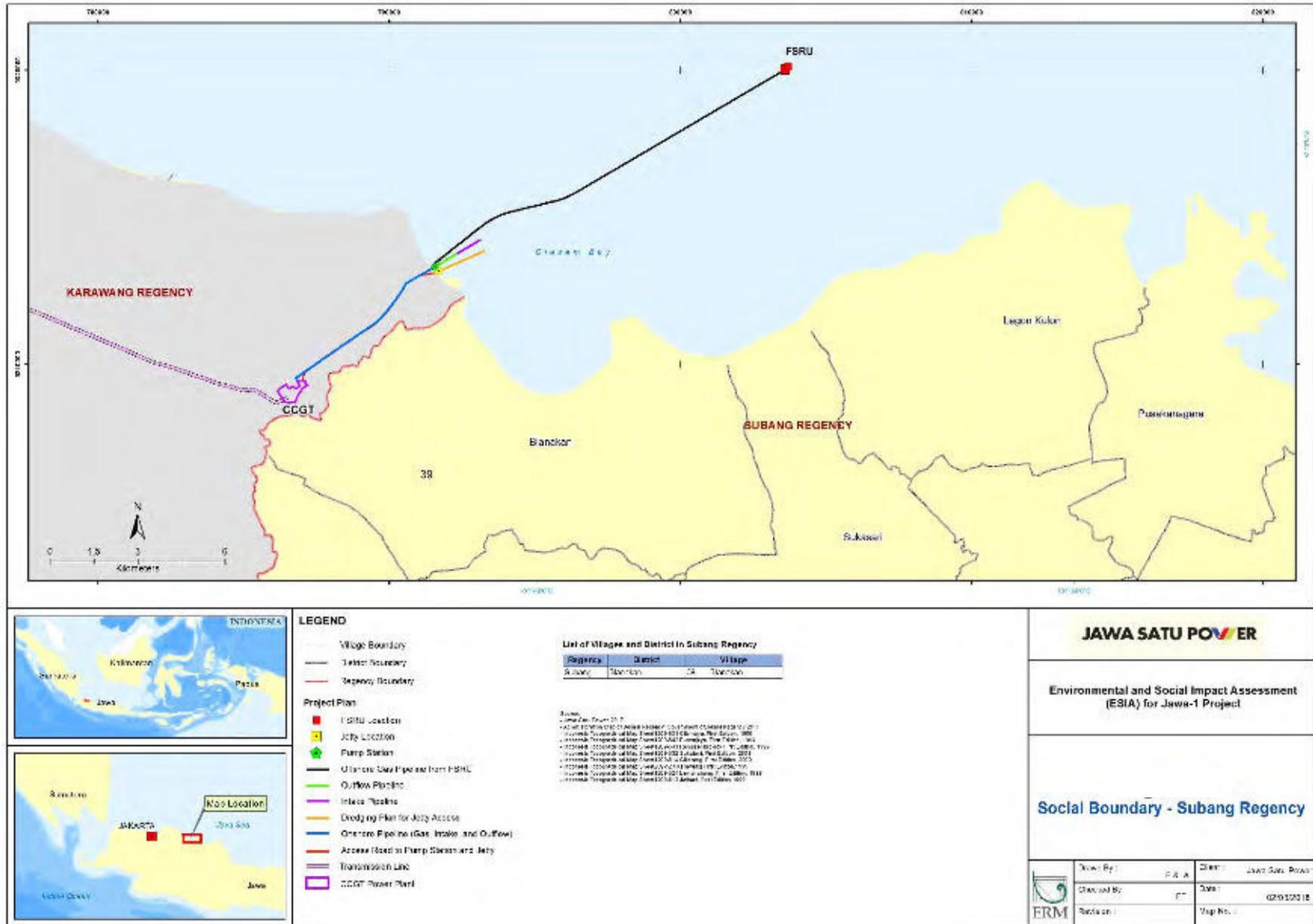
Similar to Karawang and Bekasi the largest age group is that of a working age. **Table 7-35** sets out further details of Blanakan village.

**Table 7-35** *Potentially Impacted Population in Subang Regency*

| District | Village  | HH    | Male  | Female | Ratio  | Total  | Population Density (per km <sup>2</sup> ) |
|----------|----------|-------|-------|--------|--------|--------|---|
| Blanakan | Blanakan | 3,193 | 6,226 | 5,711  | 109.00 | 11,937 | 927                                       |

Source: *Blanakan District in Figure, 2017*

Figure 7-29 Social Boundary - Subang Regency



The following chapter summaries the existing education conditions in the Karawang, Bekasi, and Subang Regencies in West Java Province. The data presented in these chapters is referred from the secondary sources such as Statistic Bureau at the national and local level, academic research, and credible news portals.

#### Literacy Rate

The adult literacy rate (of those aged 15 and above) in Indonesia has increased from 90.4% in 2004 to 93.9% in 2015 (CIA, 2018). This results from the education programs conducted by the government such as literacy movement in 2004 and prioritisation of literacy program in the National and Medium Term Development Plan (2004-2009). Although ranked in the above global average, Indonesia is still one of the ASEAN countries where educational improvements are required.

#### Education Infrastructure

Education infrastructure is one of the top indicators to assess the quality of the education in one area. Data from the Education Department of West Java Province provides the number of education facilities in the three regencies in 2016 as presented **Table 7-36**.

**Table 7-36** Education Infrastructures in Karawang, Bekasi, and Subang Regency

| Regency  | Primary |         | Islamic Primary |         | Junior High School |         | Senior High School |         | Vocational School |         | Higher Education |         |
|----------|---------|---------|-----------------|---------|--------------------|---------|--------------------|---------|-------------------|---------|------------------|---------|
|          | Public  | Private | Public          | Private | Public             | Private | Public             | Private | Public            | Private | Public           | Private |
| Karawang | 849     | 41      | 2               | 137     | 83                 | 62      | 28                 | 18      | 19                | 78      | 1                | 11      |
| Bekasi   | 703     | 214     | 1               | 197     | 89                 | 215     | 36                 | 78      | 12                | 165     | 0                | 2       |
| Subang   | 848     | 24      | 3               | 104     | 77                 | 74      | 17                 | 31      | 15                | 87      | 2                | 9       |

Source: Karawang Regency in Figure, 2016

**Table 7-37** and **Table 7-38** presents the detailed information on the number of schools in each of the Project's boundary area.

**Table 7-37** Number of Schools within the Study Area of Karawang Regency

| District       | Primary School | Junior High School | Senior High School |
|----------------|----------------|--------------------|--------------------|
| Cilamaya Wetan | 41             | 9                  | 9                  |
| Cilamaya Kulon | 38             | 8                  | 9                  |
| Tempuran       | 34             | 8                  | 2                  |
| Rawamerta      | 27             | 4                  | 6                  |
| Cilebar        | 29             | 3                  | 1                  |
| Kutawaluya     | 36             | 6                  | 6                  |
| Rengasdengklok | 39             | 6                  | 6                  |
| Karawang Barat | 50             | 16                 | 25                 |

| District   | Primary School | Junior High School | Senior High School |
|------------|----------------|--------------------|--------------------|
| Perbayuran | N/A            | N/A                | N/A                |

Source: Karawang Regency in Figure, 2016

**Table 7-38** Number of Schools within the Study Area of Bekasi Regency

| District       | Primary School | Junior High School | Senior High School |
|----------------|----------------|--------------------|--------------------|
| Kedungwaringin | 31             | 9                  | 7                  |
| Cikarang Timur | 37             | 14                 | 7                  |
| Karang Bahagia | 33             | 15                 | 10                 |
| Cikarang Utara | 88             | 34                 | 24                 |

Source: Bekasi Regency in Figure, 2016

In Blanakan District, the only district to be impacted by the Project in Subang Regency, the total number of primary school is 29 with six junior high schools and three senior high schools (KPK, 2018).

#### School Participation Rate and Dropout Rates

School Participation Rate (SPR) is the primary indicator used to measure student's access to educational facilities. Higher rates mean greater opportunity to access education. **Table 7-39** outlines the SPR in the three (3) impacted regencies in 2015.

**Table 7-39** School Participation Rate (2015)

| Regency  | Age Group |       |       |       |
|----------|-----------|-------|-------|-------|
|          | 7-12      | 13-15 | 16-18 | 19-24 |
| Karawang | 100.00    | 97.19 | 62.07 | 12.42 |
| Bekasi   | 99.97     | 92.69 | 73.04 | 14.10 |
| Subang   | 99.73     | 94.70 | 52.89 | 14.15 |

Source: West Java in Figures, 2016

The table above shows that the population of age group of 7-12 years has a high opportunity to access education in all three (3) regencies. Despite the compulsory requirement for the 12 years and above to attend schools, the data indicates that only 53% of 16-18 years has the opportunity to enter senior high school, 62.17% in Karawang Regency and 73.0% in Bekasi Regency. Furthermore, less than 15% of the population aged 19-24 years has the opportunity to enter higher education levels. This figure is reflected in the school drop rates from primary to senior high level (including vocational school) in all regencies (refer to **Table 7-40**).

**Table 7-40** Student Dropouts in 2016-2017

| Regency  | Primary |      | Junior High |      | Senior High |      | Vocational School |      |
|----------|---------|------|-------------|------|-------------|------|-------------------|------|
|          | Female  | Male | Female      | Male | Female      | Male | Female            | Male |
| Subang   | 42      | 74   | 85          | 151  | 133         | 146  | 161               | 250  |
| Karawang | 157     | 178  | 148         | 316  | 183         | 148  | 299               | 789  |
| Bekasi   | 228     | 213  | 138         | 313  | 131         | 116  | 310               | 518  |

Source: Ministry of Education and Culture, 2017

The table also shows the segregated sex of the drop out students at each education level. At the primary level, male dropouts are higher than females

in Subang and Karawang Regencies; which is the opposite in Bekasi Regency. At the junior high level, the number of female dropouts was lower than males in all regencies; and the same condition in vocational schools. At the senior high school level, the number of female dropouts are lower than males in Subang Regency but higher in Karawang and Bekasi Regency.

Research by Gajah Mada University (West Java Province) confirmed several factors leading to dropping out of education such as affordability of school fees and having to work to support the household (CNN, 2017).

In Karawang regency, high dropout rates are mostly associated with poverty issues hence the students decided to help their parents to work as a farmer or a fisherman after graduated from primary schools (Republika, 2017).

#### 7.5.1.3 *Livelihoods and Socioeconomic Profile*

The three (3) regencies are varied in terms of livelihoods; ranging from fishing, agriculture and privately owned businesses.

The Indonesian government has commenced a preliminary study on the establishment of Special Economic Zone (SEZ), which includes the Bekasi-Karawang-Purwakarta in the West Java province. Industrial areas in the three regencies account for 43% of the national industrial output, as multinational companies, such as Toyota, Honda, and Mitsubishi, have manufacturing plants located there. The SEZ is expected to increase the efficiency of domestic production and decrease its costs with economic coordination and easier regulations.

For instance, companies would not need to obtain licenses for land as this would be handled by the SEZ administrator (Pressreader, 2017). However, the SEZ of Bekasi-Karawang-Purwakarta is still in the preliminary stages and no time has been disclosed.

In terms of employment, the total labor force in West Java (regencies and cities) is 18,791,482 people while the unemployment number is 1,794,874 people (roughly 10 %) (West Java in Figures, 2017). The non-working age group in West Java area is 13,531,127 people. The details on each regency in comparison to West Java can be seen in **Table 7-41**.

Despite the fact that Bekasi has the highest rate of labor force, it also has the highest rate of unemployment. The reason being it is the most populated area amongst the three (3) regencies. Based on the table it is clear there is an available pool of resources to support the Project. However their skills and ability to support the Project's needs will need to be assessed. This will be an important area for the Project to plan for given the local communities high expectation for Project benefits (as expressed during the consultation activities).

**Table 7-41 Population of Working Age Group by Regency/City in 2015**

| Regency/<br>City | Working Group Age                    |                                 |                   | Non-<br>Working<br>Group Age | Total<br>Population |
|------------------|--------------------------------------|---------------------------------|-------------------|------------------------------|---------------------|
|                  | Total<br>Labor and<br>% of W<br>Java | Unemployment<br>and % of W Java | Total             |                              |                     |
| Karawang         | 873,995<br>(4.7%)                    | 113,693<br>(6.3%)               | 987,688           | 689,091                      | 1,676,779           |
| Bekasi           | 1,344,821<br>(7.2%)                  | 149,859<br>(8.4%)               | 1,494,680         | 871,267                      | 2,365,947           |
| Subang           | 633,116<br>(3.4%)                    | 70,682<br>(4.0%)                | 703,798           | 452,866                      | 1,156,664           |
| <b>West Java</b> | <b>18,791,482</b>                    | <b>1,794,874</b>                | <b>20,586,356</b> | <b>13,531,127</b>            | <b>34,117,483</b>   |

Source: West Java in Figures 2017

### *Karawang Regency*

According to Karawang Regency in Figures 2016, the number of people working in the regency in 2015 was approximately 873,995 people while 113,693 people were reported as unemployed; therefore 88.5% of Karawang's people are employed. This number is based on the productive working age group. Based on the same data sources, the manufacturing industry has the highest participation with 27.8% working in this industry. Other types of sources of income can be seen in **Table 7-42**.

Based on data from the National Statistical Bureau in 2017 the poverty line in West Java Province was IDR 354.679/ capita/ month (or roughly 25.5 USD). As of March 2017, the number of population below the poverty line in Karawang was 11%, in Subang 11% and in Bekasi 5%.

A Decree of the Governor of West Java Province No. 561/Kep. 1191-Bangsos/2016, has set the minimum regional wage rate in Karawang Regency (2017) at IDR 3,605,272. It is the highest rate of all three (3) impacted regencies.

Based on ESIA field survey of farmers in Karawang and Bekasi the average monthly income is an estimated IDR 3.9 million while the minimum wage for the two regions is between IDR 3.5 - 3.6 million. Whereas for fishermen in Subang and Karawang, the average income is IDR 4 million (sampling from Muara and Blanakan village) and the minimum wage for Subang Regency is IDR 2.3 million.

As such, overall, the farmers and fishermen's income in three (3) regencies is higher than the minimum regional rate. However based on the results of the survey the estimated percentage of fishermen earning below the monthly minimum wage was 30% and 16% for farmers.

Table 7-42 *Total Labour Force by Livelihood in Karawang Regency*

| Location                        | Total Labour Force by Livelihoods | Percentage of Total Workforce (%) |
|---------------------------------|-----------------------------------|-----------------------------------|
| <b>Karawang Regency</b>         | <b>873,995</b>                    | <b>100</b>                        |
| Agriculture                     | 141,586                           | 16,20                             |
| Manufacturing Industry          | 242,896                           | 27,79                             |
| Trading, Hotels and Restaurants | 237,360                           | 27,16                             |
| Services                        | 127,306                           | 14,57                             |
| Others                          | 124,847                           | 14,28                             |

Source: Karawang Regency in Figures, 2017

In terms of community welfare, Gross Regional Domestic Product (GRDP) and GRDP per capita can be used as indicators for determining the size of a community's local economy. The GRDP is a basic measure of the value added from economic activity or a total value of production of goods and services within a region per annum.

The higher the GDP<sup>1</sup> per capita of an area, the better the level of the local economy although this measure does not include income inequality factors. Although there are limitations, this indicator is sufficient to determine the level of the economy of a region at the macro level. According to Central Bureau of Statistics of Karawang Regency, the GRDP in the Karawang District in 2015 was IDR 167.05 trillion; this was an increase in the level from 2014, which was IDR 155.07 trillion. With the increase of GRDP from 2014 to 2015, this means that economic growth in Karawang Regency tends to be positive, as much as 7.7%.

While the West Java GRDP was and IDR 1,385.83 trillion in 2014 rising to IDR 1,524.83 trillion in 2015 (*West Java in Figures 2017*), meaning that economic growth rate in West Java was 10.0%. However, the Karawang Regency's GRDP is lower than that of the West Java. As such - the economic growth rate in Karawang Regency was lower than the West Java Province.

The categorisation of welfare family can also be determined by the National Population and Family Planning Board (BKKBN) criteria as follows (*BKKBN, 2018*):

- Pre-prosperous families (*Keluarga Prasejahter* or KPS) are families who do not meet one of the six indicators of Prosperous Family I (*Keluarga Sejahtera* or KS I) or indicator "basic family needs". These six (6) indicators are:
  - the families eat twice a day;
  - the families have different clothes for home, working/ school, and recreation activities;

<sup>1</sup> Measures the size of a region's economy.

- the families' house has a proper roof, floor, and walls;
  - the families can access a health facility if a family member is sick;
  - the families have access to contraceptives; and
  - all children aged seven (7) – 15 years old are going to school.
- Prosperous families I (KS I) are the families who are able to meet the six (6) KS I stage indicators, but do not meet any of the indicators of the Prosperous Family II or the family's "psychological needs". These indicators are:
    - the families have a religion;
    - once in a week, all the family members eat meat/fish/egg,
    - is at least eight (8)  $m^2$ ;
    - the last three months the family is in good health;
    - one or more family members works to earn a family income;
    - all family members aged 10 - 60 years can read; and
    - couples of childbearing age with two (2) or more children use contraceptives.
- Prosperous families II are the families that are capable of fulfilling the six (6) indicators of KS I and eight (8) KS II indicators, but do not meet one of the five (5) indicators of Prosperous Family III (KS III), or "development needs" of the family. These five (5) indicators are:
    - the families seek to increase religious knowledge;
    - some family income is saved;
    - eat together at least once a week;
    - participate in community activities in the neighborhood; and
    - access information from newspapers/magazines/radio/TV/internet.
- Prosperous families III are the families are capable to fulfilling the six (6) KS I, eight (8) KS II, and five (5) KS III indicators, but does not meet one (1) of two (2) indicators of Prosperous Family III Plus (KS III Plus) or an indicator of "self-actualisation" (self-esteem) of the family. These two (2) indicators including families regularly volunteer to contribute material for social activities and there are family members who are active as administrators of social associations/ foundations/ community institutions; and
- Prosperous families III plus are the families that are capable of fulfilling the all six (6) KS I, eight (8) KS II indicators, five (5) KS III indicators, as well as the two (2) KS III Plus stage indicators.

According to data from the Villages Profiles 2016 within Cilamaya village, there are four (4) of the classifications:

- Pre-prosperous families consist of 795 households;
- Prosperous families I consisting of 1,216 households;
- Prosperous families II consisting of 774 households;

- Prosperous families III consisting of 682 households; and
- Prosperous families III plus consisting of 202 households.

Thus, the households in Cilamaya village are mostly categorised as prosperous family I meaning the families are capable of fulfilling their basic needs but are not able to meet the psychological social needs.

#### *Bekasi Regency*

In Bekasi Regency 1,344,821 people (90.0%) people were employed while 149,859 people (10.0%) were unemployed. Similar to Karawang, the labor force participation was the highest in the manufacturing sector with 517,312 people or 38.5% of the total work force participating.

This is to be expected given the high level of industry in the area, largely manufacturing sector for automotive industry. The second highest is from the trading, hotels, and restaurants sector which employs around 334,957 people or 24.9%.

Other livelihoods in Bekasi Regency can be seen in **Table 7-43**. The regional wage rates in Bekasi Regency in 2017 was IDR 3,530,438 as regulated by *Decree of Governor of West Java Province No. 561/Kep. 1191-Bangsos/2016*.

**Table 7-43** *Total Labour Force by Livelihoods in Bekasi Regency*

| Location                        | Total Labour Force by Livelihoods | Percentage of Total Workforce (%) |
|---------------------------------|-----------------------------------|-----------------------------------|
| <b>Bekasi Regency</b>           | <b>1,344,821</b>                  | <b>100</b>                        |
| Agriculture                     | 58,990                            | 4.39                              |
| Manufacturing Industry          | 517,312                           | 38.47                             |
| Trading, Hotels and Restaurants | 334,957                           | 24.91                             |
| Services                        | 227,307                           | 16.90                             |
| Others                          | 206,255                           | 15.34                             |

*Source: Bekasi Regency in Figures, 2017*

Based on the Bekasi Regency in Figures 2016, the GRDP increased 8.1% from IDR 227,584,535.1 billion in 2014 to IDR 246,046,148.4 billion compared to the West Java GRDP of IDR 1,524,832.2 billion in 2015 and IDR 1,385,825.07 billion in 2014 (*West Java in Figures, 2017*). The economic growth rate in West Java 10.03%.

In comparison to the West Java Province, it is clear that economic growth in Bekasi Regency is not as significant as West Java Province. However, the GRDP in Bekasi Regency each year is greater than West Java Province, due to a fact the Bekasi Regency is an industrial area hence the GRDP is higher.

## Subang Regency

According to Subang in Figures 2017, the number of people employed in in 2016 was approximately 680,737 with 70,682 people unemployed. Hence, the ratio between employed and unemployed people is 90.0% and 10.0%, respectively. Of that amount, 257,982 people or about 38 % work in the agriculture sector.

**Table 7-44** *Total Labour Force by Livelihoods in Subang Regency*

| Location              | Total Labour Force by Livelihoods | Percentage of Total Workforce (%) |
|-----------------------|-----------------------------------|-----------------------------------|
| <b>Subang Regency</b> | <b>680,739</b>                    | <b>100</b>                        |
| Agriculture           | 257,982                           | 37.90                             |
| Industry              | 113,911                           | 16.74                             |
| Services              | 308,846                           | 45.36                             |

Source: Subang Regency in Figures, 2017.

The field of service businesses (which includes shops and stalls) is the highest source of income within Subang Regency, which employs approximately 308,846 people or about 46%. While the field of industry employs approximately 113,911 people or about 17% of the working population. As mentioned in Karawang and Bekasi Regencies, the regional wage rates in Subang Regency are also determined by the *Decree of Governor of West Java Province No. 561/Kep. 1191-Bangsos/2016*. The minimum regional wage rate in Subang Regency in 2017 was IDR 2,327,072. The rate is the lowest rate of the three Project impacted regencies.

The GRDP in Subang Regency increased 11.8% from IDR 25,985,952.7 million in 2014 to IDR 23,227,841.6 million; a more rapid economic growth than West Java Regency (IDR 1,524,832.2 billion in 2015 from IDR 1,385,825.07 billion in 2014).

According to the Villages Profiles 2016 in the ANDAL, there were a total of 3,193 households in Blanakan Village. Of that amount, 1,579 households (49.5%) are categorised as pre-prosperous families meaning they cannot meet their basic needs such as food, clothing, and health needs as mentioned in previous chapter. The remaining categorisation, according to BKKBN are as follows:

- Prosperous family I : 651 households;
- Prosperous family II : 542 households;
- Prosperous family III : 361 households; and
- Prosperous family III Plus: 60 households.

The main source of livelihoods in West Java is from the agricultural sector. The AoI is mostly agricultural land or paddy fields with a mix of vegetation. Given the Project will be located on largely paddy land the following chapter provides an overview of the agricultural practices in the three regencies.

*Karawang Regency*

The 2017 Karawang statistical data identified that of the total land area 55% are paddy fields (175,259 Ha). Karawang is one of the largest rice producers in West Java with a total paddy field area of 95,906 Ha. Based on the district in Figure, 2017, Tempuran District has the largest area of paddy field (6,480 Ha) and a production rate that reaches more than 91,000 ton/Year. This production is valued at approximately IDR 409,500,000,000 with a market price of IDR 4,500,000/ton. Karawang Barat district has the smallest agricultural land in Karawang Regency due to increased land conversion into residential areas.

**Table 7-45** summarises the area and the field's production rate between 2012 and 2016.

Paddy farmers in Cilamaya, where the CCGT is located, conduct two (2) seasons of harvesting every year. During January, the first planting season starts with the harvesting period in May or June. After the harvesting completes, the farmers let the land lie fallow for over a month to rest the land before the next planting period. During this fallow period, the farmers normalise the irrigation channels. Then, the planting period continues within June or July when farmers re-cultivate their rice fields. Farmers harvest the second season of planting in December.

Based on interviews undertaken with local farmers during the ESIA survey both harvesting periods in 2017 were poor. Farmers perceived it due to a lack of water, which in turn led to the decreasing number of the yield harvested. In 2017, the planting season is uncertain (refer to **Figure 7-30**).

Farmers could not start planting because the volume of irrigation water was insufficient. The low level of water volume was caused by dam damage in Cikalong and Mekarjaya village area. Consequently, Farmers experienced the lower number of production in Cilamaya Kulon, Cilebar and Karawang Barat. To reduce this problem, farmers use pump for irrigation facilities to utilise the river (refer to **Figure 7-31**). The majority of other sub-districts experienced a good harvest period.

Based on the ESIA survey findings, during the planting period between January 2017 and the harvesting period in June 2017 the farmers incurred the following production costs per *Bata*<sup>1</sup> (i.e. 7,000m<sup>2</sup>):

- The total cost of the land cultivation, seeds, fertiliser and pesticides is IDR 7,000,000 (omitting additional water requirements such as costs for solar and water pumps rental); and
- The operational costs of harvesting (i.e. labour and machine rental) is roughly IDR 700,000.

*Figure 7-30 Typical Paddy Fields in Cilamaya Village*



Source: ERM ESIA Survey 2017

<sup>1</sup> Bata is a local land size measurement where one Bata is equal to 7,000 m<sup>2</sup>

Figure 7-31 Pump for the Irrigation System



Source: ERM ESIA Survey, 2017

Meanwhile, the average harvesting cost per *Bata* during a poor harvesting season is approximately IDR 7,700,000. During the poor harvesting season, the total production rate is 2.5 tons. The market price for the production is IDR 5,000/kg. As such, the total harvesting income was IDR 12.5 million hence the total harvest profit was IDR 4.8 million or IDR 800,000 per month over the six (6) months period.

During normal planting conditions, the production cost per *Bata* total:

- The total cost of land cultivation, seed, fertiliser, pesticides is IDR 5,000,000; and
- The operational costs of harvesting (i.e. labour and machine rental) is IDR 700,000.

The total production costs for a harvesting season are approximately IDR 5,700,000 with the average harvest per *Bata*, during a good harvest period at four (4) to five (5) tons. Assuming IDR 5,000/kg the total harvest income totals between IDR 20,000,000 and IDR 25,000,000. Hence, the total harvest profit would be between IDR 14.3 million to IDR 19.3 million or IDR 2,400,000 to 3,220,000 per month over the six (6) month period.

The average monthly income for farmers in Karawang was approximately IDR 2.4 to - 3.22 million per *Bata* per month. Meanwhile, the minimum wage of Karawang Regency 2017 was IDR 3,605,272. Based on the survey, the majority of farmers in Karawang owned more than two (2) hectares (or greater than one (1) *Bata* of paddy field).

Therefore, the minimum income of a farmer in Karawang Regency is IDR 4.8 million. This is above the regency minimum wage standard. There are the vulnerable groups working in the agriculture sector, such as farm labourers, although given their temporary and adhoc working nature their exact income varies considerably month to month. They are only employed during the planting and harvesting periods with a salary of IDR 100,000/day. Based on the social baseline interview, some of conditions experienced by the farm labourers are as follows:

- The average monthly income is under IDR 600,000;
- The education level is primary school or even lower;
- There are no savings/or assets that can be easily sold with minimum of IDR 500,000;
- The housing conditions are poor (no concrete walls and floors); and
- There is a limited consumption of meat/milk.

In addition to farm labourers are the sharecroppers. The income earned by those who are not land owners i.e. land users or sharecroppers can be roughly calculated considering the following:

- The land user rents the land with a fixed annual rate per year. The average cost of land rent in Karawang is IDR 10 million Ha/year. The land user pays all the production costs and owns 100% of the income generated from the farming activities;
- The landowner pays the cost of land processing, fertilisers, and pesticide and the land user pays the other costs such as seeds and labours. The landowner and the land user will share 50% each of the income after the cost deduction;
- The landowner pays for all the production cost while the land user focus on cultivating the land. Both parties will share 50% each of the income after the production cost deduction; and
- The landowner only provides the paddy field and all the production costs are paid by the land users. Both parties will share 50% each of the income after the production cost deduction.

Based on survey, the majority of farmers manage their own land however when the landowner is elderly or living outside the area, they will employ land users to manage the agricultural land. Generally, the land user will receive a profit of 50% of the total harvest profit estimating between IDR 1,200,000 to 1,610,000 per month over the six (6) months period. The total amount of profit depends on the land size managed by the land user.

In 2016 the Indonesian government defined the poverty line at a monthly per capita income of IDR 354,386. Thus, the farm labourers and sharecroppers are considered to be above the poverty line however considering the above living conditions they are clearly vulnerable.

The crop yields have declined in 2017; based on discussions with the farmers, several factors have caused the declining crop yields:

- Damage to the upstream irrigation canals within Cikalong district; the reparation process has been ongoing;
- Damage to the irrigation facility within the Mekarmaya area; there has been no improvement plans;
- Extreme weather factors (rain, drought, flooding, drought, high winds) influencing the growth of the rice plants resulting in a poor growth rate;
- Pests including *sundep* (an insect that lives in the rice stem), *mentek/klowor*, that can cause abnormal rice growth and rats; and
- Lack of capital during the planting season might result in huge debts to the *Informasi dan berita Badan Usaha Milik Desa* or BUMDES (the village-owned enterprise that lends capital to the farmers).

#### *Bekasi Regency*

The land use in Bekasi Regency is divided into wet and dry lands. The wet lands are typically utilised as paddy fields whilst the dry lands are zoned for residential areas. Pebayuran sub-district has the highest rice area in Bekasi Regency with 6,815 Ha and rice production in a year of more than 83,000 tons. Cikarang Utara has the smallest agricultural lands when compared with the other sub-districts as the land is being used for residential and office areas. The majority of the land take in Bekasi for the Project (the substation and transmission line) are paddy fields.

Based on the AMDAL and ESIA surveys in Bekasi the farming and income data is similar to Karawang (i.e. production costs, profits and challenges). In 2017, some farmers interviewed also confirmed yields were low in 2017. They discussed pest issues resulting in many farmers needing to use their savings or borrow money.

**Table 7-46** summarises the land areas and paddy production between 2012 and 2016.

#### *Subang Regency*

Subang is one of the main paddy producing areas in West Java due to its availability of agricultural land area. The data of area and field production between 2012 and 2016 is presented in **Table 7-47**. In 2016, the rice production

decreased significantly compared to the previous year from 64,165 tons to 34,857 ton. This is believed as a result of the simultaneous harvest failures caused by pests.

Based on the Project description and AoI, agriculture activities in the Subang area are not affected by the Project i.e. the FSRU is the only Project facility located in Subang. As such, it is not anticipated that agricultural lands in this area will be impacted. However, given the low crop yield, impacts to the fishing communities will need to be carefully considered in particular their low reliance on farming as an alternative to fishing for income.

**Table 7-45 Paddy Fields and Production Area in Karawang (2012-2016)**

| District                | 2012          |                   | 2013           |                   | 2014          |                   | 2015          |                   | 2016          |                   |
|-------------------------|---------------|-------------------|----------------|-------------------|---------------|-------------------|---------------|-------------------|---------------|-------------------|
|                         | Area (Ha)     | Production (Tons) | Area (Ha)      | Production (Tons) | Area (Ha)     | Production (Tons) | Area (Ha)     | Production (Tons) | Area (Ha)     | Production (Tons) |
| Cilamaya Wetan          | 4,562         | 80,808            | 4,570          | 57,625            | 4,570         | 83,450            | 4,570         | 83,450            | 4,570         | 87,769            |
| Cilamaya Kulon          | 5,218         | 66,253            | 5,218          | 64,003            | 5,218         | 73,472            | 5,218         | 73,472            | 5,218         | 67,886            |
| Tempuran                | 6,480         | 91,073            | 6,480          | 92,415            | 6,480         | 92,415            | 6,480         | 92,415            | 6,480         | 103,243           |
| Cilebar                 | 5,395         | 79,898            | 5,395          | 132,514           | 5,395         | 81,955            | 5,395         | 81,955            | 5,395         | 76,273            |
| Rawamerta               | 4,191         | 66,515            | 4,191          | 20,568            | 4,191         | 62,187            | 4,191         | 62,187            | 4,191         | 66,527            |
| Kutawaluya              | 4,372         | 64,822            | 4,372          | 47,815            | 4,372         | 66,953            | 4,372         | 66,953            | 4,372         | 98,327            |
| Rengasdengklok          | 2,026         | 30,094            | 2,026          | 38,569            | 2,011         | 32,154            | 1,816         | 32,154            | 2,026         | 82,614            |
| Karawang Barat          | 2,201         | 33,177            | 2,201          | 32,596            | 1,824         | 29,512            | 1,824         | 29,512            | 1,824         | 13,944            |
| <b>Karawang Regency</b> | <b>94,429</b> | <b>1,383,336</b>  | <b>93,0078</b> | <b>1,351,668</b>  | <b>95,906</b> | <b>1,492,866</b>  | <b>95,906</b> | <b>1,502,633</b>  | <b>95,906</b> | <b>1,532,055</b>  |

Source: District in Figures, 2017

**Table 7-46 Paddy Fields and Production Area in Bekasi (2012-2016)**

| District              | 2012          |                   | 2013          |                   | 2014          |                   | 2015          |                   | 2016          |                   |
|-----------------------|---------------|-------------------|---------------|-------------------|---------------|-------------------|---------------|-------------------|---------------|-------------------|
|                       | Area (Ha)     | Production (Tons) |
| Pebayuran             | 6,827         | 83,533            | 6,827         | 85,112            | 6,827         | 81,930            | 6,815         | 87,780            | 6,815         | 85,555            |
| Kedung waringin       | 1,898         | 25,147            | 1,898         | 23,121            | 1,898         | 20,747            | 1,890         | 22,111            | 1,890         | 24,260            |
| Cikarang Timur        | 2,648         | 31,741            | 2,648         | 31,639            | 2,648         | 35,558            | 2,463         | 30,103            | 2,463         | 31,011            |
| Karangbahagia         | 2,856         | 35,007            | 2,859         | 33,613            | 2,859         | 35,107            | 2,859         | 31,209            | 2,859         | 31,614            |
| Cikarang Utara        | 380           | 4,407             | 380           | 4,732             | 380           | 6,230             | 380           | 4,410             | 380           | 4,728             |
| <b>Bekasi Regency</b> | <b>53,703</b> | <b>636,093</b>    | <b>52,966</b> | <b>597,027</b>    | <b>51,961</b> | <b>609,585</b>    | <b>51,961</b> | <b>496,776</b>    | <b>51,979</b> | <b>572,696</b>    |

Source: District in Figures, 2017

**Table 7-47 Paddy Fields and Production Area in Subang (2012-2016)**

| District      | 2012          |                  | 2013          |                  | 2014          |                  | 2015          |                  | 2016          |                  |
|---------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|
|               | Large (Ha)    | Production (Ton) |
| Blanakan      | 3,704         | 34,812           | 3,704         | 64,165           | 3,704         | 64,165           | 3,704         | 64,165           | 3,704         | 34,857           |
| <b>Subang</b> | <b>84,928</b> | <b>1,180,594</b> | <b>84,928</b> | <b>1,149,147</b> | <b>84,928</b> | <b>1,204,829</b> | <b>84,570</b> | <b>1,147,650</b> | <b>84,570</b> | <b>1,153,867</b> |

**Regency**

Source: District in Figures, 2017

The coastal areas of the Project where the pipelines, jetty, puump house etc are located as well as the FSRU, are known locally and zoned as fishing areas. As such the construction activities are likely to have some level of impact due to the laying of piping, dredging and shoreline construction activities.

During ESIA field consultations, the fishermen indicated that this area is utilised frequently for fishing. The Project will be required to ensure careful management and communication with these fishing groups before, during the construction and during the operation.

Ministry of Marine Affairs and Fisheries regulates the classification of fishing zones through the *Ministry Regulation No. 71/PERMEN-KP/2016* regarding Fishing Zone Distribution and Placement of Fishing Gear in the Territory of Fisheries Management of Indonesia. The coastal area classified of fishing areas are as follows:

- Zone I: This zone is divided into two (2) categories, i.e. Zone IA which covers coastal area up to two (2) nautical miles measured from sea level at lowest tide and Zone IB is including coastal area further two (2) nautical miles up to four (4) nautical miles;
- Zone II: The coastal area covers fishing lane zone I up to 12 nautical miles measured from sea level at lowest tide; and
- Zone III: The coastal area includes Exclusive Economic Zone of Indonesia (ZEEI) and beyond the fishing lane zone II.

It is identified that some of the coastal area in Karawang will be influenced by the Project based on ESIA field surveys, usually the local fishermen fish for shrimp up to three (3) km while for crab is at three (3) km to 11 km, and 11 km to 56 km for fish. The overlay map of fishing zones, exsiting oil and gas developments and the Project location is presented in **Figure 7-32**.

#### *Fresh Water Fishing Overview*

Fish cultivated around the Project area include mujair fish, gold, catfish, gurami, indigo, and tambakang. Eels, tawes and cork species are not cultivated by the local community due to their slow growth. However Eels are often found in water channels in rice fields, whereas corks, tawes and broomsticks are found only in the Cilamaya irrigation canal.

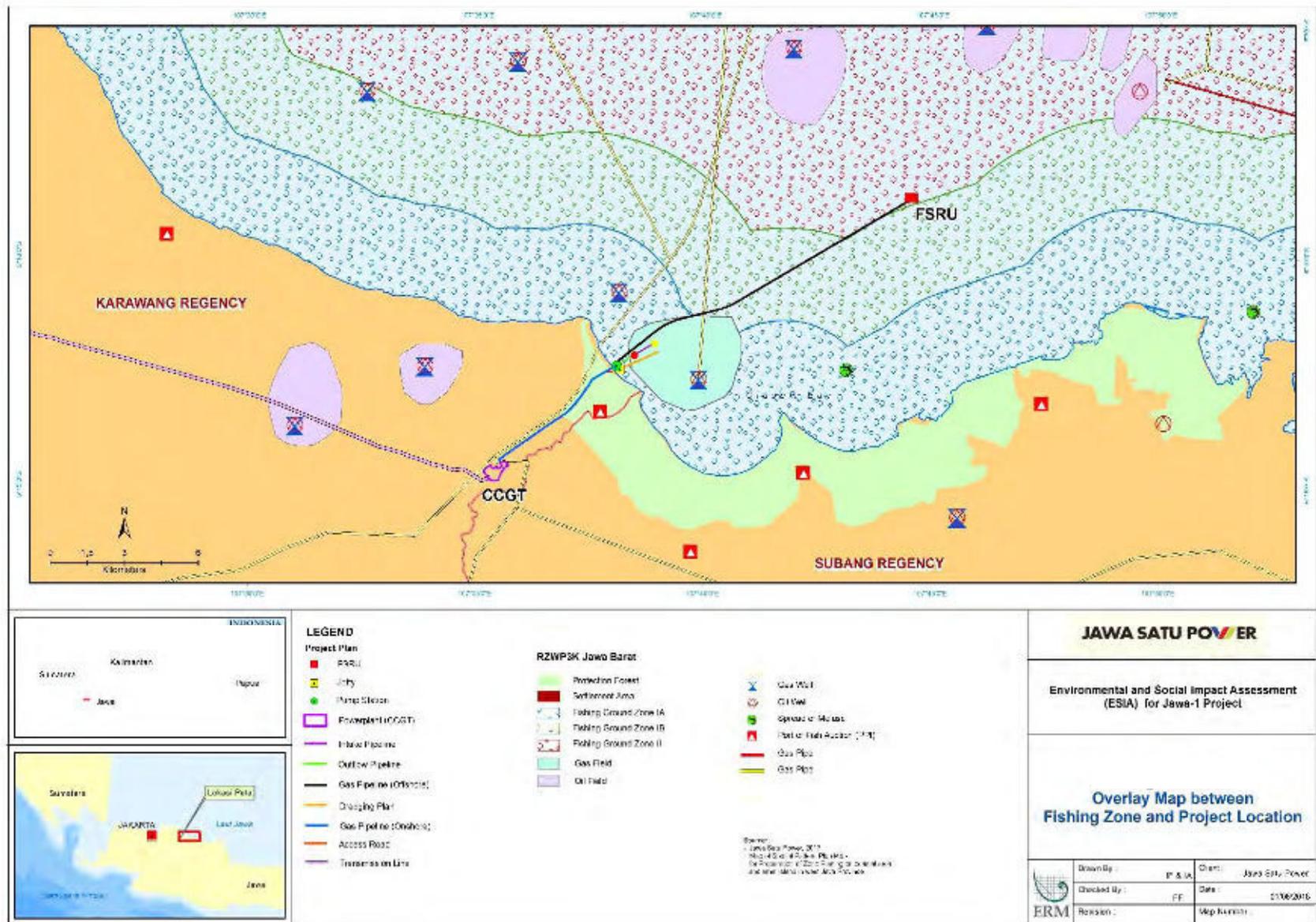
Fish commonly caught by the local fishermen with economic value include snapper, anchovies, cobs and pomfret. In addition to fish, the fishermen also catch crab, shrimp, squid and snail tails.

**Table 7-48** summarises tyical fish caught locally in the Project Area.

**Table 7-48 Typical Fish Caught by Local Fishermen**

| <b>General Name</b>  | <b>Scientific Name</b>          |
|----------------------|---------------------------------|
| Common Ponyfish      | <i>Leognatussp.</i>             |
| Giant Sea Catfish    | <i>Ariussp.</i>                 |
| Snapper              | <i>Latesp. dan Lutjanus sp.</i> |
| Threadfin            | <i>Nemipterus sp.</i>           |
| Swordfish            | <i>Scualussp.</i>               |
| Stingray             | <i>Dasyatissp.</i>              |
| Indian Scad          | <i>Decapterus sp.</i>           |
| Anchovy              | <i>Stelophorus sp.</i>          |
| Herrings             | <i>Clupeasp.</i>                |
| Sardines             | <i>Sardinellasp.</i>            |
| Indian Mackerel      | <i>Rostralliger sp.</i>         |
| Spanish Mackerels    | <i>Scomberomerus sp.</i>        |
| Tuna                 | <i>Thunussp.</i>                |
| Trevally             | <i>Caranxsp.</i>                |
| Flathead Grey Mullet | <i>Mugilsp.</i>                 |
| Atlantic Threadfin   | <i>Polydactylus octonemus</i>   |
| Pomfret              | <i>Pampussp.</i>                |
| Largehead Hairtail   | <i>Trichiurussp.</i>            |
| Rainbow Sardine      | <i>Dussumieria acuta</i>        |
| Crab                 | <i>Portunussp.</i>              |
| Giant Tiger Prawn    | <i>Penaeus merguensis</i>       |
| Shrimp               | <i>Metapenaeus Monoceros</i>    |
| Squid                | <i>Loligosp.</i>                |
| Tiger snail          | <i>Babylonia spirata</i>        |

Figure 7-32 Overlay Map between Fishing Zone and Project Location



## Karawang Regency

Karawang has a diverse range of fish with a high economic value. This is supported by the length of the coastal area that lies to the north along 84.23 km with a mangrove forest area of 9,983.93 ha. According to data provided by the Statistical Bureau in 2016 the majority of the fish production is classified as Captured Fisheries and Aquaculture. **Table 7-49** provides a breakdown of each classification in Karawang. The primary forms of fish productions within the impacted area are brackish water pond, fresh water pond and paddy field aquaculture.

**Table 7-49 Fish Production in Karawang Regency (in tons)**

| Location                | Capture Fisheries |              | Aquaculture         |                  |             |                   |
|-------------------------|-------------------|--------------|---------------------|------------------|-------------|-------------------|
|                         | Marine Fisheries  | Inland Water | Brackish Water Pond | Fresh Water Pond | Paddy Field | Floating Cage Net |
| Karawang Regency        | 8,591.15          | 87.30        | 39,702.34           | 2,482.65         | 297.63      | 273.14            |
| Cilamaya Wetan District | 0                 | 0            | 506                 | 144              | 140         | 0                 |
| Cilamaya Kulon District | 0                 | 0            | 100                 | 479              | 172         | 0                 |
| Tempuran District       | 0                 | 0            | 227                 | 418              | 0           | 0                 |
| Cilebar District        | 0                 | 0            | 221                 | 220              | 0           | 1                 |
| Rawamerta District      | 0                 | 0            | 0                   | 30               | 0           | 0                 |
| Kutawaluya District     | 0                 | 0            | 0                   | 61               | 6           | 0                 |
| Rengasdengklok District | 0                 | 0            | 0                   | 87               | 5           | 1                 |
| Karawang Barat District | 0                 | 0            | 0                   | 159              | 78          | 37                |

Source: Karawang Regency in Figure, 2017

In terms of the revenue, **Table 7-50** summarises the operational costs and income by type of fishing gears.

**Table 7-50 Incomes by Type of Fishing Gears in Karawang**

| Type of Fishing Gears      | Origin   | Type of Captured Fish | Operational Cost per-Trip (in IDR) | Gross Income per Trip (in IDR) | Nett Income per Trip (in IDR) |
|----------------------------|--|-----------------------|------------------------------------|--------------------------------|-------------------------------|
| Crab Cages (Bubu Rajungan) | Cilamaya Wetan in Karawang   | Crabs                 | 250,000                            | 350,000                        | 150,000                       |
| Shrimp net                 | <ul style="list-style-type: none"> <li>Cilamaya Wetan, in Karawang;</li> <li>and</li> <li>Blanakan, Legon Kulon in Subang</li> </ul> | Shrimps               | 100,000                            | 120,000 to 4,000,000           | 110,000 to 3,900,000          |

| Type of Fishing Gears                   | Origin   | Type of Captured Fish   | Operational Cost per-Trip (in IDR) | Gross Income per Trip (in IDR) | Nett Income per Trip (in IDR) |
|---|--|---|------------------------------------|--------------------------------|-------------------------------|
| Bottom Gillnet<br>( <i>Rampus</i> )     | Karawang   | Mackerel and threadfin fish   | 300,000 to 400,000                 | 200,000 to 3,000,000           | 100,000 to 3,600,000          |
| Fishing Rod<br>( <i>Pancing Tonda</i> ) | <ul style="list-style-type: none"> <li>Cilamaya Wetan, in Karawang; and</li> <li>Blanakan in Subang</li> </ul> | Squids and Fishes i.e. pomfret, mackerel, cob, snapper, Lowing, and grouper | 2,000,000                          | 5,000,000 to 7,000,000         | 3,000,000 to 5,000,000        |
| Fishing Rod<br>( <i>Pancing Rawai</i> ) | Cilamaya Wetan in Karawang   | Fishes i.e. garok, tandas, and grouper                                      | 100,000 to 200,000                 | 800,000 to 3,000,000           | 700,000 to 2,800,000          |

Source: Pertamina, 2014

During the ESIA field surveys, consultations with the fishing groups in Muara village reported that brackish water pond fishing for fish and shrimp was preferred. The fishponds are linked to the Kalen Atas and Cilamaya River. The fishponds can be established within approximately three years; the following activities are undertaken:

- Excavation (IDR 100,000/person/day);
- Fish cultivation (IDR 120 – IDR 350 each, depending on the type of the fish; where 2,000 – 2,500 fish are required hence up to IDR 875,000 is invested in the fish cultivation initially; and
- Fish feeding, however the cost with this method is low as the fish mostly consume plankton from the river.

The total cost of developing a fishpond varies depending on the needs and capacities of the fishermen. An example of fishponds in Muara Village is illustrated in **Figure 7-33**.

**Shrimp:** Based on discussions with the local fishpond cultivators, on average, one (1) hectare of shrimp pond can generate 50 to 100 kg of shrimps every harvest cycle i.e. three (3) months. The market price ranges between IDR 70,000 – IDR 130,000 per kg, the bigger the shrimp the higher the selling price. The estimated gross income of shrimp cultivation is IDR 13,000,000 over three (3) months period inclusive the operational cost.

**Fish:** Additionally, one (1) hectare of fishpond can produce 1.5 quintal within 3.5 to four (4) months, worth of IDR 10,000 – IDR 20,000 per kg per one (1) hectare pond. Each pond produces roughly 150 kilograms of fish with gross income of IDR 1,375,000 over four (4) months before deducting the cost for establishing the pond.

*Figure 7-33 Fish Ponds in Muara Village*



Source: ERM ESIA Survey, 2017

Most fishermen sell the surplus shrimp and fish after they allocate enough for their daily needs/household consumption. The shrimp and fish are sold at the fish auction, located two (2) km from the coastal area (refer to **Figure 7-34**).

*Figure 7-34 Fish Auction “Samudra Mina” in Muara Village*



Source: ERM ESIA Survey, 2017

There are two (2) seasonal fishing periods; the east season, which commences from May and lasts until October and the west season that starts from November and lasts until April. Their revenue increases during March and April and decreases in January to February and June to July as the winds pick up, which makes it difficult for the fishing boats to sail.

There is no information mentioned for the distance that the fishermen go for sailing. Hence, during these periods, the fishermen normally choose to fix their boats and equipment.

When considering fishermen's income in this area there are two (2) types of scenarios which includes:

- **Fishermen with small boats:** These types of fishermen use nets for fishing; the size of the boat is 1.3 m x three (3) m. The estimation of capital per boat is around IDR 5,000,000 to IDR 9,000,000 with an additional costs for the machines, nets, fuels, and logistics at IDR 10,000,000. Each trip results in a net income of approximately IDR 100,000 that is divided between the boat owner (75%) and one (1) crew (25%). These type of fishermen usually sail daily; and
- **Fishermen with large boats:** These types of fishermen use rods for fishing; the size of the boat is 2.8 m x 6.5 m. The estimated capital for the boat is IDR 28,000,000 to IDR 35,000,000. The additional cost is for the machine, GPS, fish founder, accumulator, fuel, and logistics totaling around IDR 20,000,000 to IDR 25,000,000. The net income after sailing will be around IDR 4,000,000; 50% of which goes to the boat owner and 50% for the boat crew (up to 4 people).

#### *Fishing Household Data*

In 2017, the number of fishing households was recorded with the marine agency as 2,835 with 8,593 households recorded as engaged in fish cultivation. **Table 7-51** details the number of households engaged in fishing activities in Karawang.

**Table 7-51 Households Engaged in Fishing in Karawang**

| No. | Type of Business                 | Total # of Households |
|-----|----------------------------------|-----------------------|
| 1.  | <b>Total number of fishermen</b> | <b>2,835</b>          |
|     | a. Sea water                     | 1,545                 |
|     | b. Fresh water                   | 1,290                 |
|     | - River                          | 710                   |

| No.       | Type of Business          | Total # of Households |
|-----------|---------------------------|-----------------------|
|           | - Swamp                   | 140                   |
|           | - Excavated               | 440                   |
| <b>2.</b> | <b>Fish Cultivators</b>   | <b>8,593</b>          |
|           | a. Fishpond               | 3,391                 |
|           | b. Pond                   | 3,937                 |
|           | c. Paddyfield (Mina Padi) | 896                   |
|           | d. Floating Net Pond      | 315                   |
| <b>3.</b> | <b>Fishery Products</b>   | <b>5,049</b>          |
|           | a. Salty Dried Fish       | 240                   |
|           | b. Pindang                | 4,501                 |
|           | c. Shrimp Paste           | 264                   |
|           | d. Crackers               | 44                    |
| <b>4.</b> | <b>Salt Cultivators</b>   | <b>217</b>            |

Source: Renstra DKP Kab. Karawang, 2017

### *Bekasi Regency*

Given that Bekasi Regency is not located in a coastal area, fisheries is not one of the main livelihoods within the community. As mentioned previously, the local community in Bekasi Regency mostly work in the manufacturing industry. Data provided by BPS (*Bekasi Regency in Figure, 2017*) is shown for the Bekasi Regency as a whole. **Table 7-52** summarises the fisheries production in Bekasi.

**Table 7-52** *Total Fish Production in Bekasi Regency (in tons)*

| Capture Fisheries |              |                     | Aquaculture      |             |                   |        |
|-------------------|--------------|---------------------|------------------|-------------|-------------------|--------|
| Marine Fisheries  | Inland Water | Brackish Water Pond | Fresh Water Pond | Paddy Field | Floating Cage Net | Marine |
| 1,864.5           | 6.0          | 43,684.96           | 3,296.91         | 3.67        | 496.95            | 613.21 |

Source: *Bekasi Regency in Figure, 2017*

## Subang Regency

Subang Regency also has quite a large fishing potential given its abundance of marine resources. Similar to Kaawang due to its long coastline 68 km in length. Blanakan village has roughly a 5km coastline with an area of 840 ha where fish cultivation and sea fishing is undertaken. Muara village has a coastline of 3 km with an area of 474 ha where mangroves are present, fish cultivation and sea fishing are conducted.

Blanakan District produced 12,968.15 tons of marine fishery products and 3.2 tons of inland fishery products in 2016 (*Subang Regency in Figure, 2017*). In terms of the fishermen's revenue, **Table 7-53** summarises the operational cost and income by type of fishing gears.

**Table 7-53** *Incomes by Type of Fishing Gears in Subang*

| Type of Fishing Gears                        | Origin                               | Type of Captured Fish                             | Operational Cost per-Trip (in IDR) | Gross Income per Trip (in IDR) |
|--|--------------------------------------|---|------------------------------------|--------------------------------|
| Seine net<br>( <i>Jaring Arad Apollo</i> )   | • Blanakan and Legon Kulon in Subang | Shrimp, shell, squid, cuttlefish                  | 1,500,000                          | 2,000,000-3,000,000            |
| Fishing net<br>( <i>Jaring bawal putih</i> ) | • Blanakan and Legon Kulon in Subang | Anchovy   | 150,000                            | 500,000-2,500,000              |
| Payang Gemplo                                | • Blanakan and Legon Kulon in Subang | Anchovy   | 350,000                            | 1,400,000 - 2,800,000          |
| Payang Lampara                               | • Blanakan in Subang                 | Fish: trevally, mackerel, cob, squid, and pomfret | 700,000 - 800,000                  | 1,000,000-4,000,000            |
| Squid net                                    | • Blanakan in Subang                 | Squid   | 2,000,000 - 3,000,000              | 7,000,000-8,000,000            |
| Bawal fish net                               | • Blanakan in Subang                 | Pomfret, crab, stingray                           | 150,000                            | 500,000-3,000,000              |
| Purse Seine                                  | • Blanakan in Subang                 | Pelagic fish                                      | 15,000,000 - 20,000,000            | 10,000,000                     |
| Fishing net<br>( <i>Dogol</i> )              | • Blanakan in Subang                 | Crab  | 350,000                            | 150,000-700,000                |

Source: Pertamina, 2014

Based on observations and fishermen discussions, there are a number of differences in the Subang and Karawang fishing sectors. Namely, the size of boat and the duration of sailing. In Karawang Regency, the boat is smaller and as such the duration of sailing is typically daily compared to three days for Subang (refer to **Figure 7-35**). Furthermore, given their size, the vessels in Subang can store more fish catch on the boat.

Figure 7-35 Fishing Activities in Blanakan Village



Source: ERM ESIA Survey, 2017

From the discussion with the fishermen communities in Blanakan, fishing typically takes place between March and August. During this season, the local fishermen use *arad*, a seine net which is prohibited by government. This net catches all types of fish including juveniles therefore is considered unsustainable.

Similarly to the fishermen in Karawang; the income of Blanakan fishermen are dependent on the types of boats, fishing gears and number of catches. The fishermen in Subang identified a number of different vessels that are used including:

- Small Boats i.e. three (3) gross tons: One (1) boat costs approximately IDR 70,000,000; and the supplementary equipment costs around IDR 100,000,000 – IDR 120,000,00. The boat crew for this type of boat is typically two (2) to three (3) person; and
- Large Boats i.e. 25 gross tons: One (1) boat cost approximately IDR 800,000,000; and the supplementary equipment costs roughly IDR 1,500,000,000. Normally, the fishermen needs more than three (3) boat crews to operate.

The costs for specific fishing gear equipment and the operational costs and income can be seen as follows:

- **Shrimp net:** Shrimp nets of 50 m will cost IDR 400,000. At least three (3) shrimp nets are required thus, the fishermen will need a minimum capital of IDR 1,200,000. Each trip produces between three (3) to 10 kg of shrimp with the price per kg estimated at IDR 100,000. Capital for logistics and supplies equals IDR 300,000 as such the income per day is roughly IDR 300,000 – IDR 3,000,000. This income is divided between the boat owner and boat crew respectively 50% (in general, the boat owner will receive IDR 200,000 and the crew between IDR 75,000 to 100,000);

- **Bottom Gillnet (*Rampus*):** The price of the bottom gillnet is IDR 300,000 and again a minimum of three nets are required; thus, the fishermen will spend IDR 900,000 for a complete set of nets. The fishermen will catch 80 to 100 kg for each trip. The average fish price is about IDR 20,000, hence the fishermen usually earn IDR 2,000,000. The capital for three (3) days fishing costs approximately IDR 900,000. Thus, the net income for each trip (three (3) days) is IDR 1,000,000 for the boat owner and boat crew, respectively. The number of crew usually depends on the size of the boat and type of fishing gear. Normally, the net income is divided equally between the boat owner and boat crew; and
- **Seine Net (*Arad*):** The income for each trip is usually between IDR 1,000,000 and IDR 6,000,000; with the average at IDR 3,000,000 for fishermen in this area. The capital for logistics and supplies are about IDR 900,000. Thus, the net income for each trip (three days) is IDR 2,100,000. The distribution of the net income for this type of fishing gear is the same as the other type of fishing gear; it will be divided 50% respectively for boat owner and boat crew.

#### *Fishing Household Data*

In 2017, the number of fishing households in Subang was recorded as 3,070, while fishery products sellers totalled 2624 households. Further details Suang fiof number of Fishery Households can be seen in more detail in below.

**Table 7-54 Fisheries Household at Subang Regency**

| No. | Business Type          | Number of Households |
|-----|------------------------|----------------------|
| 1.  | <b>Catchment</b>       |                      |
|     | Sea water              | 3,070                |
|     | Fresh water            | 1,670                |
| 2.  | <b>Cultivation</b>     |                      |
|     | Fishpond               | 7,845                |
|     | Pond                   | 16,025               |
|     | Swamp Water Pond       | 595                  |
|     | Paddyfield             | 26,400               |
| 3.  | Sea basket & fishponds | 945                  |
| 4.  | Fisheries Products     | 2,643                |
|     | <b>Total</b>           | <b>58,943</b>        |

Sumber: Renstra DKP Kab. Subang, 2017

A further fish catch survey is being conducted by the Project in July and August 2018 that will further build knowledge on fishing activities and practices in the Project area.

#### 7.5.1.6 *Tourism and Recreation Sector*

This chapter summarises the tourism and recreational sector in Karawang, Bekasi and Subang Regencies.

##### *Karawang Regency*

The Project footprint area is unknown to have any tourism or recreational activities within it. However, there are several tourism destinations that may be impacted because of the Project transportation needs during the construction phase including (*Karawang District website, 2016*):

- Tugu Proklamasi, Tugu Kebulatan Tekad, Soekarno Exile house Rengasdengklok located in the Rengasdengklok district (40 km west of Cilamaya), characterised as a historical tourism site;
- Pantai Tanjung Baru located in the Cilamaya Wetan district (15 km north west of Cilamaya), characterised as a marine tourism site;
- Makam Syekh Kuro located in the Lemah Abang district (20 km west of Cilamaya), characterised as religious tourism site; and
- Tugu Rawa Gede (40 km west of Cilamaya) located in Rawamerta district considered as a historical tourism site.

##### *Bekasi Regency*

Although there are several tourism destinations in Bekasi Regency, there are no tourism sites likely to be impacted by the Project activities).

##### *Subang Regency*

There are a number of tourism destinations in Subang Regency (*Reference, 2017, available on the Subang Government's website*). The tourism destinations include:

- Wisata Buaya Blanakan located in Blanakan District, characterised as an eco-tourism site, this is a man-made conservation area for crocodile; and
- Ekowisata Tambak alas Blanakan and Greenthink are located in Blanakan District, characterised as an ecotourism site, these are a fishpond and mangrove ecotourism area (refer to **Figure 7-36**).

Figure 7-36 Mangrove Tourism Spot in Greenthink, Subang Regency



Source: ERM ESIA Survey, 2017

- Pantai Pondok Bali located in Pamanukan, Subang (40 km east of Cilamaya), characterised as beach tourism site, this is a white sand beach along the coastal area of Mayangan.

Given the close proximity of Blanakan village to the Project activities attention will be required to mitigate potential impacts to these tourism/cultural heritage activities.

**Figure 7-37** illustrates the locations of the tourism locations.

Figure 7-37 Locations of Tourism and Cultural Heritage in Karawang, Bekasi and Subang



### 7.5.1.1

#### *Cultural Heritage*

Culturally Indonesia is very diverse, a number of cultural heritage have been identified within the AoI that may be impacted by the Project activities.

##### *Karawang Regency*

The transmission line route is designed to pass through Rengasdengklok Village in Rengasdengklok District. It is understood that there is physical cultural heritage present including the Monument of Rengasdengklok which represents a relief depicting event of Proclamation of the Indonesian Independence on 17 August 1945 (*Kwarsa, 2016*).

##### *Bekasi Regency*

There is no physical cultural heritage located nearby the Project location. Some physical cultural heritage in Bekasi Regency are situated near the beach area such as Buni Desa Muara Bakti as Bekasi was historically a port area for Padjajaran Kingdom during the seventh century (*Tourism website of West Java Province Government, 2017*).

##### *Subang Regency*

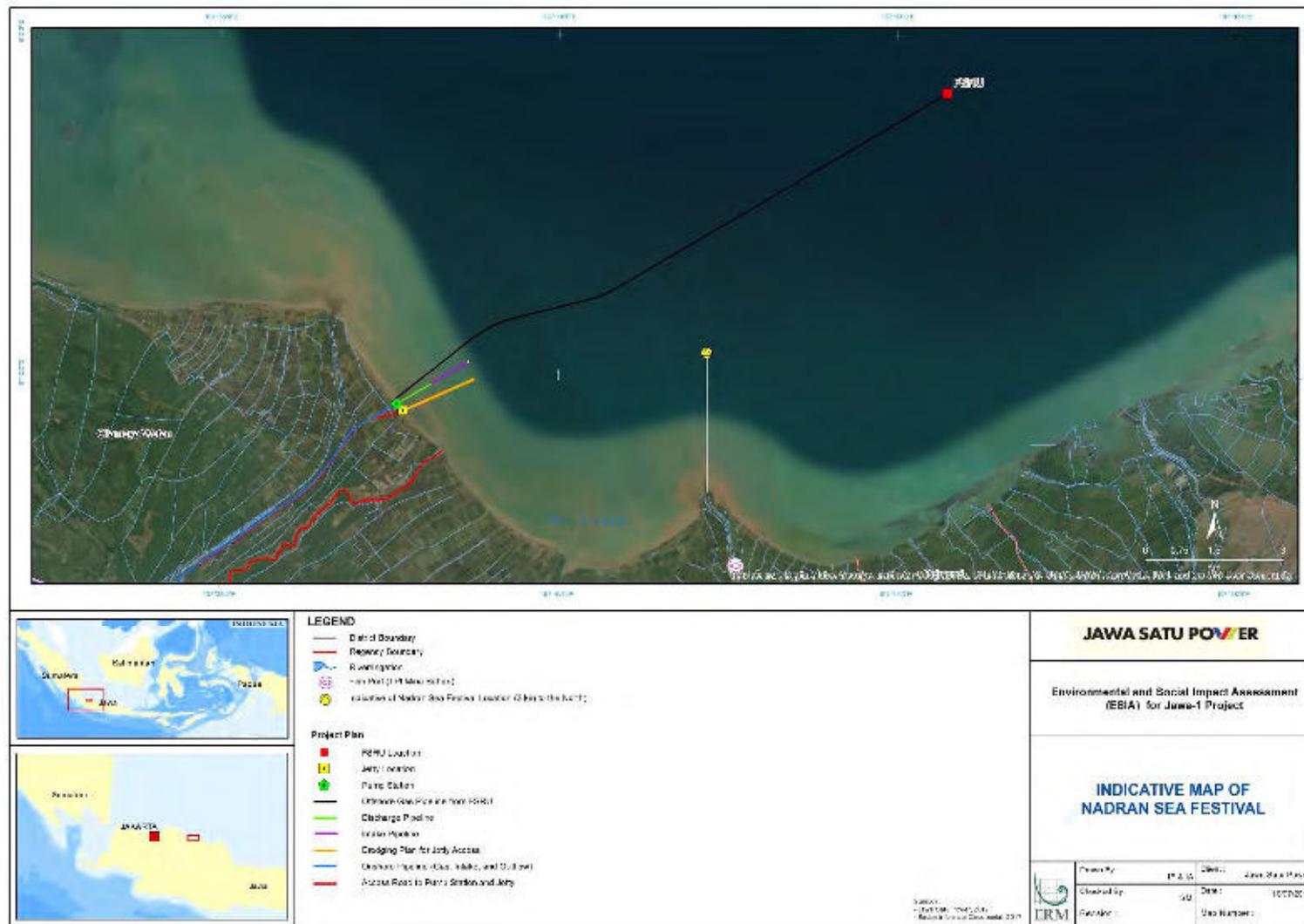
Subang has cultural heritage in form of cultural ceremonies that relate closely with agriculture and fishery.

*Hajat Bumi or Babaritan* is a cultural ceremony to thank nature for a good crop yield in Karawang, Bekasi and Subang. Hundreds of people gather in their village to eat and pray together to show gratitude to their environment.

*Nadran* is a cultural ceremony to thank the sea on behalf of the villagers in Blanakan Village (*Subang Government Tourism Website, 2016*). Hundreds of people and traditional ships parade each year along the Blanakan coast. This tradition usually happens during August to October each year for a week based on the local government agenda. In addition to traditional ritual ceremonies, traditional arts and night markets are held. The ceremony offers the rulers of the sea, *ancak*, boat-shaped replica of a buffalo head. The ceremony attract hundreds of people to the area.

Given the close proximity of Blanakan village (the location is presented in **Figure 7-37** and **Figure 7-38**) to the Project activities attention will be required to mitigate potential impacts to these cultural heritage activities.

Figure 7-38 Location of Nadran Annual Festival



### 7.5.1.2

#### *Industrial Sector*

##### *Karawang Regency*

Based on the data from the West Java Investment Coordinating Board, the total industry in Karawang reached 9,963 units in 2013. This was an increase of 0.4% from 2012. The industry groups included metal, machinery and engineering, assorted electronics, textile, tool transports, chemical, agro, pulp and paper and forest products (*Karawang Regency in Figure, 2017*).

##### *Bekasi Regency*

During 2015, the largest cumulative industry in Bekasi was the fabricated metal products, computer and electronic equipment valuing at IDR 83.3 trillion. The second largest industry was transportation (IDR 26.7 trillion) follows by the machinery and equipment (IDR 18.02 trillion) (*Bekasi Regency in Figure, 2017*).

##### *Subang Regency*

In 2016 it was reported that the Subang Regency had 7,195 companies with 25,461 employees. The largest industrial group was the agro industry (*Subang Regency in Figure, 2015*). Meanwhile, the major industry in Blanakan District was rice milling i.e. 67 companies with 395 employees (*Blanakan District in Figure, 2017*).

### 7.5.1.3

#### *Electricity*

##### *Karawang Regency*

There is no data about the use of electricity in Karawang Regency. However, based on observations and the survey, the local communities within the Project area are connected to the national grid via PLN of an average 450 – 900 Watts. The quality of the electricity is good and disruption are reported to be rare. However, during heavy rain the electricity outage is impacted. During the social survey, 72.2% of respondents confirmed they use a postpaid system to pay their electricity.

##### *Bekasi Regency*

Most of the electricity needs in the Bekasi Regency is supplied by the PLN and the other is supplied by non-PLN which are produced by the co-operation, regional government and private company (*Bekasi Regency in Figures, 2017*). The PLN electricity production is divided into its own development electricity and electricity buying from the other industry. The non-PLN electricity industries have one (1) kW capacity and which has over 10 consumers. The total customers are 1,462,283; 94.74 % of which are households (refer to **Table 7-55**).

**Table 7-55** *Number of Electric Customers and Growth of Installed Capacity by Kind of Customers, 2016*

| <b>Kind of Customer</b> | <b>Amount</b>    | <b>Growth of the installed capacity (VA)</b> |
|-------------------------|------------------|--|
| Social                  | 14,477           | 81,328,350                                   |
| Household               | 1,385,408        | 1,439,881,150                                |
| Business                | 57,504           | 607,313,600                                  |
| Industry                | 1,686            | 1,778,055,850                                |
| Government              | 3,010            | 34,861,857                                   |
| Others                  | 198              | 54,014,500                                   |
| <b>Total</b>            | <b>1,462,283</b> | <b>3,995,455,307</b>                         |

*Source: Bekasi Regency in Figures, 2017*

#### 7.5.1.4 *Telecommunication*

##### *Karawang Regency*

Limited telecommunication data is available in Karawang Regency. During the ESIA survey, it was confirmed that most communities use a mobile phone to communicate however not all areas in Karawang have coverage.

##### *Bekasi Regency*

Telecommunications are on a par with Jakarta in Bekasi given its urban status and proximity.

The main communication facility used is the mobile phone; every village in Bekasi Regency has coverage by a cellular network. Furthermore, internet access can also be provided through the mobile phone network. Bekasi Regency Government is building fiber optic network in their area since 2015 and become pilot project since they are the first area who is doing this in West Java. A fiber optic cable network called optical fiber is one of the kind of cable-based internet hardware from glass fiber with a very high data transfer rate (*Sindonews, 2018*).

#### 7.5.1.5 *Transportation*

West Java province transportation access, in general, is considered to be good in comparison to other provinces in Java. As such the main access roads (e.g. Tol Cikampek and Cipali) do not require new infrastructure. In order to access areas along the transmission line, the Project traffic movements will be traversing smaller village roads of a poor condition. The following chapter provides an overview of the land and marine transportation activities relevant to the Project.

## *Karawang District*

### Land Transport

The total road network in Karawang District is 2,682 km which includes national, provincial and toll roads. The remaining roads are a mix of local sub-district/village roads; it is reported that more than 35% of these roads are in a poor condition (*Karawang Regency in Figure, 2016*). Village roads within the Project area are approximately two (2) to three (3) meters in width and are constructed using either concrete or ground surface. During the site visit survey, the majority of access to Muara village was in a poor condition and unpaved yet; unsuitable for a vehicle.

However Karawang District Plan (2005--2025) has several infrastructure Projects underway including the:

- Development of new roads to connect the International Port in Cilamaya to the existing main arterial road network;
- Upgrade of Cikampek to Cilamaya Local Road (Cikalongsari – Cilamaya);
- Upgrade of Karawang to Cilamaya Local Road (via Telagasari and Lemahabang);
- Upgrade of Rengasdengklok to Cilamaya Local Road (via Pedes an Tempuran); and
- Development of a new highway access to Cilamaya and new rail networks (*IDRJPD, 2017*).

Many village roads are narrow and in a poor condition often not suitable for vehicles. The proposed transmission line route and substation construction requirements will require arrangements for heavy equipment transportation involving potentially the enhancement of roads and temporary bridges.

The number of road accidents reported in Karawang District was 305 cases in 2015; the main cause is cited as due to travelling at high speeds (*BPS, 2016*).

### Shipping and Navigation

Shipping arrangements will require co-ordination with the local fishery authority. Muara village is a fishery port and fish auction area for anglers and fishermen around Karawang area (*Karawang Regency Government website, 2016*).

The Project is likely to utilise Tanjung Priok Port to transport some equipment and materials to the area (prior to the construction of the jetty). Tanjung Priok is the gateway for incoming goods import-export or inter island goods.

Around 12,770 vessels were recorded in 2016 carrying over 34.5 million gross tons per year (*Worldportsource, 2016*). Passenger ships also travel from Tanjung Priok to Tanjung Mas and vice versa; this is however only served during Idul Fitri (three (3) return trips). The shipping navigation should also consider offshore facilities owned by Pertamina PHE ONWJ.

#### *Bekasi District*

##### Land Transport

The length of road facilities in Bekasi Regency varies depending on the type: the state route is 29 km in length, the province route is 26 km in length and the regency route is 841,117 km in length. The state route is entirely paved, meanwhile 44.4% of the province route is paved; the remaining route is concrete. On average, the route conditions are medium to good condition. (*Bekasi Regency in Figure, 2016*).

Traffic incidents are not well recorded; the last data update recorded 839 accidents in 2013 (*Bekasi Regency in Figure, 2016*).

#### *Subang District*

##### Land Transport

For the past five (5) years, there are no significant changes to the total road network excluding the provincial route in Subang, the length being 1,054 km; roughly, 75% of road conditions are considered of a good quality (*Subang in figure, 2016*).

The number of road accidents reported in Subang District was 592 cases in 2014 (*BPS, 2015*).

##### Shipping and Navigation

Ciasem Bay and Blanakan Fishery Port have active fishery activities such as fishing ground area and fish auctions. Activities are mainly ship docking areas and auction areas. These have not been identified within the Project footprint.

As discussed previously the shipping arrangement for LNG input to FSRU also should consider the movement of shipping routes from the port of Tanjung Priok, North Jakarta to the port of Tanjung Emas, Semarang as well as the passenger ship from Tanjung Priok to Tanjung Mas during Eid celebrations.

## 7.5.2 *Sociocultural System*

### 7.5.2.1 *Indigenous Peoples*

When defining if a group of people are indigenous the ADB refers to the following criteria:

- Descends from population groups present in a given area;
- Maintenance of cultural and social identities, and social, economic, cultural, and political institutions separate from mainstream or dominant societies and cultures;
- Self identifies as Indigenous and identification by others as being part of a distinct indigenous cultural group, and the display of desire to preserve that cultural identity;
- Converses in a linguistic identity different from that of the dominant society;
- Conducts social, cultural, economic, and political traditions and institutions distinct from the dominant culture;
- Economic systems oriented more toward traditional systems of production than mainstream systems; and
- Possess unique ties and attachments to traditional habitats and ancestral territories and natural resources in these habitats and territories.

The villages along the transmission line, around the power plant and coastal area do not self-identify as IP and there are no traditional practices or rituals undertaken that would be associated with IP. The communities have integrated into Indonesian mainstream society, in particular given the locations proximity to Jakarta. Further the local language widely spoken Bahasa or Sunda neither considered as a distinct dialect.

Based on this criteria, along with consultation with the impacted communities in the Project area and baseline data gathered it is confirmed that no IP are present in the Project area.

### 7.5.2.2 *Ethnicity*

The diversity of ethnicity in Indonesia is very diverse depend on the historical factors and local migration factors. In the AoI the majority of people are of the Sunda group (similar to the West Java Province profile) however the existence of a port in the coastal area creates a more diverse mix of ethnicities and language acculturation.

No statistical data is available at the regency level how based on the national census undertaken in 2010 besides Sunda (73%), Jawa (13%), Betawi (6%) and Cirebon (4%) are the most common ethnicities in the West Java Province.

### *Karawang Regency*

The majority of ethnic groups in Karawang Regency are of the Sunda group. The people in this area use Bahasa Indonesia and the Sundanese language with many variations according to the locality. There are no recognised indigenous peoples within the vicinity of the proposed Project area. Moreover, since most of the district can be categorised as urban and peri-urban area with factories in the surrounds Karawang consists of various ethnic groups from across the Java Island (*Karawang Regency in Figures, 2016*).

### *Bekasi Regency*

Several ethnicities exist in Bekasi regency; mainly Sundanese, Javanese, Banten, Melayu and Balinese. The majority being Sundanese, therefore the language that the people use in this area are Bahasa Indonesia and Sundanese. There are no indigenous peoples within the vicinity of the proposed Project area. The mix among those ethnicities is the common social population in West java province (*Bekasi Regency in Figures, 2016*).

### *Subang Regency*

The local population in Subang is mostly Sundanese as is the case across most of West Java. There are no indigenous peoples within the vicinity of the proposed Project area. The difference is only in coastal area, instead of using only Bahasa Indonesia and Sundanese language, some coastal communities speak in a Javanese language. (*Subang Regency Government, 2016*).

#### 7.5.2.3

#### *Vulnerable People*

In terms of vulnerable people in the three (3) regencies, secondary data gathered from Regency in Figure 2016 and Regency Statistical Bureau 2016 cited the vulnerable people as poor families, neglected infants, homeless children, people with special needs, women prone to social-economic issues, neglected elderly and sex workers as presented in **Table 7-56**.

**Table 7-56 Vulnerable Groups**

| Vulnerable Group                      | Regency  |         |         |
|---------------------------------------|----------|---------|---------|
|                                       | Karawang | Bekasi  | Subang  |
| Number of poor people                 | 230.600  | 108.975 | 349.207 |
| Neglected infants                     | 841      | 176     | 2.208   |
| Homeless children                     | 4.054    | 2.662   | 6.427   |
| Disabled People                       | 6.237    | 2.500   | 9.794   |
| Women prone to Social Economic issues | 18.009   | 4.106   | 8.456   |
| Neglected elderly                     | 19.662   | 5.082   | 10.885  |
| Sex Workers                           | 520      | 36      | 319     |

*Source: Regency in Figure 2016*

#### 7.5.2.4 Religion

The largest religion in Indonesia is Islam, however the Indonesian government supports the right to choose a religion for all its citizens. In Karawang, Bekasi and Subang Regency, the religious groups are diverse.

##### *Karawang Regency*

The Karawang Regency has a diverse range of religious groups accommodating various religious facilities. The Ministry of Religion, 2014, stated that the Islam religion had the highest population (2,085,810 persons with 409 mosques and 1.081 mushollas), Protestants (6,024 persons and 78 churches), Catholics (53,102 persons with one (1) church), Hinduism (1,620 person and two (2) temples), Buddhism (23,651 and 17 Viharas) and Konghucu (140 persons and one (1) temple).

##### *Bekasi Regency*

The Bekasi Regency also has a diverse range of religious groups with Islam religion had the highest population (2,486,010 persons and 1,313 mosques and 750 mushollas), Protestants (33,124 persons and no church), Catholics (137,254 persons and eight (8) churches), Hinduism (6,125 person with two (2) temples), Buddhism (19,578 with 20 Viharas) and Konghucu (922 persons and no temple).

##### *Subang Regency*

Similarly the Subang Regency also has a diverse range of religious groups; with Islam religion had the highest population (.470.140 persons, with 2,021 mosques and 4,486 mushollas), Protestants (2,318 persons, with 30 churches), Catholics (20,363 persons with two (2) churches), Hinduism (192 person with no temple), Buddhism (1,453 with no Vihara) and Konghucu (one (1) person and no temple).

#### 7.5.2.5

##### *Historical Conflict*

###### *Karawang Regency*

Interviews conducted with key informants in Karawang during the ESIA survey showed that historically there has been no significant social conflict (between ethnicities or religious group, etc.) between community groups. As mentioned earlier, the villagers have lived harmoniously and no case of religious conflict have been reported in the study area.

However, there were reported land disputes mainly relating to land acquisition conflict between industry and farmer's groups as well as within families. These conflicts have been under the facilitation of the local social office.

###### *Bekasi Regency*

Similar to Karawang, interviews conducted with key informants in Bekasi show that historically there has been no significant social conflict (between ethnicities or religious, etc.) between community groups.

A routine conflict has been documented on the Bekasi Regency's government website. An ongoing conflict between DKI Jakarta Administration and Bekasi city's government on Bantargebang waste management. This has been an ongoing dispute since 2015. As DKI Jakarta waste distribution has been disposing of 7,000 tons of waste per day to Bantargebang waste facilities since 2015. This number exceeds the agreed amount, which is only 2,000 tons per day. As such the Bantargebang management frequently closes the facility to DKI garbage trucks creating negative tension between government agencies.

###### *Subang Regency*

Similar to Bekasi, interviews conducted with key informants in Subang show that historically there have been no significant social conflicts (between ethnicities or religious, etc.) between community groups.

#### 7.5.2.6

##### *Crime and Community Security*

###### *Karawang Regency*

No crime records are publically available however during the survey, the community discussed alcohol consumption linked to criminal activity. The respondents perceive alcohol consumption among youth triggering fighting and shooting incidents. The number of reported crimes was 2,002 cases, while 786 cases were solved (*Karawang Regency in Figures, 2016*).

###### *Bekasi Regency*

Similar to Karawang no crime records are publically available however again alcohol consumption amongst youths was identified as a concern leading to

violence. The number of reported crimes during 2015 was 172 cases, while 115 cases were solved (*Bekasi Regency in Figure, 2016*).

### *Subang Regency*

Crime reports were also not available for Subang, however, Blanakan District recorded 23 cases of the crimes. During the survey, the alcohol consumption amongst the youth were noted to be a concern.

## **7.5.3 Community Health**

Health is one of fundamental needs of human being. Therefore, the availability of supporting health facilities and infrastructure is very important. The availability of health facilities, personnel and patterns of life styles support the improvement of community health. This chapter explains the local health status where possible and the availability of medical personnel.

### *7.5.3.1 National Key Health Indicator*

Life expectancy at birth provides an indication of overall mortality of a country's population. In Indonesia the life expectancy at birth has improved by 2.8 years i.e. from 2000 (66.3 years) to 2015 (69.1 years) in 2015 (*WHO, 2017*).

At the same time, Indonesia faces demographic challenges, numerous epidemics and nutrition problems. The main causes of death in Indonesia are coronary heart disease, influenza and pneumonia, stroke, lung disease and tuberculosis (*TforG, 2016*).

Communicable diseases also remain a significant challenge to the health system as demonstrated by increasing trends of various communicable diseases such as filariasis. Tuberculosis (TB) cases vary widely across regions (330,729 in total in 2015) (*WHO, 2016*).

Growth of the HIV/AIDS epidemic among high-risk groups is increasing, although it remains concentrated, with low prevalence rates among the general population. Approximately 700,000 people are living with HIV in Indonesia and 0.5% of the working population lives with HIV.

Significant investments by the Government and the international community have increased access to healthcare but poor quality, poor infrastructure and equipment, under resourcing and inefficiencies remain major concerns across the country.

## Karawang Regency

Based on the available secondary data (*Karawang Regency in Figures, 2016*) and during the consultation of baseline study, there is no hospital in Cilamaya Wetan and Cilamaya Kulon Districts. The location of the proposed CCGT Power Plant and the nearshore facilities located in the district of Cilamaya Wetan, while Cilamaya Kulon is the neighbouring district. It is reported that the nearest hospital is located in the Karawang Barat area, approximately 28 km from the power plant. However, public health centres are available in both districts.

Number of health facilities available in the Regency of Karawang are presented in **Table 7-57** and the availability of health personnel is presented in **Table 7-58**.

**Table 7-57** Public Health Facilities in Karawang Regency

| District / Sub-District | Health Facilities |                      |                      |                           |                        |                         |
|-------------------------|-------------------|----------------------|----------------------|---------------------------|------------------------|-------------------------|
|                         | Hospital          | Hospital / Maternity | Public Health Centre | Aux. Public Health Centre | Village Maternity Post | Family Service Planning |
| Cilamaya Wetan          | -                 | -                    | 2                    | -                         | 3                      | 68                      |
| Cilamaya Kulon          | -                 | -                    | 2                    | -                         | 3                      | 76                      |
| Karawang Barat          | 4                 | 6                    | 5                    | 2                         | 15                     | N/A                     |
| Rawamerta               | -                 | -                    | 2                    | -                         | 6                      | N/A                     |
| Tempuran                | -                 | 4                    | 3                    | 3                         | 10                     | 69                      |
| Kutawaluya              | -                 | -                    | 2                    | -                         | -                      | 85                      |
| Rengasdengklok          | 1                 | 2                    | 2                    | 1                         | 2                      | 58                      |
| Cilebar                 | -                 | -                    | 1                    | -                         | 7                      | -                       |

Source: ERM 2018b

**Table 7-58** Number of Health Personnel in Karawang Regency

| District / Sub-District | Health Personnel |        |          |            |        |
|-------------------------|------------------|--------|----------|------------|--------|
|                         | Doctors          | Nurses | Midwives | Pharmacist | Others |
| Cilamaya Wetan          | 6                | 9      | 28       | 1          | 4      |
| Cilamaya Kulon          | 6                | 7      | 23       | N/A        | 3      |
| Karawang Barat          | 3                | 6      | 14       | 11         | 1      |
| Rawamerta               | 6                | 14     | 28       | 1          | 2      |
| Tempuran                | 6                | 9      | 26       | N/A        | 1      |
| Kutawaluya              | 6                | 12     | 25       | 1          | 2      |
| Rengasdengklok          | 7                | 11     | 30       | 2          | 9      |
| Cilebar                 | 3                | 3      | 15       | N/A        | 1      |

Source: Karawang Regency in Figure, 2016

### Bekasi Regency

Based on the available secondary data (*Bekasi Regency in Figures, 2016*), the health facilities in the Bekasi Regency are slightly better in quality than in the Karawang Regency. Hospital and health centres are both available within the potentially impacted districts area in Bekasi Regency.

Number of health facilities available in the Regency of Bekasi is presented in **Table 7-59** and the availability of health personnel is presented in **Table 7-60**.

**Table 7-59** *Public Health Facilities in Bekasi Regency*

| District / Sub-District | Health Facilities |                      |                      |                           |                        |                         |
|-------------------------|-------------------|----------------------|----------------------|---------------------------|------------------------|-------------------------|
|                         | Hospital          | Hospital / Maternity | Public Health Centre | Aux. Public Health Centre | Village Maternity Post | Family Service Planning |
| Kedung Waringin         | 2                 | 2                    | 2                    | -                         | 13                     | 43                      |
| Cikarang Timur          | -                 | 2                    | 2                    | 1                         | 6                      | 78                      |
| Karang Bahagia          | 2                 | 4                    | 1                    | 3                         | 22                     | 79                      |

Source: Bekasi Regency in Figures, 2016

**Table 7-60** *Number of Health Personnel in Bekasi Regency*

| District / Sub-District | Health Personnel |        |          |            |        |
|-------------------------|------------------|--------|----------|------------|--------|
|                         | Doctors          | Nurses | Midwives | Pharmacist | Others |
| Kedungwaringin          | 6                | 14     | 18       | -          |        |
| Cikarang Timur          | 19               | 39     | 23       | -          |        |
| Karangbahagia           | 10               | -      | 49       | -          | 27     |

Source: Bekasi Regency in Figure, 2016

It is also reported that in 2014, there were 16 doctors, 36 medical specialists supported by more than 220 medical assistants e.g. pharmacist, physiotherapists, psychologists, midwives etc. These medical staff serve various health facilities within the Bekasi Regency (*Bekasi Regency in Figures, 2016*)

### Subang Regency

In Subang Regency, hospitals and public health centres are both available with adequate number of health personnel. The number of health facilities available in the Regency is presented in **Table 7-61** and the availability of health personnel is shown in **Table 7-62**.

**Table 7-61** *Public Health Facilities in Subang Regency*

| District / Sub-District | Health Facilities |                      |                      |                           |                        |                         |
|-------------------------|-------------------|----------------------|----------------------|---------------------------|------------------------|-------------------------|
|                         | Hospital          | Hospital / Maternity | Public Health Centre | Aux. Public Health Centre | Village Maternity Post | Family Service Planning |
| Blanakan                | 1                 | -                    | 1                    | -                         | 9                      | 1                       |

Source: Blanakan District in Figure, 2016

**Table 7-62** *Number of Health Personnel in Bekasi Regency*

| District / Sub-District | Health Personnel |        |          |            |        |
|-------------------------|------------------|--------|----------|------------|--------|
|                         | Doctors          | Nurses | Midwives | Pharmacist | Others |
| Blanakan                | 2                |        | 15       |            | 1      |

Source: Blanakan District in Figure, 2016

7.5.3.3 *Data of Key Community Diseases*

*Karawang Regency*

**Table 7-63** presents the most common illnesses that required treatment in the seven Project impacted districts, as identified from the patient data from the community health centers. The data of community health center covers all community health facility in each district during 2016 and 2017.

**Table 7-63** *Number of Reported Patient and Diseases in Karawang Regency*

| Type of Disease                                | District (Number of Patient) |                |          |           |            |                |                |         |
|--|------------------------------|----------------|----------|-----------|------------|----------------|----------------|---------|
|  | Cilamaya Wetan               | Cilamaya Kulon | Tempuran | Rawamerta | Kutawaluya | Rengasdengklok | Karawang Barat | Cilebar |
| Non-specific Acute Respiratory Tract Infection | 2,635                        | 7,635          | 3,407    | 5,828     | 10,998     | 1,015          | 7,630          | 6,183   |
| Hypertension                                   | 1,816                        | 6,680          | 2,066    | 4,513     | 5,988      | 777            | 2,224          | 1,882   |
| Gastritis                                      | 1,598                        | 5,689          |          | 3,779     | 5,811      | 930            | 2,990          | 4,389   |
| Myalgia  | 1,347                        | 4,133          | 1,968    | -         | -          | 874            | 2,094          | 4,151   |
| Skin Disease                                   | 1,041                        | 6,534          | -        | -         | 5,881      | -              | -              | -       |
| Fever Suspect Typhoid                          | 714                          | -              | -        | -         | -          | -              | -              | -       |
| Headache                                       | 658                          | 7,488          | -        | 1,132     | -          | -              | -              | -       |
| Rheumatic                                      | 628                          | 5,172          | 1,472    | -         | 4,522      | -              | 2,973          | 1,996   |
| Dermatitis                                     | 645                          | -              | 1,370    | 2,434     | 2,446      | 782            | 3,059          | 2,419   |
| Fever  | 356                          | 5,728          | 699      | -         | 4,611      | 968            | 946            | 3,809   |
| Cough  | -                            | 7,542          | -        | -         | -          | -              | -              | 2,879   |
| Influenza                                      | -                            | 4,061          | 1,656    | 1,123     | -          | -              | 2,083          | 3,637   |
| Stomachache                                    | -                            | -              | 2,246    | -         | -          | -              | -              | -       |
| Diarrhea                                       | -                            | -              | 992      | 1,039     | 3,256      | -              | -              | -       |
| Common Cold                                    | -                            | -              | -        | 3,496     | -          | 1,081          | -              | -       |
| Arthritis                                      | -                            | -              | -        | 3,158     | -          | -              | -              | -       |
| Toothache                                      | -                            | -              | -        | 1,648     | -          | -              | -              | -       |
| Worms  | -                            | -              | -        | -         | 1,871      | -              | -              | -       |
| Pulpa Disease                                  | -                            | -              | -        | -         | 1,871      | -              | -              | -       |
| Other ISPA                                     | -                            | -              | -        | -         | -          | 1,070          | -              | -       |
| Migraine                                       | -                            | -              | -        | -         | -          | 835            | -              | 3,348   |
| Diarrhea                                       | -                            | -              | -        | -         | -          | 745            | -              | -       |

| Type of Disease | District (Number of Patient) |                |          |           |            |                |                |         |
|-----------------|------------------------------|----------------|----------|-----------|------------|----------------|----------------|---------|
|                 | Cilamaya Wetan               | Cilamaya Kulon | Tempuran | Rawamerta | Kutawaluya | Rengasdengklok | Karawang Barat | Cilebar |
| Dispepsia       | -                            | -              | -        | -         | -          | -              | 1,502          | -       |
| Others          | -                            | -              | 21,163   | -         | -          | -              | 15,524         | 6,183   |

Source: ERM, 2018b

As presented in the table above, acute respiratory infections were the most common illnesses in all districts. Reported to be due to the level of dust particulates in the local area and traffic levels.

#### Bekasi Regency

**Table 7-64** below presents the number of patients of common diseases in potentially impacted districts in Bekasi Regency in 2017. The data shows that acute respiratory tract infection is the most common disease found in the area. Pebayuran district is recorded with the highest number of patient, almost five times of the cases number in Karangbahagia. The second common disease found in each of the district is hypertension. Overall, the number of each disease are higher in Pebayuran district as this facility covers health reports from three supporting public health centers (*Puskesmas Pembantu*) in the area.

**Table 7-64** Number of Reported Patients & Diseases in Bekasi Regency

| Type of Disease                                | District (Number of reported patients) |                |           |            |          |
|--|--|----------------|-----------|------------|----------|
|  | Karangbahagia                          | Kedungwaringin | Pebayuran | Lemahabang | Cikarang |
| Non-specific Acute Respiratory Tract Infection | 2,397                                  | 3,024          | 12,126    | 4,164      | 2,432    |
| Hypertension                                   | 1,895                                  | 1,968          | 3,431     | 953        | 714      |
| Non-specific Gastritis                         | 1,557                                  | 1,058          | -         | -          | -        |
| Myalgia  | 1,41                                   | 820            | 1,812     | 1,392      | -        |
| Rheumatic                                      | 1,245                                  | 781            | -         | -          | -        |
| Fever  | 1,239                                  | 662            | 1,747     | -          | -        |
| Non-specific Antenatal Examination             | 1,239                                  | -              | -         | -          | 752      |
| Influenza                                      | 1,231                                  | -              | -         | -          | -        |
| Pulpitis                                       | 1,211                                  | -              | -         | -          | -        |
| Non-specific Dermatitis                        | 195                                    | -              | -         | -          | -        |
| Cough  | -                                      | 1,341          | -         | -          | 1,479    |
| Antenatal Examination                          | -                                      | 1,288          | -         | -          | 1,119    |
| Acute Nasopharyngitis                          | -                                      | 720            | -         | -          | -        |

| Type of Disease  | District (Number of reported patients) |                |           |            |          |
|--|--|----------------|-----------|------------|----------|
|  | Karangbahagia                          | Kedungwaringin | Pebayuran | Lemahabang | Cikarang |
| Headache   | -                                      | 682            | 949       | 300        |          |
| Pulp Disease and Periapical System                         | -                                      | -              | 4,935     | -          | 527      |
| Gum and Periodontal Disease                                | -                                      | -              | 3,544     |            |          |
| Dyspepsia  | -                                      | -              | 2,516     | 1,378      | 1,277    |
| Arthritis  | -                                      | -              | 1,694     | 195        |          |
| Disturbances in Tooth Eruption                             | -                                      | -              | 1,143     | 660        |          |
| Dermatitis   | -                                      | -              | -         | 978        | -        |
| Diabetes Mellitus  | -                                      | -              |           | 232        |          |
| Conjunctivitis   | -                                      | -              |           | 263        |          |
| Routinely Examination of Children Health                   | -                                      |                |           |            | 829      |
| Diarrhea and Gastroenteritis of Presumed Infectious Origin | -                                      |                |           |            | 606      |
| Necrosis of Pulp   | -                                      |                |           |            | 589      |

Source: ERM, 2018b

#### Subang Regency

Based on Blanakan Health Centre data, the most common disease in Blanakan village is non-specific acute respiratory tract infections. While the next most common disease is febris (fever) disease likely because of the dust in the village. Other disease is presented in **Table 7-65**.

**Table 7-65** Number of Reported Patients and Diseases in Bekasi Regency

| Type of Disease                                | Total |
|--|-------|
| Non-specific Acute Respiratory Tract Infection | 1,191 |
| Febris   | 239   |
| Non-specific Gastritis                         | 230   |
| Peptic Ulcer                                   | 184   |
| Thyphus & Parathypus                           | 118   |
| Non-specific Rheumatic                         | 101   |
| Myalgia  | 93    |
| Chepalgia/headache                             | 90    |
| Non-specific Contact Dermatitis                | 89    |
| Diarrhea and Non-specific Gastroenteritis      | 85    |

Source: ERM, 2018b

#### 7.5.3.4 Condition of Environmental Sanitation

Sanitation and community health are interrelated with sanitation being a basic human need in the terms of cleanliness of waste and defecation. Sanitation can be one of the factors for disease prevention effort by eliminating or controlling environmental risk factors that are linked to disease transmission. There are at

least three aspects, which are of important when considering environmental health: availability of clean drinking water, sewage disposal, and household waste disposal.

### *Karawang Regency*

#### Clean Water

Community access to clean water is an important indicator to show the level of sanitation of a community. Based on information provided by the local government of Karawang Regency, the coverage of safe drinking water services in Karawang regency in 2016 reaches 80% of the total population of Karawang Regency, of which 16% is served by the State Water Service Company (PDAM) and the rest by communal Drinking Water Supply System (SPAM) or from the community and individual wells.

During ERM survey to 179 respondents, the most respondents use electric pump well (43.58%) to supply their drinking water, cooking (60.34%), 65.36% for bathing and washing, respectively. The remaining portion of each source of water supply is presented in **Table 7-66**.

**Table 7-66** *Source of Water Supply and Utilisation in Karawang Regency*

| Source of Water Supply                       | Drinking (%) | Cooking (%) | Bathing (%) | Washing (%) |
|--|--------------|-------------|-------------|-------------|
| PDAM   | 11.73        | 18.99       | 21.23       | 21.23       |
| Electric Pump Well                           | 43.58        | 60.34       | 65.36       | 65.36       |
| Manual Well                                  | 0.56         | 1.12        | 3.91        | 3.91        |
| Hand Pump Well                               | 1.68         | 1.68        | 1.12        | 1.12        |
| Public Hydrant                               | 1.12         | 1.12        | 0.56        | 0.56        |
| Others: Purchased Water (Gallon), Lake, etc. | 40.78        | 16.76       | 7.82        | 7.82        |
| No Answer                                    | 0.56         | 0.00        | 0.00        | 0.00        |
| <b>Total</b>                                 | <b>100</b>   | <b>100</b>  | <b>100</b>  | <b>100</b>  |

Source: ERM, 2018b

Given that the most used source of water supply is via an electric pump well, it most people in Karawang Regency already have easy access to clean water. However the second highest is purchased drinking water (40.8%), as the community consider water from the well not suitable for potable drinking.

#### Sanitation

The coverage of sanitation services in 2016 reached 82% of the total population of Karawang Regency. This percentage comprises the population that uses a permanent toilet connected to a septic tank (50%), the population using a communal sewage installation toilet (33%). The remaining 17% of the population still practices open defecation (*Kabupaten Kerawang, 2018*).

Furthermore, based on the ESIA survey in 2017, 87% of people in Karawang Regency use a gooseneck latrine, 2% use a pit latrine, 6% dispose their waste in the river, and the remaining (5%) still dispose their waste either in the paddy field or to the ponds.

### Waste Management

The solid waste generation in Karawang District was recorded at 208,050  $m^3$ , approximately 15% higher than the capacity of local waste treatment plant.

This was also observed during the surveys, where a high volume of waste was thrown in the river or to the area close to residential areas. Waste burning in the house yard was also observed (refer to **Figure 7-39**). In order to meet the demand of the increased population and waste volume in the future, the local authority has implemented an Integrated Solid Waste Management Program - which also requires participation of communities in managing waste at source supported by the sub-district/village of Development Department.

**Figure 7-39** *Waste Burning Activities in Cilamaya Village*



Source: ERM ESIA Survey, 2017

Additional to the data above, the survey in 2017 indicated that 89% of the local community in Karawang Regency practices open burning in their home.

### *Bekasi Regency*

#### Clean Water

Related to community access to clean water, 60% of the respondents purchased drinking water, 36% sourced the water from an electric pump well and the remaining 4% did answer. While for cooking purposes 82% of respondents stated that they sourced the water from an electric pump well and only 18% used purchased water. Whereas, for bathing and washing purposes, the majority of respondents (96%) stated that they sourced the

water from the electric pump wells and the remaining 4% practicing bathing and washing in the nearby river.

### Sanitation

In terms of sanitation, based on data sourced from the document of City Sanitation Strategy of Bekasi Regency in 2016 the percentage of villages within the Bekasi Regency who have access to proper sanitation facility (using a permanent toilet and toilet connected to septic tank) reached 75%. While 3 % of villages use communal sewage installation and the remaining practicing open defecation.

In addition to the data above, 68% of survey respondents from the Bekasi Regency stated that they have and use proper sanitation facilities / permanent. While 4% stated that they use a communal sewage installation and with similar number of 4% of respondents stated they practice defecating in nearby river close to their house (refer to **Figure 7-40**). While, the remaining 24% of the respondents did not answer the survey.

*Figure 7-40 Open Defecation Practice in Bekasi Regency*



*Source: ERM ESIA Survey, 2017*

### Waste Management

Sources of waste in Bekasi Regency include not only industrial waste but also domestic waste from settlements, markets and shops, streets, offices, hotels and public places. Waste management in Bekasi Regency is still based on a conventional management system undertaken by the Sanitary Agency of Bekasi Regency. Waste from the Bekasi Regency is disposed at the landfill of TPA Burangkeng located in Burangkeng Village, Setu District. TPA

Burangkeng was initially 3.5 Ha with an open dumping system, operating since 1995. Currently, it has expanded to 10 Ha with system improvements to the sanitary landfill system. Not all 15 districts in the Bekasi Regency received services in waste management.

### *Subang Regency*

#### Clean Water

Based on the survey in 2017 the community in Blanakan village has access to water supply through several sources. Most of them use the PDAM to supply their needs for drinking, cooking, bathing, and washing, both for drinking and cooking total 53% and for bathing and washing are 47%. The remaining numbers and source of water supply is presented in **Table 7-67**.

**Table 7-67** *Source of Water Supply and its Utilisation in Subang Regency*

| <b>Source of Water Supply</b>        | <b>% Drinking</b> | <b>% Cooking</b> | <b>% Bathing</b> | <b>% Washing</b> |
|--------------------------------------|-------------------|------------------|------------------|------------------|
| PDAM                                 | 53.33             | 53.33            | 46.67            | 46.67            |
| Electric Pump Well                   | 33.33             | 33.33            | 40.00            | 40.00            |
| Dug Well                             | 6.67              | 6.67             | 6.67             | 6.67             |
| River                                | 0                 | 0                | 6.67             | 6.67             |
| Others: Purchased Water, Gallon, etc | 6.67              | 6.67             | 0                | 0                |
| <b>Total</b>                         | <b>100</b>        | <b>100</b>       | <b>100</b>       | <b>100</b>       |

*Source: ERM, 2018b*

#### Sanitation

Information sourced from the government of Subang Regency website stated the coverage of sanitation service in 2017 reached more than 70%. It is reported that 158 out of 253 villages within the Subang Regency were categorised as ODF or Open Defection Free, which means the population of the 158 villages having access to proper sanitation facilities (e.g. utilising septic tank or individual permanent toilet) (*Subang, 2017*).

This was supported by the ESIA survey where 67% of the community in Blanakan use proper sanitation facility/ permanent toilet at home nonetheless 27%, still utilise the river with the remaining 6% using a communal toilet.

#### Waste Management

The survey conducted in Blanakan village in 2017 reported that the waste management in Blanakan village is either by open burning or been sent to the landfill.