

Initial Environmental Examination

Document Stage: Final
Project Number: 48434-003
Grant Number: 0495-IND
October 2018

IND: Visakhapatnam-Chennai Industrial Corridor Development Program - Project 1 (3 MW power grid connected floating type solar PV power project on Meghadrigedda Reservoir in Vishakhapatnam under UCCRFT Grant)

Prepared by Greater Visakhapatnam Municipal Corporation, Government of Andhra Pradesh for the Asian Development Bank.

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CURRENCY EQUIVALENTS

(as of 01 October 2018)

Currency Unit	–	Indian Rupees (INR)
INR1.00	=	\$0.014
\$1.00	=	INR72.71

ABBREVIATIONS

ADB	–	Asian Development Bank
AP	–	Affected Persons
ASI	–	Archeological Survey of India
CAPP	–	Community Awareness and Public Participation
CFE	–	Consent for Establishment
CFO	–	Consent for Operation
GVMC	–	Greater Visakhapatnam Municipal Corporation
DoF	–	Department of Forest
DoL	–	Department of Labour
EA	–	Executing Agency
EAC	–	Expert Appraisal Committee
EARF	–	Environmental Assessment and Review Framework
EC	–	Environmental Clearance
EIA	–	Environmental Impact Assessment
EMP	–	Environmental Management Plan
GRM	–	Grievance Redress Mechanism
IA	–	Implementing Agency
IEE	–	Initial Environmental Examination
LARRA	–	Land Acquisition, Rehabilitation and Resettlement Authority
MFF	–	Multi-tranche Financing Facility
MoEFCC	–	Ministry of Environment and Forest, Climate Change
NGO	–	Non-Governmental Organization
NGT	–	National Green Tribunal
GVMC	–	Program Implementation Unit
PMC	–	Project Management Consultancy
PMU	–	Program Management Unit
PPTA	–	Project Preparatory Technical Assistance
RF	–	Resettlement Framework
ROW	–	Right of Way
SO	–	Safeguards Officer
SPS	–	Safeguard Policy Statement
TOR	–	Terms of Reference
UGR	–	Underground Service Reservoir
WTP	–	Water Treatment Plant

NOTES

- (i) The fiscal year (FY) of the Government of India and its agencies ends on 31 March.
- (ii) In this report, "\$" refers to US dollars.

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I. EXECUTIVE SUMMARY

1. The UCCRFT Grant of USD \$5 million has been provided under the Vishakhapatnam-Chennai Industrial Corridor Development Program (VCICDP) to support the Government of Andhra Pradesh (GoAP) for climate resilient and clean energy infrastructure development, and policy and institutional reforms to stimulate economic growth and employment generation.

2. VCICDP will help boost manufacturing sector growth along the Visakhapatnam-Chennai Industrial Corridor (VCIC), which runs over 800 km from north to south covering almost the entire coastline of the state of Andhra Pradesh covering a population of 49.4 million and an area of 160,205 km². The VCIC is part of the East Coast Economic Corridor, which is India's first coastal economic corridor, and is poised to play a critical role in driving India's new "Act East Policy" and "Make in India" initiatives. The "Act East Policy" is a proactive initiative focused on, among others, increasing the integration of the Indian economy with the dynamic global production networks of the Association of Southeast Asian Nations. VCICDP will complement the ongoing efforts of the Government of Andhra Pradesh (GoAP) to enhance manufacturing sector growth and create high quality jobs in the state of Andhra Pradesh.

3. Greater Visakhapatnam Municipal Corporation (GVMC) is a Local Body under the Ministry of Administration and Urban Development (MA&UD), Government of Andhra Pradesh (GoAP) with the responsibility of providing basic civic services like roads, water supply & sewerage, health & sanitation and storm water disposal for the Vishakhapatnam city. This is the biggest city in the state of Andhra Pradesh and GVMC has jurisdiction over an area of 534 Sq.Km. with a population¹ of 17,30,320.

4. GVMC has taken initiatives to promote climate resilient measures and actions for climate change reduction in various activities of urban management in the city of Visakhapatnam.

5. **The Subproject.** The main objective of this subproject is to design, erect, commission and operate a grid connected 3 MW floating type solar power project on Mehadrigeedda reservoir in Vishakhapatnam. The proposed project brings in advantages of producing clean, pollution free energy, demonstrate use of reservoir area for solar power generation and provide employment to the people living around the area.

6. **Screening and assessment of potential impacts.** ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguard Policy Statement (SPS), 2009. The proposed subproject is a clean energy project. As per the GoI EIA Notification, 2006, this subproject does not require EIA study or environmental clearance. The potential environmental impacts of the subproject have been assessed using ADB Rapid Environmental Assessment Checklist² for power plants. The potential negative impacts were identified in relation to pre-construction, construction and operation.

7. **Categorization.** Based on results of the assessment and ADB SPS, the subproject is classified as environmental Category B, i.e., the subproject is judged to be unlikely to have significant adverse environmental impacts. An initial environmental examination (IEE) is required to determine whether significant environmental impacts warranting an environmental impact assessment are likely.

¹As per Census Year 2011

²Appendix - I

8. This IEE aims to (i) provide critical facts, significant findings, and recommended actions; (ii) present the national and local legal and institutional framework within which the environmental assessment has been carried out; (iii) provide information on existing geographic, ecological, social and temporal context including associated facilities within the subproject's area of influence; (iv) assess the subproject's likely positive and negative direct and indirect impacts to physical, biological, socioeconomic, and physical cultural resources in the subproject's area of influence; (v) identify mitigation measures and any residual negative impacts that cannot be mitigated; (vi) describe the process undertaken during project design to engage stakeholders and the planned information disclosure measures and the process for carrying out consultation with affected people and facilitating their participation during project implementation; (vii) describe the subproject's grievance redress mechanism for resolving complaints about environmental performance; (viii) present the set of mitigation measures to be undertaken to avoid, reduce, mitigate, or compensate for adverse environmental impacts; (ix) to describe the monitoring measures and reporting procedures to ensure early detection of conditions that necessitate particular mitigation measures; and (x) identify indicative costs and who is responsible for carrying out the mitigation and monitoring measures.

9. **Description of the Environment.** Provision of power supply, a major infrastructure component, plays a vital role in maintaining urban infrastructure facilities and generation of clean power will facilitate action towards combating greenhouse gas emissions and climate change. GVMC has therefore proposed to take up a clean power supply project for Vishakhapatnam to propel Industrial growth. GVMC has proposed to develop a project for developing clean power using water reservoir surface for floating PV cells in one of the reservoirs in the Vizag district.

10. Visakhapatnam–Chennai Industrial Corridor (VCIC), also Vizag–Chennai Industrial Corridor, is a key part of the East Coast Economic Corridor (ECEC), India's first coastal corridor. VCIC is aligned with the Golden Quadrilateral and is poised to play a critical role in driving India's Act East Policy and Make in India campaign. The nearly 800-kilometer corridor links India with the Association of Southeast Asian Nations (ASEAN) and East Asian economies that form the bedrock of global manufacturing economy. The corridor traverses nine districts of the state of Andhra Pradesh. VCIC intends to complement the ongoing efforts of the Government of Andhra Pradesh (GoAP) to enhance industrial growth and create high quality jobs.

Industrial nodes are an integral component of economic corridor development. When equipped with comprehensive infrastructure support and a business-friendly environment, nodes can serve as hubs geared to cradle industries. Through a node selection process, four industrial nodes were identified:

1. Visakhapatnam Node
2. Kakinada Node
3. Amaravati Node, and
4. Yerpedu - Srikalahasti Node

The proposed subproject is pertaining to developing and providing clean power to the grid and augmenting power supply in the industrial clusters falling under Vishakhapatnam node.³

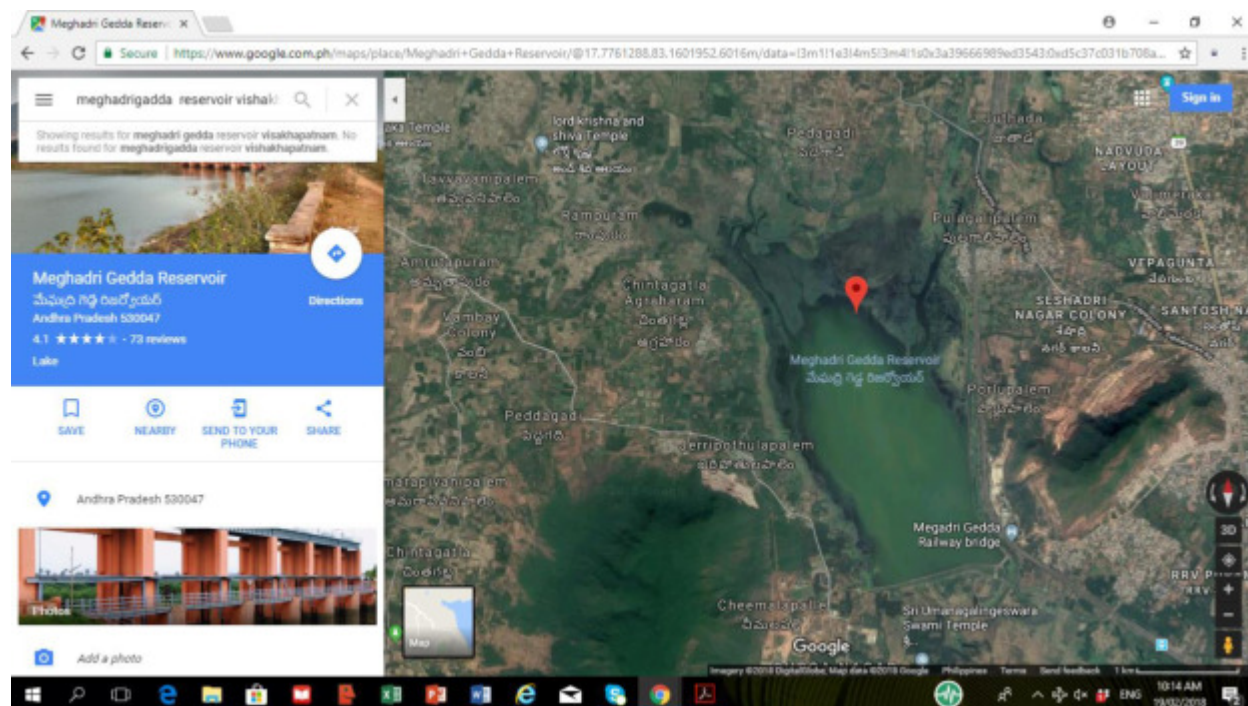


Figure 1: Google Map of Proposed Subproject Area

11. **Potential environmental impacts.** The subproject is unlikely to cause significant adverse impacts because: (i) the components will involve straightforward installation and operation, so impacts will be mainly localized; (ii) there are no significant sensitive environmental features in the project sites and (iii) predicted impacts are site-specific and likely to be associated with the installation process and are temporary in nature. The process will involve short term storage, construction and installation activities and involve minor excavation and earth movements.

12. Environmental impacts as being due to the project design or location are not significant. The proposed solar power plant will be on a small area of the existing reservoir and will not impact any aquatic life or nearby biodiversity.

13. Potential negative impacts were identified in relation to pre-, construction and operation of the improved infrastructure, but no permanent environmental impacts were identified as being due to either the subproject design or location. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. As it is proposed as a turnkey project under the design-build and operate mode, these will be further discussed with specialists responsible

³Source Google Maps

for the engineering aspects and additional measures as required will be included in the designs for the infrastructure. This would ensure that the number of impacts and their significance will be further reduced by amending the design. During the construction phase, impacts mainly arise from the construction dust and noise; in areas close to existing community settlements from the traffic and from the need to import of construction material. Impacts due to dust from construction activities are expected to be localized and temporary. Appropriate measures are suggested.

14. **Environmental Management Plan.** An environmental management plan (EMP) has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels. Locations and siting of the proposed subproject will not require any additional land as the PV panels will be placed on the water surface of the reservoir. The transmission line will be connecting to a nearby substation and transmission tower (s) will be laid along the RoW alongside main/access roads.

15. The EMP will guide the environmentally-sound construction of the subproject and ensure efficient lines of communication between PMU, PMSC and the contractors. The EMP will (i) ensure that the activities are undertaken in a responsible non-detrimental manner; (i) provide a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site; (ii) guide and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iii) detail specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (iv) ensure that safety recommendations are complied with. The EMP includes design and location related measures such as (i) area and placement details of the PV cells (ii) measures to avoid reservoir water contamination from erection and commissioning of solar power cells, (iv) fine tuning transmission line alignments based on the location of the PV cells and connectivity to the nearest substation. During construction, the EMP includes mitigation measures such as (i) (vi) use of barricading, dust screens, dust-suppression methods such as watering and/or covering of stockpiles to control dust (ii) implementation of traffic management plan in coordination with local traffic police to minimize traffic impacts; (iii) awareness campaigns and consultations to inform residents and businesses of potential disturbances; (iv) provision of walkways and planks over trenches to ensure access will not be impeded; (v) use of noise-dampening measures in areas with sensitive receptors such as hospitals, schools, places of worships and other silence-zones; and (vi) finding beneficial use of excavated materials to extent possible to reduce the quantity that will be disposed-off.

16. The contractor will be required to submit to, for review and approval, site environmental plan (SEP) including (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following of the EMP to ensure no significant environmental impacts; (iii) monitoring program as per SEP; and (iv) budget for SEP implementation. No works are allowed to commence prior to approval of SEP.

17. A copy of the EMP/approved SEP will be kept on site during the construction period at all times. The EMP has been made binding on all contractors operating on the site and included in the bid and contract documents. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

18. **Consultation, disclosure and grievance redress mechanism.** The stakeholders were involved in developing the IEE through focused group discussions on-site at several places in the subproject area, after which views expressed were incorporated into the IEE and in the

planning and development of the project. The IEE will be made available at public locations and will be disclosed to a wider audience via the ADB and GVMC websites. The consultation process will be continued and expanded during project implementation to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation. A grievance redress mechanism is described within the IEE to ensure any public grievances are addressed quickly.

19. **Implementation Arrangements.** DOI is the executing agency (EA). A PMU is established within the Directorate of Industries, which is under the DOI, for planning, implementation, monitoring and supervision, and coordination with GVMC. GVMC will be responsible for implementing the subproject and the PMSC will provide support in implementation of subproject under VCICDP.

20. GVMC will appoint competent company to execute the turnkey project under the DBO contract. GoAP has prior experience as it is already implementing a 2MW floating solar power project in Visakhapatnam under a different government program. agencies as per the normal contracting procedures construction contractors to build infrastructure. Once the infrastructure is built and commissioned, the GVMC will operate and maintain the infrastructure. At state-level a Project Steering Committee (PSC) will be established to provide overall policy direction for the implementation of VCICDP.

21. **Monitoring and Reporting.** The PMU, GVMC and PMC will be responsible for monitoring. The PMSC along with GVMC will submit semi-annual monitoring reports to PMU, which will review and submit to ADB. ADB will post the environmental monitoring reports on its website.

22. **Conclusions and Recommendations.** Therefore, as per ADB SPS, the project is classified as environmental category B and does not require further environmental impact assessment. This IEE shall be updated during the detailed design stage by the PMSC to reflect any changes, amendments and will be reviewed and approved by ADB.

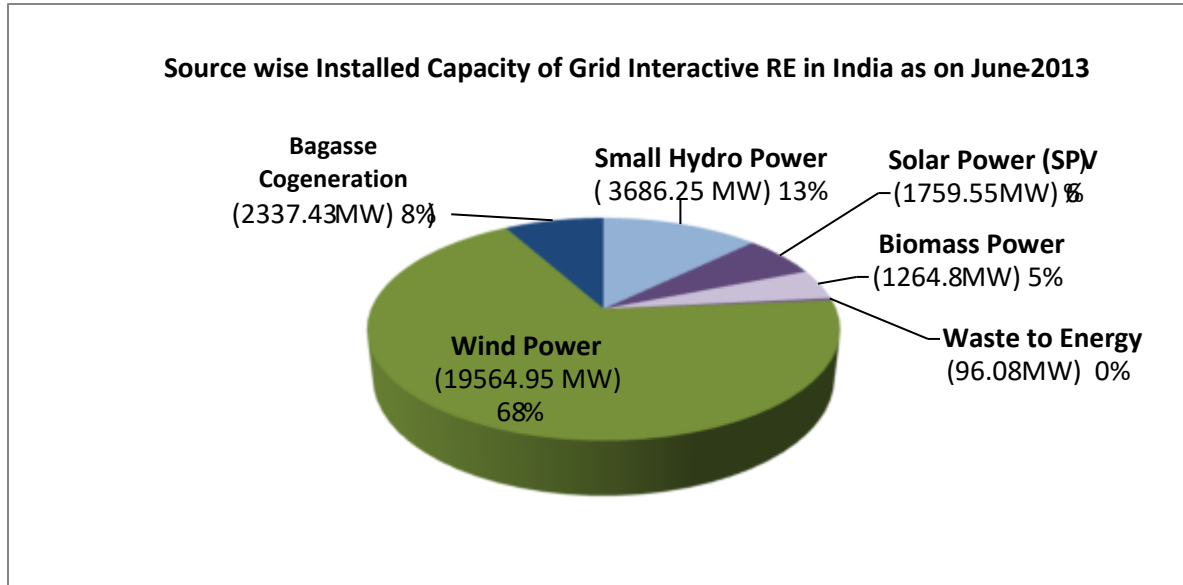
II. INTRODUCTION

A. Project Background & Context

23. India is blessed with abundant sunshine and solar power is expected to play a critical role in meeting the energy needs of the country in the long run. Solar power projects can be setup in a much shorter timeframe when compared to conventional power projects and the cost of solar power has become more economical today. Solar power can also help meet energy requirements for both grid-connected as well as off-grid applications such as solar powered agricultural pump-sets. Considering the energy security concern and commitment for a 'Low Carbon Growth Strategy', the 12th Five Year plan has provisions to ensure sustainable development of the power sector. In their efforts to reduce GHG emissions, Government is emphasizing the development of nuclear power, hydro power as well as power from renewable sources. Renewable energy solves the sustainability problem associated with conventional fuels used for power generation as these sources are non-exhaustible, free and relatively clean, hence more sustainable. In theory, these sources will be able to guarantee secure energy supplies for generations to come.

24. Development of RE resources is being accorded special emphasis in view of not just its inherent advantages of cleaner power production but also the social benefit of providing energy access and energy security to remote areas. The drivers identified herein for development of renewable energy in India are – (i) Country's interest in energy security; (ii) High potential of wind and solar energy in India; (iii) Emissions reduction by shifting from polluting sources like oil and coal; (iv) Country's interest towards clean energy options.

25. The renewable energy installed capacity in India is growing steadily. In March 2012, RE installed capacity stood at 24,914.24 MW which was 10.5% of the power mix in the country (source: central statistical office 2013). Within 15 months the RE capacity in the country has expanded by 15%, as on June 2013 this was 28708.9 MW (Source: MNRE Website⁴). The Eleventh Five Year Plan realized the significant role of new and renewable energy to enhance the domestic supply options as well as the need to diversify energy sources. The wind power potential for India has been calculated by Center for Wind Energy Technology (CWET) to be 102,788 MW and 49,130 MW at 80m and 50m hub height (CWET, 2005). India has vast potential for solar power generation since about 58% of the total land area receives annual average global insolation above 5kWh/sq.m./day. The total installed capacity of grid-interactive renewable energy in India as on March 2013 was 28,068 MW and off-grid power capacity was 882.5 MW. Of this, 68.9% comes from Wind, while Solar PV contributed nearly 4.59% of the Renewable Energy in the country (MNRE, 2013). The total installed capacity for electricity generation in the country as on Mar 2012 was 2,36,387 MW 4 <http://mnre.gov.in/mission-and-vision-2/achievements/> Small Hydro Power (3686.25 MW) 13% Solar Power (SPV) (1759.55MW) 6% Biomass Power (1264.8 MW) 5% Waste to Energy (96.08 MW) 0% Wind Power (19564.95 MW)



26. Andhra Pradesh is poised for rapid industrial growth driven by infrastructure investments and has also been selected by Ministry of Power as one of the pilot states for implementation of the 24X7 – Power for All (PFA) scheme. Solar energy can become an important source in meeting the growing power requirements of the State. AP has large agriculture consumption constituting around 24% of the total energy consumption of the State. Solar power can also help shift the agriculture load and meet the power demand during the day time.

27. The GoAP is keen to tap the immense solar potential and promote this clean source of energy to meet the rising energy requirements of the State. The following factors make Andhra Pradesh an ideal location for setting up Solar Power Projects:

- Availability of about 300 sunny days in a year with solar insolation of more than 5 kWh/m²/day.
- Amongst the best performing power distributing companies in India (APEPDCL and APSPDCL).
- An efficient and strong evacuation infrastructure that can facilitate distributed generation.

28. The 3MW floating solar power subproject under the UCCRFT Grant and Vishakhapatnam Chennai Industrial Corridor Development Program (VCIC-DP) aims to generate and provide clean power to the grid and improve the level, quality and sustainability of power supply for the city of Vishakhapatnam contributing to improved quality of life among the urban poor. The subproject will be implemented over a period of one year beginning in 2018 and will be funded under the UCCRFT Grant of the Asian Development Bank (ADB).

29. ADB classified the Project as environment Category B and accordingly initial environmental examination (IEE) is required for all subprojects. This Initial Environmental Examination (IEE) has been prepared and assesses the environmental impacts and provides mitigation and monitoring measures to ensure no significant impacts as a result of the project.

30. The potential environmental impacts of the subproject have been assessed using ADB Rapid Environmental Assessment Checklist for Solar Power (Appendix 1). Then potential negative impacts were identified in relation to pre-construction, construction and operation of the improved infrastructure, and results of the assessment show that the subproject is unlikely to

cause significant adverse impacts. Thus, this initial environmental examination (IEE) has been prepared in accordance with ADB SPS's requirements for environment category B projects.

31. This IEE has been conducted mainly based on field reconnaissance surveys and secondary sources of information. No field monitoring (environmental) survey was conducted however, the environmental monitoring program developed as part of the environmental management plan (EMP) will require the contractors to establish the baseline environmental conditions prior to commencement of BOD works. The results will be reported as part of the environmental monitoring report and will be the basis to ensure no degradation will happen during subproject implementation. Discussions with the GoAP agencies, neighboring residents and other shops / offices in the area were conducted. Findings of detailed stakeholder consultations will be included in the updated IEE.

32. Implementation work is likely to commence in 2018 and will be completed in 6 months for the total 3MW solar power generation and supply subproject.

33. This IEE is based on the preliminary information and as the project will be DBO turnkey contract, certain details may change as the design and development of the subproject progresses. This IEE, therefore, will be required to be updated during the detailed design stage, to reflect any changes, or amendments to the subproject.

34. This Report contains the following sections:

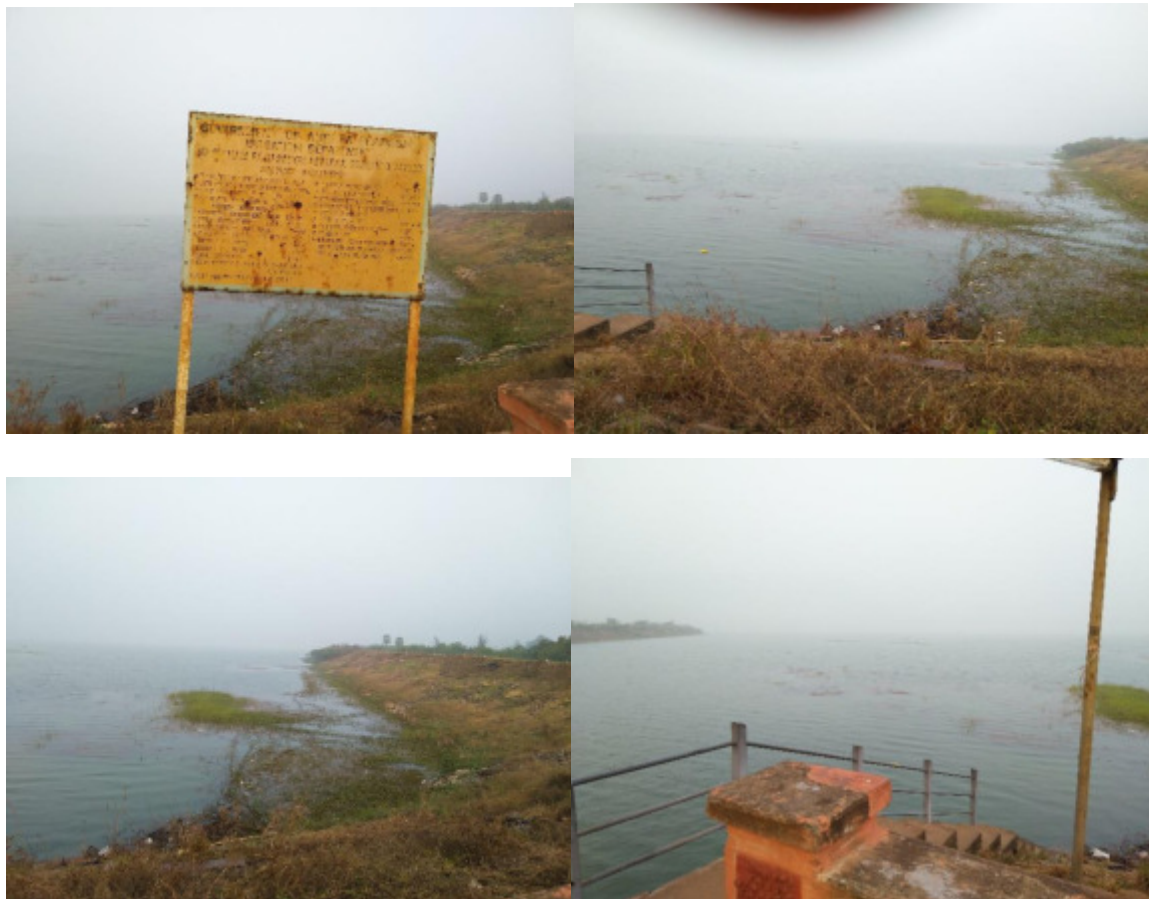
- (i) Executive summary;
- (ii) Introduction
- (iii) Description of the project
- (iv) Policy, legal and administrative framework
- (v) Description of the environment;
- (vi) Anticipated environmental impacts and mitigation measures;
- (vii) Public consultation and information disclosure;
Grievance redress mechanism;
- (viii) Environmental management plan, and,
- (ix) Conclusion and recommendation.

III. DESCRIPTION OF THE PROJECT

A. Project Area and Existing Scenario

35. Subproject Site at Meghadrigedda Reservoir, Vishakhapatnam India is located at Latitude/Longitude 17° 45' 59" North, 83° 11' 0" East. The Meghadrigedda Reservoir project was constructed across the river Naravagedda and Meghadrigedda at Kamarapalem village in Visakhapatnam District in the year 1977. The catchment area is about 368 sq.kms, which includes the reservoir. The reservoir was commissioned in the year 1979 with a storage capacity of 29.31 M.cum and later, during the year 1989, the water withdrawal capacity of the reservoir was increased to 10.00 million gallons per day (source: zilla prajaparishad), with the reservoir capacity increased to 33.1024 M.cum @ F.R.L + 18.60 m. The maximum length of the reservoir is 2950 m and the maximum breadth is around 1700 m. with a total area of approx. 5015 sq km. Meghadrigedda is a typical shallow reservoir covering a large area.

Fig 2: Pictures of Meghadrigedda Reservoir taken during REA study conducted in February 2018



Google Earth diagram with survey lines are provided in the Bathymetric Survey conducted for the reservoir (Bathymetric Survey report attached as Appendix-8)

B. Proposed Sub-Project

36. It is proposed to install and commission a 3MW floating solar power plant at the Meghadrigedda Reservoir in Visakhapatnam, India. Floating solar arrays have been in use for a little over a decade. They have several advantages; they don't take up any valuable space on land, and the cooling effect of the water on which the panels float makes them more efficient. They can also help to mitigate the evaporation of water for drinking or irrigation by intercepting sunlight before it hits a reservoir's surface. Floating solar plants have higher efficiency compared to ground-mounted installations due to the moderating effect of water bodies on panel temperature.

37. Total capacity of Solar PV power plant to be installed is 3000 kWp. The total 3000 kWp shall be distributed on the available water reservoir. The final locations and cabling requirements will be decided during the detailed design stage. Solar panels and array junction boxes will be installed on shade free areas while the PCU and distribution boards, etc. will be housed inside an appropriate canopy. For string inverters, option of indoor vs outdoor installation will be finalized during design stage.

38. Array structure of PV yard and all electrical equipment's such as PCU, inverters, etc. will be grounded properly and enclosed in appropriate housing that are rated IP 65/66 and in accordance with the requirements of IS:3043-1987. PV modules will be connected in series up to the maximum allowed operating voltage of the PV modules and the PV inverter whichever is lower. The reverse current of blocking diodes (connected in series), if required/provided, will be rated for 2 X VOC STC of the PV string. Reverse blocking diode would not be required if inverter has reverse polarity protection feature.

39. All cables that are submerged or in contact with water should be water resistant and water proof. Proper sealing arrangements at the points of cables entering the enclosures would be incorporated. Although not mandatory, manufacturers are however encouraged that the cables entering into the enclosures be sealed with modular EPDM based cable sealing and protection system based on multi- diameter technology. Access to the Floating Solar PV Power Plant shall be through a walkway.

40. The DC output from the modules shall be fed to array junction box and the strings are paralleled at sub Main & Main junction boxes. Then PCU shall convert DC energy produced by the solar array to AC energy. The AC power output of the inverter shall be fed to the AC distribution board (metering panel & isolation panel), which also houses the energy meter. The system shall automatically wake-up in the morning and supply power, provided there is sufficient solar energy and the grid voltage and frequency are in range. When the grid voltage and/or frequency go out of pre-set range, the inverter shall be immediately disconnected from the grid. The inverter will reconnect after a pre-determined time when the grid is back in the range (which should not be more than 5 minutes).

41. For safety reasons, PV inverter system will be disconnected from the network following a fault or loss of supply on the power network. The performance and generation data shall be recorded using a data logger.

42. SPV module will be highly reliable, light weight and shall have a service life of more than 25 years. SPV modules shall have a limited power loss of not more than 10% of nominal output at the end of 10 years and of not more than 20% of nominal output at the end of 25 years.

43. The floatation device will be prefabricated and designed for simple mechanical on-site installation. There shall be no requirement of welding, masonry or complex machinery at the installation site. The floatation device will be modular, such that the installed assembly can be easily expanded and scaled up if required. Each module/combination of maximum two modules should support at least one solar panel. All modules should be standardized and independently created.

44. The design of the floatation device will incorporate appropriately sized walking platforms for regular maintenance and inspection. The walking platform will have a continuous uninterrupted surface with the minimum width of at least 400 mm. The buoyancy, on an average, of the floatation device should be greater than 75 kg/m² of area covered by the floatation device. In order to increase longevity of the floatation device and reduce the maintenance requirements the thickness will not be less than of 3 mm and the floatation device should be foam filled with rigid closed-cell cellular polystyrene with moisture retention of less than 5%. The floatation device will be re-processable and recyclable at the end of its useful life.

45. Anchoring and mooring system: The water level variation and prevailing wind speed are the primary safety considerations, to be taken in account while designing the plant such that the plant has no impact on the reservoir. The mooring system thus needs to be designed that it not only restricts the lateral movement of the proposed plant but also accommodates the water level variability. In addition, the mooring system should also have minimal impact on the overall ecosystem of the reservoir, specifically on the flora and fauna.

46. Necessary concrete foundation or any other arrangement for holding the lightning conductor in position is to be made after giving due consideration to shadow on PV array, maximum wind speed and maintenance requirement at site in future. The lightning conductor and structures shall be earthed through flats as per applicable Indian Standards with earth pits. Each lightning conductor shall be fitted with individual earth pit as per required Standards including accessories and providing masonry enclosure.

47. Night consumption of the PCU shall be less than 0.2% of the rated power of the inverter. Noise level of the PCU should be less than 65 dBA (nominal) at 1m. DC insulation resistance should be more than 50MΩ.

48. The system description, general/technical requirements, etc. will be given for general guidance in the bid documents. The supplier/manufacturer shall submit the detailed design of the complete solar generating system by using their software to optimize the combination of modules considering the specific location, insolation, nature of load, cable to be routed in standard manner through cable trays & cable marker to be placed for future identification. Armored cable is to be used wherever required

Fig: 3 – Sample photo of a similar proposed Floating Solar Power Plant (source – Google Pics)



49. **Installation and Commissioning works:** BOD works in the subproject mainly include installation of PV modules, junction boxes and cabling and power evacuation to the grid through a distribution line up to the nearest substation (200meters) from the reservoir.

Some of the key activities involved will be:

- (i) Excavation
- (ii) Barricading
- (iii) Temporary material storage
- (iv) Temporary storage of excavated soil, refilling & disposal of surplus soil
- (v) Traffic diversions

50. Contractor will prepare a standard work instruction for each activity prior to commencement of work and will get it approved by the GVMC engineer / safeguards officer. The work will be carried out during day time. Only in case of emergency or site conditions night work will be taken up with due permission from the concerned agencies. Proper precautionary measures will also be followed.

Figure 4: Google Earth Map showing Proposed Location of Solar System in Meghadrigedda Reservoir



Figure 5: Google Earth Map showing the Proposed Feeder Line Alignment from the Floating Solar Panels to the Narawa SS



C. Implementation Schedule

51. The subproject tenders may be invited in Quarter I of 2018 and the works likely to be completed in 6 months after the contract is awarded.

IV. POLICY, LEGAL & ADMINISTRATIVE FRAMEWORK

A. ADB Policy

52. ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB SPS, 2009. This states that ADB requires environmental assessment of all ADB investments.

53. **Screening and categorization.** The nature of the environmental assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project; the sensitivity, scale, nature, and magnitude of its potential impacts; and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental impacts, and are assigned to one of the following four categories:

- (i) **Category A.** Projects could have significant adverse environmental impacts. An EIA is required to address significant impacts.
- (ii) **Category B.** Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. An IEE is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.
- (iii) **Category C.** Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.
- (iv) **Category FI.** Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all projects will result in insignificant impacts.

54. **Environmental management plan.** An EMP, which addresses the potential impacts and risks identified by the environmental assessment, shall be prepared. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the project's impact and risks.

55. **Public disclosure.** ADB will post the safeguard documents on its website as well as disclose relevant information in accessible manner in local communities:

- (i) for environmental category A projects, draft EIA report at least 120 days before Board consideration;
- (ii) final or updated EIA and/or IEE upon receipt; and
- (iii) environmental monitoring reports submitted by the implementing agency during project implementation upon receipt.

56. **ADB SPS Additional Requirements on Pollution Control, Health & Safety.** During the design, construction, and operation of the project the PMU and GVMCs will apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines. These standards contain performance levels and measures that are normally acceptable and applicable to projects. When Government of India regulations differ from these levels and measures, the PMU and GVMCs will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the PMU and GVMCs will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

B. National Environmental Laws

Applicable Environmental Safeguards Policies and Regulatory Framework

I. GoI India Regulatory Framework

As per the present regulatory framework, solar power projects do not require any prior environmental clearances either at the Centre or at the State level. The Schedule of EIA notification, 2006 does not include solar power projects and thus are out of the purview of this notification.

Further, as per the re-categorization of industries notified in March 2016 by MOEF&CC, Government of India, the solar power projects of all capacities are now placed under white

category, which are exempted from all regulatory approvals including seeking consent to establish (CTE) and consent to operate (CTO) from the State Pollution Control Board. The notification of Central Pollution Control Board dated March 2016 as well as notification of Andhra Pradesh Pollution Control Board dated May 2016 regarding the recategorizing of Industries is given in Annexure 1.

The subproject will be on the reservoir water surface and no land is required. NOC (No objection certificate) from the Irrigation department and AP Transmission Company will be undertaken after the detailed design is completed and prior to the start of installation and commissioning.

As per the GoAP Solar Power Policy, 2015, open access clearance for the whole tenure of the project or 25 years whichever is earlier will be granted as per the APERC Regulations amended from time to time. In absence of any response or intimation from the Nodal Agency to the generator within 21 days, then such application shall be considered to be deemed open access. GVMC has been mandated to develop the solar projects at the reservoir.

57. **Applicable environmental regulations.** Besides EIA Notification 2006, there are various other acts, rules, policies and regulations currently in force in India that deal with environmental issues that could apply to infrastructure development. The specific regulatory compliance requirements of the subproject are shown in Table 2.

Table 1: Environmental Regulations Applicable to the Subproject

S. No	Legislation	Requirements for the Investment Program
A	Policies	
1.	National Environment Policy, 2006.	- Government of India policy at national level, and is a general guidance document - Subproject design shall overall be in line with the Policy principles, the most relevant policy principle for this subproject is the principle of enhancing and conservation of environmental resources and abatement of pollution". - Designing the pumping and distribution system with optimal energy use, and overall resource conservation through minimizing loss of water and overall load on the system
2	GoAP Solar Power Policy 2015	- open access clearance will be granted for a maximum period of 25 years on application. Application will be made after the detailed design is completed and before the start of installation at site.
B	Acts, Rules	
1.	EIA Notification, 2006.	- specifies requirements for EIA and environmental clearance (EC) - Not applicable to the subproject
2.	Air (Prevention and Control of Pollution) Act, 1981, amended 1987 and its Rules, 1982.	- Subproject do not include components that attract this Act - Act provisions will be applicable during construction works (emissions from equipment, machinery, vehicles shall conform to emission norms) (including but not limited to diesel generators and vehicles) Appendix 2& 3 presents the ambient air quality standards and vehicle emission norms
3	EIA Guidance Manual for Building, Construction, Townships & Area Development Projects, Ministry of Environment & Forests, 2010.	- this is manual is applicable to construction projects requiring environmental clearance (EC) - Considering high air pollution, especially dust, in ambient air, the National Green Tribunal has given a ruling in 2015 that all construction projects (irrespective of EC requirement) shall follow the dust control norms - Follow the dust & noise control measures as suggested in the manual
4.	Environmental (Protection) Act, 1986 amended 1991 and the following rules/notifications:	

S. No	Legislation	Requirements for the Investment Program
4a.	Environment (Protection) Rules, 1986 including amendments.	- compliance with emission and disposal standards during construction.
4d.	Noise Pollution (Regulation and Control) Rules, 2000.	- Rule 3 of the Act specifies ambient air quality standards in respect of noise for different areas/zones (Appendix 4) - Compliance with noise standards
4b	Municipal Solid Wastes Management Rules, 2016	- Not applicable to the subproject
4c	Construction & Demolition Waste Management Rules, 2016	- Rules to manage construction & to waste resulting from construction, remodeling, repair and demolition of any BOD structure. Rules define C&D waste as waste comprising of building materials, debris resulting from construction, re-modeling, repair and demolition of any BOD structure. - Construction & demolition waste generated from the project construction shall be managed and disposed as per the rules (Appendix 5)
5.	Ancient Monuments and Archaeological Sites and Remains Acts, 1958, its Rules, 1959 and notification, 1992.	- The Act designates areas within 100 m of the protected monument as "prohibited area" and 100-300 m as "regulated area". -Any construction activity within these areas require prior permission of the National Monuments Authority (NMA). -a protected monument is located just outside the subproject area, and some of the regulated zone is located within the subproject areas; requires permission of NMA for laying pipelines - Not applicable to the subproject
6.	Labour laws (Appendix 6 provides labor laws applicable to establishments engaged in construction of BOD works).	Applicable to construction works and some of the provisions are as follows: - Contractors to obtain license from the designated Labour Officer and shall register with Department of Labour, if Inter-state migrant workmen are engaged; - Adequate and appropriate amenities and facilities shall be provided to workers including housing, medical aid, traveling expenses to/from home etc. - The employer is required to provide safety measures at construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation for workers near the workplace etc.; - Rules stipulates hours of work, night work, welfare, payment of wages, registers and records, facilities to be provided, and safety and health - No child labour shall be employed. - All construction workers be paid not less than the prescribed minimum wage. - Compensation for workers in case of injury by accident shall be provided as per the provisions of the Acts - Equal wages for work of equal nature to male and female workers; there shall be no discrimination in terms of gender
7.	Wetlands (Conservation and Management) Rules, 2010	The Rules specify activities which are harmful and prohibited in the wetlands such as industrialization, construction, dumping of untreated waste and effluents, and reclamation. The subproject is not impacting any notified wetlands in the area. Nearest notified site (Kambalakonda Wildlife Sanctuary¹) is 23 kms. From the subproject location.

¹Kambalakonda Wildlife Sanctuary Gazette Notification attached as Appendix 10

S. No	Legislation	Requirements for the Investment Program
8.	Forest (Conservation) Act, 1980 and Forest Conservation Rules, 2003 as amended.	As per Rule 6, every user agency, who wants to use any forest land for non-forest purposes shall seek approval of the Central Government. No notified forest land within the subproject area.

C. Administrative Framework, Enforcement & Grievance Redress

58. **Environmental Clearance.** Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India, governs and enforces the environmental clearance requirements in India. Clearances are handled at two levels –clearance to Category A projects is issued at central level by MoEFCC, and for Category B projects, clearance process is decentralized at state-level, and clearance is issued by the respective State-level EIA Authorities set up under the EIA Notification, 2006. This subproject does not fall under the ambit of EIA notification therefore this is not applicable.

59. **Enforcement of Pollution Control Laws.** Andhra Pradesh Pollution Control Board (APPCB) enforce the pollution control laws and regulations (water pollution, air pollution, solid waste, hazardous waste and biomedical waste management, etc.,) in the state. No consent from APPCB is required for this subproject.

V. DESCRIPTION OF ENVIRONMENT

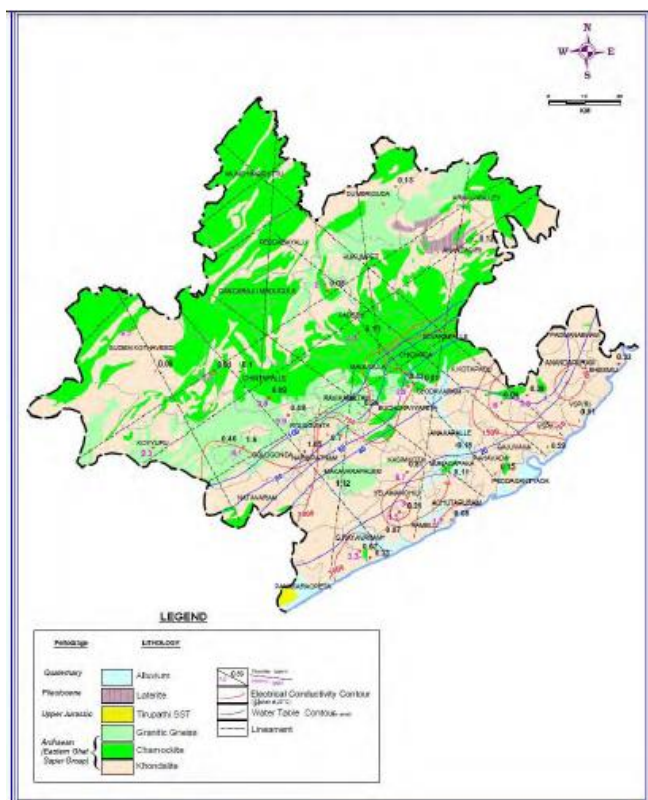
A. Methodology Used for Baseline Study

Data collection and stakeholder consultations. Data for this study has been primarily collected through comprehensive literature survey, discussion with stakeholder agencies, and field visits to the proposed subproject sites.

Physical Resources

60. **Topography, drainage, and natural hazards:** Visakhapatnam is strategically located midway between Howrah and Chennai, the two of the four metropolis of the country. The city is rated as the fastest growing city on the East. The industrialization and the accompanying urbanization is responsible for the rapid growth of the city. Visakhapatnam is the second largest city in Andhra Pradesh, a sprawling industrial city and one of the emerging metropolises.

61. The total area of the Greater Visakhapatnam Municipal Corporation is 534 sq.km. Greater Visakhapatnam Municipal Corporation (GVMC) is a Local Body with the responsibility of providing basic civic services like roads, water supply & sewerage, health & sanitation, storm water disposal etc. GVMC is also responsible for planned growth of the city. This is one of emerging new metropolitan cities and 2nd biggest town in Andhra Pradesh. Total area of G.V.M.C is 534 Sq.Km. The population of GVMC as per 2011 census is 17,30,320



HYDROLOGY OF VISAKHAPATNAM DISTRICT

Town History

62. Visakhapatnam, popularly known as Vizag is a fast developing port city with a population a land area of 534 square kilometres. Visakhapatnam is Andhra Pradesh's second largest urban agglomeration in population. On account of rapid industrialization, there has been significant migration into the city. The city was originally a small fishing village but due to its natural harbor it developed into a major port. It has experienced rapid industrialization with the growth of major industries, including steel, petroleum refining and fertilizer. With the formation of "Greater Visakhapatnam" in 2005 the city's development is set for a quantum leap

63. Visakhapatnam, the District Head Quarters of the District, the revenue Division and the Mandal of the same name is situated on the Madras-Howrah broad gauge line. The name Visakhapatnam is named after "VAISAKHA" or 'KARTIKEYA' the lord of Valour. The city is built along the seashore of the Bay of Bengal and it is bounded and broken by the Bold headland called the 'Dolphin's Nose'. This place is also known as Black Mores hill. It is a bustling Industrial and commercial center surrounded by hills, beautiful beaches and lush green nature. The undulating terrain within the city is emphasized by three hills – the Ross Hill housing a Roman Catholic Church, the path way leading to which is strewn with Catholic icons. The Second hillock Dargakonda has a mosque and the tomb of muslim saint who was revered for his prophecies and the third hill is called Sri Venkateswara Konda with a temple built by Captain Blackmoor in 1886. It has its own importance educationally because it is the seat of Andhra University. The places of interest in the city include the Dolphin's Nose, Light House with 7 Million Candle power covering 64 Kms., range harbour, BHPV, Hindustan Shipyard, HPCL, Coromondal Fertilizers Factory, KGH, Circuit House on the Hill, a beautiful beach near Ramakrishna Mission and an airport etc.

64. Visakhapatnam is situated on the East Coast of country, mid way between Howdah and Chennai. The city is rated as the fastest growing city of East Coast due to strategic location with natural seaport, Eastern naval command headquarters, and Rapid industrialization, Andhra University along with its many engineering and medical colleges in addition to many non-professional colleges.

65. Visakhapatnam is the second largest city in Andhra Pradesh, a sprawling industrial city and one of the emerging metropolises. The city in total is having an extent of 534 Sqkm in the limits of Greater Visakhapatnam Municipal Corporation (GVMC). The town was Municipality in 1903 and municipal corporation during 1979 and became Greater Visakhapatnam Municipal Corporation (GVMC) through G.O Ms. No.938 (MA&UD) Ele-II, dated 21/11/2005 by merging Gajuwaka Municipality and 32 gram panchayat areas surrounded on three sides of the town.

66. The GVMC is an industrial hub with industries like Visakhapatnam Steel Plant (VSP), Hindustan Zinc limited (HZL), Bharat Heavy Plats Vessels (BHPV), Visakhapatnam Special Economic Zone (VSEZ) and APIIC Industrial belt etc., The other major industries like Coromandel Fertilizers Limited, Hindustan Petroleum Corporation Limited (HPCL) and Hindustan Shipyard Limited (HSL) etc., are situated in the surroundings. The new coming up deep-sea port at Gangavaram is also contributing to growth of town from these areas. Great historic and ancient important temple of "varaha narasimha swamy" and some historic Boudha places are located in or nearer to these areas.

67. This is one of emerging new metropolitan cities and 2nd biggest town in Andhra Pradesh. Total area of G.V.M.C is 534 Sq.Km. The present total population of GVMC is 17,30,320.

Location & Topography

68. Vizag is located on the east coast of India, in 17°42' North latitude and 82°02' East range of hills. Based on topographical conditions, the city and its environs can be divided into four categories viz., Hilly region, Upland tracks, Rolling plains and Plains. The Kailasa and Yarada are the major hill ranges in the city. The Kailasa hill range stretches from Simhachalam to MVP Colony on the north flank of the city. The city, which appears like a small basin, is surrounded by the Yarada hill popularly known as Dolphin's nose (358m) on the side of the Kailasgiri hills on the north, with the Bay of Bengal forming the eastern wall. The coastal line runs from north- east to south west over a distance of six kilometres. On the west there is an extensive tidal basin called Upputeru now under reclamation. Beyond Yarada there is a valley followed by another range of hills.

Climate and Rainfall Climate

69. According to Thronthwait's scheme of climatic classification the city area falls under semi-arid type of climate.

Climatic setting in brief:

@ Ambient air temperature:

@ Absolute maximum 44.4 degrees C - Absolute minimum 12.8 degrees C

@ Sea surface temperature: Min 20.2 degrees C, Max 32.3 degrees C,

Monthly mean relative humidity

Absolute maximum: 100%

Absolute minimum: 4%

Climate data for Visakhapatnam													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °C (°F)	34.8 (94.6)	38.2 (100.8)	40.0 (104)	40.5 (104.9)	45.0 (113)	45.4 (113.7)	41.4 (106.5)	38.8 (101.8)	38.2 (100.8)	37.2 (99)	35.0 (95)	34.0 (93.2)	45.4 (113.7)
Average high °C (°F)	28.9 (84)	31.3 (88.3)	33.8 (92.8)	35.3 (95.5)	36.2 (97.2)	35.3 (95.5)	32.9 (91.2)	32.7 (90.9)	32.5 (90.5)	31.7 (89.1)	30.4 (86.7)	28.9 (84)	32.5 (90.5)
Average low °C (°F)	18.0 (64.4)	19.9 (67.8)	23.0 (73.4)	26.1 (79)	27.7 (81.9)	27.3 (81.1)	26.1 (79)	26.0 (78.8)	25.6 (78.1)	24.3 (75.7)	21.6 (70.9)	18.6 (65.5)	23.7 (74.7)
Record low °C (°F)	10.5 (50.9)	12.8 (55)	14.4 (57.9)	18.3 (64.9)	20.0 (68)	21.1 (70)	21.3 (70.3)	21.1 (70)	17.5 (63.5)	17.6 (63.7)	12.9 (55.2)	11.3 (52.3)	10.5 (50.9)
Average precipitation mm (inches)	11.4 (0.449)	7.7 (0.303)	7.5 (0.295)	27.6 (1.087)	57.8 (2.276)	105.6 (4.157)	134.6 (5.299)	141.2 (5.559)	174.8 (6.882)	204.3 (8.043)	65.3 (2.571)	7.9 (0.311)	968.8 (38.142)
Avg. rainy days	0.5	0.5	0.5	1.2	3.0	6.4	8.7	9.3	9.9	8.7	2.7	0.6	52.0
Avg. relative humidity (%)	71	70	69	71	69	71	76	77	78	74	68	67	7

Monthly Wind Speed

Mean value: 10-16 kmph

Prevailing Direction South West

Frequency Distribution : 44.5%

Highest monthly mean wind speed for 24 hours : 21.4 kmph.

Extreme wind velocity : 131 kmph.

Monthly sea level pressure:

Mean value : 1009 mb

Maximum observed : 1014 mb

Monthly Visibility: Less than ½ N mile, Less than 1 mile, Less than 2 N miles, Less than 10 N miles. Fog is infrequent at sea in all seasons. Reduction in visibility is mostly due to heavy rains, which during the southwest monsoon can reduce visibility below fog levels.

Rainfall

Average Annual : 973.6 mm

Annual Min : 654.0 mm

Annual Max : 1308.6 mm

Maximum recorded in a day : 375.2

Highest annual : 1,314

Highest monthly : 606 mm

Highest daily : 293.3 mm

Fog: Months: December to February

Coastal and Oceanographic Data: The cyclonic activity and the coastal and offshore data are presented to appreciate the various factors that affect the recreational aspects along the beaches.

Monsoons and Cyclones

70. In the Bay of Bengal, depressions are likely to be encountered in all seasons of the year with a gradual fall in pressure. On an average 4 to 5 cyclones per year occur. However, at particular locations the average frequencies may be lower. Hind casting studies indicated that the Coast is mainly affected by waves generated by Cyclones from the South East to South East direction. The highest waves are experienced in the period April September when the winds are more intense and consistent. The deep sea waves with the highest and lowest period frequent from the South West quadrant. Waves of over 1.5 mtrs in the height may be expected approximately 14% of the time. The daily record of tidal levels shows two highs and two lows. There is published evidence to indicate that strong tides as much as 60 cms in excess of the predicted tides may occur during the cyclones.

Seismicity

71. Earlier the city fell under the seismic zone of Category II, where earthquakes of magnitude 5.6 and above do not occur. But in recent revised seismic map by National Geophysical Research Institute, Hyderabad the zone has been elevated to Category III which suggests that earthquakes of magnitude greater than 5.6 are possible. In the recent times earth tremors are being increasingly felt particularly along the foot hills of Kailasa Hill and Yarada hills. Major fracture lineaments are noted in the structural history of the area. The small tremors and

shocks experienced in the recent times as a sequel to structural movements which is indeed a rare phenomenon. The strongest earthquake recorded had a magnitude of 6.5.

Ecological Resources.

72. The sensitive and critical natural habitats such as national park, marine park, wildlife sanctuary, tiger reserve, elephant reserve, reserved forest, protected area and its buffer zone, declared special area for protecting biodiversity or wildlife habitat, estuarine area, coral reef, wet land or marshes or mangrove, cultural heritage sites, etc. are not found in the subproject area. None of the rare and endangered species of flora and fauna were observed within and surroundings of project area.

Social and Cultural Resources

73. Population and Communities. The population of GVMC city as per 2011 census is 79158. The population density is only 2032.25 persons per Sq. km. The total number of households as per 2011 census is 19123. Number of slum households is 856 and population is 4,563. Sex ratio is 969. Literacy rate is 79.98%. Main occupation is agriculture. Secondary occupation is weaving.

74. Health facilities. One government hospital and about 50 private health centers (major numbers of Ayurvedic practices) were observed within CMC limits.

75. Education facilities. One government school and several private schools and preuniversity college were noticed in the project area.

76. Literacy rate. About 77% of total population shows literacy as per 2001 census. 85.7% males are literate and 68% females are literates.

77. Work participation rate. Out of the total population of 67,170, as per 2001 census, 63.4% is the work participation rate. About 50.8% of male population and about 12.6% of female population are in the working category.

78. Land use pattern. According to the land use pattern of 1995, residential area constitutes 52.62 percent of the total developed area of 358.07 Ha. The core area of GVMC town is overcrowded and very congested as a result; new extension areas are forming in the peripheral areas of the town. The commercial and industrial establishments occupy 4.36 percent and 4.50 percent of the total developed area of the town. About 11 percent of the developed area is under park and playgrounds, which indicates that the town has good recreational places. The circulation pattern of the town occupies about 12 percent of the developed area. The local planning area has about 32.53 Ha of vacant land for future development.

79. Physical or cultural heritage. No physical or cultural heritage was observed in the vicinity of the subproject area.

VI. ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

80. Potential environmental impacts of the proposed infrastructure components are presented in this section. Mitigation measures to minimize/mitigate negative impacts, if any, are recommended along with the agency responsible for implementation. Monitoring actions to be conducted during the implementation phase is also recommended to reduce the impact.

81. Screening of potential environmental impacts are categorized into four categories considering subproject phases: location impacts and design impacts (pre-construction phase), construction phase impacts and operations and maintenance phase impacts.

- a. **Location impacts** include impacts associated with site selection and include any potential impacts on adjacent environment including biodiversity impacts.
- b. **Design impacts** include impacts arising from design, including technology used, scale of operation/throughput, waste production, discharge specifications, pollution sources and ancillary services.
- c. **Construction impacts** include impacts caused by site clearing, earthworks, machinery, vehicles and workers. Construction site impacts include erosion, dust, noise, traffic congestion and waste production.
- d. **O&M impacts** include impacts arising from the operation and maintenance activities of the infrastructure facility. These include routine management of operational waste streams, and occupational health and safety issues.

82. Screening of environmental impacts has been based on the impact magnitude and impact duration.

83. This section of the IEE reviews possible project-related impacts, in order to identify issues requiring further attention and screen out issues of no relevance. ADB SPS (2009) require that impacts and risks will be analyzed during pre-construction, construction, and operational stages in the context of the project's area of influence.

84. The ADB Rapid Environmental Assessment Checklist has been used to screen the project for environmental impacts and to determine the scope of the IEE.

85. This subproject is a clean energy project and (i) most of the individual elements involve straightforward installation and operation, so impacts will be mainly localized and not greatly significant; (ii) most of the predicted impacts are associated with the installation and commissioning process which are localized and temporary and will not have significant impacts. (iii) being located on a reservoir surface, any potential biodiversity impact has been screened using the Integrated Tool on Biodiversity Assessment² (IBAT) and the study reveals that there are no potential impacts on any critically endangered or vulnerable species in the subproject area. The subproject will be on the reservoir surface owned by the GVMC and used for water supply for the Visakhapatnam urban area. The access to the subproject location and the power transmission line is through public rights-of-way and existing roads hence, land acquisition and encroachment on private property will not occur.

86. The subproject implementation will result in renewable energy generation and GHG emission reductions to the tune of around 1500 tons of CO₂ equivalent per annum.

²IBAT Report for Meghadrigedda Reservoir is attached as Appendix - 7

A. Pre-Construction Impacts – Design & Location

87. **Design of the Proposed Components.** Technical design of the (i) floating solar panels, (ii) Cabling and junction boxes and (iii) power evacuation and distribution network follows the relevant design guidelines, focusing on providing a robust system which is easy to install and operate, sustainable, efficient and economically viable. Subproject design will include the following environmental considerations:

- (i) Minimizing transportation and storage by installing pre-fabricated panel structure.
- (ii) Avoiding use of any hazardous chemicals on the PV panels and structure to prevent reservoir water contamination.
- (iii) Optimizing the surface area required for PV panel placement to ensure higher efficiency and power generation.
- (iv) Avoiding placement of transmission lines on private or agricultural land and use available ROW along the existing road alignment.

88. **Proposed Subproject Locations and Impacts.** Location impacts are associated with planning particularly on the site selection, and include impacts due to encroaching on sensitive areas, and impacts on the people who might lose their homes or livelihoods. The site presently has some trees and bushes around it which will be avoided during the transportation and storage of the power plant components. Adjacent land is owned by GVMC and temporary storage will not require any disturbance.

89. **Utilities** Proposed transmission line from the reservoir to the substation will be along the available ROW. Various utilities (telephone lines, sewers and pipelines) may be located along these roads. These may require to be shifted in few cases. To mitigate the adverse impacts due to relocation of the utilities, the contractor, in collaboration with GVMC shall:

- (i) Identify the locations and operators of these utilities to prevent unnecessary disruption of services during construction phase
- (ii) Conduct detailed site surveys with the construction drawings and discuss with the respective agencies before site clearance and start of excavation work; and
- (iii) Instruct construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.

90. Advance notice will be given to the consumers about the likely disruptions, and if the disruption extends over a day, then alternative arrangements will be provided. Following measures are to be implemented to minimize the inconvenience:

- (i) provide prior information to public on likely disturbances, and
- (ii) make temporary arrangements for water supply in the affected area (for example, through mobile tankers) if the water supply service is disrupted over 24 hours.

91. **Site selection of construction stockpile areas, storage areas, and disposal areas.** Consider sites that will not result in destruction of property, vegetation, irrigation, and drinking water supply systems. Residential areas shall not be considered for setting up camps to protect the human environment (i.e., to curb accident risks, health risks due to air and water pollution and dust, and noise, and to prevent social conflicts, shortages of amenities, and crime). Extreme care will be taken to avoid disposals near the forest, water bodies, swamps, or in areas which will inconvenience the community. All locations would be included in the design

specifications and on plan drawings. Construction work camps, if required shall be located at least 200 m from residential areas. Material stockpiles shall be protected by bunds during the monsoon to arrest the silt laden runoff into drains. The subproject is likely to generate soil from excavations, which needs to be disposed safely.

92. **Site selection of sources of materials.** Most of the material will be pre-fabricated and very small quantities of coarse aggregate and fine aggregate will be required for construction works. Requirement of gravel is limited. Following measures are to be implemented:

- (i) Contractor should procure these materials only from the quarries permitted/licensed by Mines and Geology Department.
- (ii) Contractor should, to the maximum extent possible, procure material from existing authorized quarries.
- (iii) It will be the construction contractor's responsibility to verify the suitability of all material sources and to obtain the approval of Department of Mines & Geology and local revenue administration.
- (iv) Contractor should submit the details of sources and copies of approvals, permissions to GVMC, and should start procurement only after the respective source is approved by GVMC.

B. Construction Impacts

93. **Floating solar PV Installation works:** Installation works for the subproject include placement of PV modules and the pre-fabricated structures on the reservoir surface. No welding operations are required for the installation of the PV modules.

94. The subproject location has an existing road and no additional access is required to be constructed. The transmission line will be on the available ROW and the nearest substation is 200 meters from the edge of the reservoir

95. Any earth work excavation, if required, will be undertaken by machine and include danger lighting and using sight rails and barricades. Excavated material will be stocked within that area.

96. Although construction of the subproject components involves simple techniques of BOD work, the installation at water surface will require avoidance of any waste material or chemical getting disposed in the reservoir. The transportation of materials and installation works will result in impacts to the environment and sensitive receptors such as residents, businesses, and the community in general. These anticipated impacts are temporary and for short duration.

97. **Air Quality.** The installation work will not use welding and the impact on air quality is expected in the form of dust or transportation impacts which will be minimal and temporary. Emissions from construction vehicles, equipment, and machinery used for excavation and installation may induce impacts short term and temporary air quality impacts in the construction sites.

98. **Surface Water Quality.** Run-off from stockpiled materials and chemical contamination from PV panels and lubricants during installation works can contaminate reservoir surface water quality. As the rainfall in the project areas is mostly confined to monsoon, these potential

impacts are short-term and temporary. However, to ensure that these are mitigated, construction contractor will be required to:

- (i) All earthworks be conducted during the dry season to prevent the problem of soil run-off during monsoon season
- (ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
- (iii) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
- (iv) Place storage areas for fuels and lubricants away from any drainage leading to water bodies;
- (v) Dispose any wastes generated by construction activities in designated sites; and
- (vi) Conduct surface quality inspection according to the Environmental Management Plan (EMP).

99. **Noise and Vibration Levels.** All the installation works will be conducted during the day time and any sensitive receptors will be avoided. Increase in noise level may be caused by excavation, transportation of equipment, materials, and people. This impact is negative but short-term, and reversible by mitigation measures. The construction contractor will be required to:

- (i) Plan activities in consultation with GVMC so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance
- (ii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and use portable street barriers to minimise sound impact to surrounding sensitive receptor.

100. **Socio-Economic – Employment.** Manpower will be required during the 6 months installation and commissioning stage. This can result in generation of temporary employment and increase in local revenue. Thus potential impact is positive and long-term. The construction contractor will be required to:

- (i) Employ local labour force, or to the maximum extent possible to increase local employment opportunities temporarily

101. **Occupational Health and Safety.** Workers need to be mindful of the occupational hazards which can arise from working in the reservoir area and electrical installation works. Potential impacts are negative and long-term but reversible by mitigation measures. The construction contractor will be required to:

- (i) Comply with all national, state and local labour laws (see Appendix 6);
- (ii) Develop and implement site-specific occupational health and safety (OH&S) Plan which will include measures such as: (a) identification of potential hazards and safety issues (b) ensuring all workers are provided with and use personal protective equipment; (c) OH&S Training³ for all site personnel; (d) documented

³ Some of the key areas that may be covered during training as they relate to the primary causes of accidents particularly while working in water for the placement of PV solar cells, laying of transmission lines, etc. (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does

- procedures to be followed for all site activities; and (e) documentation of work-related accidents;
- (iii) Ensure that qualified first-aid is provided at all times. Equipped first-aid stations shall be easily accessible throughout the site
 - (iv) Secure all installations from unauthorized intrusion and accident risks
 - (v) Provide supplies of potable drinking water
 - (vi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances
 - (vii) Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers
 - (viii) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions may be present. Ensure also that visitor/s do not enter hazard areas unescorted
 - (ix) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas
 - (x) Ensure moving equipment is outfitted with audible back-up alarms
 - (xi) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and
 - (xii) Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.

Operation and Maintenance Impacts

102. Once the installation and commissioning is over, the operation and maintenance of the 3 mw power will be done by the contractor under the supervision of GVMC. The subproject will require minimal maintenance and the potential impacts during this stage are expected to be negligible.

VII. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Overview

103. The active participation of stakeholders including local community, NGOs/CBOs, and the media in all stages of project preparation and implementation is essential for successful implementation of the project. It will ensure that the subprojects are designed, constructed, and operated with utmost consideration to local needs, ensures community acceptance, and will bring maximum benefits to the people. Public consultation and information disclosure is a must as per the ADB policy.

not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

104. Most of the main stakeholders have already been identified and consulted during preparation of this IEE, and any others that are identified during project implementation will be brought into the process in the future. Primary stakeholders of the subproject are: nearby residents, substation staff and irrigation department staff.

B. Public Consultation

105. GVMC held consultations with the residents of Jerripothulapalem village located near Meghadrigedda Reservoir. About 22 residents, mostly belonging to fisherman community participated in the consultations. The meeting was held at the residence of the local community leader, who chaired the meeting. The Assistant Executive Engineer and the jurisdictional Work Inspector of GVMC explained the details of the project and the benefits that GVMC will derive by establishing the floating solar plant. The fisherman reported that people from about 10 villages in the vicinity such as Jerripothulapalem, Nandavanipalem, Chintala Agraharam, Pedagadi, Porlupalem, Chintagatla etc depend on fishing in the reservoir. Further, they expressed their concern on availability of space for fishing, if the reservoir is covered with solar panels. The GVMC engineer explained that an area of about 0.048sq.km only would be covered by solar panels and the remaining area 4.97 sq.km out of the total area of 5.015sq.km area of the reservoir would continue to be available for fishing. The engineer explained that just about 1% of the reservoir area in the south west will be used for this project and the remaining area can be used for fishing. Further, the engineer explained that the settlements in the west and the south east (closer to the sluice gates) which are using the reservoir for fishing can continue to access the reservoir without any hindrance as no work is proposed in these areas. They were assured that the proposed works will not affect their fishing activity and were informed that they could contact the GVMC engineer in-charge of the project if they have any issues related to the project, during its implementation and even afterwards. The consultation meeting attendance sheet and photograph is given in Appendix 5.

106. Future consultations will be conducted and recorded after the detailed design is completed. Any suggestions or grievances relating to environmental issues will be addressed through proper mitigation measures as outlined in the EMP. Government regulatory agencies such as AP Power Transco, AP Irrigation department and Archeology Survey of India were also consulted during the project preparation.

C. Information Disclosure

107. Executive summary of the IEE will be translated in Telugu and made available at the offices of GVMC and in the subproject area. Electronic version of the IEE in English and Executive Summary in Telugu will be placed in the official website of the GVMC & PMU after approval of the IEE by Government and ADB. Stakeholders will also be made aware of grievance register and redress mechanism.

VIII. GRIEVANCE REDRESS MECHANISM

Redress of Grievances

108. To ensure that public grievance and/or complaint on environmental (and social) issues are addressed during the implementation of the subproject, GVMC has established a grievance redress mechanism (GRM⁴).

109. The GRM shall provide an accessible platform for receiving and facilitating resolution of affected person's grievances related to the project/ subproject. According to SPS 2009, the GRM will address concerns and complaints promptly, using an understandable and transparent process that is gender responsive, culturally appropriate and readily accessible to the affected persons at no costs and without retribution. GRM on environmental safeguards will cover matters that may be raised on environmental issues such as increased level of dust and noise causing inconvenience to local people, traffic, or other relevant issues.

110. Project GRM. Project GRM is established at three levels as indicated below and covers both environment and social issues. The GRM will be disclosed to the affected communities and households prior to the mobilization of contractors in any subproject areas. The Project grievance redress committee, supported by the PMSC consultants as well as the PMU and GVMC safeguard officers will be responsible for timely grievance redress on environmental and social safeguards issues and responsible for registration of grievances, related disclosure and communication with the aggrieved party. Contact details, procedures and complaint mechanism will be disclosed to the project affected communities at accessible locations and through various methods such as leaflets, direct communication, sign boards etc.

(i) 1st Level Grievance. The phone number of the GVMC office shall be made available at the construction site signboards. The contractors and GVMC safeguard officer can immediately resolve grievances on-site in consultation with each other and will be required to do so within seven days of receipt of a complaint/grievance.

(ii) 2nd Level Grievance. All grievances that cannot be redressed within seven days at field/ward level will be reviewed by the GRC at District level headed by District Commissioner with support from GVMC designated safeguard officer and PMSC environment and social specialists. GRC will attempt to resolve them within 15 days. The GVMC designated safeguard officer will be responsible to see through the process of redressal of each grievance.

(iii) 3rd Level Grievance. All grievances that cannot be redressed within 15 days shall be reviewed at the PMU level with support from PMSC environment and social specialist. The PMSC designated safeguard officer will be responsible to see through the process of redressal of each grievance.

Grievance Redressal Committee

111. Grievance Redressal Committee (GRC) will be established at GVMC level to receive, evaluate and facilitate the resolution of displaced persons concerns, complaints and grievances. The GRC is aimed to provide a trusted way to voice and resolve concerns linked to the project, and to be an effective way to address displaced person's concerns without allowing it to escalate resulting in delays in project implementation. The Project Director, PMU will be the appellate authority who will be supported by the Safeguard Officer of PMU and Team Leader of

⁴ GRM Government Order attached as Appendix 11

the external monitoring consultant. This will be the highest grievance redressal mechanism at the project level.

112. The GRC will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project. The GRC is not intended to bypass the government's inbuilt redressal process, nor the provisions of the statute, but rather it is intended to address displaced persons concerns and complaints promptly, making it readily accessible to all segments of the displaced persons and is scaled to the risks and impacts of the project.

113. The GRC will continue to function, for the benefit of the APs, during the entire life of the project including the defects liability period. The response time prescribed for the GRCs would be four weeks. The GRC, PMU and GVMC will meet at least once every month in the first year of project implementation.

114. Capacity Building. GVMC Environmental Officer will be further trained by PMSC's environmental safeguards officer on safeguards issues of the projects, EMP of VCICDP and ADB Safeguards Policy. Safeguards training will also be conducted by PMU safeguards expert to the relevant project team members. The targeted participants of the briefings would be PMU staff, resettlement implementation support NGO or agency and GVMC staff. The GVMC safeguards officer will be further supported by the PMSC experts through on the job training for updating IEEs, EMP implementation, complaint resolution and report writing on safeguards.

115. Disclosure of Information: GVMC through its Safeguards Officer will inform the APs on grievance redress procedure, who to contact and when, where and how to file a grievance, time likely to be taken for redressal of minor and major grievances, etc. Grievances received and responses provided will be documented and provided to the APs during the process. The number of grievances recorded and resolved and the outcomes will be displayed/disclosed in the field offices of AP Transco.

116. Review of the Process: GVMC will periodically review the implementation of the GRM and record information on the effectiveness of the mechanism, especially on the Project's ability to prevent and address grievances.

117. Cost of Implementation Costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by GVMC. The cost of implementation will be taken from the administration cost included in the total cost of the implementation for the project.

118. Grievances will first be brought to the attention of the implementing NGO. Grievances not redressed by the NGO will be brought to the Grievance Redress Committee (GRC) established in each Investment Program district. The GRC process is designed to be transparent, gender responsive, culturally appropriate and commensurate to the risks and adverse impacts of the project, as well as readily accessible to all segments of the affected people. Affected people are to be appropriately informed about the mechanism through media and public outlets. And to ensure that all views incorporated in implementation process.

119. Only major grievances shall be placed before the GRC. The GRC will determine the merit of each grievance and attempt to resolve the same within a month from the date of lodging of complaints, failing which the grievance shall be addressed to the Deputy Commissioner. The GRC shall forward grievances of serious nature immediately on receipt of complaint to the

Deputy Commissioner. The DC will hear appeals against the decisions of GRC. The decision of DC is final and cannot be contested in any other forum except in the Courts of Law.

120. **Record-keeping.** The GVMC will keep records of grievances received, including contact details of the complainant, the date the complaint was received, the nature of the grievance, agreed corrective actions and the date these were affected and the final outcome. The number of grievances recorded and resolved and the outcomes will be displayed/disclosed in the GVMC office, and on the DJB website, as well as reported in monitoring reports submitted to ADB on a semi-annual basis.

IX. ENVIRONMENTAL MANAGEMENT PLAN

A. Implementation Arrangements

121. The subproject will be carried out under the oversight of the GVMC. The DOI has been appointed as the EA and will be responsible for the management, coordination and execution of all the activities funded under the project.

122. The GVMC staff will include a Safeguard Officer (SO), who will be an Assistant Engineer rank officer, and will be responsible for all environment, health and safety, social, and grievance redress tasks. The SO will be a qualified engineer (preferably an environmental engineer). The SO can also be deputed from GVMC. Environmental and Social Safeguard Specialists of the PMSC will assist the SO.

B. Environmental Management Plan

123. An environmental management plan (EMP) has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels.

124. The EMP will guide the environmentally-sound construction of the subproject and ensure efficient lines of communication between PMU, GVMC, consultants and contractors. The EMP will (i) ensure that the activities are undertaken in a responsible non-detrimental manner; (i) provide a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site; (ii) guide and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iii) detail specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (iv) ensure that safety recommendations are complied with. The EMP includes a monitoring program to measure the environmental condition and effectiveness of implementation of the mitigation measures. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries.

125. The contractor will be required to submit to GVMC, for review and approval, a site environmental plan (SEP) including (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring program as per SEP; and (iv) budget for SEP implementation. No works are allowed to commence prior to approval of SEP.

126. A copy of the EMP/approved SEP will be kept on site during the construction period at all times. The EMP included in the bid and contract documents. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

127. For BOD works, the contractor will be required to (i) carry out all of the mitigation and monitoring measures set forth in the approved SEP; and (ii) implement any corrective or preventative actions set out in safeguards monitoring reports that the employer will prepare from time to time to monitor implementation of this IEE and SEP. The contractor shall allocate budget for compliance with these SEP measures, requirements and actions.

128. The following tables show the potential environmental impacts, proposed mitigation measures and responsible agencies for implementation and monitoring.

Table 2: Design Stage Environmental Management Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Cost and Source of Funds
Design of 3 MW Power plant PV modules and structure including cabling and junction boxes.	Use of chemicals, other hazardous lubricants. Provision of canopies for safety.	(i) Minimize surface water impacts by use of non-hazardous chemicals / paints, adequate canopies to prevent electrical hazards. Adequate measures for electrical cabling to prevent accidental hazards.	GVMC – to include in bidding documents. Contractor –to ensure during implementation.	Part of BOD works costs
Design of transmission line for power evacuation with identified alignment.	Use of existing ROW for energy evacuation and transmission to the grid.	(i) Avoid any private land / irrigated land.	GVMC	Part of BOD works costs
Project siting	Loss of tree cover	(i) Minimize removal of trees by adopting to site condition and with appropriate layout design of UGR (ii) Obtain prior permission from Tree Officer, Forest Department for tree cutting (iii) Plant and maintain 3 trees for each tree that is removed	GVMC	Part of BOD works costs
Socio cultural resource	Chance finds	(i) Develop a protocol for use by the construction contractors in conducting any work, to ensure that any chance finds are recognized and measures are taken to ensure they are protected and conserved. This should involve: ○ Conduct awareness training to contractor & supervision staff prior to start of excavation ○ Stopping work immediately to allow further investigation if any finds are suspected; ○ Calling in the ASI if a find is suspected, and taking any action they require to ensure its removal or protection in situ	GVMC	Part of BOD works costs

Table 3: Environmental Management Plan of Anticipated Impacts during Pre-Construction

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Cost and Source of Funds
Utilities	Telephone lines, electric poles and wires, within proposed project area	(i) Identify the locations and operators of these utilities to prevent unnecessary disruption of services during construction phase (ii) Conduct detailed site surveys with the construction drawings and discuss with the respective agencies before site clearance and start of excavation work; and (iii) Instruct construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.	Contractor in collaboration with GVMC	Part of BOD works costs
Construction work camps, stockpile areas, storage areas, and disposal areas.	Conflicts with local community; disruption to traffic flow and sensitive receptors	(i) Select a camp site away from residential areas (at least 50 m buffer shall be maintained) or locate the camp site within the existing facilities of GVMC (ii) Avoid tree cutting for setting up camp facilities (iii) Camp site shall not be located near (100 m) water bodies, flood plains flood prone/low lying areas, or any ecologically, socially, archeologically sensitive areas (iv) Separate the workers living areas and material storage areas clearly with a fencing and separate entry and exit	Construction Contractor	Part of BOD works costs
Sources of Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution.	(i) Contractor should procure these materials only from the quarries permitted/licensed by Mines and Geology Department. (ii) Contractor should, to the maximum extent possible, procure material from existing quarries, and creation of new quarry areas should be avoid as far as possible. (iii) It will be the construction contractor's responsibility to verify the suitability of all material sources and to obtain the approval of Department of Mines & Geology and local revenue administration. (iv) Contractor should submit the details of sources and copies of approvals, permissions to GVMC, and should start procurement only after the respective source is approved by GVMC	Construction Contractor	Part of BOD works costs
Consents, permits, clearances, NOCs, etc.	Failure to obtain necessary consents, permits, NOCs, etc. can result to design revisions and/or	(i) Obtain all necessary consents, permits, clearance, NOCs, etc. prior to award of BOD works Ensure that all necessary approvals for construction to be obtained by contractor are in place before start of construction (ii) Acknowledge in writing and provide report on compliance all	GVMC	Part of project costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Cost and Source of Funds
	stoppage of works	obtained consents, permits, clearance, NOCs, etc. (iii) Include in detailed design drawings and documents all conditions and provisions if necessary		

Table 4: Environmental Management Plan of Anticipated Impacts during Construction

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
Sources of Materials	Extraction of materials can damage environment	(i) Procurement of material only after the respective source is approved by GVMC (ii) Submit to GVMC on a monthly basis documentation of sources of materials.	Construction Contractor	Part of BOD works costs
Air Quality	Emissions from construction vehicles, equipment, and machinery used for installation resulting to dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons.	(i) Barricade the construction area using hard barricades (of 2 m height in Mild Steel (MS) frame and 1 mm MS sheet) on both sides and provide dust/wind screen (such geo textile fabric) up to 3 m height (1m above the hard barricading) (ii) Initiate site clearance and excavation work only after barricading of the site is done (iii) Confine all the material, excavated soil, debris, equipment, machinery (excavators, cranes etc.), to the barricaded area (iv) Damp down the soil and any stockpiled material on site by water sprinkling; (v) Apply water and maintain soils in a visible damp or crusted condition for temporary stabilization (vi) Apply water prior to leveling or any other earth moving activity to keep the soil moist throughout the process (vii) Limit the stocking of excavated material at the site; remove the excess soil from the site immediately to the designated disposal area (viii) Cover the soil stocked at the sites with tarpaulins (ix) Control access to work area, prevent unnecessary movement of vehicle, public trespassing into work areas; limiting soil disturbance will minimize dust generation (x) Undertake the work section wise: 100 – 200 m section should be demarcated and barricaded	Construction Contractor	Part of BOD works costs
Surface /	Mobilization of settled	(i) All earthworks be conducted during the dry season to prevent	Construction	Part of

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
Reservoir water quality	silt materials, and chemical contamination from fuels and lubricants during installation of pipelines can contaminate nearby surface water quality.	the problem of soil run-off during monsoon season (ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets; (iii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, only designated disposal areas shall be used; (iv) Identify construction waste/excess disposal sites prior to start of work (v) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; (vi) Place storage areas for fuels and lubricants away from any drainage leading to water bodies; (vii) Dispose any wastes generated by construction activities in designated sites; and (viii) Conduct surface quality inspection according to the Environmental Management Plan (EMP).	Contractor	BOD works costs
Noise Levels	Increase in noise level due to earth-moving and excavation equipment, and the transportation of equipment, materials, and people	(i) Plan activities in consultation with GVMC so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance (ii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and use portable street barriers to minimize sound impact to surrounding sensitive receptors (iii) Utilizing modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions and ensuring that these are maintained to manufacturers' specifications at all times. (iv) Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. (v) Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity (vi) Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach	Construction Contractor	Part of BOD works contract
Socio-Economic - Employment	Generation of temporary employment and increase in local	(i) Employ local labor force, or to the maximum extent possible to increase local employment opportunities temporarily	Construction Contractor	-

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
	revenue			
Occupational Health and Safety	Occupational hazards which can arise during work	(i) Comply with all national, state and local labour laws (see Appendix 6) (ii) Develop and implement site-specific occupational health and safety (OH&S) Plan which will include measures such as: (a) identification of potential hazards and safety issues (b) ensuring all workers are provided with and use personal protective equipment; (c) OH&S Training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents (iii) Ensure that qualified first-aid is provided at all times. Equipped first-aid stations shall be easily accessible throughout the site (iv) Secure all installations from unauthorized intrusion and accident risks (v) Provide supplies of potable drinking water (Appendix 7 provided drinking water standards) (vi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances (vii) Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers (viii) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions may be present. Ensure also that visitor/s do not enter hazard areas unescorted (ix) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas (x) Ensure moving equipment is outfitted with audible back-up alarms (xi) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and (xii) Disallow worker exposure to noise level greater than 85 dBA for	Construction Contractor	Part of BOD works costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.		
Biodiversity	Any potential harm to existing biodiversity in the subproject area, including biodiversity in the reservoir.	(i) To ensure during that adequate precautions are taken during site mobilization and construction. (ii) To monitor closely if any flora or fauna is observed that needs to be protected.	Construction Contractor / GVMC	Part of works cost
Post-construction clean-up	Damage due to debris, spoils, excess construction materials	(iii) Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required (iv) All excavated roads shall be reinstated to original condition. (v) All disrupted utilities restored (vi) All affected structures rehabilitated/ compensated (vii) The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up. (viii) All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be top soiled and re-grassed (ix) The contractor must arrange the cancellation of all temporary services. (x) Restore the work sites to pre-project conditions; GVMC to approve in writing that site is restored	Construction Contractor	Part of BOD works costs

Table 5: Operation Stage Environmental Management Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
Occupational health and safety	Health, social and economic impacts on the workers	- Provide appropriate PPE to workers& training on its proper use - Use fall protection equipment when working at heights. - Maintain work areas to minimize slipping and tripping hazards.	Contractor / GVMC	Operating costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		Implement a training program for operators who work with chlorine regarding safe handling practices and emergency response procedures.		
Biodiversity	Any potential harm to existing biodiversity in the subproject area, including biodiversity in the reservoir.	(xi) To ensure during that adequate precautions are taken during site operation and maintenance. (xii) To monitor closely if any flora or fauna is observed that needs to be protected.	GVMC	Part of operating costs
Public inconvenience & safety during repair and maintenance works	Traffic disruption, dust, safety risk etc.	- As the work will be similar to laying of pipes, the issues will be similar, but confined to very small area where the repair work is being implemented - Implement the measures as suggested in the construction stage EMP	Contractor / GVMC	Operating costs

Table 6: Construction Stage Environmental Monitoring Plan

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Construction disturbances, nuisances, public & worker safety,	All work sites	Implementation of dust control, noise control, traffic management, & safety measures.	Regularly as required during construction; checklist to be filled monthly once	Supervising staff and safeguards specialists	Part of TOR of GVMC, PMC and PMU
Ambient air quality	3 locations (2 at reservoir site, and 1 close to substation)	PM10, PM2.5 SOx, NOx	Once before start of construction. Monthly during construction.	Construction Contractor	Contractor cost (part of BOQ items) 150samples x 5000 per sample = INR 750,000
Ambient noise	3 locations (2 at reservoir site, and 1 close to substation)	Day time and night time noise levels (24 hours)	Once before start of construction. Weekly during construction.	Construction Contractor	Contractor cost (part of BOQ items) 150samples x 1500 per sample = INR 225,000

Surface / Reservoir water quality	2 locations (locations to be selected prior to start of construction)	pH, Oil & grease, Cl, F, NO3, TC, FC, Hardness, Turbidity BOD, COD, DO, Total Alkalinity	Once before start of construction fortnightly during construction	Construction Contractor	Contractor cost (part of BOQ items) 18samples x 4000 per sample = INR 72,000
Biodiversity	Reservoir area and substation.	Recording / photos of any protected animal / bird sighting in the subproject area.	Daily monitoring during construction. Weekly monitoring during operations.	Operation phase	Operating cost

C. EMP Compliance Responsibilities

129. **PMU/GVMC Responsibilities.** Safeguard Officer will be supported by PMSC, which will be staffed with an Environmental Specialist.

Contractor's responsibilities.

Bidding stage:

- (i) Understand the EMP requirements and allocate necessary resources (budget, staff, etc.)
- (ii) Understand the regulatory compliance requirements related to labour welfare, safety, environment etc.,

Construction stage:

- (i) Ensure that all regulatory clearances (both Project related and contractor related) are in place before start of the construction work.
- (ii) Mobilize EHS supervisor prior to start of work
- (iii) Confirm with GVMC availability of rights of way at all project sites prior to start of work.
- (iv) Prepare the following duly incorporating EMP measures, and submit to the GVMC:
 - a. Construction waste management (CWM) plan
 - b. Occupational Health & Safety (OHS) Plan
- (v) Implement the mitigation measures as per the EMP including CWM & OHS Plans
- (vi) Follow the EMP measures/guidelines for establishment of temporary construction camps, construction waste disposal sites, and material borrow areas, etc.,
- (vii) Implement EMP and ensure compliance with all the mitigation and enhancement measures
- (viii) Conduct environmental monitoring (air, noise, water etc.) as per the EMP
- (ix) Undertake immediate action as suggested by GVMC / PMU / PMC to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation
- (x) Submit monthly compliance reports on EMP implementation
- (xi) Act promptly on public complaints and grievances related to construction work and redress in a timely manner in coordination with GVMC
- (xii) Comply with applicable government rules and regulations
- (xiii) Site clean-up and restoration

D. Monitoring and Reporting

130. Prior to commencement of the works, the contractor will submit a compliance report to GVMC that all identified pre-construction mitigation measures as detailed in the EMP are undertaken. Contractor should confirm that the EHS supervisor is mobilized. GVMC with the assistance of the PMSC will review the report and permit commencement of works.

131. During construction, results from internal monitoring by the contractor will be reflected in their monthly EMP implementation reports to the GVMC. GVMC will review and advise contractors for corrective actions if necessary. A Semi-annual Environmental Monitoring Report summarizing compliance and corrective measures taken, will be prepared by PMC and submitted to GVMC. PMU will submit to ADB the semi-annual (6-monthly) EMR. Once concurrence from the ADB is received the report will be disclosed on the GVMC / PMU website.

132. ADB will review project performance against the commitments as agreed in the legal documents. The extent of ADB's monitoring and supervision activities will be commensurate with the project's risks and impacts. Monitoring and supervising of social and environmental safeguards will be integrated into the project performance management system

E. EMP Implementation Cost

133. Most of the mitigation measures require the contractors to adopt good site practice, which should be part of their normal procedures already, so there are unlikely to be major costs associated with compliance. The costs which are specific to EMP implementation will be included in the contractor costs.

X. CONCLUSION AND RECOMMENDATIONS

134. The process described in this document has assessed the environmental impacts of all elements of the 3 MW proposed floating solar power project at Meghadrigedda Reservoir in Visakhapatnam. All potential impacts were identified in relation to pre-construction, construction, and operation phases. Planning principles and design considerations have been reviewed and incorporated into the site planning and design process wherever possible; thus, environmental impacts as being due to the project design or location were not significant.

135. The subproject activities are mainly located in the Reservoir area and there are no nationally protected monuments in the subproject area.

136. During the construction phase, impacts mainly arise from the construction dust and noise; anticipated impacts during operation and maintenance are minimal.

137. The public participation processes undertaken during project design ensured stakeholders are engaged during the preparation of the IEE. The planned information disclosure measures and process for carrying out consultation with affected people will facilitate their participation during project implementation.

138. The project's grievance redress mechanism will provide the citizens with a platform to redress of their grievances, and describes the informal and formal channels, time frame, and mechanisms for resolving complaints about environmental performance.

139. The EMP will assist the GVMC, PMSC and the construction contractor in mitigating the environmental impacts and guide them in the environmentally sound execution of the proposed project.

140. A copy of the EMP/approved SEP shall be kept on-site during the construction period at all times. The EMP shall be made binding on all contractors operating on the site and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document shall constitute a failure in compliance.

141. The subproject will provide Clean and Green energy and benefit in the implementation of climate resilient and GHG reduction technology for power generation. There impacts associated with the subproject implementation are not significant and can be mitigated through adequate mitigation measures during the installation and commissioning phase.

142. Therefore, as per ADB SPS, the project is classified as environmental category B and does not require further environmental impact assessment. However, to conform to government guidelines, the project requires open access clearance for power transmission to the grid; tree cutting permission as applicable.

143. This IEE shall be updated during the detailed design stage by the PMSC to reflect any changes, amendments and will be reviewed and approved by ADB.

APPENDIX - 1

Rapid Environmental Assessment (REA) Checklist

Instructions:

- (i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES), for endorsement by Director, RSES and for approval by the Chief Compliance Officer.
- (ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.
- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: INDIA – VCICDP Tranche-II, 3MW floating solar power project, VIZAG

Sector Division: SAUW - SARD

Screening Questions	Yes	No	Remarks
A. PROJECT SITING IS THE PROJECT AREA ADJACENT TO OR WITHIN ANY OF THE FOLLOWING ENVIRONMENTALLY SENSITIVE AREAS?			The subproject will have floating solar panels on the MeghadriGedda reservoir in Vishakhapatnam, Andhra Pradesh.
▪ PHYSICAL CULTURAL HERITAGE SITE		N	The subproject location will not impact any Physical cultural heritage site.
▪ LOCATED IN OR NEAR TO LEGALLY PROTECTED AREA		N	There is no legally protected area in the vicinity of the subproject. The nearest legally protected area is more than 10 kms. from the proposed site.
▪ LOCATED IN OR NEAR TO SPECIAL HABITATS FOR BIODIVERSITY (MODIFIED OR NATURAL HABITATS)	Y		The subproject will be implemented on the surface of the reservoir. The area has biodiversity in the form of flora and fauna which will not be impacted due to the subproject activity during construction or operation phases.
▪ WETLAND		N	The site is not on a wetland.
▪ MANGROVE		N	There are no mangroves adjacent to the site.
▪ ESTUARINE		N	There are no estuaries close to the site.
▪ OFFSHORE (MARINE)		N	This is not an offshore/marine site.
B. POTENTIAL ENVIRONMENTAL IMPACTS WILL THE PROJECT CAUSE...			

Screening Questions	Yes	No	Remarks
▪ large scale land disturbance and land use impacts specially due to diversion of productive lands?		N	No land is impacted due to subproject activity. Pre-fabricated solar panels will be placed on the surface of the reservoir.
▪ involuntary resettlement of people? (physical displacement and/or economic displacement)		N	Not applicable to the subproject.
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		N	Not applicable for this subproject.
▪ noise, vibration and dust from construction activities?	Y		Short term impact during transportation, temporary storage and placement of solar panels on the water surface is envisaged.
▪ an increase in local traffic during construction?	Y		Short term impact on local traffic will be there.
▪ environmental disturbances such as soil erosion, land contamination, water quality deterioration, air pollution, noise and vibrations during construction phase?	Y		Short term impact on land, water and air is expected during the construction activity.
• aesthetic degradation and property value loss due to establishment of plant and ancillary facilities?		N	Not anticipated as no local activity at site will be there.
▪ changes in flow regimes of the water intake from surface water or underground wells due to abstraction for cooling purposes?		N	Not applicable to the subproject.
▪ pollution of water bodies and aquatic ecosystem from wastewater treatment plant, from cooling towers, and wash-water during operation?		Y	No such impact is anticipated during the operation phase.
▪ a threat to bird or bat life from colliding with the project facilities and/or being burned by concentrated solar rays?		N	Not anticipated. The solar panels will be placed at the water surface where presence of birds/bats is not there. The transmission tower that will evacuate power will also be at a short height of ...meters where the birds/bats are not expected. Suitable measures for mitigation in case of such situation will be included in the EMP.
▪ industrial liquid (dielectric fluids, cleaning agents, and solvents) and solid wastes (lubricating oils, compressor oils, and hydraulic fluids) generated during construction and operations likely to pollute land and water resources?	Y		Short term impact on the reservoir water is expected during the construction phase.
▪ Soil/water contamination due to use of hazardous materials or disposal of broken or damaged solar cells (photovoltaic technologies contain small amounts of cadmium, selenium and arsenic) during installation, operation and decommissioning?	Y		Short term impact is expected during the implementation and de-commissioning phase.
▪ noise disturbance during operation due to the proximity of settlements or other features?	Y		The nearest settlement is 3 kms. Away and noise impact during transportation and construction is expected to be minimal. Suitable measures to avoid such impacts will be included in the EMP.

Screening Questions	Yes	No	Remarks
▪ visual impacts due to reflection from solar collector arrays resulting in glint or glare?		N	Not applicable as the nearest settlement is 3 kms. Away and the reservoir is surrounded by tree cover at 3 sides.
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		N	Not applicable. Local workers will be employed during construction. Only 3-4 people will be employed during operation phase.
▪ social conflicts between local laborers and those from outside the area?		N	Not applicable as mentioned above.
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during construction, installation, operation, and decommissioning?	Y		Occupational health and safety impacts will be there during construction and installation activity. Suitable measures will be outlined in the EMP.
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials and wastes such as explosives, fuel and other chemicals during construction, and operation?		N	Not applicable.
▪ community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		N	Not applicable.

A Checklist for Preliminary Climate Risk Screening

Country/Project Title:

Sector :

Subsector:

Division/Department:

Screening Questions		Score	Remarks ¹
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	1	
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc.)?	0	
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	1	
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?	1	
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	1	

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response, will be categorized as high risk project.

Result of Initial Screening (Low, Medium, High): **Medium**

Other Comments: Visakhapatnam is a cyclone prone area and adequate precautions in design and installation of the floating power plant will be required to ensure that any risk to the power plant is avoided / minimized during such events.

Prepared by: _____

¹ If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

APPENDIX – 2**Appendix 2: National Ambient Air Quality Standards**

SL NO:	Pollutants	Time weighted average	Concentration in ambient air		Method of measurement
			Industrial, Residential, Rural & Other Areas	Ecologically Sensitive Areas	
1	Sulphur Dioxide (SO ₂) µg/m ³	Annual 24 hours	50 80	20 80	Improved West and Geake-Ultraviolet fluorescence
2	Nitrogen Dioxide (NO ₂) µg/m ³	Annual 24 hours	40 80	30 80	Modified Jacob &Hochheiser (Na-Arsenite) Chemiluminescence
3	Particulate Matter (Size less than 10 µm) or PM10 µg/m ³	Annual 24 hours	60 100	60 100	Gravimetric -TOEM -Beta attenuation
4	Particulate Matter (Size less than 2.5 µm) or PM2.5 µg/m ³	Annual 24 hours	40 60	40 60	Gravimetric -TOEM -Beta attenuation
5	Carbon Monoxide (CO) mg/m ³	8 hours 1 hours	02 04	02 04	Non Dispersive Infra Red (NDIR) Spectroscopy

APPENDIX – 3**Appendix 3: Vehicle Exhaust Emission Norms****1. Passenger Cars**

Norms	CO(g/km)	HC+ NOx(g/km)
1991 Norms	14.3-27.1	2.0(Only HC)
1996 Norms	8.68-12.40	3.00-4.36
1998 Norms	4.34-6.20	1.50-2.18
India stage 2000 norms	2.72	0.97
Bharat stage-II	2.2	0.5
Bharat Stage-III	2.3	0.35 (combined)
Bharat Stage-IV	1.0	0.18 (combined)

2. Heavy Diesel Vehicles

Norms	CO(g/kmhr)	HC (g/kmhr)	NOx (g/kmhr)	PM(g/kmhr)
1991 Norms	14	3.5	18	-
1996 Norms	11.2	2.4	14.4	-
India stage 2000 norms	4.5	1.1	8.0	0.36
Bharat stage-II	4.0	1.1	7.0	0.15
Bharat Stage-III	2.1	1.6	5.0	0.10
Bharat Stage-IV	1.5	0.96	3.5	0.02

Source: Central Pollution Control Board

CO = Carbon Monoxide; g/kmhr = grams per kilometer-hour; HC = Hydrocarbons; NOx = oxides of nitrogen; PM = Particulates Matter

APPENDIX – 4

Appendix 4: National Ambient Air Quality Standards in Respect of Noise

Area code	Category of area/zone	Limit in dB (A)	
		Day time	Night time
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45
D	Silence zone	50	40

APPENDIX – 5

PUBLIC
Sheet

CONSULTATION:

Jerripothulapalem

Meeting

Attendance

విశాఖపట్నం నుండి చేస్తూ వరకు
పారిశ్రామిక వాడ అభివృద్ధి చేయుటకు (వి.సి.ఐ.సి.డి.సి)

ప్రజా సంప్రదింపులు / సామూహిక చర్చనీయాంశాలు

హాజరు పట్టిక

తేది : 04/09/2018			
ప్రదేశం : మే వరకు గట్ల రెవెన్యూయారు			
క్ర.సం.	పేరు	ఫోన్ నం.	సంతకం
(1)	సాలపు జీవసాయం	—	శ్రీమద్దాసు
(2)	సాలపు గ్రెస్సికిరం	7095294291	శ్రీ స. గ్రెస్సికిరం
(3)	కుంభానామ	9948212546	శ్రీ కుంభానామ
(4)	రామకృష్ణ వరసింహారావు	8008748692	MR. Ramakrishna
(5)	సాలపు మారయ్య	9618232946	శ్రీ S. మారయ్య
(6)	నెపర్తి రామ	6303574776	శ్రీ N. రామ
(7)	నారసింహ దేవుడు	—	శ్రీ N. దేవుడు
8	సాలపు మారయ్య	9949682910	శ్రీ Marappa
9	బాబ్బా (కె.ఎస్)	9959132871	(B. Babbar)

క్ర.సం.	పేరు	ఫోన్ నెం.	సంతకం
11	సామెప్పకొనవరయ్య	8886086011	
12	శామరాజు కృష్ణశాస్త్రి	7702571485	R. కృష్ణశాస్త్రి
(13)	సూర్య కృష్ణారావు	7702416814	S. K. Ram
(14)	పరవతి	-	పరవతి
(15)	కొడిపి రమణ	-	కొడిపి
(16)	కె. కె. సీత	9885065002	
(17)	కె. కె. సు.	9704696622	కె. కె. సు.
(18)	N. కె. సు.	9515295376	N. కె. సు.
(19)	ఎ. కృష్ణారావు	8121980095	E. కృష్ణారావు
(20)	G. భంగిరయ్య	8374307583	G. భంగిరయ్య
(21)	M. దేవయ్య	-	V. దేవయ్య
(22)	V. నారాయణ	-	V. నారాయణ
(23)	V. చిరంజీవులు	-	చిరంజీవులు



APPENDIX – 6

Appendix 6: Salient Features of Major Labor Laws Applicable to Establishments Engaged in Construction of BOD Works (this list is indicative only, contractor should check all applicable laws that are in force during contractor period)

- (i) Workmen Compensation Act, 1923 - The Act provides for compensation in case of injury by accident arising out of and during the course of employment.
- (ii) Payment of Gratuity Act, 1972 - Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years' service or more or on death at the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.
- (iii) Employees' PF and Miscellaneous Provisions Act, 1952 - The Act provides for monthly contributions by the employer plus workers @10 % or 8.33 %. The benefits payable under the Act are: (a) Pension or family pension on retirement or death as the case may be; (b) deposit linked insurance on the death in harness of the worker; (c) payment of PF accumulation on retirement/death etc.
- (iv) Maternity Benefit Act, 1951 - The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.
- (v) Contract Labour (Regulation and Abolition) Act, 1970 - The Act provides for certain welfare measures to be provided by the Contractor to contract labor and in case the Contractor fails to provide, the same are required to be provided by the Principal Employer by Law. The principal employer is required to take Certificate of Registration and the Contractor is required to take a License from the designated Officer. The Act is applicable to the establishments or Contractor of principal employer if they employ 20 or more contract labor.
- (vi) Minimum Wages Act, 1948 - The employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, Runways are scheduled employment.
- (vii) Payment of Wages Act, 1936 - It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.
- (viii) Equal Remuneration Act, 1979 - The Act provides for payment of equal wages for work of equal nature to Male and Female workers and not for making discrimination against Female employees in the matters of transfers, training and promotions etc.
- (ix) Payment of Bonus Act, 1965 - The Act is applicable to all establishments employing 20 or more workmen. The Act provides for payments of annual bonus subject to a minimum of 8.33 % of wages and maximum of 20 % of wages to employees drawing Rs. 3,500/- per month or less. The bonus to be paid to employees getting Rs. 2,500/- per month or above up to Rs.3,500/- per month shall be worked out by taking wages as Rs.2,500/- per month only. The Act does not apply to certain establishments. The newly set up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of the Act.
- (x) Industrial Disputes Act, 1947 - The Act lays down the machinery and procedure for resolution of industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.
- (xi) Industrial Employment (Standing Orders) Act, 1946 - It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central

Government to 50). The Act provides for laying down rules governing the conditions of employment by the employer on matters provided in the Act and get the same certified by the designated Authority.

(xii) Trade Unions Act, 1926 - The Act lays down the procedure for registration of trade unions of workmen and employees. The trade unions registered under the Act have been given certain immunities from BOD and criminal liabilities.

(xiii) Child Labor (Prohibition and Regulation) Act, 1986 - The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of child labor is prohibited in Building and Construction Industry.

(xiv) Inter-State Migrant Workmen's (Regulation of Employment and Conditions of Service) Act, 1979 - The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The inter-state migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home up to the establishment and back, etc

(xv) The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996 - All the establishments who carry on any building or other construction work and employ 10 or more workers are covered under this Act. All such establishments are required to pay Cess at rate not exceeding 2% of the cost of construction as may be notified by the Government. The employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation for workers near the workplace etc. The employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.

APPENDIX – 7

IBAT Proximity report generated by the Integrated Biodiversity Assessment Tool has been attached separately.

APPENDIX – 8

Bathymetric study for Meghadrigedda Reservoir has been attached separately.

APPENDIX – 9

Andhra Pradesh Solar Policy 2015 has been attached separately.

APPENDIX – 10

Gazette Notification; Kambalakonda Wildlife Sanctuary, Andhra Pradesh has been attached separately.

APPENDIX – 11

Government Order (G.O.)**Grievance Redress Mechanism**

GOVERNMENT OF ANDHRA PRADESH

ABSTRACT

VCICDP - Establishment of Project Grievance Redress Mechanism (GRM) at three levels to cover both environmental and social issues - Orders - Issued.

=====

INDUSTRIES AND COMMERCE (INFRA) DEPARTMENT

G.O.RT.No. 163 Dated: 08-06-2018

Read the following:

1. Facility Administrative Manual (FAM) of VCICDP.
2. From the Commissioner of Industries, Vijayawada, 15/1/2014/11427/VCIC-GRM. Dated:31-05-2018

&&&

ORDER:

In the reference 2nd read above, the Commissioner of Industries has stated that at SI. No. 95, Page No. 42 of the Facility Administrative Manual of the VCICDP, the Project Grievance Redress Mechanism (GRM) is envisaged, wherein, it is directed to establish Project GRM at three levels to cover both Environmental and Social issues.

2. The Commissioner of Industries has proposed for establishment of Project Grievance Redress Mechanism at three levels with the following provisions and requested the Government to take a view on the establishment of Project GRM and issue orders:-

a. The GRM shall be established and disclosed to the project affected communities.

b. The Project Grievance Redress Committee, supported by the consultants of PMSC and Safeguard officers of both the PMU and PIUs, will be responsible for timely redress of grievances on Environmental and Social Safeguards issues.

c. The Grievance Redress Committee is also responsible for Registration of Grievances, Related Disclosure and Communication with the aggrieved parties.

d. A complaint register shall be maintained at the field unit, PIU and PMU levels with details of 1. Complaint lodged, 2. Date of Personal Hearing, 3. Action Taken and 4. Date of communication sent to the complainant.

e. Contact Details, Procedure and Complaint Mechanism shall be disclosed to the Project Affected Communities at accessible locations and through various Media (Leaflets, Newspapers etc.,)

3. Government after careful examination of the proposal, hereby establish the Project Grievance Redress Mechanism at three levels is as follows:-

1st Level Grievance:

The Contact Number of the PIU office should be made available at the construction site signboards. The contractor and field unit staff can immediately resolve onsite, seek the advice of the PIU Safeguard Manager as required, within seven (7) days of receipt of the complaint / grievance.

2nd Level Grievance:

All grievances that could not be redressed within seven (7) days at Field / Ward level shall be reviewed by the GRC at District Level headed by Joint Collector of the respective District. GRC shall attempt to resolve them within fifteen (15) Days. The Safeguard Manager of the PIU shall be responsible to see through the process of redressal of each grievance.

(P.T.O)

-2-

3rd Level Grievance:

All grievances that cannot be redressed within fifteen (15) days at District Level shall be reviewed by the Grievance Redressal Committee (GRC) at State Level headed by the Project Director, VCICDP PMU, with support from District GRC, PMU, Social Safeguards and Gender Officer (SSGO), Environmental Safeguard Officer of PMU. Environmental and Social Safeguard Specialists of PMSC shall coordinate the GRC to ensure that the grievances be resolved within fifteen (15) days. The SSGO of PMU shall be responsible to see through the process of redressal of each grievance pertaining to the Social Safeguards

4. Government hereby constitute the Grievance Redressal Committee (GRC) at District level with the following composition:

1. Joint Collector of the
Concerned District
Chairman
2. Project Engineer of the
concerned field unit
Member Secretary
3. Revenue Divisional Officer
(RDO) or sub-collector of the
division
Member
4. Project Director, DRDA Member
5. Chief Executive Officer, Zilla
Parishad
Member
6. District Panchayat Officer Member
7. District Education Officer Member
8. District Medical and Health
Officer
Member
9. District level representative of
DISCOM
Member
10. Superintendent Engineer,

RWS Panchayat Raj

Department

Member

11. Three members from affected persons, with at least one of them a woman DP

Member

12. Team Leader of the resettlement plan implementation support NGO or Agency

Member

5. The functions of the Grievance Redressal Committee (GRC) at District level are as follows:

a) GRC at District Level shall receive, evaluate and facilitate the resolutions of displaced person's concerns, complaints and grievances.

b) The GRC shall provide an opportunity to the affected persons to have their grievances redressed prior to approaching the State Level LARR Authority, constituted by the GoAP in accordance with Section 51 (1) of the RFCTLARR Act, 2013.

c) The GRC is aimed to provide a trusted way to voice and resolve concerns linked to the project, and to be an effective way to address displaced person's concerns without allowing it to escalate resulting in delays in project implementation.

d) The GRC shall meet once in every month and review and redress any grievances / complaints. Periodical monthly reports shall be submitted to the Project Director, VCICDP PMU in the prescribed proforma.

//Countd.p.3//

-3-

e) The GRC will continue to function, for the benefit of the displaced persons, during the entire life of the project including the defects liability period. The entire resettlement component of the project has to be completed before the construction starts, and pending grievances resolved. Other than disputes relating to ownership rights and apportionment issues on which the LARR Authority has jurisdiction.

f) GRC will review grievances involving all resettlement benefits, relocation and payment of assistances.

g) The GRCs will function out of each district where the subprojects are being implemented. The existing setup for coordination, monitoring and grievance redress at district level which meets once a month, will be used for VCICDP.

h) An annual fund of Rs.1.00 Lakhs shall be allocated to each GRC for their operations like convening monthly review meetings, preparing and distributing brochures, leaflets etc.

6. The Project Director, PMU, VCICDP shall be the Appellate Authority and shall be supported by the Safeguards Officer of PMU, VCICDP and the Team Leader of PMSC. This shall be the highest Grievance Redressal Mechanism at

the project level.

7. The Project Monitoring Unit (PMU), Project Implementing Units (PIUs) and Grievance Redressal Committees (GRCs) shall update the status of complaints / grievances in the VCIC Web-Site.

5. The Project Director, PMU, VCICDP shall take further necessary action in the matter, accordingly.

(BY ORDER AND IN THE NAME OF THE GOVERNOR OF ANDHRA PRADESH)

S.SOLOMON AROKIARAJ

SECRETARY TO GOVERNMENT & CIP

To

The Project Director, Project Monitoring Unit, VCICDP, Vijayawada.

The Chairman and all the members through PD, PMU, Vijayawada.

Copy to:

The District Collectors, Visakhapatnam, East Godavari, Krishna and SPS Nellore.

P.S. to Minister for Industries

P.S. to Prl. Secretary to CM (GSP)

Sc/Sf

//FORWARDED BY: ORDER//

SECTION OFFICER

**SOUTH ASIA REGIONAL DEPARTMENT
SAFEGUARDS INFORMATION LOG FOR SAUW PROJECTS**

Project:	IND: Visakhapatnam Chennai Industrial Corridor Development Program – VCICDP Project 1		
Loan No.:	UCCRTF Grant	Package No.: UCCRTF/04	3 MW power grid connected floating type solar PV power project on Meghadrigedda Reservoir in Vishakhapatnam
Components:	This IEE is prepared for the subproject that includes design, erection, commissioning and operation of grid connected 3 MW floating type solar power project on Meghadrigedda reservoir in Vishakhapatnam. The proposed project brings in advantages of producing clean, pollution free energy, demonstrate use of reservoir area for solar power generation and provide employment to the people living around the area.		
Contract Type:	DBO		
Date of IEE:	Final October 2018		
Draft IEE		Updated/Revised IEE	Others
		No additional information required at this stage.	IEE has been prepared based on details provided in the feasibility report and the details related to a similar 2MW subproject under implementation by GVMC. An updated IEE if required will be provided by PMSC once the design elements are prepared by the DBO contractor.

	Section	Status		Comments/Remarks (include date accomplished or obtained, if applicable)
		Yes	No	
1.	Environmental assessment report (EIA/IEE/envi due diligence) has been prepared?	X		VCICDP is Cat B project. UCCRTF Grant is associated with the project and the UCCRTF subproject follows the EARF and PAM prepared for the project. IEE as required has been prepared for this subproject in accordance with the EARF. Environmental assessment for this IEE has been conducted and stakeholder comments have been incorporated in the IEE/EMP. Environmental assessment conducted is satisfactory and no additional studies are required at this stage. Action required: IEE may be disclosed at ADB website.
2.	EIA/IEE/envi due diligence based on project components and detailed engineering design?	.	No Additional information required at this stage.	IEE includes list of all sub project components as laid out in schedule 8 / contract bids of the sub project.
3.	Statutory Requirements		Forest Clearance	IEE lists down requirements related to approvals and clearances required including details of clearances obtained/in process for the subproject. Action required: Status of all statutory clearances and no-objection letters will be regularly
			No Objection Certificate	
			Site Location Clearance	
			Environmental Compliance Certificate	
			Permit to Construct (or equivalent)	
			Permit to Operate (or equivalent)	

	Section	Status			Comments/Remarks (include date accomplished or obtained, if applicable)	
			Others		reported in the semi-annual monitoring reports to be submitted to ADB.	
5.	Policy, legal, and administrative framework	Adequate		Not Adequate	Discussions are included in the Final IEE.	
		X				
		EIA/IEE/envi due diligence included discussion on:				
		complete	National regulation/law on EIA			
		complete	Environmental agency		Included	
		none	Relevant international environmental agreements			
		complete	Environmental standards (IFC's EHS Guidelines)		ADB SPS requirements are discussed. Sufficient information that contractor's measures and practices are in line with internationally-accepted practices (as required by ADB SPS).	
6.	Anticipated environmental impacts and mitigation measures	EIA/IEE/envi due diligence satisfactorily discussed impacts and risks on:		Mitigation measures provided?		Impacts and risks are package-specific. Information in the IEE is adequate to assess applicability of mitigation measures Action required: Site-specific EMP will be prepared and used by the contractor on-site and details will be provided in the SEMR.
				Yes	No	
			Biodiversity conservation	Yes		Endangered species and habitats not present in subproject area. No trees impacted due to the subproject.
			Pollution prevention and abatement	Yes		WBG/EHS requirements as applicable to be included.
			Health and safety	Yes		Discussion on health and safety impacts and risks are included.
			Physical cultural resources (PCR)	Yes		No PCR impacted due to the subproject.
		X	Cumulative impacts			Not applicable
			Transboundary impacts			Not applicable
		7.	Impacts from Associated Facilities	Addressed	Not Addressed	Not applicable
				X		
8.	Analysis of Alternatives	Yes		No	Not required for Cat B	
9.	EMP budget included	Yes		No	The environmental cost related to contractors training is included. Specific EMP implementation and monitoring cost details to be a part of contractor's budget.	
		X				
10.		Yes		No		

	Section	Status		Comments/Remarks (include date accomplished or obtained, if applicable)
	EMP implementation integrated in PAM, and in bid and contract documents	X		Included in PAM during loan processing. Included in Section 8 of bid documents.
11.	Consultation and Participation	Yes	No	Consultations have been conducted. Consultations Summary has been included in the IEE.
		X		
12.	Grievance Redress Mechanism	Yes	No	GRM mechanism included in IEE. Copy of G.O. on GRM to be attached as Annex.
		X		
		Description of GRM		Included in IEE (main text)
		Identification of GRC members		To be included.
13.	Disclosure		Endorsement to disclose on ADB website	YES
			Disclosed on project website	YES
			Relevant information available to stakeholders and affected people in language and form they understand	YES
14.	Mobilized PMU / PIU Environment Officer	Yes	No	
		X		
15.	Mobilized PIU Environment Specialist	Yes	No	
		X		
16.	Mobilized DSC Environment Specialist	Yes	No	
		X		
17.	Confirm bid and contract documents and/or EMP include requirement for the contractor to appoint EHS supervisor and/or nodal person for environmental safeguards	Yes	No	
		X		
18.	If contract awarded already, confirm contractor's appointment of EHS supervisor and/or nodal person for environmental safeguards	Yes	No	
		X		
19.	Awareness training on compliance to safeguard requirements	Yes	No	
		X		
20.	Monitoring and Reporting	Yes	No	
		X		
21.	Others/Remarks	The IEE may be disclosed at ADB website.		