

Environmental and Social Review Summary

Country: Mozambique
Project Name: Temane Regional Electricity Project (TREP)
Project Number: P160427
Environmental Category: A

Project Description

1. Temane Regional Electricity Project (TREP) includes the following: (i) Temane Transmission Project (TTP); (ii) Central Térmica Temane (CTT) gas-fired power generation plant; and (iii) Technical assistance for implementation support, investment and policy analysis, and capacity building.

2. **Temane Transmission Project (TTP).** TTP includes the construction and operation of a 560-km, 400-kV transmission line from vicinity of the town of Vilanculos, near the location of the CTT power plant, to the vicinity of the city of Maputo. The line will be implemented by Sociedade Nacional de Transporte de Energia (SNTE), a wholly-owned subsidiary of Electricidade de Moçambique (EDM), the Mozambican state-owned national power utility. Several public development financing institutions are considering financing the TTP, including African Development Bank (AfDB), Development Bank of Southern Africa (DBSA), International Development Association (IDA), Islamic Development Bank (IsDB), OPEC Fund for International Development (OFID), and the Government of Norway.

3. World Bank support to the TTP is proposed through a US\$292 million IDA loan as part of an overall US\$551 million total cost (including the cost of TTP investment and project implementation support for SNTE)¹.

4. The World Bank Safeguard Policies apply to TTP because it is a public sector activity. For a further description of TTP and its environmental and social (E&S) impacts, please refer to the TREP PID-ISDS. This ESRS is intended to describe only the E&S risks and impacts and mitigation for the Central Térmica Temane (CTT) power plant, which is a private sector activity and applies the World Bank Performance Standards.

5. **Central Térmica Temane (CTT).** CTT includes construction and operation of a 400 MW gas-fired power plant in the Temane/Mangugumete area, Inhassoro District, Inhambane Province, Mozambique. The proposed CTT project² site is located approximately 20 km in-land of the coastline, 40 km northwest of the town of Vilanculos, 30 km southwest of the town of Inhassoro, and 8 km east of the Govuro River. The footprint of the CTT power plant is approximately 20 ha.

6. CTT will be constructed and operated by Mozambique Power Invest, S.A. (MPI), in a joint development agreement with Sasol New Energy Holdings (Pty) Ltd (SNE) (together “CTT

¹ Total IDA grant amounts to US\$300 million, of which US\$8 million is for technical assistance to EDM and to the Ministry of Energy and Mineral Development for strengthening investment planning, policy, and regulation in the sector and for institutional capacity building.

² For the purposes of this ESRS, the term “project” is used to refer to the CTT and not TREP, unless otherwise specified.

Sponsor”). MPI’s major shareholders include EDM and Temane Energy Consortium (Pty) Ltd (TEC). TEC is a joint venture (JV) of Globeleq and EleQtra.

7. To support the debt and equity financing of the CTT power plant, the World Bank is providing two IDA guarantees in the total nominal value of up to US\$120 million (in aggregate) to backstop EDM’s payment obligations for gas and electricity purchases. Specifically, the IDA payment guarantees will credit enhance EDM’s payment security for (a) the Tolling Agreement with CTT; and (b) the Gas Supply Agreement with the PSA Gas Sellers (Sasol Petroleum Mozambique Limitada (SPM) and Empresa Nacional De Hidrocarbonetos E.P. (ENH).

8. The preferred location for the CTT is about 500 m south of the existing natural gas Central Processing Facility (CPF). Infrastructure and facilities, as components of the project, owned and operated by the CTT Sponsor for the construction and operation of the CTT include: (i) Electricity transmission line 25km in length to the Vilanculos substation; (ii) A water pipeline from a borehole to the CTT plant site; (iii) Gas pipeline between the CPF and the power plant; (iv) An access road, construction camp and contractor laydown areas at the CTT site; and (v) A beach landing, temporary jetty, access road and temporary bypass bridge over the Govuro River for transporting construction equipment.

9. Electricity generated by the plant will be evacuated via a 25 km, 400-kV electricity transmission line to a location near the town of Vilanculos where it will be connected to the 400-kV substation and the 400-kV Temane Transmission Line (TTP). Water for the plant is expected to be abstracted from groundwater directly around the plant or, alternatively (depending on the quality and availability) from a borehole on the east side of the Govouro River and transported to the plant via a 11km pipeline. Heavy equipment for the construction of the power plant and transmission substations will be transported by ships, where the ships will anchor while the equipment is offloaded to barges and transported to a landing site in the Inhassoro area and then transported by truck to the construction sites.

10. Natural gas for the CTT will be supplied by SPM and ENH from Temane and Inhassoro gas fields developed under the Production Sharing Agreement (PSA) of October 26, 2000 with Government of Mozambique (GoM), ENH and Sasol as parties, and a Field Development Plan approved by the GoM on January 26, 2016.

Key Issues

11. The project is classified as Category A according to World Bank Operational Policy 4.03 on World Bank Performance Standards because it has the potential for significant adverse E&S impacts that are diverse, irreversible, and unprecedented. Key E&S risks and impacts are anticipated related to: biodiversity (including protected areas and critical natural habitat), occupational health and safety, cultural assets, physical and economic displacement, and labor and population influx.

12. While all Performance Standards are applicable, the World Bank’s E&S due diligence indicates that the investment will have impacts which must be managed in a manner consistent with the following Performance Standards:

- PS 1 - Assessment and Management of Environmental and Social Risks and Impacts
- PS 2 - Labor and Working Conditions
- PS 3 - Resource Efficiency and Pollution Prevention

- PS 4 - Community Health, Safety and Security
- PS 5 - Land Acquisition and Involuntary Resettlement
- PS 6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources
- PS 8 - Cultural Heritage

13. No indigenous people, as defined by PS7, have been identified in the area of the project, therefore PS7 Indigenous Peoples is not considered relevant.

14. The World Bank Group General Environmental, Health and Safety Guidelines (EHSGs) and Industry Sector EHSGs for Thermal Power Plants, Electric Power Transmission and Distribution apply.

Key Information Sources

15. The World Bank's due diligence included review of technical, environmental, and social documentation made available by the CTT Sponsor and conducting site visits. Documentation reviewed included the Environmental and Social Impact Assessment (ESIA); construction, operational and decommissioning phase Environmental, Social Health, and Safety (ESHS) management plans; and specific studies and management plans.

16. Project sites were visited by the World Bank team in December 2017, including the proposed site for the CTT, potential landing site for heavy equipment in Inhassoro, gas well near the CPF in Temane and visited the Right-of-Way for the Temane Transport Project (TTP) Transmission Line near Maputo. The team also met with the CTT Sponsor and CPF operator.

Environmental and Social Mitigation Measures

17. The World Bank's due diligence considered the environmental and social management planning process and documentation for the project and gaps, if any, between these and World Bank requirements. Where necessary, corrective measures, intended to close these gaps within a reasonable period of time, are summarized in the paragraphs that follow and in an agreed Environmental and Social Action Plan (ESAP). Through implementation of these measures, the project is expected to be designed and operated in accordance with World Bank Performance Standards objectives.

PS1: Assessment and Management of Environmental and Social Risks and Impacts

18. **Policy.** The CTT Sponsor is a new SPV without an existing Environmental, Social, Health and Safety (ESHS) Policy. The ESAP includes provisions to ensure that the CTT Sponsor will develop and implement an ESHS Policy, endorsed by management, that defines the objectives for ESHS management of the project and provides the framework to guide CTT in the development of an integrated management system (IMS) for the construction, operation and decommissioning of the project.

19. **Identification of Risks and Impacts.** An Environmental and Social Impact Assessment (ESIA) has been prepared for the CTT on behalf of the CTT Sponsor by a qualified independent consulting firm. The ESIA assessed E&S risks and impacts and proposed mitigation measures for the CTT consistent with the requirements of the relevant E&S laws and regulations of GoM, World Bank Performance Standards, and EHSGs. The scope of the ESIA was the proposed CTT site and immediate vicinity, CTT design, infrastructure and facilities as components of the project (see

paragraph 8), and Cumulative Impact Assessment (CIA). The ESIA also included analysis of alternatives and supplemental studies, such as a Social Impact Assessment (SIA) and Marine Ecology study. Additional scope of assessment in the ESIA included borrow pits, quarries, and waste disposal sites. The ESIA is expected to be approved by GoM in the second quarter 2019.

20. The TTP is an associated facility to the CTT, however it is also a part of the overall World Bank TREP project beyond the CTT and as such, E&S risks and impacts are to be managed by GoM consistent with World Bank Safeguard Policies. The CIA assessed the incremental impacts of the CTT to existing and planned projects or activities within the CIA Study Area related to identified valued environmental and social components (VECs). The other planned projects assessed in the CIA are not part of the CTT project and are owned and operated by third-parties, including the PSA development and PPA and PSA expansion, the TTP, and other planned investments such as a Sasol Pipeline and Floating, Storage and Offloading (FSO), an industrial park near the CPF, an offshore sea cable, increased marine traffic and the Inhassoro Tourism Resort Preliminary Master Plan. Cumulative impacts were assessed to be managed for VECs related to biodiversity, population influx and community health.

21. The ESIA assessed the highest significance for potential residual environmental and social impacts during the construction phase. Environmental impacts during construction are anticipated related to biodiversity related to the temporary landing and anchorage sites for heavy equipment transport, the possible creation of a transient barrier to movement of dugong individuals between southern and northern feeding grounds and other impacts to marine species as a result of vessel and barge traffic between the anchorage point and beach landing site and the associated noise and potential vessel strike effects. The main social risks and impacts expected during construction are related to physical and economic displacement, public health, and influx of workers and opportunity seekers (including GBV/SEA).

22. **Management Program.** The CTT Sponsor, as provided in the ESAP, will develop and implement a third party certified IMS adopting the ISO 14001 environmental management system and ISO 45001 occupational health and safety management system standards. The IMS will include procedures for the management of contractors and their E&S impacts during the construction phase and specific management plans for operations phases. The CTT Sponsor will ensure that the CTT contractor(s) prepares and implements a Project Contractor Environmental and Social Management Plan (CESMP) and Occupational Health & Safety Plans (OHS Plans), as well as on all other environmental and social management plans and required by the Environmental and Social Management Plan (ESMP) provided in the ESIA, as well as the ESAP. The ESMP will be updated following decisions on various outstanding technology options. A full list of management Plans contemplated in the ESIA and ESMP is included in the ESAP.

23. During the construction phase, the contractor(s) will be required, as part of the ESAP and IMS, to recruit experienced environmental and social staff. The CTT Sponsor's IMS will have procedures to ensure that all sub-contractors comply with the same environmental, social, health and safety standards as the main contractor(s).

24. During operations, E&S risks and impacts will be managed by the CTT Sponsor through implementation of the IMS and relevant specific management plans. In addition, CTT will manage cumulative impacts through implementation of specific management plans, namely the Biodiversity Management Plan, Population Influx Management Plan and Sustainable Development Plan.

25. Aside from physical and economic displacement (see PS5), measures to manage social risks are provided in the following specific management plans: Stakeholder Engagement Plan, Influx Management Plan and Community Development Plan.

26. The Community Development Plan requires CTT to implement sustainable and integrated community development initiatives aimed at uplifting local project affected communities. These development initiatives, especially if implemented in consultation with other community development actors in the area, can contribute considerably towards education, health, socio-economic development, sustainable jobs and income stability within the project area. CTT will review community development initiatives which are on-going in the area and consult with communities to identify and support necessary development gaps related to water supply, education, health and other identified needs.

27. **Organizational Capacity and Competency.** The CTT Sponsor, as provided in the ESAP, will be responsible for the oversight and implementation of the IMS to manage E&S risks and impacts from the project. The CTT Sponsor will hire qualified personnel to prepare and implement any specific management plans identified in the ESAP. Globeleq, an equity partner in the CTT and closely involved in project development, has significant experience developing and operating independent power plants in Africa.

28. **Emergency Preparedness and Response.** The CTT Sponsor will establish a suite of emergency preparedness, response management and incident investigation procedures. The ESMP provided in the ESIA includes an Emergency Preparedness and Response Plan. As provided in the ESAP, the EPC Contractor and O&M Contractor shall develop Emergency Preparedness and Response Plans (including Community Emergency Response Plans) for the construction and operation periods that contain the following principles: identification of areas where accidents and emergency situations may occur; identification of communities and individuals that may be impacted; establishment of response procedures for fire and safety; provision of equipment and resources; designation of responsibilities and communication with workers and the public.

29. **Monitoring and Review.** The CTT Sponsor will establish procedures to monitor the effective implementation of the environmental and social mitigation measures as prescribed in the Construction ESMP and the Contractor ESMP. Monitoring is undertaken by the Managing Contractor. The project's ESHS performance will also be audited by an independent auditor that will review the adequate implementation of the CESMPs and OHS Plans.

30. **Stakeholder Engagement.** CTT consulted with local communities in the area of the project (within a 5 km buffer zone around the proposed CTT site), as well as with institutional stakeholders, particularly local authorities in Inhassoro, Inhambane, Maimelane and Maputo through formal meetings, key informant interviews and focus groups. During the ESIA process (scoping and final report phases), consultations were held in key localities in the project area. Stakeholder concerns were noted and addressed where possible in the scope of work and proposed mitigation measures, and any additional concerns were documented. The Project will also implement a multitiered grievance management process (included in the Stakeholder Engagement Plan) that includes community participation through a Social Reconciliation Committee comprising representatives of local communities that represent all demographic sectors of the community and will work with the Grievance Officer to address concerns and complaints.

PS2: Labor and Working Conditions

31. The CTT project will employ between 690-850 people during peak construction, depending on the final technology option selected. During the operations phase, approximately 70 full-time employees will be employed along with some contractors, such as security, cleaners, drivers and gardening personnel. Workers from directly affected communities will be given preference for employment should they meet the job requirements. Where possible, the CTT project will create employment opportunities for women and youth.

32. **Human Resources Policies and Procedures.** CTT's Construction Work Camp and Lay Down Area Management Plan and Employment and Labor Management Plan, includes measures to ensure contractor workers are being managed consistent with PS2 requirements, including: a Project Labor Agreement (CTT-GOM); Selection Procedure; Fit for work Procedure; Training and Induction Program; Worker's Grievance Procedure; Code of Conduct; and Disciplinary Procedure.

33. An internal monitoring system will be established to ensure that CTT adheres to local employment laws and policies. CTT will adopt and implement an HR policy including: (i) Provisions to implement the National Labor Agreement to be entered into between CTT and GOM; (ii) a Code of Conduct that all workers will sign prior to starting to work, including prohibition of Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA), prohibition of discrimination with regard to gender, religion and sexual orientation, respectful behavior towards local communities and the environment, etc.

34. **Worker Grievance Mechanism.** CTT will have a Project level GRM as described in the ESIA. This GRM has a local level participatory grievance management committee and will be managed, monitored and reported on by the CTT Sponsor. CTT project ESHS team are working together on a GBV/SEA risk assessment and action plan which will include enhancing the GRM to function properly as one entry point for GBV/SEA cases and response. Contractors will be required to have systems in place to respond to worker and community complaints, and to register any complaints received in the CTT GRM management system for follow up and reporting.

35. **Occupational Health and Safety (OHS).** Contractors will prepare and implement Health and Safety Plans in compliance with international standards, such as OHSAS 20018, or similar and recruit qualified and certified staff for their preparation and implementation. There will be separate OHS Plans for construction and operation.

36. **Workers Accommodation.** Workers accommodation needs to be in compliance with international standards, regarding number of people per room, number of people per bathroom, hygienic conditions of food and kitchen, effluent standards for sewage disposal, septic tank effluent and sludge, etc. These conditions will be detailed and enforced through the Construction Work Camp and Lay Down Area Management Plan, among others.

37. **Contractor Safety and Workers Engaged by Third Parties.** Contractor will require all subcontractors to implement labor conditions and health and safety plans consistent with the ESMP and the labor management plans listed above.

PS3: Resource Efficiency and Pollution Prevention

38. The ESIA studied two technology options to assess pollution impacts: (i) gas turbine (GT) technology in Combined Cycle (CCGT) and Open Cycle (CGT) configurations, and (ii) Open Cycle Gas Engine (OCGE). Recent studies are indicating that the gas turbines will be used for the Project.

39. **Greenhouse Gases (GHGs).** Stationary and mobile greenhouse gas emissions were estimated for the CTT for both CCGT and OCGE options. Mobile source GHG emissions were estimated to be negligible.

40. *CCGT*: Estimated GHG emissions to be 1,068,174 tCO₂e per annum for the first 5 years (2021 - 2025), and 1,303,426 per annum for the next 20 years (2025-2045). Assuming a design life of 25 years, the annual emissions of the CTT project will be on average 1,256,376 tCO₂e. As such, the magnitude of the annual emissions of the use of CCGT is rated as high in terms of the threshold of >1 million tCO₂e presented by the EBRD.

41. *OCGE*: Estimated GHG emissions to be 1,239,845 tCO₂e per annum for the first 5 years (2021-2025), and 1,621,335 per annum for the next 20 years (2025 - 2045). Assuming a design life of 25 years, the annual emissions of the CTT project will be on average 1,545,037 tCO₂e. As such, the magnitude of the annual emissions of the use of OCGE is rated as high in terms of the same EBRD thresholds as presented above.

Ambient Air Quality

42. *CCGT*: Impacts to air quality from PM₁₀, NO₂ and SO₂ emissions during operations were assessed to be low post-mitigation. Proposed mitigation measures included: increased stack height, selective catalytic reduction (SCR), selective non-catalytic reduction (SNCR), catalytic combustion, and wet low emissions (WLE).

43. *OCGE*: Impacts of Air Quality emissions of PM₁₀, NO₂ and SO₂ were assessed to be low post-mitigation. Mitigation measures: increased stack height, low NO_x burners, Homogeneous Charge Compression Ignition (HCCI); and Flue-Gas Recirculation (FGR).

44. **Water Consumption.** Based on simulations, the impact from the proposed new borehole is considered to be a high-moderate rating before mitigation. However, with mitigation and management of abstraction boreholes, the impact of groundwater level decline is assessed as low. Mitigation and management of abstraction boreholes need to include continuous level and abstraction volume monitoring, as provided in the ESAP. All abstraction boreholes will be set up and managed so that the sustainable yield is not exceeded during a 24-hour period, and to always allow for boreholes to recover sufficiently between abstraction cycles.

45. **Surface Water.** During the operational phase, several potential sources of contamination/pollutants associated with operations may impact local water resources in the event of spills, leaks or incorrect management. These include spills from the evaporation pond and the improper management of discarded sludge from the pond; spills from the first flush pump; discharge from the clean storm-water sump; and the irrigation of effluents into the surrounds: The overall significance of this impact prior to mitigation is moderate. Implementing the mitigation measures provided in the Surface Water Impacts Assessment and Geohydrology Report, reduce residual impacts to a low significance. Mitigation measures include developing and implementing a Storm Water Management Plan, ensuring the separation of clean and dirty water, and the containment and correct disposal of potentially contaminated water. All wastewater discharged from the site must comply with the relevant requirements of GoM and the EHSGs.

46. **Solid and Hazardous Waste Management.** During construction and operation, there is a possibility for contamination/ pollution of soil and water resources from leaks and spills of fuel and lubricants from construction vehicles and other machinery and equipment if not properly maintained or handled correctly. As part of the CESMP, the Contractor will develop and

implement measures to manage the storage, handling and disposal of all chemicals, non-hazardous and hazardous substances used on-site during all phases of the proposed project, including the preparation and implementation of a spill response plan. During operations, CTT will develop and implement specific managements plans as part of the IMS for the management of hazardous materials, solid and hazardous waste.

PS4: Community Health, Safety, and Security

47. Potential impacts on community health and safety will result from several project activities and induced processes and will be addressed through mitigation. The Community Health and Safety Plan will be in place before construction mobilization starts, and will be updated regularly, communicated to communities and contractors and enforced through construction contracts and supervision. Key aspects of community health and safety risks mitigation include:

48. **Population and Labor Influx.** The proposed CTT project is likely to fuel the ongoing significant influx of people in search of work and business opportunities to the Project area and nearby areas. This additional influx will contribute to: (i) Increased pressure on local resources, infrastructure and social services which are already not adequate or sufficient for the local people; and (ii) Increased social pathologies such as drug and alcohol abuse, prostitution, gender violence, increased incidence of sexually transmitted diseases and other communicable diseases. To mitigate these impacts CTT will update and implement a comprehensive influx management plan (taking into consideration World Bank Group policies and guidelines on induced labor influx) aimed at identifying areas of potential influx and appropriate influx management measures. Additionally, relevant stakeholders will be engaged and consulted during the development of the detailed influx management plan, which will be approved and in place prior to signature of the construction contracts.

49. **Gender based violence and sexual exploitation and abuse (GBV/SEA).** GBV/SEA was identified as a risk in the SIA. The health impact assessment outlines the impacts related to sexual exploitation and drug abuse in the study area. CTT is working jointly with TTP to further analyze these risks and to develop a SEA/GBV Prevention and Response Action Plan to be implemented before construction starts. CTT and its contractors will implement the following mitigation measures: (i) Access to the construction site must be controlled to prevent sex workers from entering the construction camp; (ii) Implement GBV and SEA campaigns (including educational awareness around risks such as sexual violence, sex with minors, sexually transmitted diseases) in the project affected communities; (iii) implement the Work Camp Management Plan including enforcement of the worker's Code of Conduct, and its sanction mechanisms; and (iv) implement the SEA/GBV prevention and response action plan, including incident tracking and reporting through grievance redress and otherwise, and service referrals for survivors.

50. **Traffic and Transportation of Heavy Equipment.** The proposed project will cause an increase in the traffic of general construction vehicles bringing goods and raw materials to the site (from either Maputo or Beira), so both directions of the EN-1 road will see noticeable increases in construction vehicle numbers and traffic. Special heavy vehicles capable of handling abnormally heavy and large dimension loads, also are expected to result in increased traffic safety risks. The Traffic Impact Assessment and Health Impact Assessment provides mitigation measures to managed traffic safety risks. Safe travelling speeds will be determined for the transportation vehicles, and measures must be implemented to ensure that these restrictions are enforced. CTT

will implement the traffic safety measures outlined in the Traffic Management Plan, including applying it to contractors.

51. **Community Health.** Population influx that is likely to introduce various health impacts in the form of migrant workers (disease communication such as STI's, HIV/AIDS, etc.), increased pressures on health facilities and services, waste generation and unhygienic practices by local communities, etc. If mitigation measures are not adequately applied certain health related impacts such as increase in STI's, HIV and AIDS may be high. CTT will implement the Community Health and Safety Plan to manage these risks, including undertaking information and awareness campaigns on HIV/AIDS and STIs in both the community and the workplace; support for widespread availability and social marketing of condoms in the workplace, hot spots in the community (bars and taverns) and at the lodge/hotel in Inhassoro; support awareness and behavior change communication activities in the communities; develop workplace health strategies as part of the occupational health plan or organizational health plan; extend specific community-based malaria and vector controls as part of the communicable diseases strategy; and prevent discharge of inadequately treated water from the waste-water and sewerage treatment plants.

52. **Security Personnel.** CTT will implement a Security Management Plan to ensure that any security personnel adhere to the requirements of PS4 and the Voluntary Principles on Security and Human Rights. The Security Management plan will include the company's code for security personnel and will ensure that past records of security personnel employed are screened; security personnel have clear objectives and permissible actions laid out; security personnel are trained in avoidance of human rights violations and handling various situations with clear procedures; security incidents are recorded, investigated and corrective action implemented; complaints against security personnel are investigated and disciplinary actions implemented; rules of engagement with public forces are clearly defined; and there is a grievance redress mechanism for members of community (GRM), in the event of a violation of the code by security personnel or Contractors.

PS5: Land Acquisition and Involuntary Resettlement

53. CTT will require acquisition of land and includes activities that may cause restrictions to use or access to land and resources on a temporary or permanent basis to make way for the proposed project infrastructure, such as the 25 km transmission line from the plant to the Vilanculos Substation, possible water pipeline, the equipment landing site and associated anchorage point and transport routes, and other ancillary facilities. These may lead to loss of assets, as well as physical and/or economic displacement impacting households, individuals or other groups in the Project area, potentially including impacts on the livelihoods of fishermen and tourism operators, and on small agricultural producers and roadside vendors and business in the areas affected by water and land transportation of heavy equipment. The location options and route alignments for these facilities are still to be refined, which may result in changes in impact, including reductions or complete avoidance of the impact, where possible.

54. CTT will seek to re-align the transmission line in certain sections, the water pipeline (if utilized) and transportation route (southern transport route option) to avoid any sensitive receptors along the route and thus minimize the need for resettlement or compensation. Surveys and studies have been conducted and indicate that potential resettlement or impacts for all facilities combined that would involve any direct and permanent land take will affect no more than an estimated 80 households. Likewise, good planning can avoid or minimize most negative economic impacts on

fishing, tourism and other businesses, and compensation can be calculated and provided for any unavoidable impacts due to temporary restriction or suspension of activities.

55. If resettlement or economic impacts are unavoidable, then Project-affected people will be identified and compensated according to the Project RPF. The RPF establishes the principles and processes for the client to develop a comprehensive resettlement action plan (or set of site-specific plans) in accordance with national legislation and WB OP4.03 (Performance Standard 5). The principles of the RPF include land for land compensation, full replacement cost for all assets, compensation for lost income and full livelihood restoration, as well as continuous consultation with PAPs and a grievance redress mechanism.

56. **Livelihood Impacts (Tourism, Fishing, etc.) from Anchorage, Beach Landing activities and associated transport routes.** The operation of the temporary anchorage and beach landing site and associated activities and transport routes may have impacts on artisanal fishermen and on the local tourism industry and other businesses in Inhassoro town and the Bazaruto Island, by interfering with fishing sites, restricting access to certain land and maritime areas during cargo movement and making the area less desirable to visit from a tourism point of view.

57. CTT will plan the shipments and off-loading periods as far as possible during the low occupation period (outside of main holiday periods) and seek to limit activities to day time hours only. CTT will only use the local Inhassoro facilities as possible to accommodate the beach landing contractor staff as well as any other CTT worker accommodation needs that cannot be met at the main construction camp. Fishermen and other affected businesses will be notified of restrictions and assisted in minimizing the interruptions of their activities. Residual economic losses will be compensated and addressed through site specific compensation measures and LRPs prepared according to the Project RPF.

PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

58. Heavy equipment cannot be transported overland all the way from Beira or Maputo, because of the heavy weight restrictions on the many bridges. The only solution is to bring heavy equipment by vessel, moor the vessel and load the heavy equipment on barges, which can land on the shore at a landing point near Inhassoro. Landing sites are being assessed, but a final selection of the sites has not yet been taken. Two anchoring points were identified on historical maritime maps and are assessed in the CTT ESIA. At least one of these two previously identified anchorage points is expected to have been used for off-loading in the past for the construction of the CPF. However, these sites are located inside the Bazaruto Archipelago Marine National Park (BANP). As such additional environmental studies acceptable to the Bank are needed in order to further investigate and identify possible sites located outside the borders of the BANP. Heavy cargo will be transported from the selected anchoring point (potentially through the marine national park area) on barges to a beach landing site in the Inhassoro area, where a temporary jetty will be built for the unloading of the heavy equipment.

59. Marine turtles are the only threatened reptiles reported to occur in the estuarine and coastal habitats of the Study Area. All five species of marine turtles are protected from hunting by the Forest and Wildlife Law (Decree 12/2002 of 6 June) and its eggs and habitats by the Regulation on Pollution Prevention and Protection of the Marine and Coastal Environment (Decree 45/2006 of 30 November). Apart from these, one other threatened species (Zambezi Soft-shelled Terrapin - *Cycloderma frenatum*) may be present in the Study Area, confined to the Save River and the Govuro River estuaries (Golder, 2015a). This species is mostly found in northern Mozambique,

with the Save River marking the southern extent of its range. Hence, these six species are the main reptile species of conservation concern for the estuarine and coastal area.

60. Some of these turtle species may nest on the sandy beaches of the Study Area, with special reference to the Nhamábuè area (north of Inhassoro) where beaches are considered suitable for nesting. It is likely that loggerhead turtles nest in this beach (ERM & IMPACTO, 2016), but Marshall et al. (2015) consider the area a suitable nesting ground for green and leatherback turtles as well. However, the 3 identified landing points, especially the SETA landing site, are too disturbed to be suitable as turtle nesting sites. Loggerhead turtle (*Caretta caretta*) and Leatherback turtle (*Dermochelys coriacea*) are considered Vulnerable according to the IUCN Red List, while Green turtle (*Chelonia mydas*) are Endangered status.

61. **Operation at Anchorage Points.** The operational activities at the anchorage points will involve mooring of the transshipment vessel. It is understood that there will be 7-10 vessels total, with the vessel will be anchored for at most a day or two at a time to offload the heavy and oversized equipment, with one barge trip per vessel during the equipment offloading (therefore 7-10 barge trips). The transport of the heavy equipment will be completed over an overall period of less than 15 month, with ships arriving in the interval of up to 2-4 months. The presence of the transshipment vessel could give rise to impacts including contamination of the local marine water and sediment quality with hydrocarbon fuels, oils and/or lubricants, and disturbance of migratory/congregatory seabird species associated with the BANP Important Birding Area (IBA).

62. The intensity of the potential impact of marine water and sediment contamination could be moderate, and the duration short-term, persisting for the period of the use of the anchorage points. Impacts are likely to affect local water and sediment quality, which would have knock-on effects on underlying natural habitats such as coral reefs. The application of the required mitigation measures can reduce the severity of potential impacts as well as the probability of them occurring in the first place, reducing the residual impact to one of low significance. mitigation measures: (i) Strict controls should be put in place to ensure that leakages of hydrocarbon fuels, oils and/or lubricants from barges, transshipment vessels and heavy equipment are minimized/eliminated. Daily maintenance and monitoring checks of vessels should be conducted; (ii) Anchorage points will be further evaluated pursuant to studies acceptable to the Bank in order to locate the anchoring point outside of the boundary of the Bazaruto Archipelago National Park/IBA and away from popular recreational sites, with a buffer of at least 250 m to be maintained between the outer extent of the boundary and the anchorage point/navigation routes of the transshipment/barging vessels; anchorage points inside the BANP will only be considered if it can be demonstrated that they are environmentally and socially superior to points outside the BANP, and are supported by BANP Management in accordance with its management plan, Mozambican legislation and World Bank PS6 par. 20 requirements; and (iii) Ensure that all vessels and machinery are in sound mechanical order, do not have any oil leaks and are fitted with appropriate mufflers to minimize nuisance affecting migratory/congregatory seabird species. Other measures include restrictions in operating hours for heavy machinery and vessels.

63. **Impacts of Barge and Vessel Movements on Marine Resources:** The seagrass meadows of the tidal flats in Bazaruto Bay are known to support the largest remaining populations of dugong in the Western Indian Ocean. Dugongs are IUCN Red List Vulnerable status. Barge strikes with dugong are possible during barge transport of heavy equipment, as dugong are very slow moving (average 10 km/h, typically 5 - 8 km/h, short bursts of up to 20 km/h) and are typically concentrated in shallow waters (<5 m depth) where seagrass beds occur. Barge strikes could also affect the

Endangered Indian Ocean Humpback Dolphin, which is resident in the coastal waters of the Study Area. The intensity of the potential impact is high, and effects would be long-term, lasting until such a time as Dugong/Indian Ocean Humpback Dolphin recovered from the loss of the affected individuals.

64. The potential effect is assessed at the national scale for nationally-protected Dugong, and at the international scale for the globally Endangered Indian Ocean Humpback Dolphin. There is a high probability of barge strike for Dugong, and a moderate probability of barge strike for Indian Ocean Humpback Dolphin which is a faster-swimming, more agile species. The application of the required mitigation measures, specifically strict speed restrictions of <5km/hour as well as the presence of a Certified Marine Mammal Observer on all barge and vessel movements, reduces the intensity of the potential impact for both species, resulting in residual impacts of low significance.

65. The barge movements may cause seabed scour in areas of shallower water, which could affect seagrass beds which are the preferred foraging habitat for Dugong. In the context of the large extent of this habitat in the project area, the potential impact will be very local and will be of moderate intensity, with the loss being medium-term, persisting until such a time as the barge movements cease (after approximately 8 - 15 months) and seagrass beds can recover within one year to a few years. Prior to mitigation, the significance of the impact of loss of natural primary dune and sandy beach habitat will be moderate. The application of the required mitigation measures reduces the intensity of the impact to low, as well as the probability of the impact occurring, resulting in a residual impact of low significance.

66. Mitigation measures include: (i) Strict speed restrictions must be enforced on barges and other vessels to protect Dugongs (and Indian Ocean Humpback Dolphin) from vessel strikes in Bazaruto Bay. The maximum allowable speed should be <5 km/h to allow Dugong to move out of the way of oncoming vessels, minimizing the risk of collision; (ii) A Certified Marine Mammal Observer (MMO) must be employed by the Proponent or the Contractor responsible for such activities to observe and monitor all barge and transshipment movements from a small lead boat. The MMO will have authority to influence the speed and direction of vessel movements where any potential risks to marine mammals or other marine life are identified; and (iii) Barges and vessels must be routed via specific barge and vessel lanes delineated by non-styrofoam buoys. These barge and vessel lanes will have to avoid potentially important areas of seagrass and coral habitat.

67. The main direct Project environmental effects relate to the temporary landing and anchorage sites for heavy equipment transport and the possible creation of a transient barrier to movement of dugong individuals between southern and northern feeding grounds and other impacts to marine species within the Critical Habitat Area of Analysis, as a result of increased vessel and barge traffic between the anchorage point and beach landing sites, and the associated noise and potential vessel strike effects. More important, however, could be the potential impact of the Project through indirect/induced effects, i.e. population influx and increased fishing pressure in Bazaruto Bay, including impacts on the dugong population (Dugong dugong) due to increased rates of accidental bycatch of fishing operations. The CTT Sponsor is continuing to study and assess viable anchorage points, barge routes and landing sites. As provided in the ESAP, further environmental studies will be conducted in a manner acceptable to the World Bank and thus the final selection is subject to World Bank non-objection.

68. In areas with a high bird and fruit bat activity guyed V-transmission towers will be avoided since they pose a higher collision risk for birds and fruit bats in general and for birds of conservation concern, including species of conservation concern, such as several globally threatened vulture species. The distance between the conductors will be 3 meters in order to minimize the risk of bird and bat collisions.

PS8: Cultural Heritage

69. No archaeological areas of significant concern have been identified during the ESIA process. There are no cultural assets in close proximity to the proposed power plant site, and so no impacts from noise, air or visual disturbance are anticipated. There are also no impacts from a change in environmental setting anticipated at the burial and cemetery sites along the proposed electricity transmission line or as a result of air emissions during decommissioning. Cultural sites adjacent to the proposed southern transport route alternative are expected to experience noise, air and visual impacts as a result of construction and decommissioning traffic. This will be limited to the construction and decommissioning periods and will only occur during delivery of equipment and materials. Potentially impacted sites comprise burials, churches, sacred places, locations of traditional medical practice. The CTT project construction activities also have the potential to impact undiscovered archaeological remains which are buried and may become disturbed through excavations and other earth moving works.

70. CTT will implement the CHMP which will include plans to monitor changes to the environmental setting of those assets highlighted above during the construction phase. This will also include measures for the screening and demarcation of sensitive areas (e.g. roadside sites) to prevent accidental damage via the laydown of materials, etc. during construction and/or additional planting. CTT will adhere to its Chance Find Procedure (CFP) in accordance with Mozambican heritage legislation and will include all related requirements in all contracts for construction activities. If significant archaeological remains are discovered, the need for excavation and 'preservation through record' may be required. CTT will continue to liaise with local cultural leaders to facilitate the identification of any cultural sites not yet shared by the community and potentially affected by the proposed Project. The CHMP must set out plans for stakeholder identification and a program for long term consultation in this regard.

Access to Client Documentation

71. The ESIA has been posted and is available locally in hard copy or on the client's project website at:

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