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MINISTRY OF POWER, ENERGY & MINERAL RESOURCES (Power Division) Bangladesh Power Development Board (BPDB)

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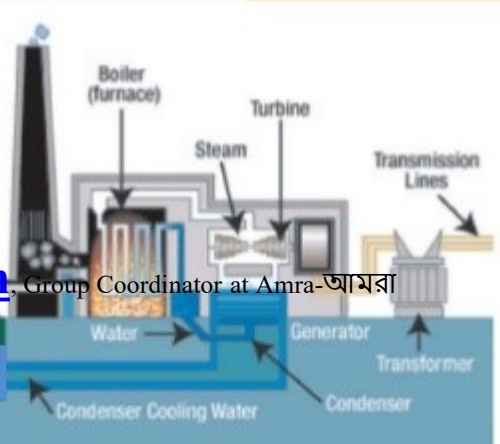


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The Department of Environment has approved this facility EIA submitted by the Power Development Board. The project would be implemented by the governments of Bangladesh and India.

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## Environmental Impact Assessment (EIA) report on Rampal 1320MW coal-based power plant near the Sundarbans mangroves

1. 1. October.January 2013
2. [2.](#) GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH MINISTRY OF POWER, ENERGY & MINERAL RESOURCES POWER DIVISION BANGLADESH POWER ENERGY & MINERAL RESOURCES POWER DIVISION BANGLADESH Assessment of 2x (500-660) MW Coal Based Thermal Power Plant to be Constructed at the Location of Khulna Dhaka January 2013 Center for Environmental and Geographic Information Services A public trust under the Ministry of Water Resources
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21. 21. Abbreviation and Acronyms xxii Abbreviations and Acronyms AD Air Dried ADB Asian Development Bank AEZ Agro-Ecological Zone AHP Ash Handling Plant AR As received ASB Asiatic Society of Bangladesh BACT Best Available Control Technology BBS Bangladesh Bureau of Statistics BIWTA Bangladesh Inland Water Transport Authority BMD Bangladesh Meteorological Department BOD Biological Oxygen Demand BPDB Bangladesh Power Development Board BWDB Bangladesh Water Development Board CAAB Civil Aviation Authority of Bangladesh CAS Catch Assessment Survey CEGIS Center for Environmental and Geographic Information Services CF Capacity Factor CHP Coal Handling Process CITES Convention on International Trade of Endangered Species COD Chemical Oxygen Demand CW Cooling Water CWPB Cooling Water Pump House DAE Department of Agricultural Extension DC Deputy Commissioner DEM Digital Elevation Model DGPS Differential Global Positioning System DM Demineralization DO Dissolve Oxygen DoE Department of Environment DoF Department of Fisheries DPHE Department of Public Health Engineering DSP Demand Supply Management DTW Deep Tube Well ECA Environment Conservation Act /Ecological Critical Area ECC Environmental Clearance Certificate ECR Environment Conservation Rules EGCB Electricity Generation Company of Bangladesh EIA Environmental Impact Assessment EMP Environmental Management Plan EOT Electrical Overhead Travelling EPC Engineering Procurement and Construction EPZ Export Processing Zone ESNB Estuarine Set Bag Nets ESP Electrostatic Precipitator FAO Food and Agricultural Organization FD Force Draft FGD Focus Group Discussion FGD Flue Gas Desulfurization FRSS Fishery Resources Survey System
22. 22. Abbreviation and Acronyms xxiii GAR Gross As Received GCP Ground Control Point GCV Gross Calorific Value GDP Gross Domestic Product GIIP Good International Industry Practice GSB Geographical Survey of Bangladesh HAVC Heating, Ventilation and Air Conditioning HAZMAT Hazardous Material HCSD High Concentration Slurry Disposal System HFO Heavy Fuel HHV High Heating Value HP High Pressure HYV High Yielding Variety ID Induced Draft IEE Initial Environmental Examination IESCs Important Environmental and Social Components IMO International Maritime Organization IPP Independent Power Producer KII Key Informants Interview KV Kilo Volt KWh Kilo Watt hour LGED Local Government Engineering Department LP Low Pressure MEAs Multilateral Environmental Agreements MoU Memorandum of Understanding MPA Mongla Port Authority MW Mega Watt NCA Net Cultivable Area NCS National Conservation Strategy NEMAP National Environmental Management Action Plan NEP National Environmental Policy NGO Non-Government Organization NOC No Objection Certificate NOx Oxides of Nitrogen NTPC National Thermal Power Corporation NWRD National Water Resources Database OD Operation Directorates OP Operational Policy PAP Project Affected Person PCM Public Consultation Meeting PL Post Larva PPM Parts Per Million PPP Public Private Partnership PRA Participatory Rural Appraisal PSMP Power System Master Plan PWD Public Works Department RO Reverse Osmosis RRA Rapid Rural Appraisal RS Remote Sensing SCC Site Clearance Certificate SOx Oxides of Sulfur SPM Suspended Particulate Matter
23. 23. Abbreviation and Acronyms xxiv SRDI Soil Resource Development Institute STW Shallow Tube-Well SWRO Sea Water Reverse Osmosis TDS Total Dissolved Solid ToR Terms of Reference TPH Ton Per Hour UFO Upazila Fisheries Office UNCED United Nations Conference on Environment and Development UNDP United Nations Development Program UNO Upazila Nirbahi Officer WARPO Water Resources Planning Organization WZPDCL West Zone Distribution Company Ltd

Units ppb Parts per Billion ppm Parts per Million hr Hour Kg Kilogram m Meter mg Milligram  $\mu$ g microgram MT/Year Million Ton per Year MW Mega Watt Nm Normal Meter s Seconds TPD Ton per Day TPH Ton per Hour KV Kilo Volt

24. [24](#). Abbreviation and Acronyms xxv Glossary Aila: Major Cyclone, which hit Bangladesh coast on May 25, 2009 Aman: Group of rice varieties grown in the monsoon season and harvested in the post-monsoon season. This is generally transplanted at the beginning of monsoon from July-August and harvested in November-Dec. Mostly rain-fed, supplemental irrigation needed in places during dry spell. Aus: Group of rice varieties sown in the pre-monsoon season and harvested in the monsoon season. These are broadcast/transplanted during March-April and harvested during June-July. Generally rain-fed, irrigation needed for HYV T. Aus. B: When preceding a crop means broadcast (B. Aus) Bagda: Shrimp (*Penaeus monodon*), brackish/slightly saline water species. Bazar: Market Beel: A saucer-shaped natural depression, which generally retains water throughout the year and in some cases seasonally connected to the river system. Boro: A group of rice varieties sown and transplanted in winter and harvested at the end of the pre-monsoon season. These are mostly HYV and fully irrigated, planted in December-January and harvested before the onset of monsoon in April- May. Golda Prawn (*Macrobrachium rosenbergii*), non-saline/fresh water species Gher Farm lands converted into ponds with low dykes and used for cultivation of shrimp/prawn/fish. Haat: Market place where market exchanges are carried out either once, twice or thrice a week, however not every day. Jaal: Different types of fishing net to catch fish from the water bodies. Kacha: A house made of locally available materials with earthen floor, commonly used in the rural areas. Khal: A drainage channel usually small, sometimes man-made. The channel through which the water flows. These may or may not be perennial. Kharif: Pre-monsoon and monsoon growing season. Cropping season linked to monsoon between March-October, often divided into kharif-1 (March-June) and kharif-2 (July-October). Perennial Khal: Water available in the khal all the year round. Pacca: Well constructed building using modern masonry materials. Rabi: Dry agricultural crop growing season; mainly used for the cool winter season between November and February.
25. [25](#). Abbreviation and Acronyms xxvi Ring Slab: The simple pit latrine consists of a hole in the ground (which may be wholly or partially lined) covered by a squatting slab or seat where the user defecates. The defecation hole may be provided with a cover or plug to prevent the entrance of flies or egress of odor while the pit is not being used. Seasonal Khal: Water not available in the khal all the year round. Sidr: Major Cyclone, which hit Bangladesh coast on November 15, 2007. T. Aman: When preceding a crop means transplanted (T. Aman). Upazila: Upazila is an administrative subdivision of a District. Water sealed: A water sealed latrine is simply a pit latrine that has a water barrier to prevent odors. These latrines are simply pits dug in the ground in which human waste is deposited. A water sealed latrine has a bowl fixture that has a set amount of water retained in it. It is operated on the pour to flush system. These types of latrines can be connected to a septic tank system.
26. [26](#). Unit conversion table xxvii Unit Conversion Table General Units 1 meter = 3.28 ft 1 kilometer = 0.621371192 mile 1 nautical mile = 1.852 kilometer 1 kilogram = 2.20 pound 1 metric ton = 1000 kg 1 barrel = 42 U.S. gallons = 159.0 liters 1 liter = 0.264172052 gallon (US) 1 square mile = 640 acres = 2.590 km<sup>2</sup> 1 hectare = 10-2 km<sup>2</sup> = 2.471 acres 1 Pascal = 1 N/m<sup>2</sup> = 0.01 millibar 1 liter = 0.001 cubic meter 10 C = 274.15K=33.80 F 1 mg/m<sup>3</sup> = 1  $\mu$ g /L 1 mg/L  $\approx$  1 g/m<sup>3</sup>  $\approx$  1 ppm (w/w) 1  $\approx$  g/L  $\approx$  1 mg/m<sup>3</sup>  $\approx$  1 ppb (w/w) Energy Units 1 Cal = 4.19 J 1 Btu = 1055.87J 1 Btu = 251.9958 cal 1 joule = 0.239 cal 1 kWh = 3412 Btu. 1MW=1000KW=106 W 1 kWh = 3.6 x 10<sup>6</sup> J 1 kWh = 859.85 kcal 1 horsepower = 746 W 1 GWyr = 8.76 x 10<sup>9</sup> kWh
27. [27](#). Executive Summary xxviii Executive Summary Background Sustainable power supply is a major precondition for the socio-economic development of Bangladesh. The Government has given top priority to the development of power sector considering its importance in overall development of the country. To this end, the government has set the goal of providing electricity to all citizens by 2020. At

present about 53% of the total population of Bangladesh has access to electricity and per capita Electricity generation is only 272 KWh but reliable and quality supply of power is still a faraway. In financial year 2012, total electricity generation capacity is 8,100 MW including 3,771 MW from private sector and electricity demand growth 10% per annum. Country's maximum electricity demand will be 13,000 MW in 2017 and 34,000 MW in year 2030. To meet up these, the Government of Bangladesh has formulated a Power System Master Plan (PSMP). Power System Master Plan (PSMP 2010) recommends diversification of fuel used for electricity generation because present primary energy i.e. natural gas supply will decrease after 2017 and opt coal as a prime energy for electricity generation. The Master plan targets, by 2030, 50% of power generation would be coal based (domestic and imported). Coal import has two advantages, BPDB may choose coal of having low Sulfur content from international sources, and may avoid coal washing and processing related hazard at plant site. In this regard, BPDB plans for installation of three coal based mega thermal power stations. One of the proposed power stations is Khulna 1320MW Coal based Power plant. The proposed thermal power plant will be a joint venture of BPDB and NTPC Ltd., India under the name of Bangladesh-India Friendship Power Company. Accordingly, BPDB and NTPC have signed a Joint Venture Agreement on 29 January 2012. BPDB has entrusted CEGIS the responsibility for conducting the IEE and EIA studies with the aim of obtaining Site Clearance Certificate and Environmental Clearance Certificate from DoE. The IEE study has been completed and submitted to DoE. The project proponent has already obtained Site/Location Clearance Certificate from DoE on 23 May, 2011 upon submission of the IEE report. This report presents the Environmental Impact Assessment prepared as per the ToR approved by the DoE. There are two major environmentally sensitive zone situated to the south (e.g. Sundarbans) and north (e.g. Khulna city) of the proposed project. The presence of those two major sensitive areas, the EIA of the project has been studied very carefully. The IEE study advocated Sapmari Katakhal, Rampal as the suitable site in comparison to Labanchara, Khulna site for the proposed coal based thermal power plant. The Rampal site is located around 23 km southward from the Khulna City, 11 km North-eastward Points of interest Distance in Km from plant Zero point of Khulna City 23 Rampal Upazila Head quarter 11 Mongla Port 14 Proposed Khan Jahan Ali Air Port 12

xviii Table 2. Percentage of household having livestock and poultry... World Heritage site of Sundarbans 70 Hiron Point of Sundarbans 97

28. [28](#). Executive Summary xxix from Rampal Sadar Upazila, 14 km North-eastward from Mongla port, 14 km north- westward from the nearest point of Sundarbans and 4km north-westward from the declared Ecologically Critical Area of Sundarbans (including 10 km radius from forest boundary). Policy, Legal and Administrative Framework A set of Policy, Acts and Administrative Framework require for a new coal based thermal power plant. According to the ECR, 1997 this power plant project falls under red category where environmental clearance certificate from DoE is obligatory. This study has been detail out of the relevant national acts and rules in different phases of the power plant project. Chapter 2 figure out the specific laws or legislatives works related to power plant construction and operation process. National and international acts are identified for the coal-based power plant and for the transportation, handling process. In addition, national environmental standard limit has been specified and it has been compared to the international standard for the best practice of this project. This document focuses on the issues addressing the specific impacts which have been evaluated, mitigated and suggested the management and monitoring plan within the standard practices. Approach and methodology The study has been conducted following the ToR approved by the DoE. The approach and methodology adopted for this study complies with the DoE and World Bank's Guideline of Environmental Impact Assessment. The international standardized multidisciplinary approaches and tools along with participation of local people and stakeholders were adopted in carrying out the study. In the EIA study, attempts were made to identify and evaluate all potential impacts through Delphi method and develop the Environmental Management Plan including hazard and risk management plan

and Monitoring Plan for mitigation of the negative impacts, enhancing the positive impacts and monitoring the impacts and responses of the measures as mentioned in the EMP. The details of the methodology have been described in Chapter 3. Evaluation of alternative sites DoE has already issued Site Clearance Certificate on 23 May 2011 upon evaluation of alternatives sites reported in IEE. The evaluation has further been reconciled taking consideration of comments of DoE and other experts. Chapter 4 describes detail of the evaluation of alternative sites for selection the project location. The Rampal site is finalized comparing the two alternative sites: Labanchara, Khulna and Sapmari Katakhal, Rampal, Bagerhat. Due to less availability of land, dense settlement, chances of significant impact on air quality of the nearby city, low depth of Kazi Bacha River, the Labanchara site was found less feasible for the proposed project. On the other hand, the Sapmari Katakhal site is located 4 km away from the ECA boundary, 14km away from the Sundarbans, and 70km away from the world heritage site. Navigability of Passur river, low density of settlement, direction of prevailing wind, feasibility of coal transportation system, less chances of impact on air quality beyond the project boundaries, are the prime factors in selecting the Sapmari Katakhal site. The project location covers Sapmari Katakhal and Kaigar Daskati Mauza of Rajnagar Union. Besides, the land requirement has also been revised minimizing 475 acre (192.226 ha) of land and avoiding around 150 households at

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xxi Plate 6.28: Housing pattern .....

Abbreviation and Acronyms xxii Abbreviations and Acronyms AD Air Dried ADB Asian Development Bank

AEZ Agro-Ecological Zone...

Abbreviation and Acronyms xxiii GAR Gross As Received GCP Ground Control Point GCV Gross Calorific

Value GDP Gross Domesti...

Abbreviation and Acronyms xxiv SRDI Soil Resource Development Institute STW Shallow Tube-Well

SWRO Sea Water Reverse Osmos...

Abbreviation and Acronyms xxv Glossary Aila: Major Cyclone, which hit Bangladesh coast on May 25,

2009 Aman: Group of rice...

Abbreviation and Acronyms xxvi Ring Slab: The simple pit latrine consists of a hole in the ground (which

may be wholly or ...

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