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Geothermal Power Plant Project Ijen Bondowoso

Landscape and Visual Impact Assessment

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11 August 2023

Geothermal Power Plant Project Ijen Bondowoso

Landscape and Visual Impact Assessment

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1. INTRODUCTION

This document describes the Landscape and Visual Impact Assessment (LVIA) for a 34 MW geothermal project ("the Project") located at Blawan Ijen, Bondowoso East Java by MEDCO CAHAYA GEOTHERMAL ("MCG") which is a subsidiary of Medco Power Indonesia.

The project needs to develop an Environmental and Social Impact Assessment (ESIA) that follows international standards as part of the project financing process for lenders. This report includes the Project area (well pads, geothermal power plant, logistics yard, base camp, access roads, and the transmission line to the Banyuwangi sub-station passing through Protected Forest Area in Bondowoso Regency and Banyuwangi Regency).

2. LEGISLATION AND STANDARDS

2.1 International Best Practice And Guidelines

The assessment approach is based on the Guidelines for Landscape and Visual Impact Assessment[1], published by the United Kingdom Landscape Institute and the United Kingdom Institute of Environment Management and Assessment. In addition, the LVIA has been prepared following international best and good practice required by financial institutions.

The Environmental, Health and Safety (EHS) Guidelines are technical reference documents that address IFC's expectation regarding the industrial pollution management performance of projects. This information supports actions aimed at avoiding, minimizing, and controlling EHS impacts during the construction, operation, and decommissioning phase of a project or facility.

In the context of the proposed Project, the most relevant EGS Guidelines or good practices to be considered is:

- International Finance Corporation Environmental, Health, and Safety Guidelines[2];

3. PROJECT DESCRIPTION

This section provides and overview of the Project description including the construction and operation as well as alternative assessment of the Project Site.

MCG proposes to develop a 34 MW geothermal project located at Blawan Ijen, Bondowoso East Java. The Project will be carried out in two stages. The first stage referred to as Unit-1 will have a capacity of 34 MW and the second or final stage referred to as Unit-2 reaching the full capacity at 110 MW. This ESIA Report covers only Unit-1 of the proposed Project. The key components of the Project include the following:

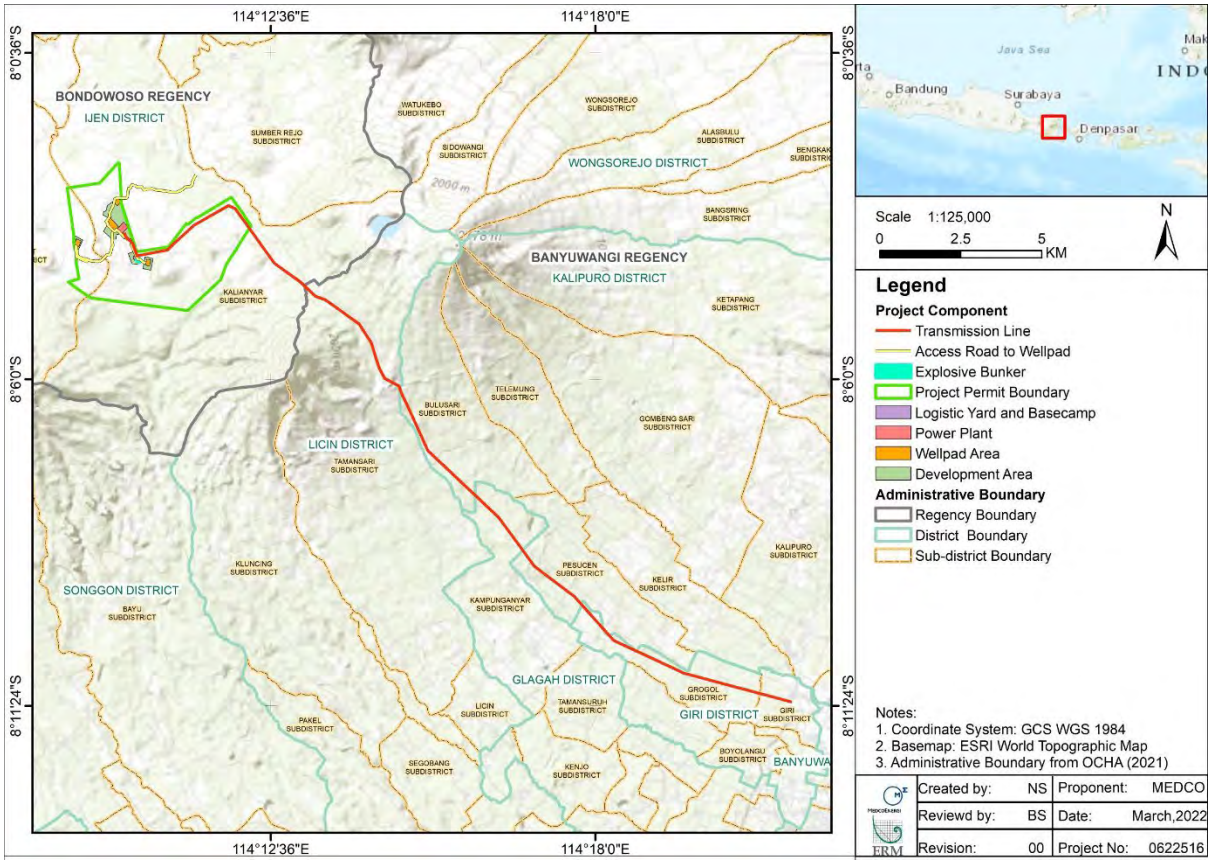
- Exploitation facilities including power plant, separator and brine pump, vent station (rock muffler), base camp, office, and car park;
- Drilling and exploration facilities including well pad areas, logistics yard, and explosives bunker;
- Access Roads (within the Project Site); and
- 150 kV Transmission line and towers 28.3 km.

The Project is located on Bondowoso and Banyuwangi Regencies, East Java province, Indonesia and is approximately 270 km southeast of Surabaya. The Project location is shown in ***Figure 3-1***.

[1] Guidelines for landscape and visual impact assessment, IEMA 2013.

[2] Environmental, Health and Safety Guidelines, IFC, April 30, 2007 and subsequent amendments and additions.

Figure 3.1 Project Location (with Transmission Line)



For further details see Project Description Chapter of the ESIA.

4. METHODOLOGY

The assessment of impacts of the Project on landscape and visual amenity has been undertaken in accordance with accepted methodologies derived from best practice guidelines as detailed in Section 2. In the absence of published guidelines on landscape and visual impact assessment in Indonesia, the assessment was conducted with reference to the Guidelines for Landscape and Visual Impact Assessment (UK).

Landscape and visual assessments are separate, but linked, procedures. The landscape baseline, its analysis and the assessment of landscape impacts all contribute to the baseline for visual assessment studies.

- Landscape impacts derive from changes in the physical landscape; which may give rise to changes in its character and how this is experienced. This in turn may affect the perceived value attributed to the landscape.
- Visual impacts relate to changes that arise in the composition of available views as a result of changes to the landscape, to people's response to any changes, and the overall impacts with respect to visual amenity.

The methodology for baseline data gathering and evaluation, presented below, is applicable to the assessment of short-term impacts during the Project construction and to any long-term impacts during its operation and future decommissioning.

4.1 Baseline

4.1.1 Landscape Baseline

The landscape is characterized by different components: topography, land use and potentially sensitive areas with regards to landscape (e.g. tangible and intangible cultural heritage sites) and it has been categorized according to the presence of common elements. Therefore the proposed assessment has been developed according to the following tasks:

- Definition of the landscape study area;
- Description of the baseline landscape and topography in the study area;
- Mapping and description of Landscape Character Unit (LCUs) and View Points (VPs);
- Landscape character;
- Landscape value.

The LCUs and VSRs of the Study Area have been categorized according to the presence of common elements. These include factors such as:

- Topography;
- Vegetation type (both species and age);
- Built forms;
- Evidence on human modifications;
- Land use.

During the scoping field survey, photographs of the site and surrounding landscape were taken in order to have a global view of the landscape characteristics.

4.1.2 Visual Baseline

Visual interferences may occur when new elements are introduced into a landscape or existing elements are altered or removed leading to a change in the way that stakeholder's access, perceive or experience landscape resources. The proposed visual baseline has been developed according to the following tasks:

- Study area definition;
- Viewshed analysis
- Viewpoints and sensitive receptors identification

4.2 Study Area Definition and Viewshed

The visual study area is defined as the area within which the Project could be discernible by the human eye and could interfere with the main sensitivities identified in the local context.

In open landscapes, where higher ground provides views of the site, the potential visual influence of the Project could extend beyond any predetermined limit fixed by map data alone without a site visit. Conversely, within enclosed landscapes with restricted views the impact may be concentrated within a smaller area than that previously determined. It is therefore important to define the Study Area for the assessment within the methodology for each individual site.

To identify the landscape study area, the Zone of Theoretical Visibility (ZTV) has been determined through computer analysis of topographical mapping to establish the theoretical distance from which the Project could be visible in each direction.

The ZTV was determined through a viewshed analysis using a Geographic Information System (GIS) modelling tool available within the ESRI ArcGIS 10.8.2 package. The viewshed analysis is based only on topography (i.e. digital elevation model) and represents the areas where the Project could be potentially visible. For this specific assessment SRTM (Shuttle Radar Topography Mission) 30 m Digital Elevation Model has been utilized.

Defining an appropriate viewshed helps understanding the visual impacts of the Project. The area of the viewshed will vary depending on the nature and scale of the proposed facility. Larger facilities produce larger viewsheds, as it will be more visible from a greater distance. The viewshed is therefore the area that is most likely to be visually impacted.

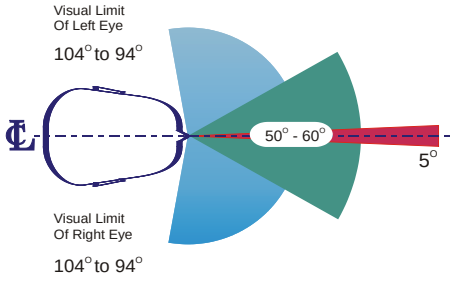
The following Box 4.1 explains how a viewshed is defined and identified depending on the horizontal and vertical field of views.

Box 4.1 Field of View

Source: Human Dimension & Interior Space – A Source Book of Design Reference Standards, Julius Panero and Martin Zelnik, The Architectural Press Ltd. London, 1979

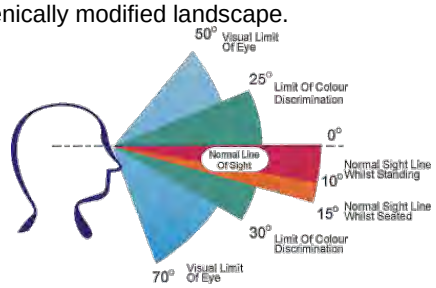
A. Horizontal Field of View

For most people, the horizontal central field of vision covers an angle of between 50° to 60°. Within this angle, both eyes observe an object simultaneously but from a slightly different angle. This creates a central field of greater magnitude than that possible by each eye separately. This central horizontal field of vision is termed the 'binocular field' (see green zone). Within this field images are sharp, depth perception occurs and color discrimination is possible. Research suggests that the visual impact of a Project component will vary according to the proportion the binocular field it occupies. Project components which occupy 5% or 2.5° or less of the horizontal central binocular field of vision are usually perceived as insignificant objects, whereas components which occupy 30° are considered to be visually dominating.



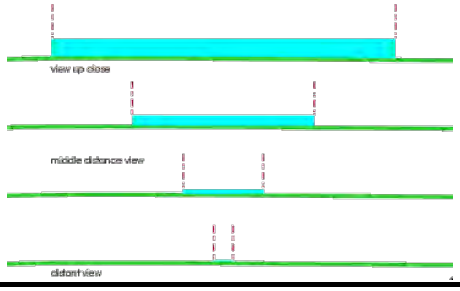
B. Vertical Field of View

The vertical central field of vision has a similar set of parameters. The vertical binocular field is normally 25° above the vertical and 30° below the vertical. When project components exceed the 50° upper visual limit of the eye, they are considered to dominate the vertical central field of vision. When project components occupy 0.5° they are not considered dominant, nor are they usually perceived as a significant change to the existing baseline condition when they are located within an anthropogenically modified landscape.



C. Horizontal versus Vertical Visibility Over Distance

As a person moves further away from a project component, the visibility of the vertical dimension tends to reduce more significantly than the visibility of the horizontal dimension. This effect is illustrated below.



4.3 Impact Assessment

The assessment of impacts on landscape and visual amenity was undertaken in accordance with accepted methodologies derived from best practice guidelines.

Impact significance for landscape and visual amenity is generally derived on the basis of the following main factors:

- The quality/importance of the landscape/visual amenity as a resource/function that is potentially affected;
- The sensitivity of the landscape/visual amenity towards Project activities;
- The magnitude of change to the receiving landscape and visual amenity as a result of the Project.

4.4 Landscape Effects

The landscape impact assessment describes the nature and scale of changes to individual landscape elements and characteristics and the subsequent effect on the landscape as a resource. To determine the significance of landscape effects it is necessary to consider the sensitivity of the landscape against the magnitude of landscape effects.

Landscape resources will be assessed in terms of their sensitivity, combining judgements on their susceptibility to the specific change proposed and the value attached to the resource. Susceptibility refers to the degree to which a particular landscape type or area can accommodate change arising from the Project, without detrimental effects on its character, and will vary with the:

- Existing land use;
- Pattern and scale of the landscape;
- Sense of enclosure and tranquillity;
- Condition of the landscape; and
- Scope for mitigation which would be in character with the existing landscape.

The value of landscape resources will to some degree reflect landscape designations and the level of importance they signify. The sensitivity of a landscape is judged based on the extent to which it can accept change of a particular type and scale without adverse effects on its character. Sensitivity varies according to the type of development proposed and the nature of the landscape such as its individual elements, key characteristics (land use, pattern and scale of landscape, enclosure/openness), inherent quality, condition, presence of detracting elements (e.g., pylons), value and capacity to accommodate change, and any specific values, such as designations, that apply. Grades of sensitivity can be defined as low, medium and high and are defined as illustrated in ***Table 4.1***.

Table 4.1 Landscape Sensitivity Criteria

Landscape Sensitivity	Criteria
Low	A moderately valued landscape, perhaps a locally important landscape, or where its character, land use, pattern and scale may have the capacity to accommodate a degree of the type of change envisaged.
Medium	A landscape protected by a structure plan or national policy designation and/ or widely acknowledged for its quality and value; a landscape with distinctive character and low capacity to accommodate the type of change envisaged.
High	A landscape protected by a regional (structure plan) or national designation and/ or widely acknowledged for its quality and value; a landscape with distinctive character and low capacity to accommodate the type of change envisaged.

Judgements on the magnitude of effect should also be recorded on a scale (e.g., negligible, small, medium and large). More weight is generally given to effects that are greater in scale and permanent or long term. Therefore, a temporary change confined to a small area may be considered to be of low magnitude. Where planting is proposed as mitigation, its effectiveness during the early periods of a

project should be taken into account in suggesting reductions in magnitude. The typical criteria in determining the magnitude of effect on the landscape are set out in ***Table 4.2.***

Table 4.2 Landscape Magnitude of Effect Criteria

Landscape Magnitude	Criteria
Negligible	An imperceptible, barely or rarely perceptible change in landscape characteristics.
Small	A small change in landscape characteristics over a wide area or a moderate change either over a restricted area or infrequently perceived.
Medium	A moderate change in landscape characteristics, frequent or continuous, and over a wide area, or a clearly evident change either over a restricted area or infrequently perceived.
Large	A clearly evident and frequent /continuous change in landscape characteristics affecting an extensive area.

4.5 Visual Effects

The visual impact assessment describes changes in the character of the available views to people resulting from a given Project and their visual amenity. To determine the significance of visual effects it is necessary to consider the sensitivity of the visual receptors against the magnitude of visual effects.

Visual receptors are people and must be assessed in terms of their sensitivity, combining judgements on their susceptibility to the specific change proposed and the value attached to a view or their visual amenity. Susceptibility refers to the degree to which a particular visual receptor can accommodate change arising from the Project, without detrimental effects on the visual amenity, and will vary with the:

- Occupation or activity of people experiencing the view;
- Location and context of the view; and
- Extent to which their attention or interest may be focused on the view and their visual amenity.

Judgements about the sensitivity of visual receptors should be recorded on a scale (e.g., low, medium and high) with clearly stated criteria. ***Table 4.3*** indicates the relative sensitivities of a number of visual receptors.

Table 4.3 Sensitivity of Visual Receptors

Sensitivity	Visual Receptor
Low	Small numbers of visitors with interest in their surroundings. Viewers with a passing interest not specifically focussed on the landscape e.g., workers, commuters. The quality of the existing view, as likely to be perceived by the viewer, is assessed as being low.
Medium	Small numbers of residents and moderate numbers of visitors with an interest in their environment. Larger numbers of recreational road users. The quality of the existing view, as likely to be perceived by the viewer, is assessed as being medium.
High	Larger numbers of viewers and/or those with proprietary interest and prolonged viewing opportunities such as residents and users of attractive and well-used recreational facilities. The quality of the existing view, as likely to be perceived by the viewer, is assessed as being high.

The magnitude of change affecting visual receptors depends on the nature, scale and duration of the particular change that is envisaged in the landscape and the overall effect on a particular view. The magnitude of change in views will depend on the scale of the development and the distance from the viewpoint, the angle of view occupied by the development, the extent of shielding by intervening features, the degree of obstruction of existing features, and the degree of contrast with the existing view, and the frequency or duration of visibility (***Table 4.4***.).

Table 4.4 Magnitude of Visual Effect

Visual magnitude	Criteria
Negligible	A change which is barely visible, at very long distances, or visible for a very short duration, perhaps at an oblique angle, or which blends with the existing view.
Small	Minor changes in views, at long distances, or visible for a short duration, perhaps at an oblique angle, or which blends to an extent with the existing view.
Medium	Clearly perceptible changes in views at intermediate distances, resulting in either a distinct new element in a significant part of the view, or a more wide ranging, less concentrated change across a wider area.
Large	Major changes in view at close distances, affecting a substantial part of the view, continuously visible for a long duration, or obstructing a substantial part or important elements of the view.

4.6 Significance of Effects

4.6.1 Significance of Landscape Effects

When determining the significance of visual effects, the following is taken into account:

- Large scale changes which introduce new discordant or intrusive elements into the landscape are more likely to be significant than small changes or changes involving features already present in the landscape;
- Changes in views from recognized and important viewpoints or amenity routes are likely to be more significant than changes affecting less important paths and roads; and
- Changes affecting large numbers of people are generally more significant than those affecting a relatively small group of users. However, in wilderness landscapes the sensitivity of the people who use the areas may be very high and this will be reflected in the significance of effect.

The significance matrix below illustrates the relationship between the sensitivity of Landscape Resources and the magnitude of the Landscape effect. The significance of a Landscape effect may

be adverse or beneficial dependent upon the nature of the change. Each case is assessed on its own merits using professional judgement and experience, and there is no defined boundary between levels of effects. What level of effect constitutes a significant effect will vary on a project-by-project basis.

Table 4.5 Significance of Landscape Effects

		Sensitivity of Landscape Resources		
		Low	Medium	High
Magnitude of Landscape effect	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

4.6.2 Significance of Visual Effects

When determining the significance of visual effects, the following is taken into account:

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The significance matrix below illustrates the relationship between the sensitivity of a visual receptor and the magnitude of the visual effect. The significance of a visual effect may be adverse or beneficial dependent upon the nature of the change. Each case is assessed on its own merits using professional judgement and experience, and there is no defined boundary between levels of effects. What level of effect constitutes a significant effect will vary on a project-by-project basis.

Table 4.6 Significance of Visual Effects

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		Low	Medium	High
Magnitude of Visual Effect	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

5. BASELINE CONDITIONS

This section provides a summary of the existing environmental conditions within the Project study area. The local environmental setting was determined through desktop analysis and photos from fieldwork (performed in June 2023) to gain a general understanding of the site visual context and landscape setting.

5.1 Landscape Area of Influence

The landscape **Area of Influence (AoI)** covers the Project Area out to around 2 km from the main works area and 500 m around the transmission line route where it is assumed that most of the potential impacts will occur (Figure 5.1).

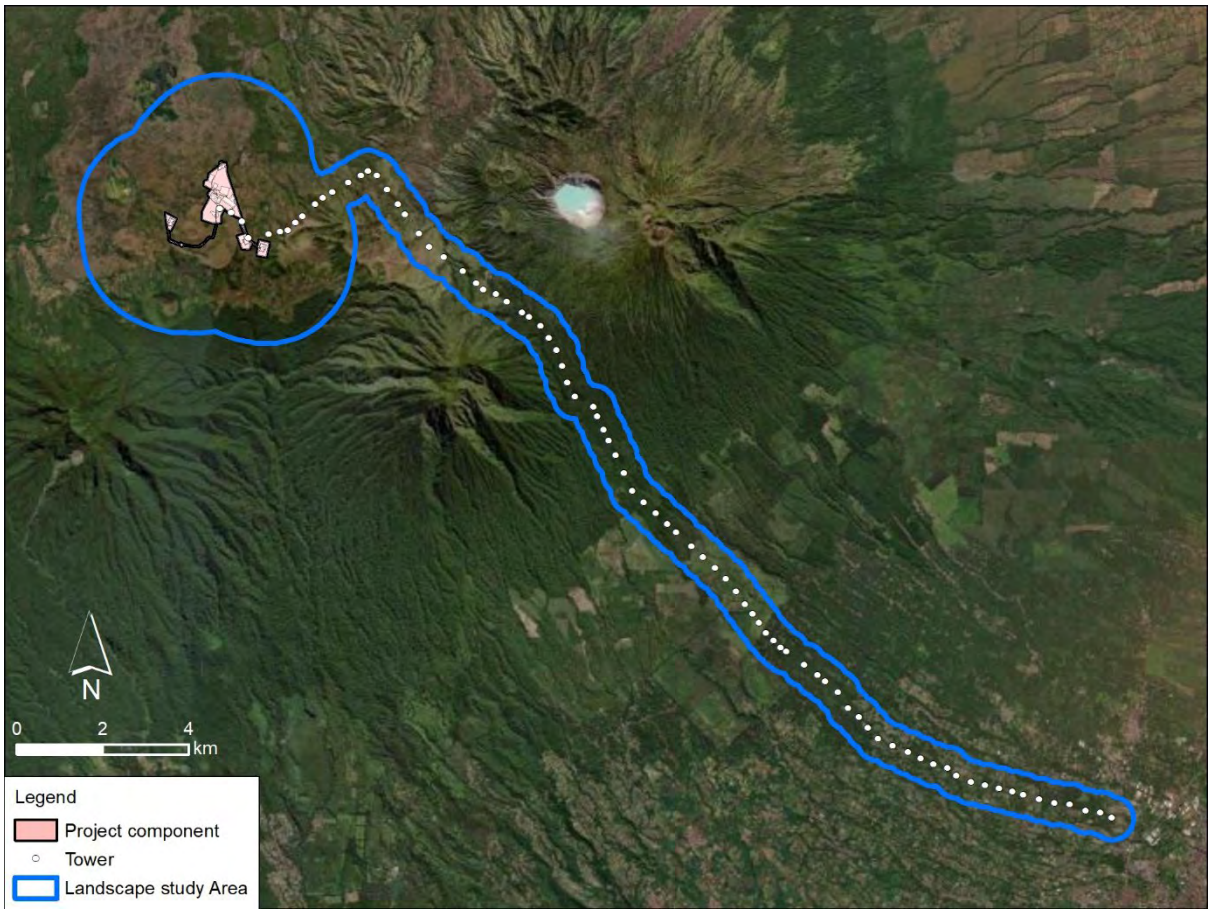


Figure 5.1: Landscape Study Area

5.2 Landscape Key Baseline Conditions

The landscape is characterized by different components: topography, land use and potentially sensitive areas relating to landscape (e.g., tangible and intangible cultural heritage sites), and according to the presence of common elements. Therefore, the proposed assessment has been developed according to the following tasks:

- Description of the baseline landscape and topography in the study area;
- Mapping and description of Landscape Character Unit (LCUs);
- Landscape character; and
- Landscape value.

5.2.1 Topography

The geothermal plant, located in the eastern part of the Java Island, will be built in an elevated, relatively flat area surrounded by mountains. The transmission line will be characterized by different terrains and heights, given the necessity to cross the forest of the Erek Erek nature reserve located in the valley of Mount Merapi to connect the plant to the power grid at about 28km to the south.

The landscape of the Project Area and topography are shown in Figure 5.1.

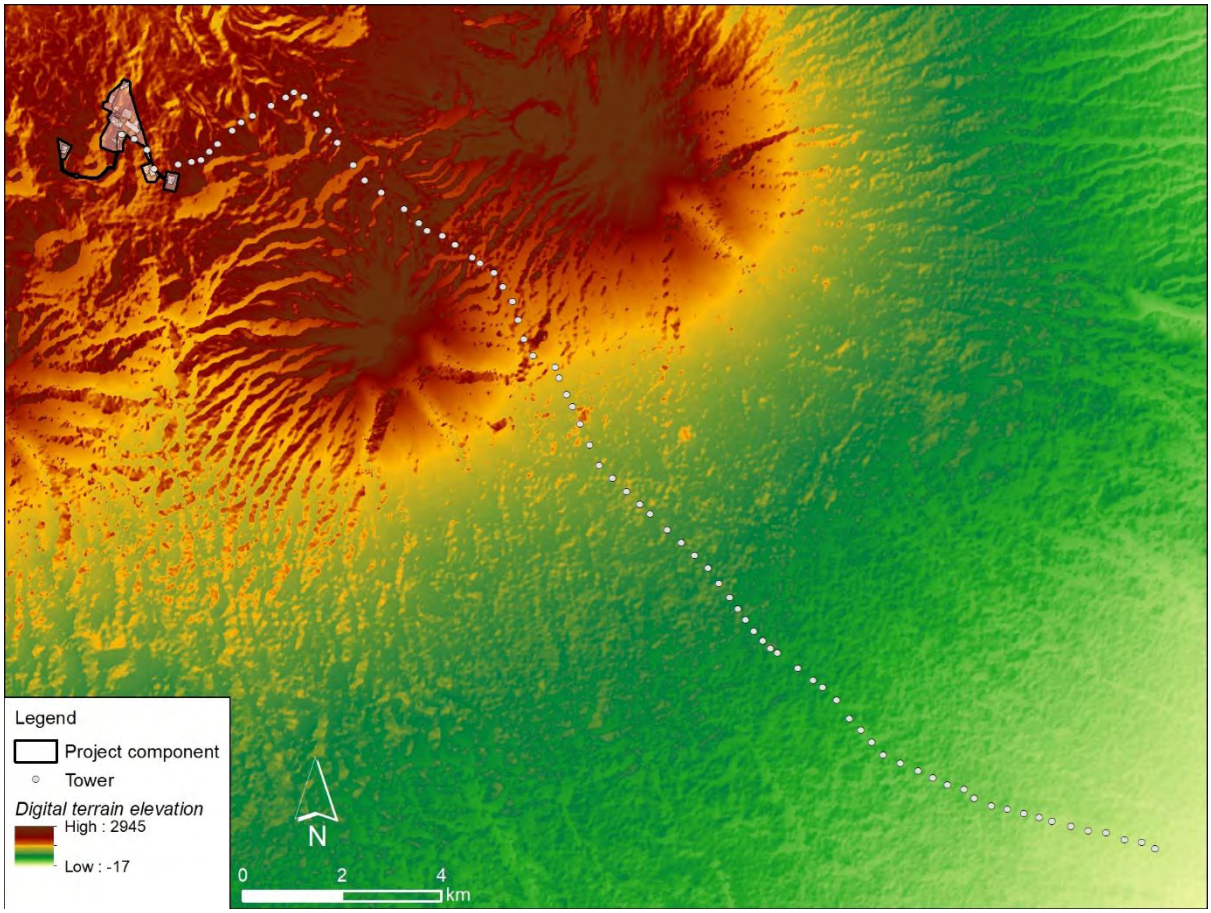


Figure 5.2: Topography of Project Area

5.2.2 Landscape Characteristic Unit (LCU)

Landscape was classified into “Bioregion” by One Earth[3] (classification previously managed by WWF[4]) ”. A Bioregion is a geographical area defined not by political boundaries but by ecological systems and could contain one or more ecoregion. The Bioregions 2023 framework is organized by the world's major biogeographical realms, the broadest divisions of Earth's land surface in which ecosystems and groupings of organisms share a common evolutionary history. These roughly correspond to the major continents of the Earth but are further subdivided.

Each bioregion is characterized by distinct landscape characteristics. The Project is located across two ecoregions in the Southeast Asian Forests sub realm of Indomalaya (Figure 5.3):

- The Eastern Java–Bali Rain-Forests (IM0113). represents the lowland moist forests of the eastern half of the island of Java and Bali, and the smaller islands off the northern coasts of both.

[3] https://www.oneearth.org/

[4] Terrestrial Ecoregions | Biome Categories | WWF (worldwildlife.org)

Average annual rainfall ranges from 1,500 to 4,000 mm, with a four to six-month dry season. Therefore, the lowland forests are predominantly moist deciduous, with semi-evergreen rainforest along the moister south coast

- The Eastern Java–Bali Montane Rain-Forests (IM0112) - ecoregion represents the montane forests of eastern Java and Bali, Indonesia. Based on the Köppen climate zone system, this ecoregion falls in the tropical wet and dry climate zones. The predominant forest types found in the ecoregion include evergreen rain forest, moist deciduous forest, and seasonal and a seasonal montane forest

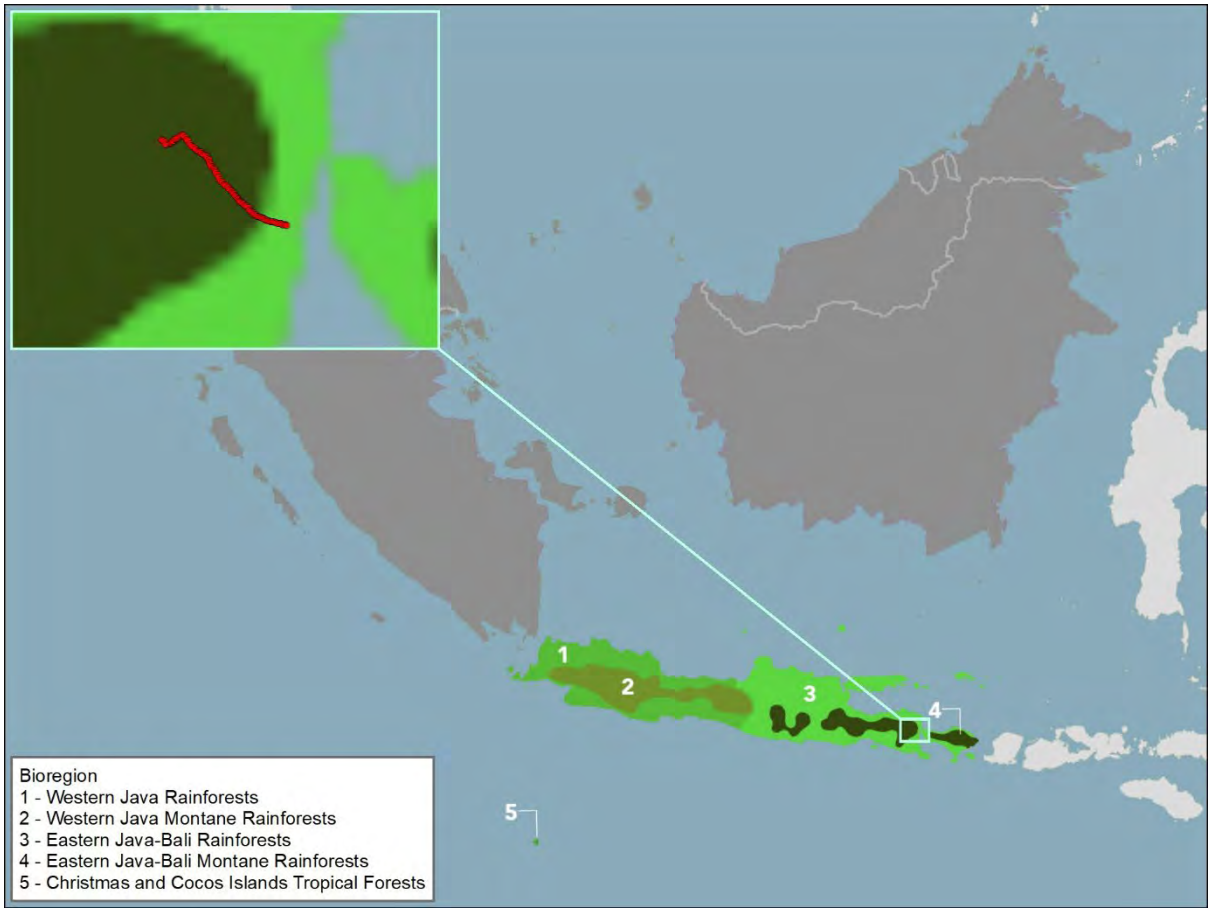


Figure 5.3: Bioregion map

In addition, the land cover characteristics have been analysed within the area nearby the Project (Figure 5.4). The proposed main development area is located within an area of production forest that has been permitted for use for the Project from the local government. The transmission line runs through a mix of forestry and agriculture areas, with the nearest residential area and public facilities are about 100 m.

It should be noted that the proposed route does not cross the legally protected Kawah Ijen Nature Reserve.

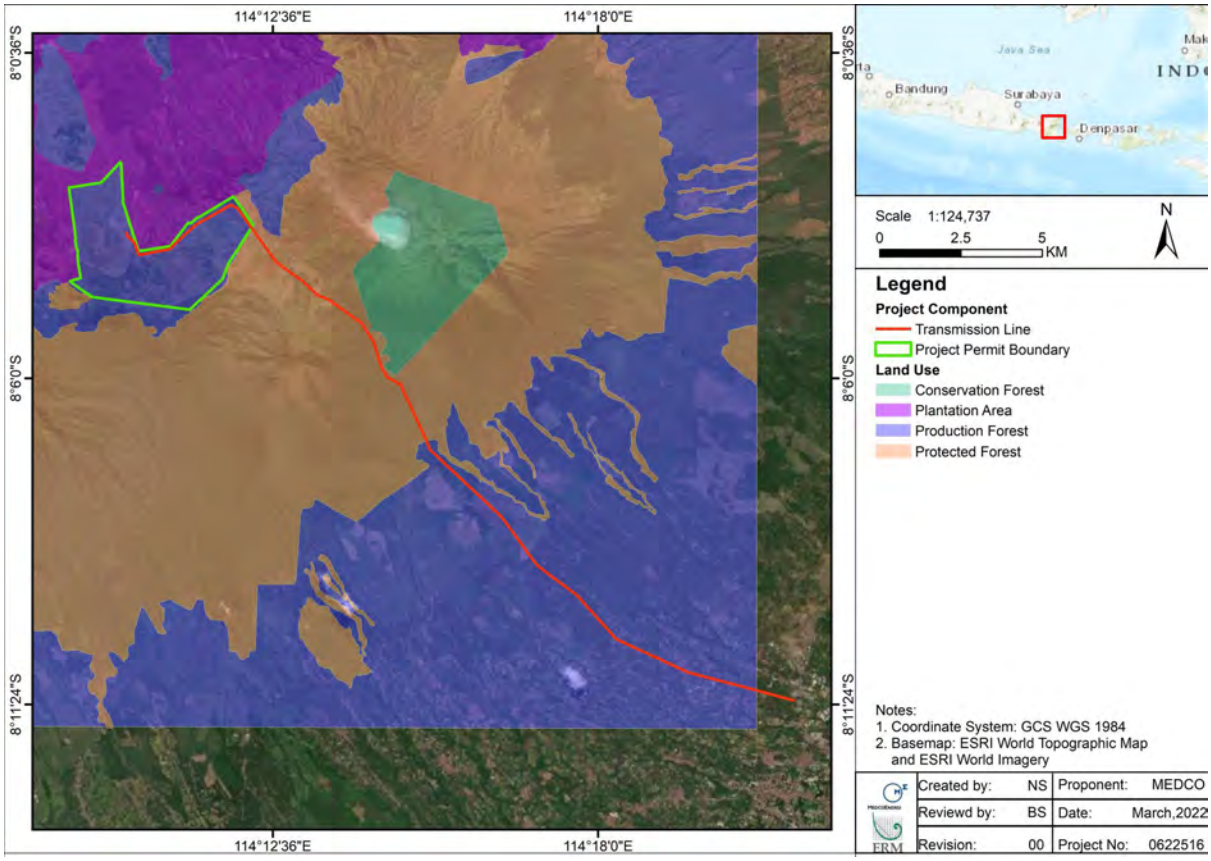


Figure 5.4: Land Use and Land Cover with the Project AoI

Factors affecting the sensitivity of change for landscapes are:

- Importance and rarity of special landscape elements;
- Ability of the landscape to accommodate change;
- Significance of the change in the local and regional context; and
- Maturity of the landscape.

Given the baseline data where the Project will be located, two Landscape Characteristic Units (LCU) are proposed (Figure 5.5):

- LCU A: forests along the central mountains, comprised of a row of about twenty active and dormant volcanos. It is predominately mountainous and less urbanized.
- LCU B: lowland forests, cropland fields urban areas and cropland fields.

Figure 5.7 provides photos showing some of the main features of the landscape.

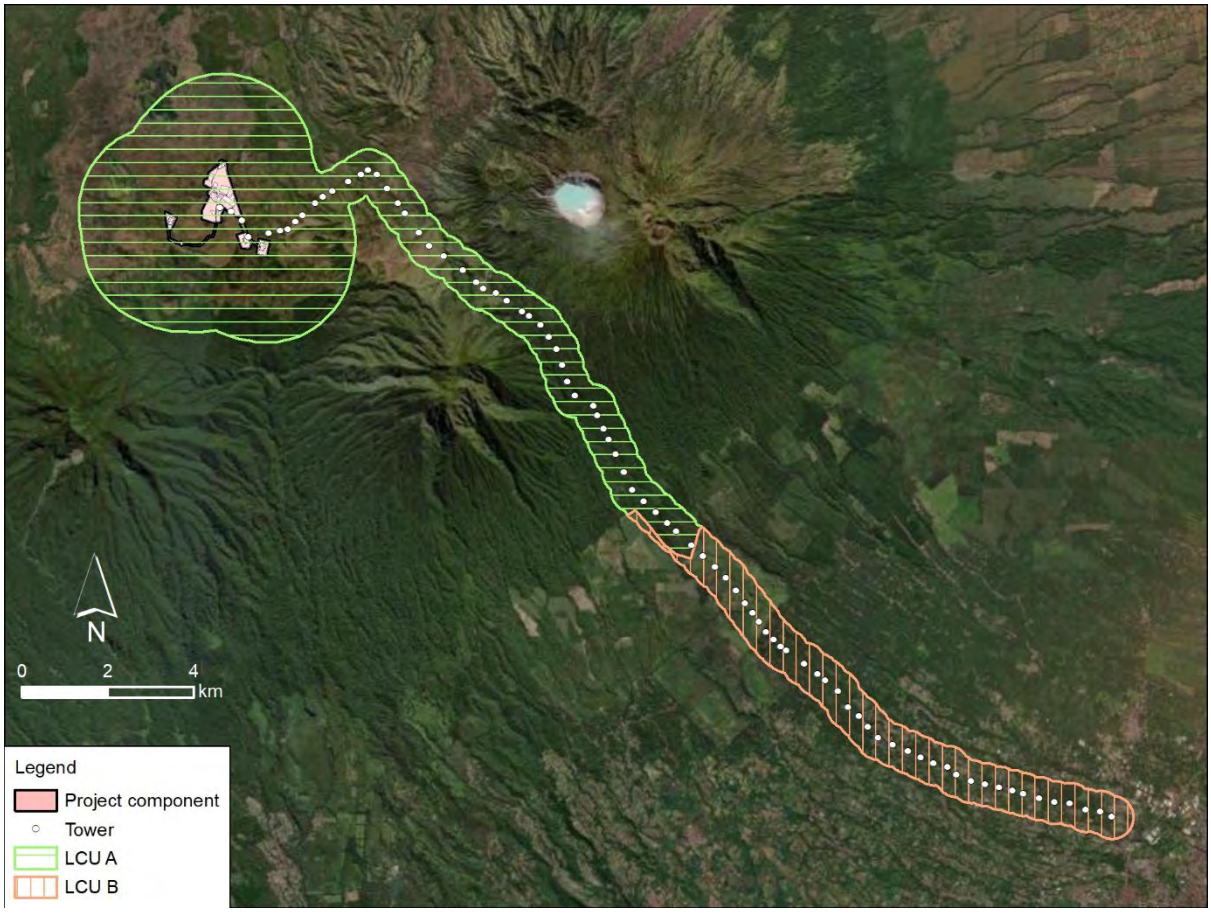


Figure 5.5: LCU Map

Figure 5.6: Photos of the Facilities area

Figure 5.7: Photos of Landscape crossed by the transmission line

The nearest residential area of the power plant site is in Curah Macan Sub-village, Kalianyar Village, which is about 600 m from one of the drilling points (Well Pad IJN-1).

The area is also surrounded by a number of tourism sites (as mentioned in Socio Economic Baseline) The Project is located within the Kawah Warang (Wurung) Park, which is a tourism hiking area known for scenic views and a number of crater features such as Kawah Wurung and Kawah Ilalang that are adjacent to the access road and transmission line respectively.

As mentioned earlier in the area there is already a geothermal plant subject to expansion.

5.2.3 Protected Areas

During the desktop baseline review, the following national and international protected areas have been considered:

- National parks, reserve forests and other locally protected areas;
- BirdLife International Important Bird Areas (IBA) and Endemic Bird Areas;
- International Union for Conservation of Nature (IUCN) Protected Areas;
- RAMSAR[5] Wetlands of International Importance;
- United Nations Educational, Scientific and Cultural Organization (UNESCO) Man and Biosphere (MAB) Reserves;
- World Heritage Sites; and
- World Commission on Protected Areas.

[5] The Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat

Protected Areas include areas that are legally designated or officially proposed for biodiversity protection and conservation, while areas with recognized high biodiversity values are areas that have been voluntarily conserved by local communities through customary laws or other effective means.

There are national protected areas within 1 km of the transmission line (Kawah Ijen Nature Reserve) and the Project site is located within 1 km of the Gunung Raung and Gunung Ijen Key Biodiversity Areas (KBAs).

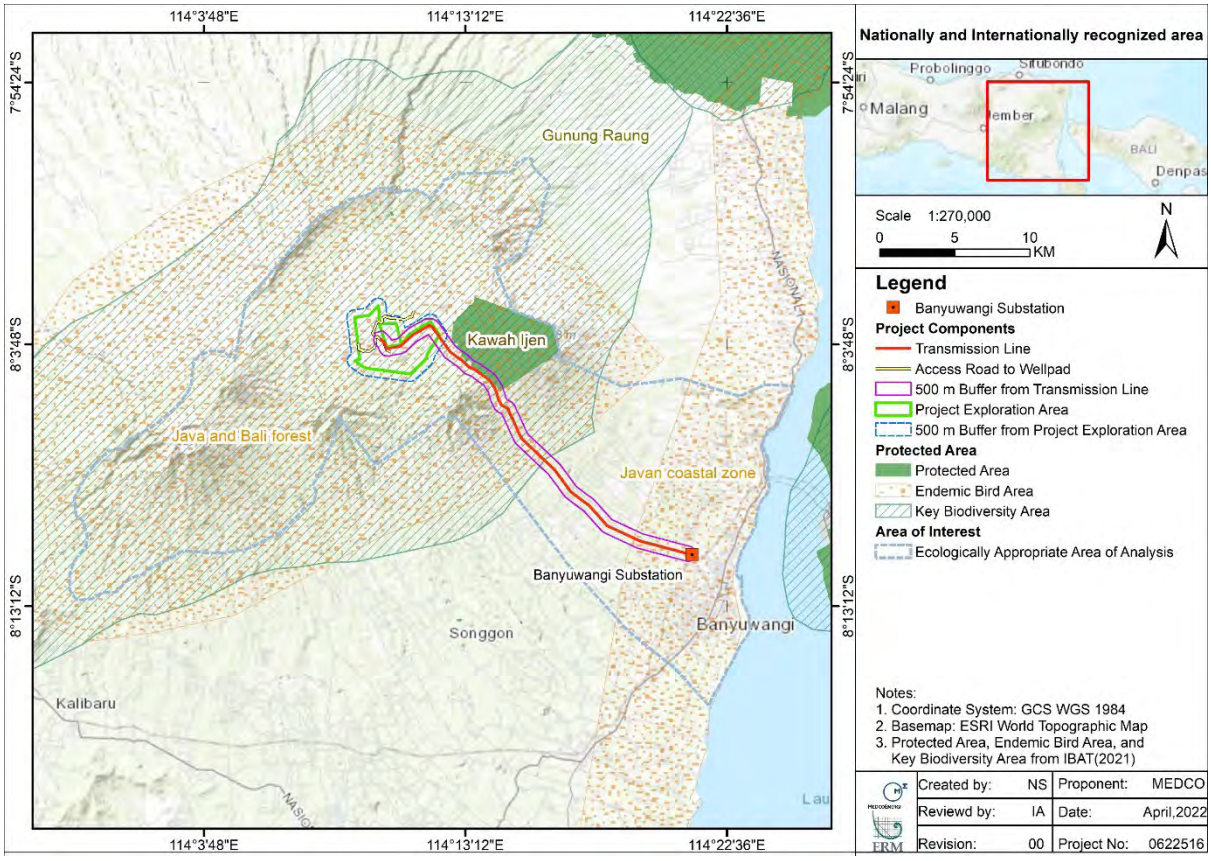


Figure 5.8: Nationally and Internationally Recognized Area

For more detailed refers to ESIA in the Biodiversity Baseline Data Collection.

5.2.4 Cultural Heritage

5.2.4.1 Tangible Cultural Heritage

According to UNESCO definition, cultural heritage can be either tangible or intangible. Tangible cultural heritage is defined as moveable or immoveable objects, sites, structures, groups of structures, and natural features and landscape that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significant. It may be located in urban or rural settings and maybe above or below ground, or under water. It also includes places of worship, buried artefacts, cemeteries and archaeological assets, etc. While the intangible cultural heritage involves customary/cultural law, understanding, knowledge, practices, innovations, and relationship of the community with nature.

Desktop review, observation, and Key Informant Interviews (KII) with local communities were conducted to identify potential cultural heritage near and within the Project Area. Through document review, it is reported that approximately 1,400 megalithic sites were discovered in Bondowoso regency. However, none was identified in Ijen District (Tourism, Youth and Sport Agency of Bondowoso Regency, 2018); they are mainly discovered in the western and southern part of Bondowoso Regency.

KIIs with local communities during the ESIA process, mainly inform the presence of community-valued cultural heritage, such as burial sites and water springs. There were no specific concerns from local communities identified for cultural heritage during the Project consultation and engagement.

Table 5.1 presents information on all identified cultural sites near the Project Area and there locations are shown in ***Figure 5.9***.

The majority of these sites are located over 10 km from the Project and unlikely to be impacted. However, the Mbah Parto Rejo Astama burial site is located 780 m from the nearest well pad (well pad 5). The burial site has significant cultural and spiritual importance for people in Jampit and surrounding area as well as others from outside East Java.

There are also three mosques that are located within 1 km of the proposed transmission line route.

Table 5.1: Cultural Sites near the Project Area

Code	Name	Area	Type	Status	Explanation	Distance from Project (km)
Nationally registered cultural heritage						
CH01	Macan Putih (White Tiger) Site  Coordinate Points: -8.251936417487016, 114.27796340871757	Banyuwangi, East Java	Site	Verified	The White Tiger site was once a forest called Sudimara which was cleared to build the capital of the kingdom of Blambangan (1655-1691). Based on the results of excavations at the Site, the following structures/ sites/ objects are found: ■ brick structure that is suspected to be the wall of the Royal capital with an estimated area of 2.5 km^2 ■ former canals ■ artefacts in the form of animal bones, ceramic fragments from Europe and China, as well as various pottery The main building of The White Tiger is made out of limestone and is predicted to be similar to Sukuh Temple in Karanganyar, Central Java. This site has been registered and verified in the national registration of cultural heritage at BPCB (Cultural Heritage Preservation Agency).	22 km
CH02	Inggrisan 	Banyuwangi, East Java	Building	Determined	This house complex was built in 1811 during the British transitional reign in Java. It was used as an army headquarters during the Japanese occupation, then used by the Banyuwangi White Tiger Battalion. The management of the Inggrisan House Complex is currently under KODIM 0825 Banyuwangi.	25 km

Code	Name	Area	Type	Status	Explanation	Distance from Project (km)
	Coordinate Points: -8.210854978159531, 114.37563342868027					
Cultural Sites in Geoparks						
CH03	Megalithic Maskuning Kulon Sites  Coordinate Points: -7.977769, 113.887500	Bondowoso, East Java	Sites	-	Maskuning Kulon Megalithic Site is located in Maskuning Kulon Village, Pujer District, Bondowoso Regency. This site has 58 dolmens[6] located in cluster and neatly arranged. The Kulon Maskuning Site is one of the largest dolmens in East Java with dimensions approximately 275 cm long, 180 cm wide and 180 cm high.	31 km
CH04	Petilasan of Rawa Bayu	Banyuwangi, East Java	Site	-	Rawa Bayu site is a relic of blambangan kingdom near the lake in the forest area. This site is frequently visited by people who perform Hindu religious rituals.	11 km

[6] a type of single-chamber megalithic tomb, usually consisting of two or more vertical megaliths supporting a large flat horizontal capstone or "table"

Code	Name	Area	Type	Status	Explanation	Distance from Project (km)
	 Coordinate Points: 8.179806, 114.172361					
CH05	Canting Butha Sumber (Cave)  Coordinate Points: -7.937650, 114.019400	Bondowoso, East Java	Structure	-	A natural cave serving as a place for meditation. The cave was established in 1394 AD. Below this cave, is a stream the Angkrek River that does not dry out throughout the year and is used for freshwater.	20 km
CH06	Umpak Sanga	Banyuwangi, East Java	Site	-	Umpak Sanga site is located in Tembokrejo village, Muncar sub-district. Originally, the site had an area of approximately 2 ha and is one of the important landmarks	43 km

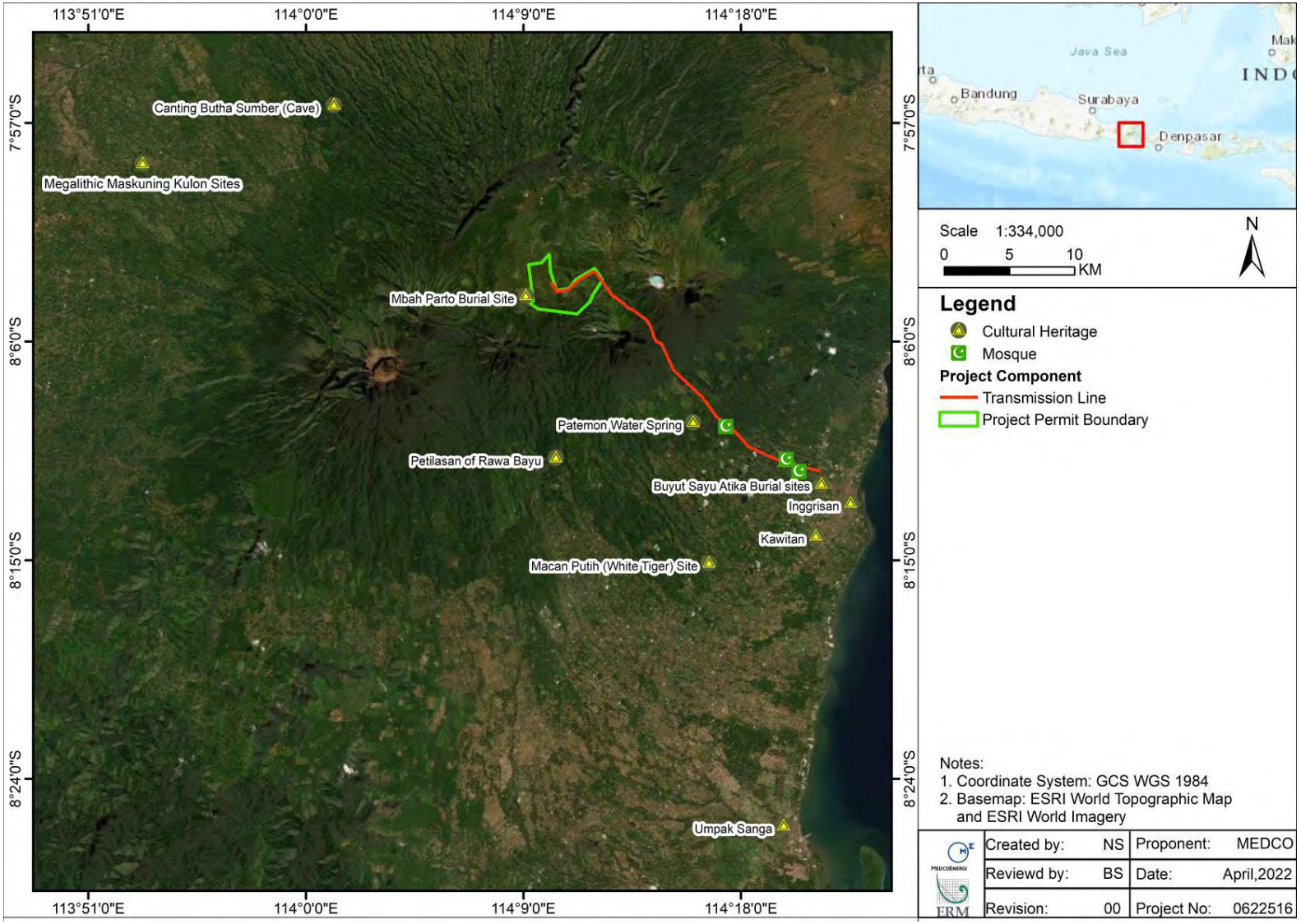
Code	Name	Area	Type	Status	Explanation	Distance from Project (km)
	 Coordinate Points: -8.432230257416435, 114.32945931155477				indicating the existence of Blambangan Kingdom in the 14th century AD (Wibowo, 2020).	
CH07	Kawitan  Coordinate Points: -8.233430524229707, 114.35174821534653	Kalipuro, Banyuwangi, East Java	Site	-	Kawitan site is suspected to be a gate of one of the relics of the kingdom of Blambangan (14th century AD). The gate is made out of limestone and has strong geologically historic value. Based on past research, it is believed that in the southeastern corner of Java island or what is now known as Plengkung was once used as the first landing site of Austronesian people in 3500 BC. This site is currently used as a Hindu holy place in the Tegaldlimo area.	25 km

Code	Name	Area	Type	Status	Explanation	Distance from Project (km)
Community-valued cultural Heritage						
CH08	Buyut Sayu Atika Burial sites  Coordinate Points: -8.197880926282775, 114.35555849630786	Banyuwangi, East Java	Site	-	Buyut Sayu Atika was known as the mother of Sunan Giri – one of nine Islamic missionary known as Wali Songo. It has substantial spiritual significance for people in Banyuwangi as well as others in Java. The burial site itself is firstly discovered in 1920s.	23 km
CH09	Mbah Parto Burial Site  Coordinate Points: -8.068552197039809, 114.15167777484068	Jampit, Bondowoso, East Java	Site	-	Mbah Parto Rejo Astama was one of the first local people who live in the area during the colonial era. He was a community leader for people in Ijen area as well as an islamic missionary. There was an Islamic boarding school next to the burial site with a total of 36 students. This school has existed for approximately 8 years. The burial site has significant cultural and spiritual importance for people in Jampit and surrounding area as well as others from outside East Java.	0.50 km

Code	Name	Area	Type	Status	Explanation	Distance from Project (km)
CH10	Patemon Water Spring  Coordinate Points: -8.155317364858522, 114.26702623950302	Kalibendo Plantation, Banyuwangi, East Java	Natural Feature		Patemon, which it is located in Kalibendo Plantation area, is a pivotal source of freshwater for multiple villages nearby including those in the Project AoI. As well as provisioning freshwater, the water spring is reportedly becoming an important / sacred place to visit for spiritual activities. This information is based on multiple interviews with locals, village authorities, and Kalibendo staff members.	12 km

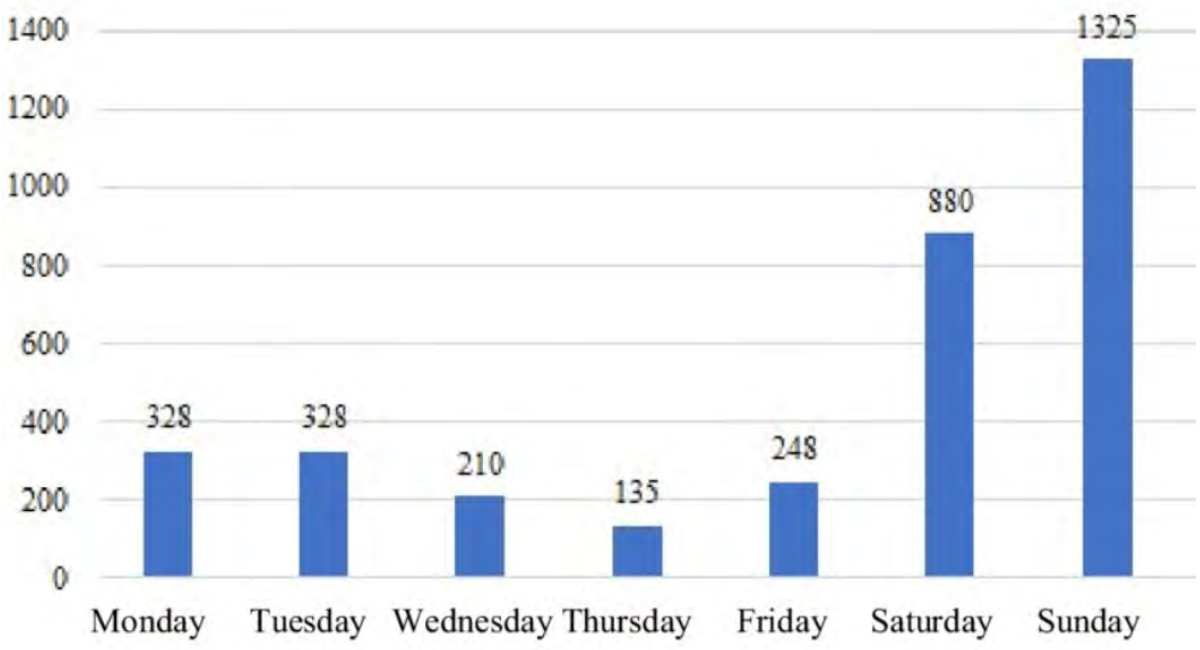
Source: Cultural heritage national registration web; Ijen Geopark Web; Banyuwangi Geopark; Key Informant Interviews (2022)

Figure 5.9: Location of Cultural Heritage in the Study Area



In terms of tourism Kawah Ijen is a composite volcano located at the easternmost part of Java Island in Indonesia and hosts the largest natural acidic lake in the world[1]. This crater is a popular tourism site as is located within the Kawah Ijen Crater Park. Tourism was on hiatus since March 2020 (due to COVID) and re-opened in July, 2020. The crater attracts around 500 tourists' daily and this number can increase to 4,000 daily tourists during long holidays[2][3]. Data from 2016 (the latest available data set for the area) shows up to 1,325 daily tourist in the peak tourism season (April to September) (***Figure 5.10***).

Figure 5.10: Daily Tourism Numbers in April-September (2016)



Source: Purnomo, Agus & Wiradimadja, A & Kurniawan, Bayu. (2019). Diversification of tourism product in KSPN Ijen. IOP Conference Series: Earth and Environmental Science. 243. 012079. 10.1088/1755-1315/243/1/012079.

One of the key attractions of the Ijen Crater is the sulphur miners. These are people from the local communities that collect sulphur from the crater and can carry around 80 kg per trip for around 7 cents (USD) per kilogram. They are employed by PT Candi Ngrimi. Since 2010, tourism at the site has become more popular and these miners are now part of the tourism attraction[4]. At its closest point, this tourism site is located 300 m from the transmission line route and around 2.5 km from the main construction area.

In addition, the Project is located in an area defined as the "Ijen Geopark" containing a number of geological, cultural, and biodiversity sites. Ijen National Geopark was established on November 30, 2018 through the decision of the Indonesian National Geopark Committee. Based on administrative boundaries, Ijen National Geopark is located in 2 regencies, namely Banyuwangi Regency and part of Bondowoso Regency, East Java Province.

The tourism sites within the Ijen Geopark and Study Area and the distance from the Project is shown in ***Table 5.2***. There are numerous sites within 500 m of the Project facilities.

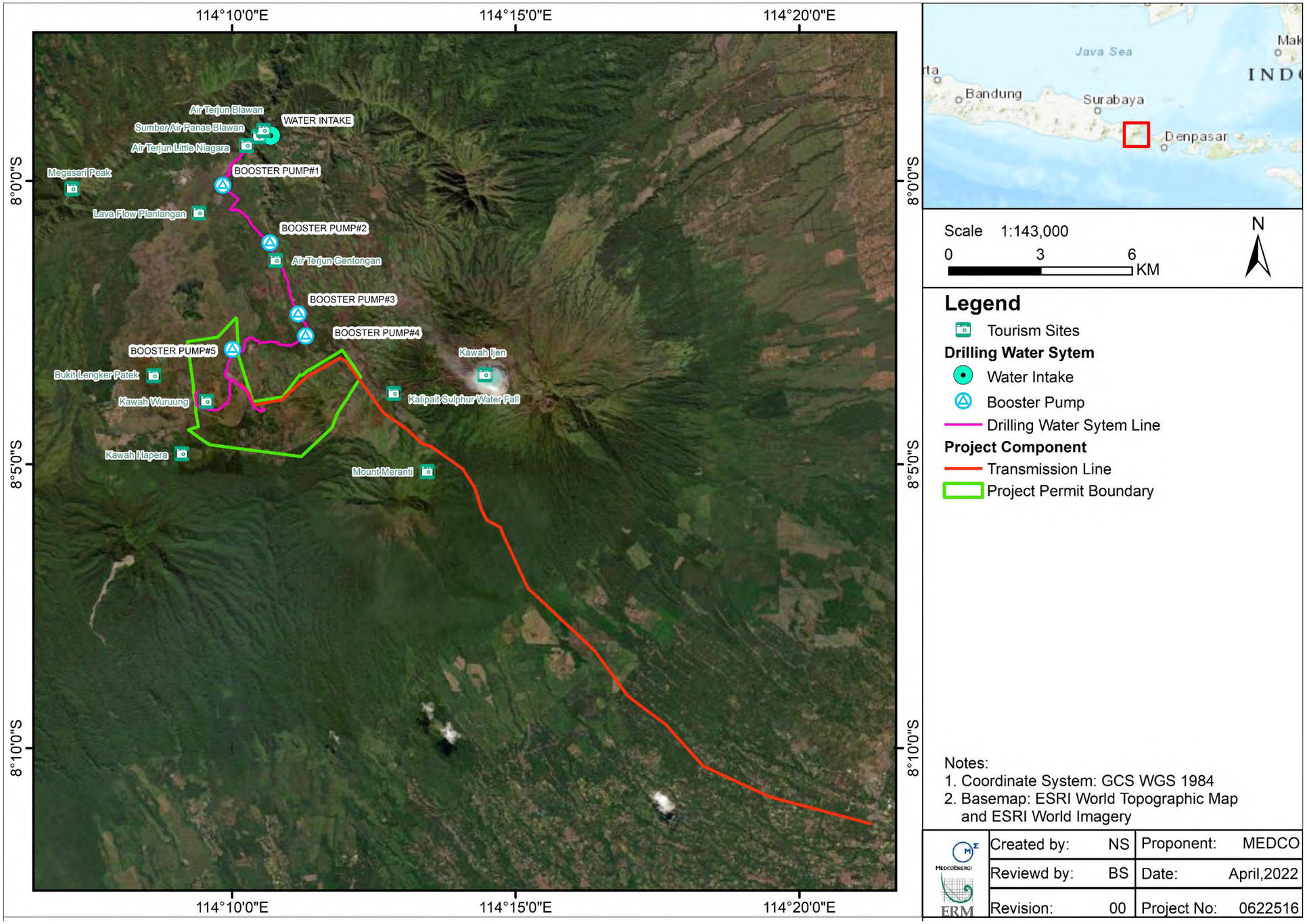
[1] USGS website, 2015: Kawah Ijen volcanic activity: A review. Available from: Kawah Ijen volcanic activity: A review | U.S. Geological Survey (usgs.gov)
[2] https://www.thejakartapost.com/travel/2020/07/14/east-javas-ijen-crater-reopens-to-tourists.html
[3] Zen, Moh & Wulandari, Dwi. (2016). Development Strategy of the Tourism Industry in Banyuwangi Regency (Case Study: Natural Park Ijen Crater Banyuwangi). IOSR Journal of Business and Management. 18. 41-47. 10.9790/487X-1808014147.
[4] https://borgenproject.org/tourists-at-kawah-ijen-crater/

Table 5.2: Tourism Sites in Study Area and Distance from Project

Name	Distance from Project (km)
Kawah Ijen/ Blue Fire (Ijen Crater)	3.02
Kalipait Water fall	0.67
Kawah Wurung (Wurung Crater)	0.10
Sumber Air Panas Blawan (Blawan Hot Spring)	0.06
Air Terjun Blawan (Blawan Waterfall)	0.24
Air Terjun Little Niagara (Little Niagara Waterfall)	0.04
Air Terjun Gentongan (Gentongan Waterfall)	0.04
Black Lava Plalangan (Lava Flow Plalangan Geosite)	1.05
Puncak Kaldera Megasari (Megasari Peak)	4.98
Bukit Jabal Kamit	1.27
Kawah Hapera	0.77
Mount Meranti	0.76

The existing tourism destinations in Kalianyar village are managed by Tourism, Youth, and Sport Agency of Bondowoso Regency. The village office does not obtain any direct revenue. However, the village is currently planning to develop the tourism potential and the community expectations are for the Project to support this initiative (from ESIA engagement).

Figure 5.11: Tourism Sites near the Main Construction Area



5.2.4.2 Intangible Cultural Heritage

Customs are unwritten rules containing habits that have been followed by the community over a long period of time, which then take root and become guidelines in the midst of people's lives. Conceptually, Ijen District has principles of harmony and perfection of life which are translated into various customs that the community have always adhered to, to this day. The concept of harmony for the people of Ijen District can be seen through the existence of ceremonial tradition, locally known as *Rokat Dhisa*, which is held in a particular month of the Islamic Calendar, namely Month of Syura. Another ceremonial tradition practiced to date is *Rokat Roma* or a housewarming event. The concept of perfection of life can be seen through specific ceremonial traditions of the community which takes place throughout an individual's life, such as *pelet kandung* ceremony to celebrate the seventh month of pregnancy, *mengubur tembhuni* or placenta burial of a newborn baby, *melangareh* to celebrate 35-day old baby, *Rokat Pandhapa* to prepare a child for adulthood, marriage, and death. These cultural values aim to maintain harmony, peace and social welfare.

5.3 Visual Area of Influence

As mentioned in paragraph 4.2.2.1 the visual area of influence is defined as the area within which the Project could be discernible by the human eye and could interfere with the main sensitivities identified in the local context.

The Zone of Theoretical Visibility (ZTV) has been determined through computer analysis of topographical mapping to establish the theoretical distance from which the transmission line could be visible in each direction.

The towers of the transmission line are the major visual element of the proposed development and may visually impact the surrounding areas. As the viewer moves further away from these structures the visual impact decreases until it is no longer visible. However, before the point of non-visibility is reached, the towers have reduced in scale such that they no longer have a significant visual impact.

Box 4.1 explains how a view-shed is defined and identified depending on the horizontal and vertical field of views.

The Project is comprised of some infrastructure. When assessing the visual impact, it is assumed that the largest horizontal component is the power plant, which would be a maximum of 350m wide.

As shown in ***Table 5-1***, calculations suggest that the impact of a 30m wide tower would reduce to be insignificant at about 6.8 km, as it would form less than 5% or 2.5° of the horizontal field of view (physical parameters are illustrated in ***Table 5-2***).

Table 5.3: Horizontal field of view

Horizontal Field of View	Impact	Distance from Observer to 350m
<2.5° of view	The development will take up less than 5% of the central field of view. The development, unless particularly conspicuous against the background, will not intrude significantly into the view. The extent of the vertical angle will also affect the visual impact.	>6.8 km
2.5° – 30° of view	The development will usually have a moderate impact that may not be noticeable at the greatest distance of this range.	550 m to 6.8 km

Horizontal Field of View	Impact	Distance from Observer to 350m
>30° of view	Developments that fill more than 50% of the central field of vision will always be noticed and only sympathetic treatments will mitigate visual effects.	<550 m

Source: taken from Guideline for landscape and visual impact assessment, Third Edition (GLVIA3), Landscape Institute and IEMA 2002 and Horner + Maclennan and Envision (2006) Visual representation of windfarms: good practice guidance, Inverness. Scottish Natural Heritage

A similar analysis can be undertaken based upon the vertical field of view for human vision. ***Table 5-2*** shows the relationship between impact and the proportion that the development occupies within the vertical line of sight.

Table 5.4: Vertical field of view

Vertical Line of Sight	Impact	Distance from Observer to a 30m
< 0.5° of vertical angle	A thin line in the landscape.	>3.4 km
0.5° – 2.5° of vertical angle	The degree of visual intrusion will depend on the development's ability to blend in with the surroundings.	690 m – 3.4 km
> 2.5° of vertical angle	Usually visible, however the degree of visual intrusion will depend on the width of the object and its placement within the landscape.	<690 m

Source: taken from Guideline for landscape and visual impact assessment, Third Edition (GLVIA3), Landscape Institute and IEMA 2002 and Horner + Maclennan and Envision (2006) Visual representation of windfarms: good practice guidance, Inverness. Scottish Natural Heritage

5.4 Visual Key Baseline Conditions

Based on the above, it is reasonable that distances greater than 3.5 km would result in an insignificant magnitude of visual impact from the towers, as a fully visible tower would be an insignificant element within the landscape.

Generally, the more conservative or worse-case distances form the basis for the assessment of visual impacts. For this Project the greater impacts would be associated with the vertical field of view along the transmission line and the horizontal field of view for the facilities area and so it is proposed to define a combination of study area:

- - 3.5 km for the towers
- - 7 km for facilities.

Arc Map 10.8.2 was used to determine the ZTV for the Project. The current visibility within the ZTV will vary depending on the presence of intervening local topography and other features, such as vegetation and buildings. The present view shed analysis has been based solely on topography and did not take into account the potential screening granted by the local vegetation patches, which would further reduce the actual view shed. Moreover, it should be highlighted that a typical view shed assessment does not take typical meteorological conditions into account that can result in changes to real visibility. For example, rainfall and other atmospheric conditions (e.g., sand transported by the wind) will alter the visibility of the Project. The diminution of visual clarity bought about by atmospheric conditions also increases with distance, and cloudy days can result in a natural attenuation of the visibility of the Project.

These mapping outputs illustrate the number of towers potentially visible from within the Study Area for the different transmission line visibility elements.

Figure 5.9 show the ZTV mapping.

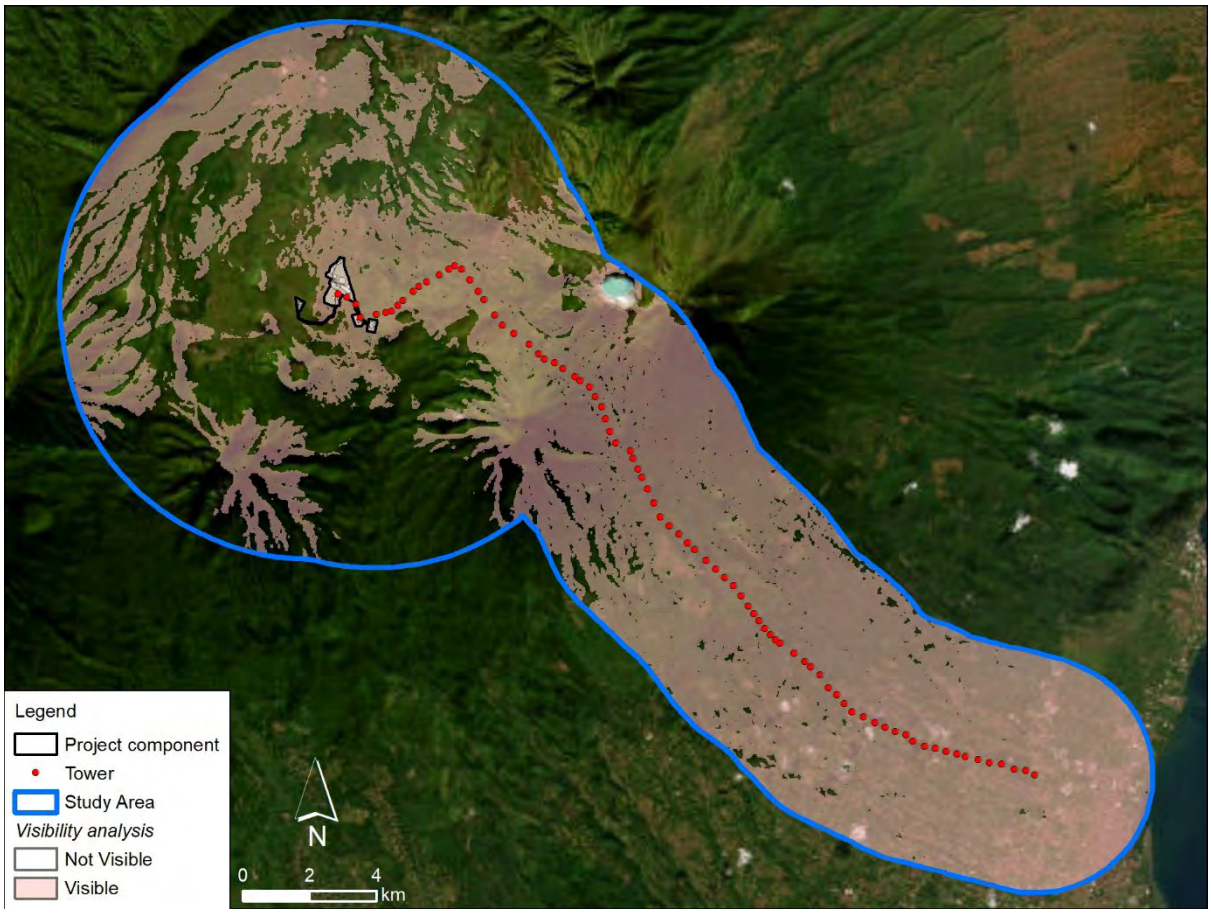


Figure 5.12: View Shed

The results of the view shed assessment shows that the visibility is influenced by the undulated morphology of the area. Figure 5.9 above shows how the towers are expected to be potentially visible across the majority of the buffer zone.

It should be emphasized that intervening vegetation is not included in this mapping and is likely to significantly reduce the visibility of the towers, in whole or in part, and therefore reduce the impact identified.

Regarding the potential visibility from local communities, towers will be visible from the several settlements spread over the communes inside the Study Area.

5.4.1 Viewpoints Identification

In order to assess the visual baseline, 19 viewpoints have been identified within the Study Area. These viewpoints are referred to as Visual Sensitive Receptors (VSRs). They represent points within the view shed from where people will be able (or not) to see the Project, and where the quality of the landscape and visual resources of people could be affected by the presence of the Project.

It should be noted that, in order to screen the potential sensitive receptors, the following criteria have been used to assess the sensitivity of the VSRs:

- Value and quality of existing views;
- Type and estimated number of receiver population;
- Duration of frequency of view; and

- Degree of visibility.

Table 5-3 and ***Figure 5.10*** show the locations of the VSRs as representative of the general landscape character of the area, from locations within the Study Area varying in distance and elevation.

Table 5-3 provides the coordinates of the points and their distance from the closest tower. The coordinates are expressed in WGS 1984/UTM Zone50S.

Table 5.5: Location of the proposed VSRs

VSR ID	X (East)	Y (South)	Site
VSR1	114,22255	-8,07588	Near the Karona Berg Homestay and Cafe
VSR2	114,25526	-8,12804	In a field to the right of to the Gantasan Bike Park
VSR3	114,24034	-8,09819	On the JI. Kawah Ijen road, after the Erek Erek Geoforest
VSR4	114,21753	-8,06920	At the Bukit Harapan, IJEN, on the road
VSR5	114,21156	-8,06197	After the Air Terjun Ijen, on the road to the Plant
VSR6	114,26568	-8,13457	In the Pal Pakis town
VSR7	114,34531	-8,18801	On the road near Masjid Nur Rohmah
VSR8	114,35632	-8,18916	On the road at Banyuwangi Substation
VSR9	114,35345	-8,19440	In a field near Warung Pangklang jpl 16 cafe
VSR10	114,17352	-8,04822	On the road to SD Negeri Kalianyar Dsn Curah Macan school
VSR11	114,20706	-8,05947	On the road to the Plant, after VSR 5
VSR12	114,18639	-8,04709	On the road, 1.5 km from VSR 10
VSR13	114,20045	-8,05197	On the road to the Plant, before Pos 3 Margahayu office
VSR14	114,21592	-8,06262	Near the creek at Air Terjun Ijen
VSR15	114,21538	-8,06276	On the road near the creek and VSR 14
VSR16	114,16898	-8,06259	At the Bondowoso sign near Warkop Sederhana Cafe
VSR17	114,17526	-8,06795	At the Injection Wellpad 2 site
VSR18	114,30464	-8,17202	On the road near Vicky AMS Retail 3

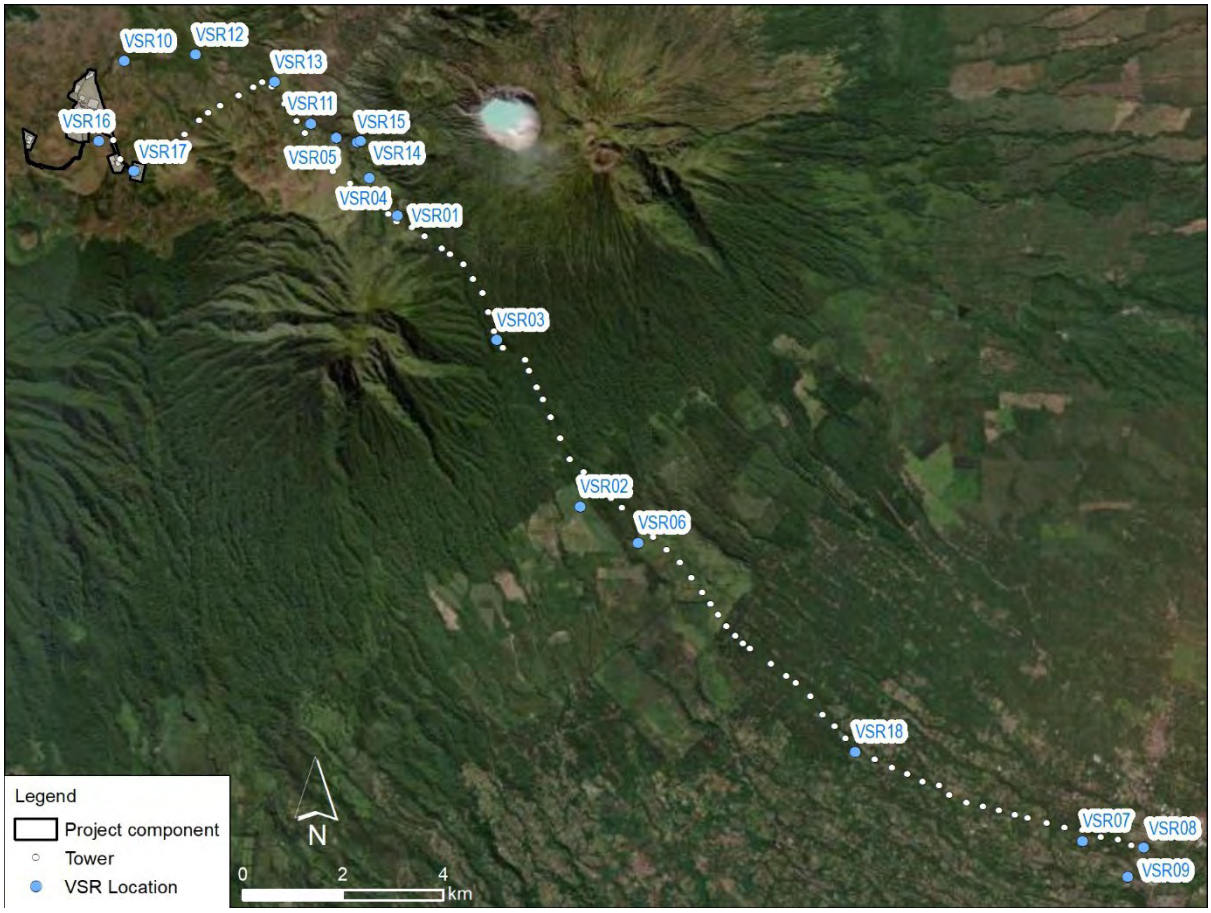


Figure 5.13: Location of the proposed VSRs

6. IMPACT ASSESSMENT

The Baseline study showed that the landscape is characterized by two different landscape area, one area more touristic surrounded by mountains with an higher altitude and a second more urbanized with cultivated areas, and a lower altitude.

6.1 Potential Impacts

6.1.1 Landscape

Landscape sensitivity can be assessed by the ability of a particular landscape character to absorb aesthetic alterations. Landscape impacts may occur upon a landscape characteristic as a direct result of the presence of the Project within an area of a particular landscape character. The area identified for the Project has a predominant abundance of cropland and grassland.

The presence of the transmission line towers is likely to cause impacts to landscape value. The Project key activities that are likely to have negative impacts on landscape include:

- Site preparation, excavation and filling works;
- Installation of the transmission line;
- Power plant construction; and
- Storage, handling and disposal of waste and materials.

The construction and operation activities associated with the Project—including land clearance, grading, excavated material disposal, and placement—have the potential to impact the landscape.

6.1.2 Visual

Visual impacts refer mainly to the visual character changes of available views resulting from project development, such as:

- obstruction of existing views;
- removal of screening elements, thereby exposing viewers to unsightly views;
- the introduction of new elements into the views;
- and intrusion of foreign elements into the viewshed of landscape features.

The presence of the towers for the transmission line is likely to cause impacts to visual.

6.2 Existing Controls

The controls to be implemented for the Project will include the following:

- The extent of the construction areas should be limited where possible to minimise impact to surrounding area; and
- Cut and fill slopes as well as areas disturbed by construction activity are suitably top soiled and vegetated / covered as soon as is possible after final shaping.
- Demarcate Project boundaries and minimize areas of surface disturbance;
- Where possible locate laydown areas and construction camps in areas that are already disturbed or cleared of vegetation;
- Maintenance of construction site – good housekeeping on site to avoid litter and minimize waste.
- Existing tracks/roads should be used for access where possible;
- Minimize night lighting in order to guarantee the minimum safety level;
- Foreseen within the environmental management system, the preparation of a restoration management plan including indigenous species replanting, construction yards landscaping and rehabilitation; and
- Structures should have a non-reflective finish and the colour should be appropriate in order to merge itself as much as possible within the landscape.

6.3 Impact Evaluation and Significance

The assessment of impacts on landscape and visual amenity was undertaken in accordance with accepted methodologies derived from best practice guidelines.

Impact significance for landscape and visual amenity is generally derived on the basis of the following main factors:

- The quality/importance of the landscape/visual amenity as a resource/function that is potentially affected;
- The sensitivity of the landscape/visual amenity towards Project activities;
- The magnitude of change to the receiving landscape and visual amenity as a result of the Project.

6.3.1 Criteria for Assessing Impact Significance - Landscape

The impact magnitude and receptor sensitivity criteria for landscape has been provided in ***Table 6.1*** and ***Table 6.2***, respectively.

Table 6.1: Landscape Magnitude of Effect Criteria

	Extent / Duration / Scale / Frequency
Large	A clearly evident and frequent /continuous change in landscape characteristics affecting an extensive area.
Medium	A moderate change in landscape characteristics, frequent or continuous, and over a wide area, or a clearly evident change either over a restricted area or infrequently perceived.
Small	A small change in landscape characteristics over a wide area or a moderate change either over a restricted area or infrequently perceived.
Negligible	An imperceptible, barely or rarely perceptible change in landscape characteristics.

Table 6.2: Landscape Sensitivity Criteria

Category	Designation / Importance / Vulnerability
High	A landscape protected by a regional (structure plan) or national designation and/ or widely acknowledged for its quality and value; a landscape with distinctive character and low capacity to accommodate the type of change envisaged.
Medium	A landscape protected by a structure plan or national policy designation and/ or widely acknowledged for its quality and value; a landscape with distinctive character and low capacity to accommodate the type of change envisaged.
Low	A moderately valued landscape, perhaps a locally important landscape, or where its character, land use, pattern and scale may have the capacity to accommodate a degree of the type of change envisaged.

6.3.1.1 Impact Significance - Landscape

The potential impacts from the construction phase likely to have negative impacts on landscape, will include mainly vegetation clearance and site preparation (excavation) for both the geothermal plant and the transmission line construction. Impacts will be limited to areas adjacent to the Project.

Although the area is characterized by numerous tourist sites, it is considered to have good capacity to absorb the type of change envisaged by the Project, which is why the sensitivity of the landscape resource (LCU A and LCU B) is expected to be **medium**. Intangible cultural heritage is not expected to be impacted by the Project as the construction and operation activities do not affect natural spaces or species with spiritual, cultural or religious importance; cultural value placed on traditional practices such as hunting, fishing, crafts and use of natural resources; cultural value placed on the aesthetic value provided by landscapes, natural landmark; information derived from ecosystems used for intellectual development, culture, art, design, and innovation or ornamental resources. The stakeholders consulted during the ESIA process did not raise any concerns related to tangible or intangible assets with some community members perceiving the Project to have a positive impact on tangible and intangible cultural heritage by continuing the existing community development program, especially in providing assistance to renovate worship facilities (mosques). The magnitude of change of landscape would be **medium**.

As such, the significance of impacts due to change in landscape is considered to be **moderate.**

6.3.1.2 Criteria for Assessing Impact Significance - Visual

The impact magnitude and receptor sensitivity criteria for visual amenity has been provided in ***Table 6.1*** and ***Table 6.2***, respectively.

Table 6.3: Visual Magnitude of Effect Criteria

	Extent / Duration / Scale / Frequency
Large	Major changes in view at close distances, affecting a substantial part of the view, continuously visible for a long duration, or obstructing a substantial part or important elements of the view.

	Extent / Duration / Scale / Frequency
Medium	Clearly perceptible changes in views at intermediate distances, resulting in either a distinct new element in a significant part of the view, or a more wide-ranging, less concentrated change across a wider area.
Small	Minor changes in views, at long distances, or visible for a short duration, perhaps at an oblique angle, or which blends to an extent with the existing view.
Negligible	A change which is barely visible, at very long distances, or visible for a very short duration, perhaps at an oblique angle, or which blends with the existing view.

Table 6.4: Visual Sensitivity Criteria

Category	Designation / Importance / Vulnerability
High	Larger numbers of viewers and/or those with proprietary interest and prolonged viewing opportunities such as residents and users of attractive and well-used recreational facilities. The quality of the existing view, as likely to be perceived by the viewer, is assessed as being high.
Medium	Small numbers of residents and moderate numbers of visitors with an interest in their environment. Larger numbers of recreational road users. The quality of the existing view, as likely to be perceived by the viewer, is assessed as being medium.
Low	Small numbers of visitors with interest in their surroundings. Viewers with a passing interest not specifically focussed on the landscape e.g. workers, commuters. The quality of the existing view, as likely to be perceived by the viewer, is assessed as being low.

6.3.1.3 Impact Significance - Visual

When determining the significance of visual effects, the following is taken into account:

- Large scale changes which introduce new discordant or intrusive elements into the view are more likely to be significant than small changes or changes involving features already present in the view;
- Changes in views from recognized and important viewpoints or amenity routes are likely to be more significant than changes affecting less important paths and roads; and
- Changes affecting large numbers of people are generally more significant than those affecting a relatively small group of users. However, in wilderness landscapes the sensitivity of the people who use the areas may be very high and this will be reflected in the significance of effect.

The visual impact is a product of the magnitude of change to the existing baseline conditions, the landscape context, and the sensitivities of Visual Sensitive Receptors (VSRs).

The viewshed analysis shows that the proposed towers have the potential to be visible in the nearby areas, although not continuously due to the variability of the landscape for the area surrounding the Project and the presence of vegetation.

Specific considerations were made for each VSR, and the impact significance, receptor sensitivity, and impact magnitude is summarized in ***Table 6.5***.

Table 6.5: Summary of Visual Impact

VSR	Site	Sensitivity of receptor	Magnitude of visual effect	Significance of visual effect
VSR01	Near the Karona Berg Homestay and Cafe	Medium	Medium	Moderate
VSR02	In a field to the right of to the Gantasan Bike Park	Medium	Small	Minor
VSR03	On the JI. Kawah Ijen road, after the Erek Erek Geoforest	Low	Small	Negligible
VSR04	At the Bukit Harapan, IJEN, on the road	Medium	Medium	Moderate
VSR05	After the Air Terjun Ijen, on the road to the Plant	Medium	Negligible	Negligible

VSR	Site	Sensitivity of receptor	Magnitude of visual effect	Significance of visual effect
VSR06	In the Pal Pakis town	Medium	Small	Minor
VSR07	On the road near Masjid Nur Rohmah	Low	Medium	Minor
VSR08	On the road outside the Banyuwangi Substation	Low	Negligible	Negligible
VSR09	In a field near Warung Pangklang jpl 16 cafe	Low	Negligible	Negligible
VSR10	On the road to SD Negeri Kalianyar Dsn Curah Macan school	Low	Negligible	Negligible
VSR11	On the road to the Plant, after VSR 5	Low	Small	Negligible
VSR12	On the road, about 2 km from the SD Negeri Kalianyar Dsn Curah Macan school	Low	Small	Negligible
VSR13	On the road to the Plant, before Pos 3 Margahayu office	Medium	Negligible	Negligible
VSR14	Near the creek at Air Terjun Ijen	Medium	Negligible	Negligible
VSR15	On the road near the creek and VSR 14	Medium	Negligible	Negligible
VSR16	At the Bondowoso sign near Warkop Sederhana Cafe	Medium	Medium	Moderate
VSR17	At the Injection Wellpad 2 site	Low	Small	Negligible
VSR18	On the road near Vicky AMS Retail 3	Medium	Medium	Moderate

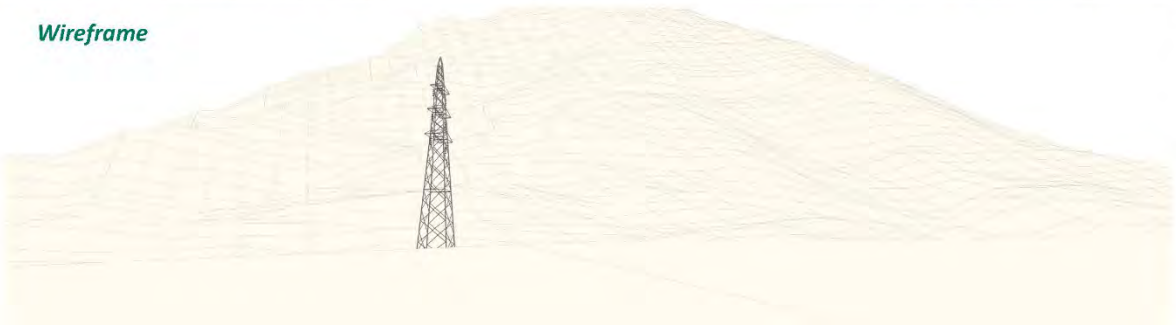
A selection was made from the VSRs, considering distances and receptor type, and photomontages are visible in the graphics sheets below.

Figure 6.1 outlines how the graphic sheets are organized (***Figure 6.2*** to ***Figure 6.10***), with sections matching these numbered descriptions:

1. Location and direction of VSR;
2. Photo current state;
3. Photo simulation;
4. Wireframe view; and
5. Summary of visual impact.

Figure 6.1: Legend of Visual Graphic Sheets

Figure 6.2: Photomontage for VSR01



Cordinate System GCS
WGS84
X -114.22254
Y -8.07588

VSR01
(1 of 2)

The view is taken from outside the Karona Berg Homestay and Cafe, the sensitivity level is therefore considered to be medium

Given the proximity, the transmission line is visible through the trees. The magnitude level is considered to be medium

Sensitivity	Magnitude	Significance
Medium	Medium	**Moderate**

Current

Photomontage

Wireframe

Cordinate System GCS
WGS84
X -114.22254
Y -8.07588

VSR01
(2 of 2)

The view is taken from outside the Karona Berg Homestay and Cafe, the sensitivity level is therefore considered to be medium

Given the distance, the transmission line is visible through the trees. The magnitude level is considered to be medium

Sensitivity	Magnitude	Significance
Medium	Medium	**Moderate**

Figure 6.3: Photomontage for VSR02

Cordinate System GCS
WGS84
X -114,25526
Y -8,12804

VSR02

The view is taken from the Pal Pakis town, the sensitivity level is therefore considered to be medium

The transmission line is visible in the foreground across the trees. The magnitude level is considered to be small

Sensitivity	Magnitude	Significance
Medium	Small	**Minor**

Figure 6.4: Photomontage for VSR08

Cordinate System GCS
WGS84
X -114.35632
Y -8.18915

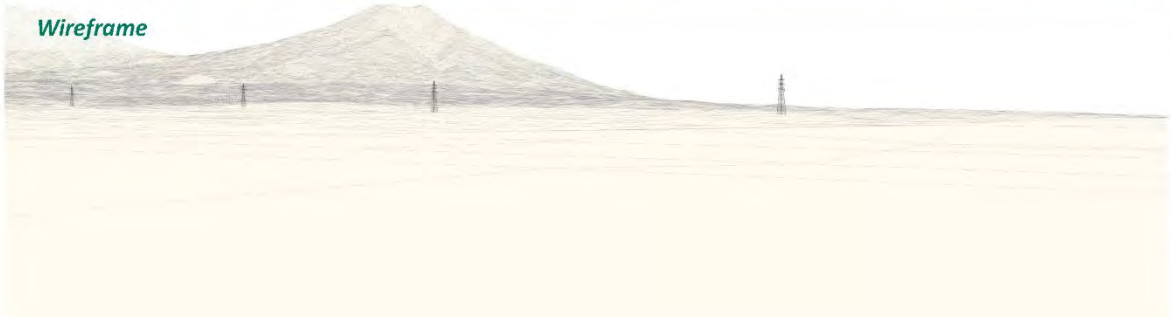
VSR08

The view is taken from the road outside the Banyuwangi Substation, the sensitivity level is therefore considered to be low

Given the proximity, the transmission line is partially visible but hidden by the Substation. The magnitude level is considered to be negligible

Sensitivity	Magnitude	Significance
Low	Negligible	**Negligible**

Figure 6.5: Photomontage for VSR09



Cordinate System GCS
WGS84
X -114.35345
Y -8.19439

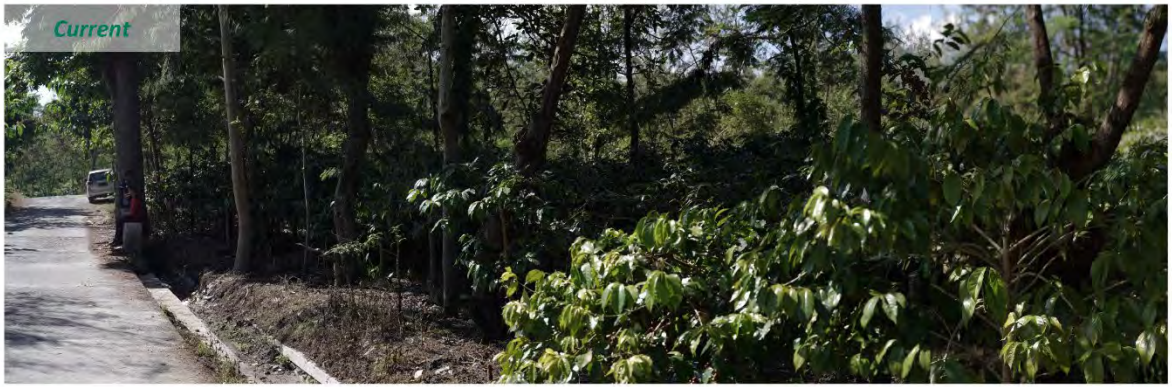
VSR09

The view is taken fromIn a field near Warung Pangklang jpl 16 cafe, the sensitivity level is therefore considered to be low

Given the distance and the trees, the transmission line is not visible. The magnitude level is considered to be negligible

Sensitivity	Magnitude	Significance
Low	Negligible	**Negligible**

Figure 6.6: Photomontage for VSR10



Cordinate System GCS
WGS84
X -114.17352
Y -8.04822

VSR10

The view is taken from the road to SD Negeri Kalianyar Dsn Curah Macan school, the sensitivity level is therefore considered to be low

Given the distance and the forest, the transmission line is not visible. The magnitude level is considered to be negligible

Sensitivity	Magnitude	Significance
Low	Negligible	**Negligible**

Figure 6.7: Photomontage for VSR12

Cordinate System GCS
WGS84
X -114.18639
Y -8.04709

VSR12

The view is taken from the road, about 2 km from the SD Negeri Kalianyar Dsn Curah Macan school, the sensitivity level is therefore considered to be low

Given the distance, the towers are visible but small. The magnitude level is considered to be small

Sensitivity	Magnitude	Significance
Low	Small	**Negligible**

Figure 6.8: Photomontage for VSR15

Cordinate System GCS
WGS84
X -114,21538
Y -8,06276

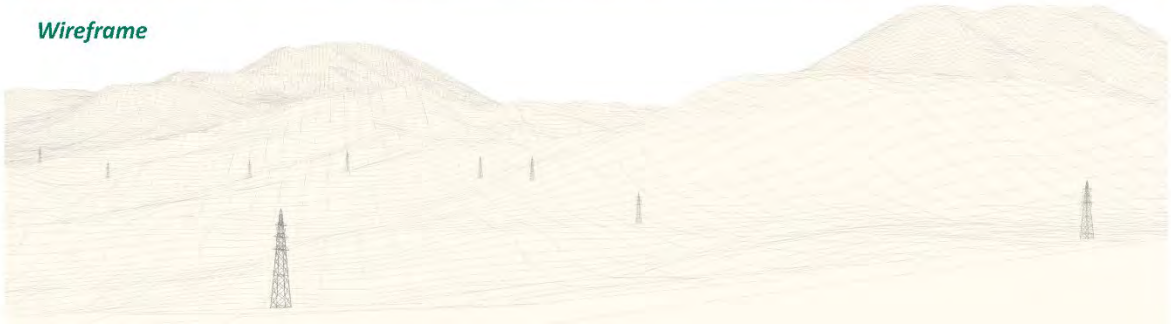
VSR15

The view is taken fromon the road near the creek, the sensitivity level is therefore considered to be medium

The transmission line is not visible above the trees. The magnitude level is considered to be small

Sensitivity	Magnitude	Significance
Medium	Negligible	**Negligible**

Figure 6.9: Photomontage for VSR16



Cordinate System GCS
WGS84
X -114.16897
Y -8.06258

VSR16

The view is taken from the Bondowoso sign near Warkop Sederhana Cafe, the sensitivity level is therefore considered to be medium

Given the proximity, the transmission line is partially visible above the trees in the distance. The magnitude level is considered to be medium

Sensitivity	Magnitude	Significance
Medium	Medium	**Moderate**

Figure 6.10: Photomontage for VSR17

Cordinate System GCS
WGS84
X -114,17526
Y -8,06795

VSR17
(1 of 3)

The view is taken from the View Point is at the Injection Wellpad 2 site, the sensitivity level is therefore considered to be low

The transmission line is not visible above the trees. The magnitude level is considered to be small

Sensitivity	Magnitude	Significance
Low	Small	**Negligible**

Wireframe

Cordinate System GCS
WGS84
X -114,17526
Y -8,06795

VSR17
(2 of 3)

The view is taken from the View Point is at the Injection Wellpad 2 site, the sensitivity level is therefore considered to be low

The transmission line is not visible above the trees. The magnitude level is considered to be small

Sensitivity	Magnitude	Significance
Low	Small	**Negligible**

Cordinate System GCS
WGS84
X -114,17526
Y -8,06795

VSR17
(3 of 3)

The view is taken from the View Point is at the Injection Wellpad 2 site, the sensitivity level is therefore considered to be low

The transmission line is not visible above the trees. The magnitude level is considered to be small

Sensitivity	Magnitude	Significance
Low	Small	**Negligible**

6.4 Additional Mitigation Measures

6.4.1 Landscape Value

In order to mitigate the landscape impacts, there are different actions that should be considered, especially during the construction phase, such as:

- Demarcate construction boundaries and minimize areas of surface disturbance;
- Where possible, locate laydown areas and construction camps in areas that are already disturbed or cleared of vegetation;
- For the construction site maintenance, conduct good housekeeping on site to avoid litter and minimize waste;
- Use existing tracks/roads for access, where possible; and
- Within the environmental management system, prepare a restoration management plan including replanting indigenous species, and landscaping and rehabilitating construction yards.

6.4.2 Visual

The following identifies mitigation measures to be applied for visual impacts, including:

- Where possible, locate laydown areas and construction camps in areas that are already disturbed or cleared of vegetation;
- For the construction site maintenance, conduct good housekeeping on site to avoid litter and minimize waste;
- Minimize night lighting while guaranteeing the minimum safety level;
- Use of materials that will minimize light reflection should be used for all Project components; and
- Existing vegetation should be retained to the greatest extent possible. Vegetation should be retained along roads, and other Project infrastructure.

6.4.3 Residual Impact Significance

With the implementation of the above existing control and mitigation measures, as well as the above-recommended additional mitigation and management measures, it is expected that the residual impact significance would be ***Minor*** to ***Moderate*** (***Table 6.6***).

Table 6.6: Residual Impact Assessment for Landscape and Visual

Impact Significance

Impact Nature	Negative	Positive	Neutral	
	Landscape and topography impact from the construction activities is negative.			
Impact Type	Direct	Indirect	Induced	
Impact Duration	Temporary	Short-term	Long-term	Permanent
Impact Extent	Local	Regional	International	

Impact Significance

Impact Scale	Impact scale is considered small given the construction activities will only be mainly visible to the visual sensitive receivers within the Project Area of Influence.				
Frequency	Impacts will arise continuously from construction related activities				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
Residual Magnitude	Negligible	Small	Medium	Large	
Residual Impact significance	Negligible	Minor	Moderate	Major	

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