Environmental and Social Impact Assessment of 400 MW ± 10% Combined Cycle Power Plant (Sirajganj-4): *Sirajganj, Bangladesh*

Sembcorp North West Power Company Limited (SNWPCL)

Annex - Final ESIA Report

August 2016

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Annex A

Letter of Intent (LOI) for the Project

নর্থ-ওয়েস্ট পাওয়ার জেনারেশন কোম্পানী লিমিটেড
NORTH-WEST POWER GENERATION COMPANY LIMITED
(An Enterprise of Bangladesh Power Development Board)
Bidyut Bhaban (Level - 14), 1 Abdul Gani Road, Dhaka-1000, Bangladesh
Phone : 9513527~29, Fax : 9513530, e-mail: info@nwpgcl.org.bd, web-site: www.nwpgcl.org.bd

Ref. 537/NWPGCL/Siraj 400MW/(Unit-4)/2015 Date: 22/09/2015

Mr. Tan Cheng Guan
Executive Vice President & Head
Group Business Development & Commercial
Sebmcorp Utilities Pte Ltd
30 Hill Street # 05-04, Singapore 179360

Subject: **Letter of Intent (LOI) for the development of a Dual Fuel (Gas/HSD) Combined-Cycle, Power Generation Facility of 413.792/333.02 MW (Net) Capacity at Sirajganj, Bangladesh.**

Ref.: (1) Power Division Letter No. 27.072.014.09.00.024.2014-640, dated 23 Aug, 2015
(2) NWPGCL Letter No. 481/NWPGCL/Sirajganj Unit-4/2015, dated 06 Sep, 2015
(3) Sembcorp Letter No. S4/NWPGCL/LOI/20150921, dated 21 Sep, 2015.

A. REFERENCE

On September 5, 2014, Sembcorp Utilities Pte Ltd, Singapore submitted an Expression of Interest (EOI) for implementing a combined cycle power plant of 400 MW (±10%) dual fuel (Gas/HSD) as IPP for 22 years, with North-West Power Generation Company Ltd., an enterprise of Bangladesh Power Development Board (hereinafter referred to as "NWPGCL"). Reference to the aforesaid EOI letter of Sembcorp Utilities Pte Ltd, Power Division of Bangladesh Government sent the Proposal Document comprising of Qualification Document and Request for Proposal (RFP) to Sembcorp Utilities Pte Ltd on October 28, 2014 for selection of the Project Sponsor to design, finance, insure, construct, own, operate and maintain a power generation project of 400 MW ±10% at Sirajganj, Bangladesh, which will sell dependable capacity and net energy to the Bangladesh Power Development Board, hereinafter referred to "BPDB". Following the submission of your Qualification Statement and Proposal dated December 07, 2014, in response to the Qualification Document and Request for Proposal (RFP) and subsequent evaluation and negotiation and in consequence of your submitted revised Tariff charge proposal and clarification letter dated March 18, 2015, you are considered as the responsive, qualified and successful sponsor. This Letter of Intent, hereinafter referred to as the "LOI" is being issued to the addressee in pursuance of the approval of the Cabinet Committee on Government Purchase upon submission of proposal security by Sembcorp Utilities Pte Ltd vide memo no. S4/NWPGCL/ LOI/20150921 dated 21 Sep, 2015 and guarantee no. GTEDAK159428 dated 21 Sep, 2015 for the development of the project identified below (the **"Project"**) on the terms described in the RFP and in this LOI. Capitalised terms used and not defined herein are defined in the RFP.

B. AUTHORIZATION

The People's Republic of Bangladesh represented by the Power Division, Ministry of Power Energy and Mineral Resources, hereinafter referred to as the "GOB" accords its approval on the Levelized Tariff of Gas 3.9850 US cents/kWh equivalent BDT3.188Tk/kWh, HSD 16.9621 US cents/kWh equivalent BDT 13.569Tk/kWh, Weighted Average Levelized Tariff 10.473 US

cents/kWh, (at 84.6% plant factor, 12% discount factor, gas price 2.4 US dollar/GJ, HSD price 20.36 US dollar/GJ and exchange rate 1US dollar = BDT 80.00) of Sembcorp Utilities Pte Ltd hereinafter referred to as the "Sponsor" and grants its permission to Sembcorp Utilities Pte Ltd to design, finance, insure, construct, own, commission, operate and maintain (the "Project") a 413.792/333.02 MW (at Reference Site Condition), Dual Fuel (Gas/ HSD) combined cycle power generating facility at Sirajganj, hereinafter referred to as the "Facility", as more fully described in the Proposal.

The Facility will have a net electric power generating capacity of 413.792 MW while running on gas and 333.02 MW while running on HSD. Net Dependable Capacity and Net Energy Output from the Facility will be sold to BPDB under the Power Purchase Agreement, hereinafter referred to as the "PPA". The Company formed by the Sponsor shall be solely responsible for the development and completion of the Project and development of the necessary related facilities in accordance with the requirements contained in the RFP and the timetable and milestones contained in the Proposal, as measured from the date of issuance of this LOI and from the Project Effective Date.

C. FORMATION OF PROJECT COMPANY

The Project Sponsor shall establish a project company (the "Company") in Bangladesh in accordance with the laws of Bangladesh for the purpose of implementing the Project. The Company shall be funded and managed as a "PPP". Twenty nine percent (29%) of the equity shall come from NWPGCL and Seventy one percent (71%) of the equity shall come from the Project Sponsor. The Company, when established, shall assume all the rights and obligations of the Project Sponsor in relation to this RFP and the Letter of Intent, including but not limited to the rights and obligations related to the execution of the Project Agreements, the achievement of Financial Closing, the achievement of the Simple Cycle Operations Date, the achievement of the Commercial Operations Date, Proposal Security, the Performance Security Deposit and the Operations Security Deposit (see Article 8 of the PPA) and the obligations of the Project Sponsor to maintain specified ownership in the Company for a specified period.

D. FINANCING OF THE PROJECT

As per requirement of the Request of Proposal (RFP); Sembcorp Utilities Pte Ltd shall be required to ensure minimum 70% foreign investment of the total Project Cost. Hence Sembcorp Utilities Pte Ltd will be required to submit commitment letter/letter of interest from the financing institutions in support of at least 70% foreign investment prior to the signing of the Project Agreements. Sembcorp Utilities Pte Ltd will also be required to submit their financing plan of the Project along with the acceptance of LOI.

E. NO LIABILITY FOR REVIEW

No review, examination, evaluation or approval by NWPGCL of any document, instrument, drawing, specification or design proposed or delivered by the Sponsor or the Company in connection with the delivering of its Proposal or NWPGCL's evaluation thereof or the issuance of this LOI shall relieve the Sponsor or the Company from any obligation of liability that it

would otherwise have had for its negligence in the preparation of such a document, instrument, drawing, specification or design or failure to comply with applicable laws of Bangladesh or to satisfy the Company's obligations under this LOI, the Project Agreements, or the other documents comprising of the Security Package (as defined in the IA) with respect thereto, nor shall NWPGCL be liable to the Sponsor or the Company of any other person by reason of its review, examination, evaluation or approval of any document, instrument, drawing, specification, or design.

F. VALIDITY OF THE PROPOSAL AND PROPOSAL SECURITY

Pursuant to Request for Proposal (RFP), the validity of the Proposal and Proposal Security shall have to be extended upon request from NWPGCL for additional period of three (3) months or more until such time as the Project Agreements are executed.

G. GOVERNING LAW

This Letter of Intent shall be governed by and construed in accordance with the Laws of Bangladesh.

H. TERMINATION OF LOI

1. The Company formed by the Sponsor will sign the Implementation Agreement ("IA"), the Power Purchase Agreement ("PPA"), the Land Lease Agreement ("LLA"), the Gas Supply Agreement ("GSA"), the Fuel Supply Agreement ("FSA"), the Share Purchase Agreement ("SPA") collectively called the "Project Agreements", which will be available after getting vetting from concerned ministries/authorities at the office of NWPGCL (Bidyut Bhaban, Level 14, 1 Abdul Gani Road, Dhaka-1000, Bangladesh) within 7 (seven) days after notification by NWPGCL, failure to which, NWPGCL shall reserves the right to terminate this LOI by written notification to the Sponsor and forfeit the Proposal Security.

2. In pursuance of the clause no. 72, page16, section A of the RFP, the Sponsor will provide the Performance Security Deposit for the amount of USD 14,896,512 (Fourteen million eight hundred ninety six thousand five hundred and twelve) only, Certificate of Incorporation (along with Memorandum and Articles of Associations) for newly formed "Company" in Bangladesh no later than two (02) days prior to the date of signing of the Project Agreements, failure to which, NWPGCL shall reserves the right to terminate this LOI by written notification to the Sponsor and forfeit the Proposal Security.

3. The Sponsor will provide their acceptance of LOI within seven (07) days from its issuance. NWPGCL shall deliver the Project Agreements, by incorporating project specific information to the Sponsor and they will initial those documents within 15 (fifteen) days from the receiving. If the Sponsor fails to (i) furnish the acceptance of LOI and (ii) initial the Project Agreements within stipulated time as mentioned above, NWPGCL shall reserves the right to terminate this LOI by written notification to the Sponsor and forfeit the Proposal Security.

4. In pursuance of the clause no. 4.6, page 28, section A of the RFP, the Sponsor shall ensure minimum 70% foreign investment of the total Project Cost by submitting

commitment letter/letter of interest from the financing institutions prior to the singing of the Project Agreements, failure to which, NWPGCL shall reserves the right to terminate this LOI by written notification to the Sponsor and subsequent failure to secure at least 70% foreign investment will be an Event of Default under Implementation Agreement. The Sponsor shall submit their financing plan of the Project along with the acceptance of LOI, failure to which, NWPGCL shall reserves the right to terminate this LOI by written notification to the Sponsor.

5. The Sponsor shall extend the Proposal Validity and the Proposal Security validity at least 7(seven) days prior to the expiration of the Proposal validity and Proposal Security validity, failure to which, NWPGCL shall reserves the right to terminate this LOI by written notification to the Sponsor and forfeit the Proposal Security.

6. Upon termination of LOI, neither the sponsor nor the Company shall have any claim for compensation or damages against NWPGCL or any other government agency on any grounds whatsoever.

I. ACCEPTANCE OF LOI

You are requested to communicate your acceptance (not acknowledgement) of this LOI within 7 (seven) days from the issuance of this LOI.

NWPGCL looks forward to working with you to make the Project a great success.

Thanking you,

Very truly yours,

22.09.15

(Dipak Kumar Dhali)
Company Secretary
North-West Power Generation Company Ltd.

Ref. 537/NWPGCL/Siraj 400MW/(Unit-4)/2015

Date: 22/09/2015

Copy:
1. Secretary, Power Division, MoPEMR and Chairman, NWPGCL, Dhaka.
2. Managing Director, NWPGCL, Dhaka.
3. Executive Director (Engg./Fin.), NWPGCL, Dhaka.
4. Chief Engineer (P&D), NWPGCL, Dhaka.
5. Office Copy.

Company Secretary
North-West Power Generation Company Ltd.

Annex B

Trade License of the Project Company (SNWPCL)

বিস্‌মিল্লাহির রাহমানির রাহিম

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার (স্থানীয় সরকার)

১০ নং সয়দাবাদ ইউনিয়ন পরিষদ কার্যালয়

বহি নং- ০২

ট্রেড লাইসেন্স

ক্রমিক নং- 63

লাইসেন্স নং- ৭৬৮

তারিখ ঃ ৩১/১২/১৫

এস, আর, ও নং- ৩৩২ - আইন/২০০৩ The Local Government (Union Parishads) Ordinance 1983 (ord Li. of 1983) এর Section 55 এ প্রদত্ত ক্ষমতা বলে সরকার ইউনিয়ন পরিষদ সমূহের জন্য যে আদর্শ কর তফশীল ২০০৩ (Model Tax Schedule 2003) প্রণয়ন করেছে তার প্রেক্ষিতে অত্র ইউনিয়নের সীমানার মধ্যে ব্যবসা, পেশা, বৃত্তি চালাইবার নিমিত্তে ২০১৫ - ২০১৬ অর্থ বছরের জন্য এই ট্রেড লাইসেন্স ইস্যু করা হইল। ইহা ৩০ শে জুন ২০১৬ ইং পর্যন্ত বলবৎ থাকিবে।

নাম /প্রতিষ্ঠানের নাম ঃ সেমকর্প নর্থ ওয়েস্ট পাওয়ার কোম্পানী লিমিটেড

প্রোপ্রাইটর . ঃ মওয়ান আহমেদ

পিতার নাম ঃ ইমতিয়াজ আহমেদ চৌধুরী

ঠিকানা ঃ গ্রাম+ডাক: সয়দাবাদ, উপজেলা+জেলা - সিরাজগঞ্জ

ব্যবসার ধরণ বিদ্যুৎ উৎপাদন

লাইসেন্সের মূল্য/করের পরিমাণ | টাকা= ৫০০/-

কথায় (পাঁচশত টাকা মাত্র) টাকা মাত্র।

৩১/১২/১৫

সৌমিক আহমেদ মিঠু
চেয়ারম্যান
১০নং সয়দাবাদ ইউনিয়ন পরিষদ
সয়দাবাদ, সিরাজগঞ্জ।

(সময়মত ব্যবসায়িক কর পরিশোধ করে ট্রেড লাইসেন্স গ্রহণ করুন)

Translated Copy

Government of the People's Republic of Bangladesh (Local Government)

[Round Seal]

OFFICE OF THE NO. 10 SOYDABAD UNION PARISHAD

Book No. 02 Serial No. 68

TRADE LICENCE

Licence No. 168 Date: 30/12/15

This Trade Licence has been issued for the financial year ***2015-2016*** *to run business, profession, vocational within this union boundary as per stated rules of Model Tax Schedule 2003 compiled by the Government for Union Councils as per power conferred by Section 55 S.R.O. No.332-Law/2003 The Local Government (Union Parishads) Ordinance 1983 (Ord. Li. of 1983) which will remain valid upto* ***30th June 2016.***

Name/Organization's Name: ***Sembcorp North West Power Company Limited***

Proprietor: ***Nauman Ahmad***

Name of the Father: Imtiaz Ahmad Chaudry

Address: Village + Post Office: Soydabad, Upazila + District- Sirajganj.

Type of business: ***Power Generation***

Licence value/Amount of taxes: Tk. 500/-

In word: Taka Five Hundred Only

ADVOCATE ABUL KALAM AZAD ★ GOVT. OF THE PEOPLE'S REPUBLIC OF BANGLADESH ★ NOTARY PUBLIC, WHOLE OF BANGLADESH

Sd/- 31/12/15
Soustik Ahmed Mithu
Chairman
No. 10 Soydabad Union Parishad
Soydabad, Sirajganj
[By Seal]

Seal & Signature of the signatory here by
AUTHENTICATED
Adv. Abul Kalam Azad
Advocate & Notary Public
(Whole of Bangladesh).
Mobile: 01914-264612
03 MAR 2016

TRANSLATED BY
03/3/2016
(M. M. ISMAIL HOSSAIN)
ASSTT. TRANSLATOR
FOR, DHAKA TRANSLATION

Annex C

Project Screening Summary

Annex C1

Rapid Environmental Assessment Checklist

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 the 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:	BAN/ Sirajganj Gas-Fired Combined Cycle Power Project
Sector Division:	PSIF1

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
▪ Cultural heritage site		☑	There are religious structures such as local mosques and mazhars in the village situated 500 m away from the Project Boundary (As identified through Reconnaissance and baseline survey). As per the information available from Department of Archaeology, Bangladesh (www.archaeology.gov.bd) and District Office website (www.dcsirajganj.gov.bd), there are reportedly no cultural heritage sites and archeological monuments in the Sirajganj District.
▪ Protected Area		☑	There is no protected area, such as National Park, Wildlife Sanctuary, Game Reserve, Safari Parks, Reserve and Protected Forests within the 10 km study area. The nearest national park is Madhupur National Park, which is located in Tangail and Mymensingh districts of Bangladesh and is about 42 km in north-east direction from the project site. (The

SCREENING QUESTIONS	Yes	No	REMARKS
			National Parks And Nature Reserves Of Bangladesh, World Institute for Conservation and Environment: WICE). An 'eco-park', named Jamuna Eco-Park, starting from about 0.5 km to the north of the project site on the west-guide bund constructed for the protection of the Bangabandhu Multi-purpose Bridge from erosion. The plantation in this eco-park was developed and this eco-park is used for eco-tourism and recreational purposes. Therefore Jamuna Eco-Park is neither a classified forest nor notified by the Government of Bangladesh as Protected Area (http://www.bforest.gov.bd/index.php/protected-areas).
▪ Wetland		☑	In Bangladesh wetlands area classified into river, streams, Baors, Haors and Beels. All of these are considered as wetlands and regarded as valuable fish and wildlife habitat. The Project site is situated on the embankment of a channel of River Jamuna and the main River Jamuna is situated about 1.38 km from the Project site boundary.
▪ Mangrove		☑	No mangrove plantations were seen in and around the study area during the reconnaissance and baseline survey visit. Also no reference was available about mangrove plantations in the Sirajganj District.
▪ Estuarine		☑	The Project site and district is not part of any estuary.
▪ Buffer zone of protected area		☑	The nearest protected area of Madhupur National Park is 42 km away from the project site in the north-east direction.
▪ Special area for protecting biodiversity		☑	None
B. Potential Environmental Impacts Will the Project cause…			
▪ impairment of historical/cultural monuments and other areas, and loss/damage to these sites?		☑	No impairment of historical/ cultural monuments and loss/ damage to these sites envisaged due to the

SCREENING QUESTIONS	Yes	No	REMARKS
			Project.
▪ encroachment into precious ecosystem (e.g. sensitive habitats like protected forest areas or terrestrial wildlife habitats?		☑	No encroachment into precious ecosystem is envisaged due to the Project, as there is reportedly no protected area, such as National Park, Wildlife Sanctuary, Game Reserve, Safari Parks, Reserve, and Protected Forests protected by law, within the study area.
▪ dislocation or involuntary resettlement of people?		☑	The land requirement of the Project is estimated to be 23.96 acres. The land is owned by BPDB/NWPGCL, BBA and Khas Land under possession of Government of Bangladesh. The land for the project is already acquired and developed for power plant by BPDB/NWPGCL and does not have any settlements on it. The RoW for gas pipeline will be obtained through a Land Lease Agreement between BPDB and BBA and finally right of way will be granted by BPDB to the Project Company. The RoW for water intake will be obtained through a Land Lease Agreement between BPDB and BBA. Finally right of way will be granted by BPDB to the Project Company. Discharge from the project will be on the southern boundary of the complex.
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		☑	As per the baseline surveys carried out during the ESIA study, Vulnerable groups identified in the study area were households displaced by flooding, Char and low land dwellers, families solely dependent on Char cultivation, large families without any permanent source of employment; women headed households, as well as households headed by chronically ill or disabled persons are identified as potential vulnerable groups. These individuals presently registered with the

SCREENING QUESTIONS	Yes	No	REMARKS
			Department of Social Welfare under their Social Safety Net Program as well as the Department of Disaster Management and Relief office, and receiving monetary aid from them. No significant impact was envisaged on them due to the project.
▪ aesthetic degradation and property value loss due to establishment of plant and ancillary facilities?		☑	The Project is being developed next to an existing Power plant so aesthetically it has precedents. The area was identified and developed for power plants so property value loss due to establishment of plant is not expected.
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	☑		The occupational health and safety impacts during the construction and operation phase of the Project would be (i) heat, (ii) noise, (iii) confined spaces, (iv) electrical hazards, (v) fire and explosion hazards, (vi) chemical hazards and (vii) dust.
▪ noise and dust from construction activities?	☑		Noise and dust will be temporally generated due to civil works, movement of heavy machinery, transportation of man & material, excavation of earth and other construction activities.
▪ short-term soil erosion and silt runoff due to construction?	☑		As per the official district website of Sirajganj, (www.dcsirajganj.gov.bd), the District is prone to floods and River Jamuna meanderings. The project site falls in the active flood plain of River Jamuna and is susceptible to floods. Flood protection measures have been taken into consideration while developing the site for power hub by the BPDB and embankments have been constructed, which are supported by the embankments constructed for protection of Bangabandhu Bridge. The site elevation is about 0.65 m higher than the highest flood level recorded in last 65 years.
▪ fugitive dust during transportation, unloading, storage, and processing of coal, and polluted runoff from coal storage?		☑	The proposed power plant is based on natural gas as primary fuel and HSD will be used only in case of non-availability of natural gas supply as

SCREENING QUESTIONS	Yes	No	REMARKS
			secondary fuel. No use of coal is envisaged in the project.
▪ risk of oil spills, which could pollute surface and groundwater and soil?	☑		Such risks exist during the construction as well as operation phase of the Project. HSD will be transported and stored (about 19,000 m^3) at site during operation phase. Three days of HSD supply will be stored in two tanks with capacity equivalent to 15 days operation at 80% output on HSD. The tanks will be installed on a bund of adequate size per environmental and safety requirements in order to avoid risk of oil spills.
▪ hazards in gas pipeline operation and gas storage at power plant sites?	☑		The gas pipeline operation would have fire and explosion hazard, as the natural gas will be present in pipeline at high pressure. However, no gas storage is required at site. The gas pipeline will be constructed in accordance with GSA specification and will be transferred to gas supplier after testing & commissioning. It will be gas supplier's property as part of the gas supply network during the plant operation. The pipeline will have a minimum cover of 1.0 m on top of it. Cathodic protection will be in place for the buried section of the pipeline and the design will be based on soil resistivity.
▪ changes in flow regimes downstream of the water intake due to abstraction for cooling purposes?		☑	The cooling system using cooling towers is basically a closed system which reduces the fresh water requirement for cooling purpose significantly in comparison of once through cooling system. The fresh water requirement for cooling water make-up and other plant water requirements will therefore be limited to 554 m^3/hr, which will be abstracted for the project from River Jamuna and as per the studies carried out by Institute of Water Modelling (IWM) this would not significantly impact the flow regimes.

SCREENING QUESTIONS	Yes	No	REMARKS
			Based on the last 15 years data of water flow in the River Jamuna as recorded by BWDB, minimum flow of the River was measured as 2036.82 m^3/s on 5th March 2013. Whereas the proposed water requirement of the Sirajganj 4 project is about 0.15 m^3/s (554 m^3/hr). This amount is only 0.007% of the lean season flow of the Jamuna River in Sirajganj and hence, the amount of intake is negligible in the context of River Jamuna. The amount of intake is also incapacble of changing the morphology of the right channel.
▪ pollution of water bodies and aquatic ecosystem from wastewater treatment plant for boiler feed, bleed-off from cooling towers, boiler blowdown and wash-water, and effluent from ash pond?	☑		The project has a raw water requirement of the order of 554 m^3/hr, whereas the outfall is expected to be 74.4 m^3/hr. The cooling tower blow down and other treated effluent generated from boiler blow down, effluent treatment plant will be discharged on a specific place in the southern boundary of the project site after treatment. The discharged effluent characteristic shall be in accordance to GOB Environment Conservation Rule (1997) Schedule 10 (Standards for Waste from Industrial Units or Project Waste) and the applicable World Bank Group environmental requirements and World Bank/IFC guidelines. This discharge will be having about <3°C of intake water temperature at the outlet of condenser. Sewage effluent will be treated in a sewage treatment plant at site and treated effluent will be used within plant premises for gardening purposes.
▪ air pollution from fuel gas discharged into the atmosphere?	☑		NOx and CO will be primarily emitted from gas based power generation, whereas SO2, NOx, CO, and PM will be emitted from HSD based power generation during non-

SCREENING QUESTIONS	Yes	No	REMARKS
			availability of gas.
▪ public health and safety hazards due to solid waste disposal in sanitary landfills (see Matrix of Impacts and Measures for Solid Waste Disposal)?	☑		Solid waste generation from the project would be limited and only from the canteen and office complex. The solid and non-hazardous wastes generated from the various areas during operations will be collected and segregated at the point of generation and stored in proper designated areas and disposed of through waste disposal contractors or authorized recyclers. It is planned that hazardous wastes (such as Chemical Cleaning waste from the CT compressor, Waste/used oil from the power house and workshop, Oil/dust contaminated cloths and rags from the lube oil system and spill kit waste) generated from the proposed Project will be collected and stored in designated roofed-areas and/or barrels with concrete flooring and secondary containment and disposed of/ sold through contractors or treated prior to discharge.
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?	☑		Total manpower requirement is estimated to be 575 people during construction phase. This is broken down into 75 skilled labour and 500 semi and un-skilled. Most of the unskilled manpower will be sourced from the neighbouring areas. The skilled manpower will mainly be specialized personnel required to complete construction tasks, such as, installation of the combustion turbine and GTG, HRSG, steam turbine and STG, DCS and other plant control systems. During the operation phase of the Project, the total workforce will be 69. This will consist of 49 skilled and 20 unskilled staff. The unskilled workers will be contract staff for cleaning, gardening, drivers, fitters, security

SCREENING QUESTIONS	Yes	No	REMARKS
			and helpers.
▪ social conflicts if workers from other regions or countries are hired?		☑	During the ESIA study no such conflict was reported by the local people.
▪ risks community safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	☑		Natural gas and HSD will be supplied to the project through underground pipelines. A new natural gas pipeline will be constructed for that of about 1.5 km length. HSD will be supplied to the project from NWPGCL's unloading and pumping facility at railway station. Sirajganj-4 project will take the supply of HSD from a tapping point within the power generation complex.
▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g. ash pond) 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?	☑		The plant operation will require chemicals for water treatment and process requirements. A list of the hazardous chemicals which will be used in the Plant and the maximum quantity stored is presented below.

A Checklist for Preliminary Climate Risk Screening

Country/Project Title: BAN/ Sirajganj Gas-Fired Combined Cycle Power Project

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	The project site falls in the active flood plain of River Jamuna and is susceptible to floods. Flood protection measures have been taken into consideration while developing the site for power hub by the BPDB and embankments have been constructed, which are supported by the embankments constructed for protection of Bangabandhu Bridge. The project site area is a developed land and elevated about 0.65 m higher than the highest flood level recorded in last 65 years.
	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	Dependency of the project on river water is limited for meeting the raw water requirement, which is limited due to the use of cooling towers in the project. Based on the last 15 years data of water flow in the River Jamuna as recorded by BWDB, minimum flow of the River was measured as 2036.82 m^3/s on 5th March 2013. Whereas the proposed water requirement of the Sirajganj 4 project is about 0.15 m^3/s (554 m^3/hr). This amount is only 0.007% of the lean season flow of the Jamuna River in Sirajganj and hence, the amount of intake is negligible in the context of River Jamuna. The amount of intake is also incapacble of changing the morphology of the right channel.
Materials and	Would weather, current and likely	0	Weather and current and future climate

[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.

Maintenance	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)?		conditions are unlikely to impact the selection of project inputs (primarily natural gas).
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	1	It is possible that changes in weather and likely future climate conditions could affect the maintenance of project outputs.
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	It is possible that changes in weather/climate conditions and related extreme events could affect the performance of project outputs.

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:_____
_____

Prepared by: _____

Annex C 2

Involuntary Resettlement Impact Categorization Checklist

Involuntary Resettlement Impact Categorization Checklist

Probable Involuntary Resettlement Effects	Yes	No	Not Known	Remarks
Involuntary Acquisition of Land				
1. Will there be land acquisition?	☑			The Project site is located within the already developed Sirajganj Power Hub of BPDB. Land acquisition for the same was done about two decades ago and handed over to BPDB by the Government in 2005. Access road, ROW for gas pipeline and PGCB sub-station area already developed by BPDB for the existing power plant of BPDB and power hub. Same will be utilized by this Project also. However, for water intake and outfall as well as HSD supply pipeline, about 1 acre of land will be required towards the eastern part of the power hub, which is government char khas land (non-agricultural).
2. Is the site for land acquisition known?	☑			Tentative locations of the water intake and outfall and pipeline alignment are known.
3. Is the ownership status and current usage of land to be acquired known?	☑			During the joint site visit with the Additional District Commission, Sirajganj, it was confirmed that the classification of the land is Government Khas Land.
4. Will easement be utilized within an existing Right of Way (ROW)?	☑			Gas pipeline will follow existing ROW.
5. Will there be loss of shelter and residential land due to land acquisition?		☑		
6. Will there be loss of agricultural and other productive assets due to land acquisition?		☑		
7. Will there be losses of crops, trees, and fixed assets due to land acquisition?		☑		
8. Will there be loss of businesses or enterprises due to land acquisition?		☑		
9. Will there be loss of income sources and means of livelihoods due to land acquisition?		☑		
Involuntary restrictions on land use or on access to legally designated parks and protected areas				

10. Will people lose access to natural resources, communal facilities and services?		☑		
11. If land use is changed, will it have an adverse impact on social and economic activities?		☑		
12. Will access to land and resources owned communally or by the state be restricted?		☑		

Information on Displaced Persons:

Any estimate of the likely number of persons that will be displaced by the Project? [☑] No [ ] Yes

If yes, approximately how many? _____

Are any of them poor, female-heads of households, or vulnerable to poverty risks? [☑] No [ ] Yes

Are any displaced persons from indigenous or ethnic minority groups? [☑] No [ ] Yes

Annex C3

Indigenous Peoples Impact Screening Checklist

Indigenous Peoples Impact Screening Checklist

KEY CONCERNS (Please provide elaborations on the Remarks column)	YES	NO	NOT KNOWN	Remarks
A. Indigenous Peoples Identification				
1. Are there socio-cultural groups present in or use the project area who may be considered as "tribes" (hill tribes, schedules tribes, tribal peoples), "minorities" (ethnic or national minorities), or "indigenous communities" in the project area?		☑		Project site falls in Saidabad Union of Sirajganj Sadar Upazilla in Sirajganj District of Bangladesh. As per the Census of Bangladesh 2011, there is only one household with one person in Saidabad Union.
2. Are there national or local laws or policies as well as anthropological researches/studies that consider these groups present in or using the project area as belonging to "ethnic minorities", scheduled tribes, tribal peoples, national minorities, or cultural communities?		☑		Not applicable
3. Do such groups self-identify as being part of a distinct social and cultural group?		☑		Not applicable
4. Do such groups maintain collective attachments to distinct habitats or ancestral territories and/or to the natural resources in these habitats and territories?		☑		Not applicable
5. Do such groups maintain cultural, economic, social, and political institutions distinct from the dominant society and culture?		☑		Not applicable
6. Do such groups speak a distinct language or dialect?		☑		Not applicable
7. Has such groups been historically, socially and economically marginalized, disempowered, excluded, and/or discriminated against?		☑		Not applicable
8. Are such groups represented as "Indigenous Peoples" or as "ethnic minorities" or "scheduled tribes" or "tribal populations" in any formal decision-making bodies at the national or local levels?		☑		Not applicable
B. Identification of Potential Impacts				

KEY CONCERNS (Please provide elaborations on the Remarks column)	YES	NO	NOT KNOWN	Remarks
9. Will the project directly or indirectly benefit or target Indigenous Peoples?		☑		Not applicable
10. Will the project directly or indirectly affect Indigenous Peoples' traditional socio-cultural and belief practices? (e.g. child-rearing, health, education, arts, and governance)		☑		Not applicable
11. Will the project affect the livelihood systems of Indigenous Peoples? (e.g., food production system, natural resource management, crafts and trade, employment status)		☑		Not applicable
12. Will the project be in an area (land or territory) occupied, owned, or used by Indigenous Peoples, and/or claimed as ancestral domain?		☑		Not applicable
C. Identification of Special Requirements *Will the project activities include:*				
13. Commercial development of the cultural resources and knowledge of Indigenous Peoples?		☑		Not applicable
14. Physical displacement from traditional or customary lands?		☑		Not applicable
15. Commercial development of natural resources (such as minerals, hydrocarbons, forests, water, hunting or fishing grounds) within customary lands under use that would impact the livelihoods or the cultural, ceremonial, spiritual uses that define the identity and community of Indigenous Peoples?		☑		Not applicable
16. Establishing legal recognition of rights to lands and territories that are traditionally owned or customarily used, occupied or claimed by indigenous peoples ?		☑		Not applicable
17. Acquisition of lands that are traditionally owned or customarily used, occupied or claimed by indigenous peoples?		☑		Not applicable

D. Anticipated project impacts on Indigenous Peoples - Not Applicable

Project component/ activity/ output	Anticipated positive effect	Anticipated negative effect

1.		
2.		
3.		
4.		
5.		

Note: The project team may attach additional information on the project, as necessary.

Annex C4

Photograph Documentation

Photo-documentation

Photo 1: Bangabandhu Bridge on River Jamuna

Photo 2: Embankment and Plantation near Bridge

Photo 3: Embankment and Plantation near Bridge

Photo 4: Silted Part of Jamuna Channel

Photo 5: Jamuna Channel after silted part

Photo 6: Jamuna Channel towards Project Site

Project: 0276008

Client : Sembcorp Utilities Pte Ltd

Environmental Resources Management
120 Robinson Road, #10-01
Singapore 068913
Tel : +65 6324 9636
Fax : +65 6226 1636

ERM

Photo-documentation

Photo 7: Khas Land between Embankment and Jamuna River

Photo 8: View of Existing BPDB Power Plant

Photo 9: View of Jamuna Channel

Photo 10: View of Jetty from Channel Side

Photo 11: View of Jetty from Channel side

Photo 12: Khas land after Jetty Location

Project: 0276008

Client : Sembcorp Utilities Pte Ltd

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Singapore 068913
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Fax : +65 6226 1636

ERM

Photo-documentation

Photo 13: View of Embankment and Existing Power Plant

Photo 14: View of BPDB Power Plant from Jetty

Photo 15: View of Khas Land and Jamuna Bridge From Jetty

Photo 16: View of Khas Land and Jamuna Channel from Jetty

Photo 17: Jetty

Photo 18: Jetty

Project: 0276008

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ERM

Photo-documentation

Photo 19: View of Project Site from SE Corner

Photo 20: Project Site from SE Corner

Photo 21: Southern Boundary Wall of Project Site

Photo 22: View of Project Site from Southern Boundary

Photo 23: Project Site and Far view of BPDB Plant

Photo 24: View of Project Site from SW Corner

Project: 0276008

Client : Sembcorp Utilities Pte Ltd

Environmental Resources Management
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ERM

Photo-documentation

Photo 25: View of Access Road and Embankment

Photo 26: View of Project Site from NW Corner

Photo 27: Road towards BPDB Power Plant

Photo 28: Road on the Eastern side of Project Site

Photo 29: Adjacent Site Earmarked for 225 MW Power Plant

Photo 30: RMS of BPDB Power Plant

Project: 0276008

Client : Sembcorp Utilities Pte Ltd

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ERM

Photo-documentation

Photo 31: PGCB Substation and Access Road

Photo 32: Agricultural Fields on the NW Part of Power Hub

Photo 33: Agricultural Fields on the NW Part of Power Hub

Photo 34: Power Hub Boundary and Embankment

Photo 35: Pillars of Gas Pipeline ROW near Access Road

Photo 36: PGCL Valve Station

Project: 0276008

Client : Sembcorp Utilities Pte Ltd

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Annex D

IEE Exemption and Approved ToR for EIA Study from the DoE

Government of the People's Republic of Bangladesh
Department of Environment
Head Office, Paribesh Bhaban
E-16 Agargaon, Dhaka-1207
www.doe.gov.bd

Memo No : DoE/Clearance/5572/2016/ 122 Date: 10/03/2016

Subject: Exemption of IEE and Approval of Terms of Reference (ToR) for Environmental Impact Assessment (EIA) of 413.792 MW (Gas)/333.02 MW (HSD) Dual Fuel Combined Cycle Power Plant (Sirajganj Unit-4) Project at Saidabad under Sirajganj District.

Ref: Your Application dated 15/02/2016.

With reference to your letter dated 15/02/2016 for the subject mentioned above, the Department of Environment hereby gives Exemption of IEE and approval of TOR for Environmental Impact Assessment (EIA) of 413.792 MW (Gas)/333.02 MW (HSD) Dual Fuel Combined Cycle Power Plant (Sirajganj Unit-4) Project at Saidabad under Sirajganj District subject to fulfilling the following terms and conditions:

I. The project authority shall submit a comprehensive Environmental Impact Assessment (EIA) considering the overall activity of the said project in accordance with the TOR submitted to the Department of Environment (DOE) and additional suggestions provided herein.

II. The EIA report should be prepared in accordance with following indicative outlines:

1. Executive summary.
2. Introduction: (Background, brief description, scope of study, methodology, limitation, EIA team, references).
3. Legislative, regulation and policy consideration (covering the potential legal, administrative, planning and policy framework within which the EIA will be prepared).

4a. Project activities:

- A list of the main project activities to be undertaken during site clearing, construction as well as operation
- Project Plan, Design, Standard, Specification, Quantification, etc.

4b. Project schedule: The phase and timing for development of the Project.

4c. Resources and utilities demand: Resources required to develop the project, such as soil and construction material and demand for utilities (water, electricity, sewerage, waste disposal and others), as well as infrastructure (road, drains, and others) to support the project.

4d. Map and survey information

Location map, Cadastral map showing land plots (project and adjacent area), Topographical map, Geological map showing geological units, fault zone, and other natural features.

5. Baseline Environmental Condition should include, inter alia, following: (Identification and Quantification of Physical Situation that has been proposed to be changed)

- Physical Environment : Geology, Topology, Geomorphology, Land-use, Soils, Meteorology, and Hydrology
- Biological Environment : Habitats, Aquatic life and fisheries, Terrestrial Habitats and Flora and Fauna
- Environment Quality : Air, Water, Noise, Vibration, Soil and Sediment Quality
- Relate baseline in both Quantitative and Qualitative term with the anticipated outcomes, achievement of goals, objectives and changes due to project interventions

6. Socio-economic environment should include, inter alia, following:

- Population: Demographic profile and ethnic composition
- Settlement and housing
- Traffic and transport
- Public utilities: water supply, sanitation and solid waste
- Economy and employment: employment structure and cultural issues in employment
- Fisheries: fishing activities, fishing communities, commercial important species, fishing resources, commercial factors.

7. Identification, Prediction and Evaluation of Potential Impacts (identification, prediction and assessment of positive and negative impacts likely to result from the proposed project).

In identification and analysis of potential impacts'-the 'Analysis' part shall include the analysis of relevant spatial and non-spatial data. The outcome of the analysis shall be presented with the scenarios, maps, graphics etc. for the cases of anticipated impacts on baseline. Description of the impacts of the project on air, water, land, hydrology, vegetation-man maid or natural, wildlife, socio-economic aspect shall be incorporated in detail.

Appropriate models shall be used for prediction of potential impacts of the project on surface water and ambient air quality using updated data. Model prediction shall be compared with national water and air quality standards and specific sensitivity data of the organisms known to be present in the project area (likely impacted area) for impact assessment.

8. Management Plan/Procedures:

For each significant major impact, proposed mitigation measures will be set out for incorporation into project design or procedures, impacts, which are not mitigable, will be identified as residual impacts Both technical and financial plans shall be incorporated for proposed mitigation measures.

An outline of the Environmental Management Plan shall be developed for the project.

In Environmental Monitoring Plan, a detail technical and financial proposal shall be included for developing an in-house environmental monitoring system to be operated by the proponent's own resources (equipments and expertise).

9. Consultation with Stakeholders/Public Consultation (ensures that consultation with interested parties and the general public will take place and their views taken into account in the planning and execution of the project)

Beneficial Impacts (summarize the benefits of the project to the Bangladesh nation, people and local community and the enhancement potentials)

10. Risk assessment, risk management, system of valuation of environmental and properties damage, damage compensation issues shall be addressed

11. Conclusion and Recommendations

III. Without obtaining approval of EIA report by the Department of Environment, the project authority shall not be able to start the physical activity of the project and also not be able to open L/C in favor of importable machineries.

IV. Without obtaining Environmental Clearance, the project authority shall not be able to start the operation of the project.

V. The project authority shall submit the EIA along with a filled-in application for Environmental Clearance in prescribed form, the applicable fee in a treasury Chalan, the no objection certificate (NOC) from the local authority, NOC from forest department (if it is required in case of cutting any forested plant, private or public) and NOC from other relevant agencies for operational activity etc. to the Rajshahi Divisional Office of DOE at Bogra with a copy to the Head Office of DOE in Dhaka.

10.03.2016

(Syed Nazmul Ahsan)
Deputy Director (Environmental Clearance, c.c)
Phone # 8181673

Managing Director
Sembcorp North-West Power Generation Company Limited
House No-1, Road No-9C
Nikunja-1, Airport Road
Dhaka-1229, Bangladesh.

Copy Forwarded to :

1) PS to Secretary, Ministry of Environment and Forests, Bangladesh Secretariat, Dhaka.
2) Director, Department of Environment, Rajshahi Divisional Office, Bogra.
3) Assistant Director, Office of the Director General, Department of Environment, Head Office, Dhaka.

Annex E

NOC from Union Parishad

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার (স্থানীয় সরকার বিভাগ)

১০ নং সয়দাবাদ ইউনিয়ন পরিষদ কার্যালয়

চেয়ারম্যান ঃ সৌপ্তিক আহমেদ মিঠু

সিরাজগঞ্জ সদর, সিরাজগঞ্জ ।

E-mail : methusanij@yahoo.com

সুত্রঃ.................. তারিখ ঃ ২৬/০৬/১৬ ইং

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তিপত্রের ছক

১। আবেদনকারী নাম ঃ ব্যবস্থাপনা পরিচালক, সেমকর্প নর্থওয়েষ্ট পাওয়ার কোম্পানী লিমিটেড

২। পিতা/স্বামী/স্ত্রীর নাম ঃ প্রযোজ্য নয়

৩। আবেদনকারীর ঠিকানা ঃ বাড়ি #১, সড়ক # ৯ সি, নিকুঞ্জ-১,এয়ারপোর্ট রোড,ঢাকা-১২২৯, বাংলাদেশ

৪। কারখানা/প্রকল্পের অবস্থাগত ঠিকানা ঃ গ্রাম ও ডাকঘরঃ সয়দাবাদ, উপজেলা ও জেলাঃ সিরাজগঞ্জ

৫। কারখানা/প্রকল্পের তফশীল ঃ

জেলার নাম	থানার নাম	মৌজার নাম	খতিয়ান নং	দাগ নং	জমির ধরন	মোট জমির পরিমান
সিরাজগঞ্জ	সিরাজগঞ্জ	খাস বড়শিমুল	১	৭৫৩,৭৫৫,৭৫৭, ৭৫৮,৭৫৯,৯২৯	ফসলী হালে বানিজ্যিক	১৬ একর

৬। কারখানা/প্রকল্পের উৎপাদিত/ উৎপাদিতব্য পন্যের নাম ঃ বিদ্যুৎ

উপরোক্ত তথ্যাদির আলোকে সেমকর্প নর্থওয়েষ্ট পাওয়ার কোম্পানী লিমিটেড (Sembcorp North-West Power Company Limited) কারখানা/ প্রকল্পকে নিম্নবর্নিত শর্তসাপেক্ষে অনাপত্তিপত্র প্রদান করা হলো ।

শর্তবলী ঃ

১. প্রকল্প/ কারখানা স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরন করতে হবে ।

২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহন করতে হবে ।

৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে ।

৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দূর্ঘটনার সময় জরুরী নির্গমন ব্যবস্থা থাকতে হবে।

৫. বায়ু ও শব্দ দূষণ করা যাবে না।

৬. কারখানা/ প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমন করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক কারখানা/ প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

২৬/০৬/১৬

মোঃ মাসুদ রানা
প্যানেল চেয়ারম্যান-১
১০নং সয়দাবাদ ইউনিয়ন পরিষদ
সয়দাবাদ, সিরাজগঞ্জ সদর।

তারিখ-

স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীলঃ

Annex F

NOC from Upazilla Nirbahi Officer

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার (স্থানীয় সরকার বিভাগ)

১০ নং সয়দাবাদ ইউনিয়ন পরিষদ কার্যালয়

চেয়ারম্যান ঃ সৌপ্তিক আহমেদ মিঠু

সিরাজগঞ্জ সদর, সিরাজগঞ্জ ।

E-mail : methusanij@yahoo.com

সুত্র ঃ.....

তারিখ ঃ ০০/০৫/২০২৬

অবস্থানগত/পরিবেশগত ছাড়পত্রের জন্য স্থানীয় কর্তৃপক্ষ কর্তৃক প্রদেয় অনাপত্তিপত্রের ছক

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২। পিতা/স্বামী/স্ত্রীর নাম ঃ প্রযোজ্য নয়

৩। আবেদনকারীর ঠিকানা ঃ বাড়ি #১, সড়ক # ৯ সি, নিকুঞ্জ-১,এয়ারপোর্ট রোড,ঢাকা-১২২৯, বাংলাদেশ

৪। কারখানা/ প্রকল্পের অবস্থানগত ঠিকানা ঃ গ্রাম ও ডাকঘরঃ সয়দাবাদ, উপজেলা ও জেলাঃ সিরাজগঞ্জ

৫। কারখানা/ প্রকল্পের তফসিল ঃ

জেলার নাম	থানার নাম	মৌজার নাম	খতিয়ান নং	দাগ নং	জমির ধরন	মোট জমির পরিমান
সিরাজগঞ্জ	সিরাজগঞ্জ সদর	খাস বড়শিমুল	১	৫০১, ৫০২	ফসলী হালে বানিজ্যিক	২৫.৫২ একরের ১৬ একর

৬। কারখানা/ প্রকল্পের উৎপাদিত পন্যের নাম ঃ বিদ্যুৎ

উপরোক্ত তথ্যাদির আলোকে সেমকর্প নর্থওয়েষ্ট পাওয়ার কোম্পানী লিমিটেড (Sembcorp North-West Power Company Limited) কারখানা/ প্রকল্পকে নিম্নবর্নিত শর্তসাপেক্ষে অনাপত্তিপত্র প্রদান করা হলো ।

১. প্রকল্প/ কারখানা স্থাপন ও পরিচালনার ক্ষেত্রে পরিবেশ সংরক্ষণ আইন ও বিধি যথাযথভাবে অনুসরন করতে হবে ।
২. পরিবেশ অধিদপ্তর হতে বিধি দ্বারা নির্ধারিত পদ্ধতিতে ছাড়পত্র গ্রহন করতে হবে ।
৩. কর্মরত শ্রমিকদের পেশাগত স্বাস্থ্য ও নিরাপত্তা নিশ্চিত করতে হবে ।
৪. উপযুক্ত অগ্নি নির্বাপক ব্যবস্থা রাখতে হবে এবং অগ্নিকান্ড কিংবা অন্য কোন দূর্ঘটনার সময় জরুরি নির্গমন ব্যবস্থা থাকতে হবে।
৫. বায়ু ও শব্দ দূষণ করা যাবে না।
৬. কারখানা/ প্রকল্প সৃষ্ট তরল বর্জ্য অপরিশোধিত অবস্থায় বাইরে নির্গমন করা যাবে না।

উল্লিখিত যে কোন শর্ত লঙ্ঘন করলে যথোপযুক্ত কর্তৃপক্ষ কর্তৃক কারখানা/ প্রকল্পের বিরুদ্ধে আইনানুগ ব্যবস্থা নেওয়া যাবে।

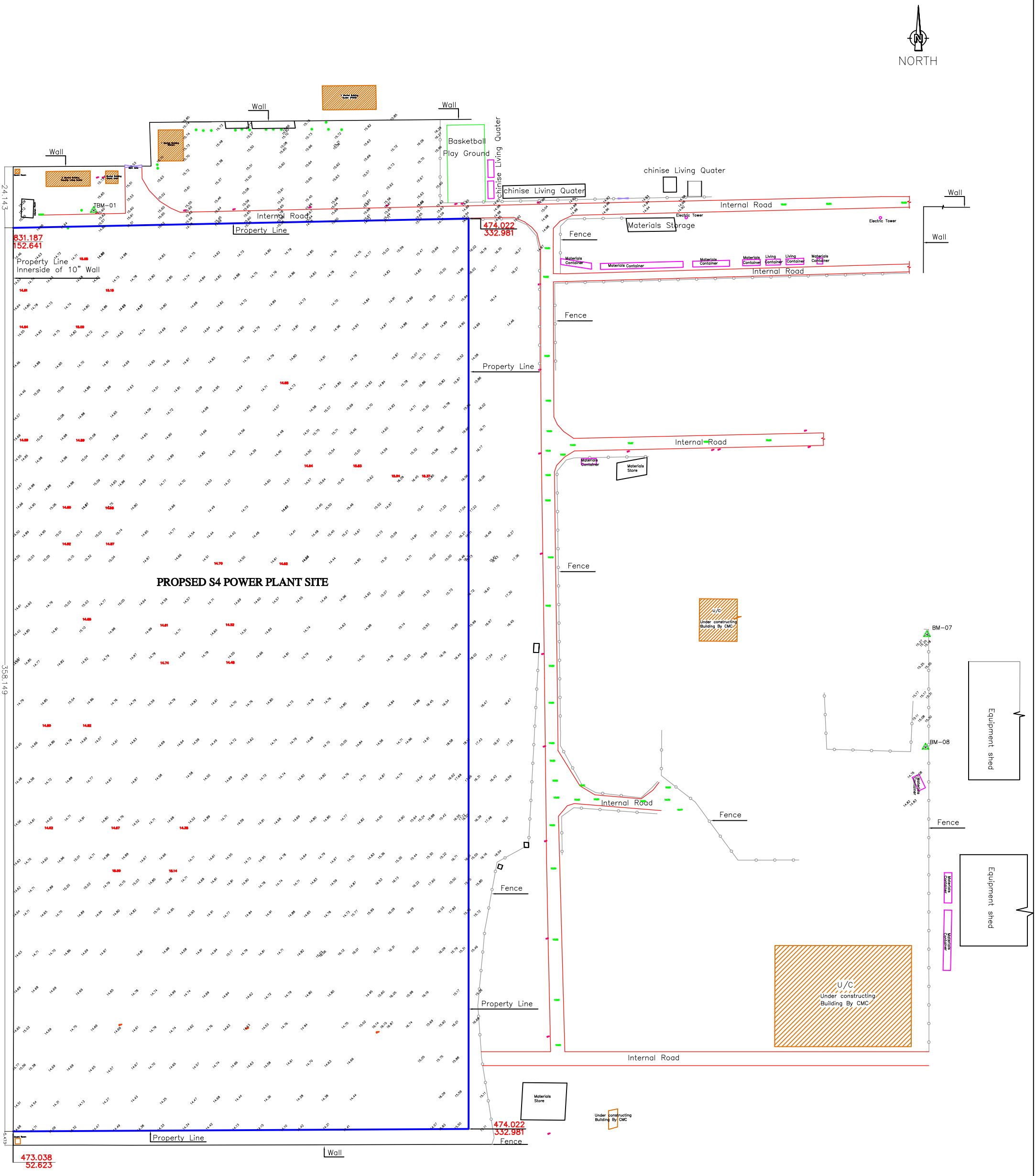
তারিখ- ০০-০৫-২০২৬

স্থানীয় কর্তৃপক্ষের স্বাক্ষর ও সীলঃ

সৌপ্তিক আহমেদ মিঠু
চেয়ারম্যান
১০নং সয়দাবাদ ইউনিয়ন পরিষদ
সিরাজগঞ্জ সদর, সিরাজগঞ্জ।

Annex G

Topographical Survey Map of the Project Site



Client:

SEMBCORP

TITLE :

TOPOGRAPHIC SURVEY & SITE PLAN

SITE:

Proposed S4 Power Plant at Sirajganj

SURVEYOR	DRAWN	CHECKED	APPROVED	DATE
AMINUL	AZAD	REZA	ARIF	29.04.2016

SURVEYED BY: SURVEY 9000 05A (2016)

Road # 21, House # 74
Block # B, Banani, Dhaka
Phone : 8818386/8853138
Mobile : 01711 323266

PRINTING SCALE:	DRG. NO:	SHEET NO:
1 : 750 (A–1)	05A (2016)	1 OF 2

LEGEND

BENCH MARK	TP–#	TUBE WELL	T WELL
PROPERTY LINE		LIGHT POST	LP
BUILDING		ROAD	
ELECTRIC POST	EP	SEMI PERMANENT	
FOOT PATH		SPOT HEIGHT	10.11
GATE		TELEPHONE POST	TP
TOWER		MANHOLE	MH
DRAIN		PUMP HOUSE	
ELECTRIC CABLE		DITCH	
TREE		FENCE LINE	
SHED		GAS METER	GM
		TELEPHON BOX	TB

NOTES:

- All dimension are in METER.
- All levels and heights are in meters and reduced to the local reference BM–07 and BM–08.
- Property Area = 64806.23 Sqm = 16.00 Acres
  Total Survey Area = 145975.00 Sqm = 36.00 Acres
- Chart coordintes are in local grid coordinate system

Reference Point :

BM–07	BM–08
X = 669.994 mE	X = 5514.041 mE
Y = 514.617 mN	Y = 625.332 mN
Z = 15.375 m	Z = 15.302 m

Annex H

Ambient Air Quality Results

Table B.1 Ambient Air Quality at Project Site (AQ1)

Date	S. No.	SPM	PM10	PM2.5	SO2	NOx	CO
		Concentration (µg/m³)					
29-12-2012	1	172.52	136.57	17.25	1.15	10.07	Nil
30-12-2012	2	212.25	117.53	21.46	2.53	8.16	1150
05-01-2013	3	221.75	150.56	14.55	1.43	20.89	Nil
08-01-2013	4	237.43	137.34	16.74	2.36	16.86	1150
12-01-2013	5	223.43	132.43	19.63	1.56	12.54	Nil
15-01-2013	6	231.56	122.61	22.74	1.97	8.54	Nil
19-01-2013	7	192.69	127.46	16.57	2.07	6.53	1150
22-01-2013	8	202.53	119.73	18.62	2.78	7.53	Nil
26-01-2013	9	185.52	141.45	16.94	2.43	11.43	Nil
29-01-2013	10	211.45	131.07	20.53	1.91	7.83	1150
02-02-2013	11	197.42	143.58	14.61	2.47	5.97	2300
05-02-2013	12	207.69	152.47	18.05	2.21	6.71	Nil
13-02-2015	13	188.5	145.75	15.65	3.58	18.2	0.75
14-02-2015	14	176.7	138.5	16.4	4.55	16.65	1.37
20-02-2015	15	162.5	136.85	13.45	4.32	17.7	0.87
21-02-2015	16	170.85	140.65	12.75	5.7	18.95	1.12
Maximum		237.4	152.5	22.7	5.7	20.9	2300.0
Minimum		162.5	117.5	12.8	1.2	6.0	0.8
Average		199.7	135.9	17.2	2.7	12.2	767.1
98 Percentile		235.7	151.9	22.4	5.4	20.3	2116.0

Table B.2 Ambient Air Quality near the Access Road (AQ2)

Date	S. No.	SPM	PM10	PM2.5	SO2	NOx	CO
		Concentration (µg/m³)					
02-01-2013	1	283.84	146.05	18.05	2.13	8.63	1150
03-01-2013	2	292.76	134.72	24.71	3.58	9.6	1150
06-01-2013	3	263.28	163.08	10.42	1.49	20.28	2300
10-01-2013	4	272.75	172.62	16.46	3.42	19.57	2300
13-01-2013	5	253.74	147.87	18.96	2.79	13.65	1150
17-01-2013	6	265.75	153.45	15.87	3.84	17.42	Nil
20-01-2013	7	218.46	138.05	24.75	3.25	10.59	1150
24-01-2013	8	232.74	157.97	21.32	2.85	16.75	2300
27-01-2013	9	226.97	143.8	22.08	3.95	11.62	1150
31-01-2013	10	273.57	136.42	13.68	3.21	18.59	2300
03-02-2013	11	236.7	161.83	23.85	2.76	15.06	2300
07-02-2013	12	218.76	153.67	21.73	2.82	20.81	1150
17-02-2015	13	234.25	137.15	17.85	6.25	16.5	1.375
18-02-2015	14	239.75	142.75	20.6	7.15	15.72	1.625
23-02-2015	15	223.5	135.5	18.45	6.4	16.25	1.875
24-02-2015	16	215.65	128.6	17.8	5.15	18.25	1.75
Maximum		292.8	172.6	24.8	7.2	20.8	2300.0
Minimum		215.7	128.6	10.4	1.5	8.6	1.4
Average		247.0	147.1	19.2	3.8	15.6	1227.1
98 Percentile		290.1	169.8	24.7	6.9	20.7	2300.0

Table B.3 Ambient Air Quality in Punorbason Village (AQ3)

Date	S. No.	SPM	PM10	PM2.5	SO2	NOx	CO
		Concentration (µg/m³)					
31-12-2012	1	201.96	126.88	12.14	1.78	4.21	Nil
01-01-2013	2	192.65	102.63	15.45	1.57	5.35	Nil
05-01-2013	3	178.62	140.3	19.1	2.86	6.78	Nil
08-01-2013	4	158.95	125.53	14.23	2.13	8.83	Nil
12-01-2013	5	166.56	118.21	13.74	1.23	9.43	Nil
15-01-2013	6	153.56	116.53	14.7	1.67	7.67	Nil
19-01-2013	7	172.53	127.43	12.79	2.31	5.9	Nil
22-01-2013	8	149.46	110.86	18.42	1.76	9.67	Nil
26-01-2013	9	162.67	106.53	13.09	1.95	13.31	Nil
29-01-2013	10	188.23	116.73	12.63	2.25	8.63	Nil
02-02-2013	11	157.49	107.62	15.6	1.86	7.74	1150
05-02-2013	12	160.65	112.96	11.37	1.59	5.98	Nil
13-02-2015	13	163.7	112.35	14.45	1.5	7.1	0.125
14-02-2015	14	167.5	118.7	16.7	1.45	4.15	0.25
20-02-2015	15	141.75	105.5	15.25	1.8	4.2	0.25
21-02-2015	16	148.35	110.45	15.9	1.15	6.15	Nil
Maximum		202.0	140.3	19.1	2.9	13.3	1150.0
Minimum		141.8	102.6	11.4	1.2	4.2	0
Average		166.5	116.2	14.7	1.8	7.2	230.1
98 Percentile		199.2	136.4	18.9	2.7	12.2	1058.0

Table B.4 Ambient Air Quality in Radhunibari Village (AQ4)

Date	S. No.	SPM	PM10	PM2.5	SO2	NOx	CO
		Concentration (µg/m³)					
02-01-2013	1	285.42	137.67	15.13	2.29	20.55	Nil
03-01-2013	2	238.14	116.83	12.75	2.75	11.55	Nil
06-01-2013	3	204.88	130.44	22.63	3.57	18.32	Nil
10-01-2013	4	226.23	117.25	15.32	2.64	13.34	1150
13-01-2013	5	212.41	115.54	11.85	1.76	15.7	Nil
17-01-2013	6	204.62	123.42	16.12	2.43	14.75	1150
20-01-2013	7	186.65	116.4	19.64	2.65	13.72	Nil
24-01-2013	8	213.36	109.7	10.97	3.41	15.87	Nil
27-01-2013	9	184.58	118.75	13.41	3.04	16.9	Nil
31-01-2013	10	164.78	117.51	17.48	1.74	12.05	Nil
03-02-2013	11	189.96	113.81	13.75	2.48	17.79	Nil
07-02-2013	12	181.9	126.82	10.98	1.59	11.76	Nil
17-02-2015	13	157.5	105.75	14.1	2.2	16.55	Nil
18-02-2015	14	165.8	101.85	15.25	2.15	13.45	Nil
23-02-2015	15	160.65	107.75	18.7	2.75	11.3	Nil
24-02-2015	16	152.65	113.5	17.35	1.9	10.15	Nil
Maximum		285.4	137.7	22.6	3.6	20.6	1150
Minimum		152.7	101.9	11.0	1.6	10.2	0
Average		195.6	117.1	15.3	2.5	14.6	383.3
98 Percentile		271.2	135.5	21.7	3.5	19.9	1150.0

Annex I

Traffic Data

Table I.1 Daily Traffic Statistics for Bangbandhu Bridge for the Month of October

Date	EastPlaza								WestPlaza								AllPlaza							
	MC	LV	SB	LB	ST	MT	LT	Total	MC	LV	SB	LB	ST	MT	LT	Total	MC	LV	SB	LB	ST	MT	LT	Total
01/10/2012	122	972	1	1,140	969	1,811	49	5,064	128	1,061	8	1'115	1,089	1,964	55	5,420	250	2,033	9	2,255	2,058	3,775	104	**10,484**
02/10/2012	120	1,040	13	1,091	1,022	1,804	64	5,154	136	1,010	23	1,080	1,051	1,906	64	5,270	256	2,050	36	2,171	2,073	3,710	128	**10,424**
03/10/2012	115	1,002	22	1,090	1,017	1,812	48	5,106	92	1,049	13	1,096	1,122	1,862	50	5,284	207	2,051	35	2,186	2,139	3,674	98	**10,390**
04/10/2012	119	1'129	9	1,148	1,134	1,927	46	5,512	108	1,084	6	1,204	994	1,663	57	5,116	227	2,213	15	2,352	2,128	3,590	103	**10,628**
05/10/2012	182	1,308	4	1,264	982	1,752	42	5,534	178	1,263	3	1,252	1,023	1,647	55	5,421	360	2,571	7	2,516	2,005	3,399	97	**10,955**
06/10/2012	127	1,093	7	1,225	959	1,451	47	4,909	143	1,159	5	1,230	1,012	1,701	33	5,283	270	2,252	12	2,455	1,971	3,152	80	**10,192**
07/10/2012	124	1,044	4	1,227	973	1,735	38	5,145	126	1,063	3	1,275	1,053	1,940	37	5,497	250	2,107	7	2,502	2,026	3,675	75	**10,642**
08/10/2012	109	1,081	2	1,240	1,090	1,945	58	5,525	127	1,060	11	1,215	1,097	1,902	60	5,472	236	2,141	13	2,455	2,187	3,847	118	**10,997**
09/10/2012	95	993	11	1,156	1,076	2,096	61	5,488	106	1,055	19	1,204	1,066	1,855	57	5,362	201	2,048	30	2,360	2,142	3,951	118	**10,850**
10/10/2012	86	1,031	20	1,238	1,104	1,974	53	5,506	87	1,094	9	1'160	1,011	1,944	51	5,356	173	2,125	29	2,398	2,115	3,918	104	**10,862**
11/10/2012	152	1'120	7	1,262	1,162	1,931	42	5,676	133	1,143	4	1,336	1,282	2,205	62	6,165	285	2,263	11	2,598	2,444	4,136	104	**11,841**
12/10/2012	163	1,311	10	1,278	1,226	2,233	53	6,274	162	1,273	12	1,215	1'121	2,000	52	5,835	325	2,584	22	2,493	2,347	4,233	105	**12,109**
13/10/2012	118	962	8	1,139	939	1,622	56	4,844	165	1,090	6	1,238	1'178	2,063	35	5,775	283	2,052	14	2,377	2,117	3,685	91	**10,619**
14/10/2012	82	1,100	7	1,239	1,266	2,405	64	6,163	84	1,081	5	1,200	1,216	2,376	64	6,026	166	2,181	12	2,439	2,482	4,781	128	**12,189**
15/10/2012	102	1'188	4	1,178	1,069	2,100	54	5,695	96	1,231	12	1'181	1,232	2,214	56	6,022	198	2,419	16	2,359	2,301	4,314	110	**11,717**
16/10/2012	100	1,187	10	1,153	1,337	2,788	56	6,631	111	1'172	17	1'171	1,269	2,589	70	6,399	211	2,359	27	2,324	2,606	5,377	126	**13,030**
17/10/2012	113	1,167	19	1'110	1'116	2,393	49	5,967	116	1,253	7	1,211	1,328	3,168	59	7,142	229	2,420	26	2,321	2,444	5,561	108	**13,109**
18/10/2012	128	1,399	4	1,265	1,400	3,145	83	7,424	137	1,349	5	1,309	1,368	2,882	74	7,124	265	2,748	9	2,574	2,768	6,027	157	**14,548**
19/10/2012	188	1,594	7	1,374	1,475	3,571	110	8,319	154	1,483	9	1,364	1,357	3,341	80	7,788	342	3,077	16	2,738	2,832	6,912	190	**16,107**
20/10/2012	146	1,381	5	1,290	1,344	3,378	86	7,630	144	1,463	5	1,377	1,361	3,564	125	8,039	290	2,844	10	2,667	2,705	6,942	211	**15,669**
21/10/2012	186	1,374	2	1,240	1'197	2,990	122	7,111	126	1,387	6	1,297	1,398	3,991	136	8,341	312	2,761	8	2,537	2,595	6,981	258	**15,452**
22/10/2012	238	1,557	5	1,290	1,395	3,858	183	8,526	156	1,581	16	1,601	1,609	4,368	204	9,535	394	3,138	21	2,891	3,004	8,226	387	**18,061**
23/10/2012	542	1,853	16	1,338	1,288	3,947	217	9,201	232	1,566	1	1,747	1,306	3,587	171	8,664	774	3,419	71	3,085	2,594	7,534	388	**17,865**
24/10/2012	911	3,011	35	2,531	1,547	4,170	240	12,445	224	1,970	333	2,813	965	2,020	87	8,412	1,135	4,981	368	5,344	2,512	6,190	327	**20,857**
25/10/2012	1,203	3,513	353	4,536	1,064	2,609	107	13,385	263	1,926	154	2,583	584	701	26	6,237	1,466	5,439	507	7,119	1,648	3,310	133	**19,622**
26/10/2012	860	2,509	118	3,082	865	2,535	65	10,034	198	1,346	60	2,076	269	843	54	4,846	1,058	3,855	178	5,158	1,134	3,378	119	**14,880**
27/10/2012	344	778	2	676	255	1,223	68	3,346	279	635	2	797	132	395	18	2,258	623	1,413	4	1,473	387	1,618	86	**5,604**
28/10/2012	705	1,407	10	1,448	104	92	3	3,769	751	1,281	9	1,385	148	136	10	3,720	1,456	2,688	19	2,833	252	228	13	**7,489**
29/10/2012	487	1,299	7	1,614	184	170	9	3,770	931	1,940	5	1,827	313	398	7	5,421	1,418	3,239	12	3,441	497	568	16	**9,191**
30/10/2012	391	1'173	25	2,261	387	331	13	4,581	853	2,208	32	2,325	581	1,037	15	7,051	1,244	3,381	57	4,586	968	1,368	28	**11,632**
31/10/2012	306	1,284	139	2,622	607	801	16	5,775	630	2,108	138	3,095	839	1,302	52	8,164	936	3,392	277	5,717	1,446	2,103	68	**13,939**
Total	**8,664**	**42,860**	**886**	**46,745**	**31,553**	**66,595**	**2,202**	**199,505**	**7,176**	**41,384**	**992**	**45,979**	**31,374**	**63,564**	**1,976**	**192,445**	**15,840**	**84,244**	**1,878**	**92,724**	**62,927**	**130,163**	**4,178**	**391,954**
Average	**279**	**1,383**	**29**	**1,508**	**1,018**	**2,148**	**71**	**6,436**	**231**	**1,335**	**32**	**1,483**	**1,012**	**2,050**	**64**	**6,208**	**511**	**2,718**	**61**	**2,991**	**2,030**	**4,199**	**135**	**12,644**

Source: Collected from Bangbandhu Toll Authority, GSIC-SEL-UDCJV(GSUJV)

Table I.2 Traffic data monitoring at Connecting point of Approach Road and National Highway

	LB	SB	LT	ST	LT	ST	LV	LV	MC	LV		LV	Non Categorized vehicle			Manual Driven Vehicle *		
Time	Bus (Large)	Mini Bus	Truck(Large)	Truck (Small)	Lorry	Pickup	Power Tiller	Tractor	Motor cycle	Jeep	Micro	Privet car	CNG *	Battery Driven Auto Rickshaw*	Nasimon / Votvoti*	Cycle	Rickshaw	Van
11.30-12.30	0	0	0	0	4	2	0	1	5	1	0	0	2	1	0	9	0	12
12.30-13.30	0	0	0	0	3	1	0	0	7	2	0	0	2	0	0	5	1	8
13.30-14.30	0	0	0	0	4	1	0	0	5	1	0	0	1	0	0	5	2	6
14.30-15.30	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	1	1	5
15.30-16.30	0	0	0	0	1	0	0	0	12	4	0	0	4	4	0	7	0	23
16.30-17.30	0	0	0	0	1	0	0	0	4	3	0	0	3	1	0	5	1	20
17.30-18.30	0	0	0	0	3	1	0	0	4	1	1	0	4	0	0	0	1	15
18.30-19.30	0	0	0	0	3	0	1	0	4	1	0	0	1	0	0	3	0	3
19.30-20.30	0	0	0	0	1	0	0	0	0	3	0	0	0	1	0	7	0	6
20.30-21.30	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	4	0	3
21.30-22.30	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	3	0	1
22.30-23.30	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	3	0	1
23.30-00.30	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	0
00.30-1.30	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	0
1.30-2.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.30-3.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.30-4.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

4.30-5.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.30-6.30	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	5	0	1
6.30-7.30	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	3	0	2
7.30-8.30	0	0	0	1	4	0	0	0	7	1	0	0	0	0	0	3	0	8
8.30-9.30	0	0	0	0	2	0	0	0	11	1	0	0	7	3	0	13	0	11
9.30-10.30	0	0	1	0	1	0	0	0	3	0	0	0	2	2	0	7	2	18
10.30-11.30	0	2	0	1	1	0	0	0	6	1	0	0	1	2	0	4	0	13

Date of monitoring: 14.01.13-15.01.13

Note:

* forbidden to pass Bangabandhu bridge

MC= Motor cycle, LV= Light Vehicle (car, jeeps and micro), SB= Small bus, LB=Large Bus, ST= Small truck, Lt=Large Truck and

MT=Medium Truck

Annex J

List of Plant Species in the Project AOI

SN	Scientific Name	Family	Common Name (Bengali name)	Habit	Used	Status of distribution	Type
1.	*Coccinia grandis* (L.) Voigt	Cucurbitaceae	Telakucha	C	medicinal	common	Wild
2.	*Ampelocissus latifolia* (Roxb.) Planch.	Vitaceae	Angurlata	C	wild	common	Wild
3.	*Atylosia scrabaeoides* (L.) Baker	Fabaceae	Banorkalai	C	wild	common	Wild
4.	*Canavalia gladiata* (Jacq.)	Fabaceae	Mousim, Makhansim	C	vegetable	common	Cultivated
5.	*Cardiospermum halicacabum* L.	Sapindaceae	Kapalphutki	C	medicinal	common	Wild
6.	*Centrosema pubescens* Benth.	Fabaceae	Gandhya Sim	C	wild	common	Wild
7.	*Cissus repens* Lam.	Vitaceae	Marmarialata	C	medicinal	common	Wild
8.	*Cocculus hirsutus*(L.) Theob.	Menispermaceae	Doipata, Jhaljamani	C	medicinal	common	Wild
9.	*Dioscorea belophylla* (Prain) Haines	Fabaceae	Sora Alu	C	vegetable	common	Cultivated
10.	*Ichnocarpus frutescens* (L.) Aiton	Apocynaceae	Dudhilata	C	medicinal	common	Wild
11.	*Ipomoea aquatica* Forssk.	Convolvulaceae	Panikalmi	C	vegetable	common	Aquatic
12.	*Lablab purpureus* (L.) Sweet	Fabaceae	Shim	C	vegetable	common	Cultivated
13.	*Lageneria siceraria* (Mol.) Stan.	Cucurbitaceae	Kadu	C	vegetable	common	Cultivated
14.	*Ludwigia adscendens* (L.) Hara	Onagraceae	Keshordam	C	weed	common	Aquatic
15.	*Lygodium fleuxuosum*	Lygodiaceae	Lata Dhekia	C	fern	common	Wild
16.	*Merremia vitifolia* (Burm. f.) Haillier	Convolvulaceae	Karmalata	C	wild	common	Wild
17.	*Momordica dioica* Roxb.	Cucurbitaceae	Dharkarolla	C	vegetable	common	Wild
18.	*Mukia maderaspatana* (L.) M. Roem.	Cucurbitaceae	Agmukhi, Bilari	C	medicinal	common	Wild
19.	*Passiflora foetida* L.	Passifloraceae	Jhumka	C	wild	common	Wild
20.	*Stephania japonica* (Thunb.) Miers	Menispermiaceae	Nimukha, Aknadi	C	medicinal	common	Wild
21.	*Acalypha indica* L.	Euphorbiaceae	Muktajhuri	H	medicinal	common	Wild
22.	*Achyranthes aspera* L.	Amaranthaceae	Apang, Bilaiachra	H	medicinal	common	Wild
23.	*Ageratum conyzoides* L.	Asteraceae	Ochunti, Phulkuri	H	medicinal	common	Wild
24.	*Alocasia indica* Schott.	Araceae	Mankachu	H	vegetable	common	Wild
25.	*Alternanthera philoxeroides* (Mart.) Griseb.	Amaranthaceae	Haicha, Malancha	H	vegetable	common	Wild
26.	*Alternanthera sessilis* (L.) DC.	Amaranthaceae	Chanchi	H	vegetable	common	Wild
27.	*Alternanthera* sp.	Amaranthaceae		H	vegetable	common	Wild
28.	*Amaranthus lividus* L. subsp. *polygonoides* (Moq.) Probst.	Amaranthaceae	Gobranotey	H	wild	common	Wild
29.	*Amaranthus spinosus* L.	Amaranthaceae	Katanotey	H	vegetable	common	Wild
30.	*Amaranthus viridis* L.	Amaranthaceae	Notey	H	vegetable	common	Wild
31.	*Anisomelis indica* (L.) O. Kuntze.	Lamiaceae	Gobura	H	medicinal	common	Wild
32.	*Arundinella bengalensis* (Spreng) Druce	Poaceae	Gongabena	H	grass	common	Wild
33.	*Axonopus compressus*(Sw.) P. Beauv.	Poaceae	Karpetghas	H	grass	common	Wild
34.	*Blumea densiflora* DC.	Asteraceae	Kukurshinga	H	medicinal	common	Wild
35.	*Blumea lacera*(Burm. f.) DC.	Asteraceae	Barakukurshinga	H	medicinal	common	Wild
36.	*Capsicum frutescens* L.	Solanaceae	Morich	H	spice	common	Cultivated
37.	*Careya herbacea*Roxb.	Lecythidaceae	Bhuidalim	H	wild	common	Wild
38.	*Celosia argentea* L.	Amaranthaceae	Swetmorogphul	H	ornamental	common	Wild
39.	*Centella asiatica* (L.) Urban	Apiaceae	Thankuni	H	medicinal	common	Wild
40.	*Chenopodium album* L.	Chenopodiaceae	Bathuashak	H	vegetable	common	Wild
41.	*Chrozophora plicata* (Vahl) A Juss.	Euphorbiaceae	Khudiokra	H	wild	common	Wild
42.	*Chrysopogon aciculatus* (Retz.) Trin.	Poaceae	Nilugi, Premkata	H	grass	common	Wild
43.	*Cleome rutidosperma* CC.	Capparidaceae	Begunihurhurey	H	wild	common	Wild
44.	*Cleome viscosa* L.	Capparidaceae	Haldehurhurey	H	wild	common	Wild
45.	*Clerodendrum viscosum* Vent.	Verbenaceae	Vhat,M Bhait	H	medicinal	common	Wild

SN	Scientific Name	Family	Common Name (Bengali name)	Habit	Used	Status of distribution	Type
46.	*Colocasia esculenta* (L.) Schott	Araceae	Bankachu	H	vegetable	common	Wild
47.	*Commelina benghalensis* L.	Commelinaceae	Kanchira, Dholpata	H	medicinal	common	Wild
48.	*Commelina diffusa* Burm. f.	Commelinaceae	Kanchira	H	wild	common	Wild
49.	*Crotalaria calycina* Schrank.	Fabaceae	Jhunjuni	H	wild	common	Wild
50.	*Crotalaria pallida* Ait.	Fabaceae	Jhunjuni	H	wild	common	Wild
51.	*Crotalaria prostrata* Rottler	Fabaceae	Chhota Jhunjuni	H	wild	common	Wild
52.	*Crotalaria sessiliflora* L.	Fabaceae		H	wild	common	Wild
53.	*Croton bonplandianus* Baill.	Euphorbiaceae	Banmarich	H	medicinal	common	Wild
54.	*Cucurbita maxima* Duch.	Cucurbitaceae	Mistkumra	H	vegetable	common	Cultivated
55.	*Curcuma longa* L.	Zingiberaceae	Halud	H	spice	common	Cultivated
56.	*Cynodon dactylon* (L.) Pers.	Poaceae	Durba	H	medicinal	common	Wild
57.	*Cyperus corymbosus* Rottb.	Cyperaceae	Golamethi	H	grass	common	Wild
58.	*Cyperus cyperoides* (L.) Kuntze	Cyperaceae	Kucha	H	grass	common	Wild
59.	*Cyperus difformis* L.	Cyperaceae	Behua	H	grass	common	Wild
60.	*Cyperus distans*L. f.	Cyperaceae	Panima Langa	H	grass	common	Wild
61.	*Cyperus iria* L.	Cyperaceae	Barachancha	H	grass	common	Wild
62.	*Cyperus rotundus* L.	Cyperaceae	Muthaghas	H	medicinal	common	Wild
63.	*Cyperus tenuispica* Steud.	Cyperaceae	Muthaghas	H	grass	common	Wild
64.	*Desmodium gyroides*(Roxb. ex Link). DC.	Fabaceae	Chhoto Salpan	H	wild	common	Wild
65.	*Desmodium heterophyllum* (L.) DC.	Fabaceae	Bipatri Salpan	H	wild	common	Wild
66.	*Desmodium triflorum* (L.) DC.	Fabaceae	Kulaliya	H	weed	common	Wild
67.	*Digitaria sanguinalis* (L.) Scop.	Poaceae	Makunjali	H	grass	common	Wild
68.	*Echinochloa stagnina*(Retz.) P. Beauv.	Poaceae	Dul, Parua	H	grass	common	Aquatic
69.	*Eclipta prostrata* (L.) L.	Asteraceae	Kalokeshi	H	medicinal	common	Wild
70.	*Eichhornia crassipes* (Mart.) Solms	Pontederiaceae	Kachuripana	H	cattle feed	common	Aquqtic
71.	*Elephantopus scaber* L.	Asteraceae	Hastipadi	H	medicinal	common	Wild
72.	*Eleusine indica* (L.) Gaertn.	Poaceae	Kesla	H	grass	common	Wild
73.	*Enhydra flactuans* Lour.	Amaranthaceae	Helencha	H	weed	common	Aquatic
74.	*Eragrostis ciliaris*(L.) R. Br.	Poaceae	Konoi	H	grass	common	Wild
75.	*Eragrostis tenella* (L.) P. Beuv.	Poaceae	Konoi	H	grass	common	Wild
76.	*Eragrostis unioloides* (Retz.) Nees	Poaceae	Konoi	H	grass	common	Wild
77.	*Erianthus longisetosus* Anders.	Poaceae	Urusia	H	grass	common	Wild
78.	*Euphorbia hirta* L.	Euphorbiaceae	Dudhia	H	medicinal	common	Wild
79.	*Euphorbia thymifolia* Burm. f.	Euphorbiaceae	Swetkarni, Swetkan	H	weed	common	Wild
80.	*Evolvulus nummularius* (L.) L.	Convolvulaceae	Bhuiokra	H	weed	common	Wild
81.	*Fimbristylis dichotoma* subsp. *dichotoma* D.A. Simpson & T. Koyama	Cyperaceae	Baranirbishi	H	grass	common	Wild
82.	*Fimbristylis dichotoma*subsp. *podocarpa* Koyama	Cyperaceae	Nirbishi	H	grass	common	Wild
83.	*Fimbristylis milliacea* (L.) Vahl	Cyperaceae	Barajavani	H	grass	common	Wild
84.	*Fuirena ciliaris*(L.) Roxb.	Cyperaceae	Mutha	H	grass	common	Wild
85.	*Hedyotis corymbosa* (L.) Lamk.	Rubiaceae	Khetpapra, Panki	H	medicinal	common	Wild
86.	*Hedyotis diffusa* Willd.	Rubiaceae		H	weed	common	Wild
87.	*Heliotropium indicum* L.	Boraginaceae	Hatisur	H	medicinal	common	Wild
88.	*Hemarthria protensa* Steud.	Poaceae		H	weed	common	Wild
89.	*Hydrilla verticillata* (L. f.) Royle		Kureli, Jhanji	H	weed	common	Aquatic
90.	*Hydrolea zeylanica*(L.) Vahl		Kaschera, Bishlanguli, Islanguli	H	weed	common	Aquatic Wild
91.	*Justicia diffiusa*willd.	Acanthaceae		H	weed	common	Wild
92.	*Kyllinga brevifolia* Rottb.	Cyperaceae	Bindimuthi	H	weed	common	Wild
93.	*Kyllinga nemoralis* (J. R. & G. Forst.)	Cyperaceae	Nirbishi	H	weed	common	Wild

SN	Scientific Name	Family	Common Name (Bengali name)	Habit	Used	Status of distribution	Type
	Dandy						
94.	*Leersia hexandra*Sw.	Poaceae	Arali	H	weed	common	Aquatic
95.	*Lemna perpusilla*Torrey	Lemnaceae	Khudipana	H	weed	common	aquatic
96.	*Leptochloa chinensis* (L.) Nees	Poaceae		H	weed	common	Aquatic
97.	*Leucaena leucocephala* (Lamk.) de Wit.	Mimosaceae	Ipil-Ipil	H	timber	common	Cultivated
98.	*Leucas indicas* (L.) r. Br.	Lamiaceae	Swetdron	H	medicinal	common	Wild
99.	*Limnophila sessiliflora* (Vahl) Blume	Scrophulariaceae		H	weed	common	Aquatic
100.	*Lindernia antipoda*(L.)Alston	Scrophulariaceae		H	weed	common	Wild
101.	*Lindernia crustacea* (L.) F. Muell.	Scrophulariaceae		H	weed	common	Wild
102.	*Ludwigia hyssopifolia* (G. Don) Exell	Onagraceae	Panimarich	H	aquatic weed	common	Aquatic
103.	*Ludwigia octovalvis* (Jacq.) Raven	Onagraceae	Banlong	H	weed	common	Aquatic
104.	*Ludwigia perennis* L.	Onagraceae	Banlong	H	weed	common	Wild
105.	*Marsilea quadrifoliata* L.	Marsileaceae	Sushnishak	H	aquatic fern	common	Aquatic
106.	*Melochia corchorifolia* L.	Sterkuliaceae	Banpat	H	fibre	common	Wild
107.	*Monochoria hastata* (L.) Soloms	Pontederiaceae	Baranukha	H	aquatic weed	common	Wild
108.	*Murdannia nudiflora* (L.) Brenan	Commelinaceae	Kureli, Kanduli	H	weed	common	Wild
109.	*Musa paradisica* L. paradisiaca	Mussaceae	Kachkola	H	vegetable	common	Cultivated
110.	*Najas indica* (Willd.) Cham.	Najadaceae		H	aquatic weed	common	Aquatic Wild
111.	*Nelsonia canescens* (Lamk.) Spreng.	Acanthaceae		H	weed	common	Wild
112.	*Nicotiana plumbaginifolia* Viv.	Solanaceae	Bantamak	H	weed	common	Wild
113.	*Nymphoides indicum*(L.) O. Kuntze	Menyanthaceae	Chandmala	H	aquatic weed	common	Aquatic
114.	*Ocimum americanum* L.	Lamiaceae	Bantulsi	H	medicinal	common	Wild
115.	*Oxalis corniculata* L.	Oxalidaceae	Amrul	H	weed	common	Wild
116.	*Panicum brevifolium* L.	Poaceae	Bashpatighas	H	grass	common	Wild
117.	*Panicum repens*L.	Poaceae	Dhanighas	H	grass	common	Wild
118.	*Paspalum conjugatum* Bergius	Poaceae	Goicha	H	grass	common	Wild
119.	*Paspalum scrobiculatum* Boj.	Poaceae	Goicha	H	grass	common	Wild
120.	*Peperomia pellucida* (L.) H. B. K.	Peperomiaceae	Luchipata	H	weed	common	Wild
121.	*Persicaria glabra* (Wild.) Gomez de la Maza	Polygonaceae	Sadakukri,	H	weed	common	Aquatic
122.	*Persicaria hydropiper* (L.) Spach	Polygonaceae	Bishkatali	H	medicinal	common	Aquatic
123.	*Persicaria lanata* (Roxb.) Hassan	Polygonaceae	Bishkatali	H	weed	common	Aquatic
124.	*Persicaria praetermissa* (Hook. F.) Hara	Polygonaceae	Chhoto Bishkatali	H	weed	common	Aquatic
125.	*Phylla nodiflora* (L.) Greene	Verbenaceae	Bakkan, Karghas	H	weed	common	Wild
126.	*Phyllanthus amarus* Schum. & Thonn.	Euphorbiaceae	Hazarmoni	H	weed	common	Wild
127.	*Phyllanthus virgatus* G. Forst.	Euphorbiaceae		H	weed	common	Wild
128.	*Physalis micrantha* Link.	Solanaceae	Phutka	H	weed	common	Wild
129.	*Piper longum* L.	Piperaceae	Pipul	H	medicinal	common	Wild
130.	*Pistia stratiotes* L.	Araceae	Kachuripana	H	aquatic weed	common	Aquatic
131.	*Portulaca oleracea* L.	Portulacaceae	Baralania, Nunia	H	weed	common	Wild
132.	*Pouzolzia zeylanica* (L.) Benn.	Urticaceae	Bilati luchipata	H	weed	common	Wild
133.	*Rumex dentatus* L.	Polygonaceae	Banpalong	H	weed	common	Wild
134.	*Rumex maritimus* L.	Polygonaceae	Banpalong	H	weed	common	Wild
135.	*Rungia pectinata* (L.) Nees	Acanthaceae	Pindi	H	weed	common	Wild
136.	*Saccharum spontaneum* L.	Poaceae	Kash	H	weed	common	Wild
137.	*Sacciolepis indica*(L). A.Chase	Poaceae	Nardulla	H	aquatic grass	common	Aquatic
138.	*Senna occidentalis* Roxb.	Caesalpiniaceae	Barakalkasu	H	medicinal	common	Wild

SN	Scientific Name	Family	Common Name (Bengali name)	Habit	Used	Status of distribution	Type
			nda				
139.	*Sida rhombifolia* L.	Malvaceae	Berela	H	medicinal	common	Wild
140.	*Solanum nigrum* L.	Solanaceae	Titbegun	H	weed	common	Wild
141.	*Solanum surattense* Burm. F.	Solanaceae	Kantikari	H	medicinal	common	Wild
142.	*Spinacea oleracea* L.	Chenopodiaceae	Palongshak	H	vegetable	common	Cultivated
143.	*Sporobolus diander* (Retz.) P. Beauv.	Poaceae	Benajoni	H	grass	common	Wild
144.	*Sporobolus indicus* R. Br.	Poaceae	Benajoni	H	grass	common	Wild
145.	*Synedrella nodiflora*(L.) Gaertn.	Asteraceae	Nakphul	H	weed	common	Wild
146.	*Tephrosia purpurea* (L.) Pers.	Fabaceae	Bannil	H	wild	common	Wild
147.	*Tridax procumbens* L.	Asteraceae	Tridhara	H	weed	common	Wild
148.	*Triumfetta rhomboidea* Jacq.	Tiliaceae	Banokra	H	weed	common	Wild
149.	*Urena lobata* L.	Malvaceae	Banghagra	H	wild	common	Wild
150.	*Vallisneria spiralis*L.	Hydrocharitaceae	Patajhanji	H	aquatic weed	common	Aquatic
151.	*Vernonia cinerea* (L.) Less.	Asteraceae	Kukurshunga	H	weed	common	Wild
152.	*Vetiveria zizanioides* (L.) Nash	Poaceae	Bena	H	medicinal	common	Wild
153.	*Vicia hirsuta* (L.) S. F. Gray	Fabaceae	Mashurchana	H	weed	common	Wild
154.	*Xanthosoma sagittifolium* (L.) Schott	Araceae	Dud Kachu	H	vegetable	common	Cultivated
155.	*Zea mays* L.	Poaceae	Bhutta	H	crops	common	Cultivated
156.	*Zingiber officinale* Rosc.	Zingiberaceae	Ada	H	spice	common	Cultivated
157.	*Cuscuta reflexa* Roxb.	Convolbulaceae	Swarnalata	P	medicinal	common	Wild
158.	*Dendrphthoe falcata* (L. f.) Etting.	Loranthaceae	Pharulla	P	parasite	common	Wild
159.	*Drynaria quercifolia*	Dryopteridaceae	Chila Fern	P	Fern	Common	Wild
160.	*Bridelia stipularis*(L.) Blume	Euphorbiaceae	Chhotokhoi	S	wild	common	Wild
161.	*Bridelia tomentosa* Blume	Euphorbiaceae	Khoi, Serai	S	wild	common	Wild
162.	*Caesalpinia digyna* Rottler	Caesalpiniaceae	Teri, Amolkuchi	S	wild	common	Wild
163.	*Calotropis gigantea* (L.) R. Br.	Asclepiadaceae	Akonda	S	medicinal	common	Wild
164.	*Carica papaya* L.	Caricaceae	Pape	S	fruit	common	Cultivated
165.	*Catharanthus roseus* (L.) G. don.	Apocynaceae	Nayantara	S	medicinal	common	Cultivated
166.	*Citrus aurantifolia* (Christ. & Panz.) Sw.	Rutaceae	Kagagilebu	S	fruit	common	Cultivated
167.	*Clerodendrum serratum* (L.) Moon	Verbenaceae	Nilbamunhati	S	medicinal	common	Wild
168.	*Croton caudatus* Geisel.	Euphorbiaceae	Nanbhantur	S	medicinal	common	Wild
169.	*Dentalla repens* (L.) J. R. & G. Forst.	Rubiaceae	Bhuipat	S	weed	common	Wild
170.	*Desmodium gangeticum* (L.) DC.	Fabaceae	Salpani	S	medicinal	common	Wild
171.	*Desmodium pulchellum* (L). Benth.	Fabaceae	Jutasalpan	S	wild	common	Wild
172.	*Eupatorium odoratum* L.	Asteraceae	Assamlata, Germanlata	S	medicinal	common	Wild
173.	*Flacourtia indica* (Burm. f.) Merr.	Flacourtiaceae	Beuchi, Katai	S	wild	common	Wild
174.	*Helicteres isora* L.	Sterculiaceae	Rajot, Atmora	S	medicinal	common	Wild
175.	*Ipomoea fistulosa* Mart. ex Choisy	Convolvulaceae	Dholkolmi	S	weed	common	Aquatic Wild
176.	*Lantana camara* L.	Verbenaceae	Kutushkata	S	medicinal, firewood	common	Wild
177.	*Lippia alba* (Mill.) Briton et Wilson	Verbenaceae	Motmoti, Motkhori	S	wild	common	Wild
178.	*Phyllanthus reticulatus* Poir.	Euphorbiaceae	Sitka	S	wild	common	Wild
179.	*Psilanthus bengalensis* (Roxb.) Leroy Syn: *Coffea bengalensis* Roxb. Ex Schult.	Rubiaceae	Ban Coffe	S	medicinal	common	Wild
180.	*Ricinus communis*L.	Euphorbiacreae	Venna, Reri	S	medicinal	common	Wild
181.	*Sesbania canabina* Pers.	Fabaceae	Dhoincha	S	firewood	common	Cultivated
182.	*Sida acuta* Burm. f.	Malvaceae	Berela	S	medicinal	common	Wild
183.	*Sida cordata* (Burm.) Bross.	Malvaceae	Berela	S	medicinal	common	Wild
184.	*Solanum torvum* Swartz	Solanaceae	Kantabegun	S	wild	common	Wild

SN	Scientific Name	Family	Common Name (Bengali name)	Habit	Used	Status of distribution	Type
185.	*Solanum violaceum*Ortega	Solanaceae	Kantabegun	S	wild	common	Wild
186.	*Citrus limon* (L.) Burm. F.	Rutaceae	Goralebu, Baralebu	ST	fruit	common	Cultivated
187.	*Ficus hispida* L. f.	Moraceae	Kakdumur	ST	wild	common	Wild
188.	*Phyllanthus acidus* (L.) Skiels.	Euphorbiaceae	Arboroi, Hariphul	ST	wild	common	Cultivated
189.	*Psidium guajava* L.	Myrtaceae	Peyara	ST	fruit	common	Cultivated
190.	*Aegle marmelos* (L.) Corr.	Rutaceae	Bel	T	medicinal	common	Cultivated
191.	*Albizia chinensis* (Osb.) Merr.	Mimosaceae	Chakua Koroi	T	timber	common	Cultivated
192.	*Albizia lebbeck* (L.) Benth.	Mimosaceae	Sirish, Kalokoroi	T	timber	common	Cultivated
193.	*Albizia odoratissimus* (L. f.) Benth.	Mimosaceae	Chikunda,Tetuiya	T	timber	common	Cultivated
194.	*Albizia procera* (Roxb.) Benth.	Mimosaceae	Silkoroi, Jatkoroi	T	timber	common	Cultivated
195.	*Albizia richardiana* King & Prain	Mimosaceae	Gagansirish, Rajkoroi	T	timber	common	Cultivated
196.	*Alstonia scholaris* (L.) R. Br.	Apocynaceae	Chattim, Satian	T	medicinal	common	Wild
197.	*Annona reticulata* L.	Annonaceae	Nona Ata	T	fruit	common	Cultivated
198.	*Annona squamosa* L.	Annonaceae	Sharifa, Ata, Shariphal	T	fruit	common	Cultivated
199.	*Aphanamixis polystachya* (Wall.) R. N.	Meliaceae	Roina, Pitraj	T	medicinal	common	Wild
200.	*Artocarpus heterophyllus* Lam.	Moraceae	Kathal	T	fruit	common	Cultivated
201.	*Artocarpus lacucha* Buch.-Ham.	Moraceae	Deoa	T	fruit	common	Wild
202.	*Azadirachta indica*A. Juss.	Meliaceae	Neem	T	medicinal	common	Cultivated
203.	*Bambusa balcooa* Roxb.	Poaceae	Barakbans	T	household	common	Cultivated
204.	*Barringtonia acutangula* (L.) Gaertn.	Lecythidaceae	Hijal	T	wild	common	Wild
205.	*Bombax ceiba* L.	Bombaceae	Shimul Tula	T	cotton	common	Wild
206.	*Borassus flabellifer* L.	Palmae	Tal	T	fruit	common	Wild
207.	*Butea monosperma* (Lamk.) Taub.	Fabaceae	Polas, Kingshuk	T	ornamental	common	Wild
208.	*Cassia fistula* L.	Caesalpiniaceae	Sonalu, Badorlathi	T	medicinal	common	Wild
209.	*Cinnamomum tamala* Nees.	Lauraceae	Tejpata	T	spice	common	Cultivated
210.	*Citrus grandis* (L.) Osbeck.	Rutaceae	Jambura, Batabilebu	T	fruit	common	Cultivated
211.	*Cocos nucifera* L.	Arecaceae	Narikel	T	fruit, fibre	common	Cultivated
212.	*Dalbergia sissoo* Rosb.	Fabaceae	Sissoo	T	timber	common	Cultivated
213.	*Diospyros malabarica* (Desr.) Kostel.	Ebenaceae	Deshigab	T	fruit	common	Wild
214.	*Diospyros philippensis* (Des.) Gamblel.	Ebenaceae	Bilatigab	T	fruit	common	Cultivated
215.	*Disoxylum gobarum*	Meliaceae	Lambu	T	timber	common	Cultivated
216.	*Elaeocarpus robustus* Roxb.	Elaeocarpaceae	Jalpai	T	fruit	common	Cultivated
217.	*Eryngium foetidum* L.	Apiaceae	Bilatidhania	T	spice	common	Cultivated
218.	*Feronia lemonia* (L.) Sw.	Rutaceae	Kadbel	T	fruit	common	Cultivated
219.	*Ficus benghalensis* L.	Moraceae	Bat	T	wild	common	Wild
220.	*Ficus religiosa* L.	Moraceae	Assawath, Panbot	T	wild	common	Wild
221.	*Lannea coromandelica* (Houtt.) Merr.	Anacardiaceae	Jiga, Jeol, Jika	T	firewood	common	Cultivated
222.	*Litchi chinensis* Sonn.	Sapindaceae	Lichu	T	fruit	common	Cultivated
223.	*Litsea monopetala* (Roxb.) Pers.	Lauraceae	Menda	T	medicinal	common	Wild
224.	*Mangifera indica* L.	Anacardiaceae	Am	T	fruit	common	Cultivated
225.	*Melaleuca leucadendron*L.	Mimosaceae	Ipil-Ipil	T	timber	common	Cultivated
226.	*Melocanna baccifera* (Roxb.) Kurz.	Poaceae	Mulibans, Nalibans	T	household	common	Wild
227.	*Moringa oleifera* Lamk.	Moringaceae	Sajna	T	vegetable	common	Wild
228.	*Neolamarckia cadamba* (Roxb.) Bosser	Rubiaceae	Kadam	T	firewood	common	Wild

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229.	*Phoenix sylvestris*Roxb.	Arecaceae	Khejur	T	fruit & gur	common	Cultivated
230.	*Phyllanthus embelica* L.	Euphorbiaceae	Amloki	T	medicinal	common	Cultivated
231.	*Samanea saman* (Jacq.) Merr.	Mimosaceae	Rain Tree, Meghsirish	T	timber	common	Cultivated
232.	*Senna siamea* (Lamk.) Irwin & Barneby	Caesalpiniaceae	Minjiri	T	firewood	common	Cultivated
233.	*Streblus asper* Lour.	Moraceae	Sheora	T	firewood	common	Wild
234.	*Suregada multiflora* (A. Juss.) Bail.	Euphorbiaceae	Ghotlatkon	T	firewood	common	Wild
235.	*Syzygium cumini* (L.) Skeels	Myrtaceae	Jam	T	fruit, firewood	common	Cultivated
236.	*Syzygium fruticosum* DC.	Myrtaceae	Khudijam	T	timber, firewood	common	Cultivated
237.	*Tamarindus indica* l.	Caesalpiniaceae	Tetul	T	fruit	common	Cultivated
238.	*Tectona grandis* L. f.	Verbenaceae	Shegun	T	timber	common	Wild
239.	*Terminalia arjuna* (Roxb.) Wight & Arn.	Combretaceae	Arjun	T	medicinal	common	Cultivated
240.	*Ziziphus mauritiana* Lamk.	Rhamnaceae	Kul, Boroi	T	fruit	common	Cultivated
241.	*Mikania micrantha* Kunth	Asteraceae	Taralata, Beratilata	C	wild	common	Wild
242.	*Imperata cylindrica* var. *major* (Nees) Hubb.	Poaceae	Chhan	H	weed	common	Wild
243.	*Scoparia dulcis* L.	Scrophulariaceae	Misridana	H	medicinal	common	Wild
244.	*Senna tora* (L.) Roxb.	Caesalpiniaceae	Kalkasunda	H	weed	common	Wild
245.	*Crinum latifolium* L.	Amaryllidaceae	Sukdarson	H	medicinal	medicinal	Wild
246.	*Argyrea argentea* (Roxb.) Choisy	Convolvulaceae	Bararupatula ,Chottobijtarak	C	medicinal	rare	Wild
247.	*Asparagus racemosus*Wild.	Lilliaceae	Satomuli	C	medicinal	rare	Wild
248.	*Derris trifoliata* Lour.	Fabaceae	Kaillalata	C	medicinal	rare	Wild
249.	*Paederia foetida* L.	Rubiaceae	Gandhyabhaduli	C	medicinal	rare	Cultivated
250.	*Scindapsus officinalis* (Roxb.) Schott	Araceae	Moneyplant	C	ornamental	rare	Wild
251.	*Abelmoschus moschatus* (L.) Medik.	Malvaceae	Mushakdana , Kalokasturi	H	medicinal	rare	Wild
252.	*Arachis hypogea* L.	Fabaceae	Cheenabadam	H	oil yielding	rare	Cultivated
253.	*Azolla pinnata*	Azollaceae	Azola	H	Fern	Rare	Aquatic
254.	*Blumea sinnuata*	Asteraceae	Kukurshinga	H	wild	rare	Wild
255.	*Curcuma zedoaria* (Christm.) Rosc.	Zingiberaceae	Shathi	H	medicinal	rare	Wild
256.	*Geodorum densiflorum* (Lamk.) Schltr.	Orchidaceae	Shankhamul	H	medicinal	rare	Wild
257.	*Leonurus sibiricus* L.	Lamiaceae	Raktodrone	H	medicinal	rare	Wild
258.	*Leucas aspera* (Willd.) Link.	Lamiaceae	Dandakalos	H	medicinal	rare	Wild
259.	*Mirabilis jalapa* L.	Nyctaginaceae	Sandhyamaloti, Krishnokali	H		rare	Cultivated
260.	*Musa paradisiaca* L. var. *sapientum*	Mussaceae	Kathalikola	H	fruit	rare	Cultivated
261.	*Nymphaea nouchali*Burm. f.	Nymphaeaceae	Sada Shapla	H	aquatic weed	rare	Aquatic
262.	*Nymphaea rubra* Roxb.	Nymphaeaceae	Lal Shapla	H	aquatic weed	rare	Aquatic
263.	*Senna sophera* (L.) Roxb.	Caesalpiniaceae	Chhotokalkasunda	H	medicinal	rare	Wild
264.	*Torenia diffusa* D. Don	Scrophulariaceae	---	H	weed	rare	Wild
265.	*Urena lobata* L. var. sinnuata	Malvaceae	Kunjira,`Kataghagra	H	wild	rare	Wild
266.	*Wedelia trilobata* (L.) A. S. Hitchc.	Asteraceae	Mahabhringaraj, Bhimraj	H	medicinal	rare	Wild
267.	*Acacia farnesiana* (L.) Willd.	Mimosaceae	Bilatibabul, Gokul	S	firewood	rare	Wild
268.	*Ardisia solanacea* (Poir.) Roxb.	Myrsinaceae	Chaoldhoa, Banjam	S	medicinal	rare	Wild

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269.	*Breynia vitis-idaea*(Burm. f.) Fisch.	Euphorbiaceae	Silpati	S	wild	rare	Wild
270.	*Caesalpinia pulcherrima* (L.) Sw.	Caesalpiniaceae	Radhachura	S	ornamental	rare	Wild
271.	*Ficus heterophylla* L. f.	Moraceae	Bhuidumur	S	wild	rare	Wild
272.	*Gardenia coronaria* Buch.-Ham.	Rubiaceae	Gandhyaraj	S	ornamental	rare	Cultivated
273.	*Lawsonia inermis* L.	Lythraceae	Mehede	S	medicinal	rare	Cultivated
274.	*Malvaviscus arboreus* Dill. ex Cav.	Malvaceae	Marichjaba	S	ornamental	rare	Cultivated
275.	*Pachyrrhizus erosus* (L.) Urban	Fabaceae	Shak Alu	S	vegetable	rare	Wild
276.	*Pedillanthes tithimaloides* Poit.	Euphorbiaceae	Berachita	S	ornamental	rare	Wild
277.	*Pereskia rosea*	Cactaceae	Rose Cactus	S	ornamental	rare	Cultivated
278.	*Phoenix loureiroi* Kunth, Enum.	Arecaceae	Bankhejur	S	wild	rare	Wild
279.	*Flacourtia jangomas* (Lour.) Raeus.	Flacourtiaceae	Lukluki	ST	wild	rare	Wild
280.	*Grewia asiatica* L.	Tiliaceae	Phalsa	ST	fruit	rare	Cultivated
281.	*Mesua ferrea* L.	Clusiaceae	Nagassar	ST	ornamental	rare	Cultivated
282.	*Polyalthia suberosa* (Roxb.) Thw.	Annonaceae	Hamjam	ST	wild	rare	Wild
283.	*Saraca indica* L.	Caesalpiniaceae	Ashok	ST	medicinal	rare	Cultivated
284.	*Araucaria cookii* R. Br. Ex D. Don.	Araucariaceae	Christmas Tree	T	ornamental	rare	Cultivated
285.	*Artocarpus chama* Buch.-Ham.	Moraceae	Chambal	T	timber	rare	Cultivated
286.	*Bauhinia acuminata* L.	Caesalpiniaceae	Swetkanchan	T	medicinal	rare	Wild
287.	*Callistemon citrinus* Stampf.	Myrtaceae	Bottlebrush	T	ornamental	rare	Cultivated
288.	*Cassia nodosa* Buch.-Ham.	Caesalpiniaceae	Bon Sonalu	T	ornamental	rare	Cultivated
289.	*Ceiba pentandra* (L.) gaertn.	Bombacaceae	Swet Shimul	T	ornamental	rare	Cultivated
290.	*Crateva nurvala* Buch.-Ham.	Liliaceae	Bonnya, Barun	T	firewood	rare	Wild
291.	*Delonix regia* (Boj.) Raf.	Caesalpiniaceae	Krisnochura	T	ornamental	rare	Cultivated
292.	*Haldina cordifolia* (Roxb.) Ridsdale	Rubiaceae	Haldu	T	timber, firewood	rare	Cultivated
293.	*Hopea odorata* Roxb.	Dipterocarpaceae	Telsur	T	timber	rare	Cultivated
294.	*Mimusops elengi* L.	Sapotaceae	Bakul	T	ornamental	rare	Cultivated
295.	*Oroxylum indicum* (L.) Kurz	Bignoniaceae	Sona, Kanaidinga	T	medicinal	rare	Wild
296.	*Peltophorum pterocarpum* (DC.) Baker ex Heyne	Mimosaceae	Haludkrishnachura	T	ornamental	rare	Cultivated
297.	*Syzygium grande* (Wight) Walp.	Myrtaceae	Dhakijam	T	timber	rare	Cultivated
298.	*Terminalia bellirica* (Gaertn.) Roxb.	Combretaceae	Bohera	T	medicinal	rare	Cultivated
299.	*Terminalia catappa* L.	Combretaceae,	Katbadam	T	medicinal	rare	Cultivated
300.	*Terminalia chebula* Retz.	Combretaceae	Haritaki	T	medicinal	rare	Cultivated
301.	*Blumea membranacea* Wall.	Asteraceae	Kukurshinga	H	wild	sporadic	Wild
302.	*Corchorus aestuans* L.	Tiliaceae	Banpat	H	wild	sporadic	Wild
303.	*Cyathula prostrata* (L.) Blume	Amaranthaceae	Chhoto Apang	H	medicinal	sporadic	Wild
304.	*Dichanthium caricosum* (L.) A. Camus	Poaceae	Detara	H	wild	sporadic	Wild
305.	*Hyptis capitata*Jacq.	Lamiaceae	Bilatitukma	H	medicinal	sporadic	Wild
306.	*Hyptis suaveolens* (L.) Poit.	Lamiaceae	Tukma	H	medicinal	sporadic	Wild
307.	*Limnophila heterophylla* (Roxb.) Benth.	Scrophulariaceae		H	aquatic weed	sporadic	Aquatic
308.	*Musa sapientum* L. var. sylvestris	Mussaceae	Aittakola	H	fruit	available	Cultivated
309.	*Ocimum sanctum* L.	Lamiaceae	Krishnatulsi	H	medicinal	sporadic	Cultivated
310.	*Bougainvillea spectabilis* Wild.	Nyctaginaceae	Baganbilas	S	ornamental	sporadic	Wild
311.	*Calamus rotung* L.	Arecaceae	Chanchibet	S	fibre plant	sporadic	Wild
312.	*Cestrum nocturnum* L.	Solanaceae	Hasnahena	S	wild	sporadic	Cultivated
313.	*Duranta ripens* L.	Verbenaceae	Katamehede	S	ornamental	sporadic	Cultivated
314.	*Flemingia macrophylla* (Willd.) Merr.	Fabaceae	Barasalpan	S	medicinal	sporadic	Wild
315.	*Hibiscus rosa-sinensis*	Malvaceae	Joba	S	ornamental	sporadic	Cultivated
316.	*Hibiscus sabdariffa* L. var. sabdariffa	Malvaceae	Chukair, Chukur	S	vegetable	sporadic	Cultivated
317.	*Jatropha curcus* L.	Euphorbiaceae	Baghbherenda	S	medicinal	sporadic	Wild
318.	*Jatropha gossypifolia* L.	Euphorbiaceae	Lalbherenda	S	medicinal	sporadic	Wild

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319.	*Justicia adhatoda* L.	Acanthaceae	Bashok	S	medicinal	sporadic	Cultivated
320.	*Justicia gandarusa* L.	Acanthaceae	Jagotmadan, Nilnishinda	S	medicinal	sporadic	Cultivated
321.	*Leea crispa*Willd.	Leeaceae	Banchalita, Mach	S	wild	sporadic	Wild
322.	*Lagerstroemia speciosa* (L.) Pers.	Lythraceae	Jarul	ST	firewood	sporadic	Cultivated
323.	*Acacia auriculiformis* A. Cunn.	Mimosaceae	Akashmoni	T	timber	sporadic	Cultivated
324.	*Acacia mangium* Willd.	Mimosaceae	Bara Akashmoni	T	timber	sporadic	Cultivated
325.	*Aporosa dioica* (Roxb.) Muell.	Euphorbiaceae	Patakharolla	T	medicinal	sporadic	Wild
326.	*Areca catechu* L.	Mimosaceae	Supari, Gua	T	timber	sporadic	Cultivated
327.	*Bambusa tulda* Roxb.	Poaceae	Tallabans	T	household	sporadic	Cultivated
328.	*Dillenia indica* L.	Dilleniaceae	Chalta	T	fruit	sporadic	Wild
329.	*Dipterocarpus turbinatus* Gaertn. f.	Dipterocarpaceae	Garjan	T	timber	sporadic	Cultivated
330.	*Erythrina ovalifolia* Roxb.	Caesalpiniaceae	Mander, Patiyamander	T	wild	sporadic	Wild
331.	*Eucalyptus citriodora* Hook	Myrtaceae	Eucalyptus	T	timber	sporadic	Cultivated
332.	*Garuga pinnata* Roxb.	Anacardiaceae	Jiyal-Bhadi	T	wild.0	sporadic	Wild
333.	*Gmelina arborea* L.	Verbenaceae	Gamari	T	timber	sporadic	Cultivated
334.	*Madhuca longifolia* (Koenig) MacBride	Sapotaceae	Mahua	T	ornamental	sporadic	Cultivated
335.	*Polyalthia longifolia* (Sonn.) Thw.	Annonaceae	Debdaru	T	timber	sporadic	Cultivated
336.	*Trema orientalis* (L.) Blume	Ulmaceae	Jibon, Nalita	T	wild	sporadic	Wild
337.	*Cordia macleodii* (Griff.) hook. F. & Thoms	Boraginaceae	Bara Bahul, Bara Baula	ST	firewood	very rare	Wild
338.	*Premna integrifolia* L.	Verbenaceae	Gambari	T	firewood	very rare	Wild

Note: Note: (H=Herb, ST=Small Tree, T=Tree, C=Climber, S=Shrub, US=Under Shrub, P=Parasite)

Annex K

Vegetation at the Proposed Power Plant Project Site

Scientific Name	Family	Common Name (Bengali name)	Habit	Used	Status of distribution	Type
Atylosiascrabaeoides (L.) Baker	Fabaceae	Banorkalai	C	wild	common	Wild
Axonopuscompressus(Sw.) P. Beauv.	Poaceae	Karpetghas	H	grass	common	Wild
Blumealacera(Burm. f.) DC.	Asteraceae	Barakukurshinga	H	medicinal	common	Wild
Calotropisgigantea (L.) R. Br.	Asclepiadaceae	Akonda	S	medicinal	common	Wild
Cardiospermumhalicacabum L.	Sapindaceae	Kapalphutki	C	medicinal	common	Wild
Centellaasiatica (L.) Urban	Apiaceae	Thankuni	H	medicinal	common	Wild
Chrysopogonaciculatus (Retz.) Trin.	Poaceae	Nilugi, Premkata	H	grass	common	Wild
Clerodendrumviscosum Vent.	Verbenaceae	Vhat,MBhait	H	medicinal	common	Wild
*Crotalaria calycina*Schrank.	Fabaceae	Jhunjuni	H	wild	common	Wild
Crotalaria pallida Ait.	Fabaceae	Jhunjuni	H	wild	common	Wild
*Crotalaria prostrata*Rottler	Fabaceae	ChhotaJhunjuni	H	wild	common	Wild
*Croton bonplandianus*Baill.	Euphorbiaceae	Banmarich	H	medicinal	common	Wild
Cynodondactylon (L.) Pers.	Poaceae	Durba	H	medicinal	common	Wild
*Cyperuscorymbosus*Rottb.	Cyperaceae	Golamethi	H	grass	common	Wild
Cyperuscyperoides (L.) Kuntze	Cyperaceae	Kucha	H	grass	common	Wild
Cyperusdifformis L.	Cyperaceae	Behua	H	grass	common	Wild
*Cyperustenuispica*Steud.	Cyperaceae	Muthaghas	H	grass	common	Wild
Dentallarepens (L.) J. R. & G. Forst.	Rubiaceae	Bhuipat	S	weed	common	Wild
Desmodiumgangeticum (L.) DC.	Fabaceae	Salpani	S	medicinal	common	Wild
Desmodiumgyroides(Roxb. ex Link). DC.	Fabaceae	ChhotoSalpan	H	wild	common	Wild
Desmodiumheterophyllum (L.) DC.	Fabaceae	BipatriSalpan	H	wild	common	Wild
Desmodiumtriflorum (L.) DC.	Fabaceae	Kulaliya	H	weed	common	Wild
Digitariasanguinalis (L.) Scop.	Poaceae	Makunjali	H	grass	common	Wild
Drynariaquercifolia	Dryopteridaceae	Chila Fern	P	Fern	Common	Wild
Ecliptaprostrata (L.) L.	Asteraceae	Kalokeshi	H	medicinal	common	Wild
Elephantopusscaber L.	Asteraceae	Hastipadi	H	medicinal	common	Wild
Eupatorium odoratum L.	Asteraceae	Assamlata, Germanlata	S	medicinal	common	Wild
Euphorbia hirta L.	Euphorbiaceae	Dudhia	H	medicinal	common	Wild

Scientific Name	Family	Common Name (Bengali name)	Habit	Used	Status of distribution	Type
*Euphorbia thymifolia*Burm. f.	Euphorbiaceae	Swetkarni, Swetkan	H	weed	common	Wild
Evolvulusnummularius (L.) L.	Convolvulaceae	Bhuiokra	H	weed	common	Wild
Fimbristylisdichotoma subsp. dichotoma D.A. Simpson & T. Koyama	Cyperaceae	Baranirbishi	H	grass	common	Wild
*Fimbristylisdichotoma*subsp. *podocarpa* Koyama	Cyperaceae	Nirbishi	H	grass	common	Wild
Hedyotiscorymbosa (L.) Lamk.	Rubiaceae	Khetpapra, Panki	H	medicinal	common	Wild
*Hedyotisdiffusa*Willd.	Rubiaceae		H	weed	common	Wild
Heliotropiumindicum L.	Boraginaceae	Hatisur	H	medicinal	common	Wild
*Hyptiscapitata*Jacq.	Lamiaceae	Bilatitukma	H	medicinal	sporadic	Wild
Hyptissuaveolens (L.) Poit.	Lamiaceae	Tukma	H	medicinal	sporadic	Wild
Imperatacylindrica var. *major* (Nees) Hubb.	Poaceae	Chhan	H	weed	common	Wild
Ipomoea fistulosa Mart. ex Choisy	Convolvulaceae	Dholkolmi	S	weed	common	Aquatic Wild
Leucasaspera (Willd.) Link.	Lamiaceae	Dandakalos	H	medicinal	rare	Wild
Leucasindicas (L.) r. Br.	Lamiaceae	Swetdron	H	medicinal	common	Wild
Lippia alba (Mill.) Briton et Wilson	Verbenaceae	Motmoti, Motkhori	S	wild	common	Wild
Nicotianaplumbaginifolia Viv.	Solanaceae	Bantamak	H	weed	common	Wild
Physalismicrantha Link.	Solanaceae	Phutka	H	weed	common	Wild
Portulacaoleracea L.	Portulacaceae	Baralania, Nunia	H	weed	common	Wild
Saccharumspontaneum L.	Poaceae	Kash	H	weed	common	Wild
Sennasophera (L.) Roxb.	Caesalpiniaceae	Chhotokalkasunda	H	medicinal	rare	Wild
Sennatora (L.) Roxb.	Caesalpiniaceae	Kalkasunda	H	weed	common	Wild
*Sidaacuta*Burm. f.	Malvaceae	Berela	S	medicinal	common	Wild
Sida cordata (Burm.) Bross.	Malvaceae	Berela	S	medicinal	common	Wild
Sidarhombifolia L.	Malvaceae	Berela	H	medicinal	common	Wild
Solanumnigrum L.	Solanaceae	Titbegun	H	weed	common	Wild
*Solanumsurattense*Burm. F.	Solanaceae	Kantikari	H	medicinal	common	Wild
Solanumtorvum Swartz	Solanaceae	Kantabegun	S	wild	common	Wild
Sporobolusdiander (Retz.) P. Beauv.	Poaceae	Benajoni	H	grass	common	Wild
Sporobolusindicus R. Br.	Poaceae	Benajoni	H	grass	commo	Wild

Scientific Name	Family	Common Name (Bengali name)	Habit	Used	Status of distribution	Type
Synedrellanodiflora(L.) Gaertn.	Asteraceae	Nakphul	H	weed	common	Wild
Tridaxprocumbens L.	Asteraceae	Tridhara	H	weed	common	Wild
*Triumfettarhomboidea*Jacq.	Tiliaceae	Banokra	H	weed	common	Wild
Urenalobata L.	Malvaceae	Banghagra	H	wild	common	Wild
Vernoniacinerea (L.) Less.	Asteraceae	Kukurshunga	H	weed	common	Wild
Vetiveriazizanioides (L.) Nash	Poaceae	Bena	H	medicinal	common	Wild
Viciahirsuta (L.) S. F. Gray	Fabaceae	Mashurchana	H	weed	common	Wild
*Ziziphusmauritiana*Lamk.	Rhamnaceae	Kul, Boroi	T	fruit	common	Cultivated

*Source:*Field Survey, Jan 2013

Table C.1 Daily Traffic Statistics for Bangbandhu Bridge for the Month of October

Date	EastPlaza								WestPlaza								AllPlaza							
	MC	LV	SB	LB	ST	MT	LT	Total	MC	LV	SB	LB	ST	MT	LT	Total	MC	LV	SB	LB	ST	MT	LT	Total
01/10/2012	122	972	1	1,140	969	1,811	49	5,064	128	1,061	8	1'115	1,089	1,964	55	5,420	250	2,033	9	2,255	2,058	3,775	104	**10,484**
02/10/2012	120	1,040	13	1,091	1,022	1,804	64	5,154	136	1,010	23	1,080	1,051	1,906	64	5,270	256	2,050	36	2,171	2,073	3,710	128	**10,424**
03/10/2012	115	1,002	22	1,090	1,017	1,812	48	5,106	92	1,049	13	1,096	1,122	1,862	50	5,284	207	2,051	35	2,186	2,139	3,674	98	**10,390**
04/10/2012	119	1'129	9	1,148	1,134	1,927	46	5,512	108	1,084	6	1,204	994	1,663	57	5,116	227	2,213	15	2,352	2,128	3,590	103	**10,628**
05/10/2012	182	1,308	4	1,264	982	1,752	42	5,534	178	1,263	3	1,252	1,023	1,647	55	5,421	360	2,571	7	2,516	2,005	3,399	97	**10,955**
06/10/2012	127	1,093	7	1,225	959	1,451	47	4,909	143	1,159	5	1,230	1,012	1,701	33	5,283	270	2,252	12	2,455	1,971	3,152	80	**10,192**
07/10/2012	124	1,044	4	1,227	973	1,735	38	5,145	126	1,063	3	1,275	1,053	1,940	37	5,497	250	2,107	7	2,502	2,026	3,675	75	**10,642**
08/10/2012	109	1,081	2	1,240	1,090	1,945	58	5,525	127	1,060	11	1,215	1,097	1,902	60	5,472	236	2,141	13	2,455	2,187	3,847	118	**10,997**
09/10/2012	95	993	11	1,156	1,076	2,096	61	5,488	106	1,055	19	1,204	1,066	1,855	57	5,362	201	2,048	30	2,360	2,142	3,951	118	**10,850**
10/10/2012	86	1,031	20	1,238	1,104	1,974	53	5,506	87	1,094	9	1'160	1,011	1,944	51	5,356	173	2,125	29	2,398	2,115	3,918	104	**10,862**
11/10/2012	152	1'120	7	1,262	1,162	1,931	42	5,676	133	1,143	4	1,336	1,282	2,205	62	6,165	285	2,263	11	2,598	2,444	4,136	104	**11,841**
12/10/2012	163	1,311	10	1,278	1,226	2,233	53	6,274	162	1,273	12	1,215	1'121	2,000	52	5,835	325	2,584	22	2,493	2,347	4,233	105	**12,109**
13/10/2012	118	962	8	1,139	939	1,622	56	4,844	165	1,090	6	1,238	1'178	2,063	35	5,775	283	2,052	14	2,377	2,117	3,685	91	**10,619**
14/10/2012	82	1,100	7	1,239	1,266	2,405	64	6,163	84	1,081	5	1,200	1,216	2,376	64	6,026	166	2,181	12	2,439	2,482	4,781	128	**12,189**
15/10/2012	102	1'188	4	1,178	1,069	2,100	54	5,695	96	1,231	12	1'181	1,232	2,214	56	6,022	198	2,419	16	2,359	2,301	4,314	110	**11,717**
16/10/2012	100	1,187	10	1,153	1,337	2,788	56	6,631	111	1'172	17	1'171	1,269	2,589	70	6,399	211	2,359	27	2,324	2,606	5,377	126	**13,030**
17/10/2012	113	1,167	19	1'110	1'116	2,393	49	5,967	116	1,253	7	1,211	1,328	3,168	59	7,142	229	2,420	26	2,321	2,444	5,561	108	**13,109**
18/10/2012	128	1,399	4	1,265	1,400	3,145	83	7,424	137	1,349	5	1,309	1,368	2,882	74	7,124	265	2,748	9	2,574	2,768	6,027	157	**14,548**
19/10/2012	188	1,594	7	1,374	1,475	3,571	110	8,319	154	1,483	9	1,364	1,357	3,341	80	7,788	342	3,077	16	2,738	2,832	6,912	190	**16,107**
20/10/2012	146	1,381	5	1,290	1,344	3,378	86	7,630	144	1,463	5	1,377	1,361	3,564	125	8,039	290	2,844	10	2,667	2,705	6,942	211	**15,669**
21/10/2012	186	1,374	2	1,240	1'197	2,990	122	7,111	126	1,387	6	1,297	1,398	3,991	136	8,341	312	2,761	8	2,537	2,595	6,981	258	**15,452**
22/10/2012	238	1,557	5	1,290	1,395	3,858	183	8,526	156	1,581	16	1,601	1,609	4,368	204	9,535	394	3,138	21	2,891	3,004	8,226	387	**18,061**
23/10/2012	542	1,853	16	1,338	1,288	3,947	217	9,201	232	1,566	1	1,747	1,306	3,587	171	8,664	774	3,419	71	3,085	2,594	7,534	388	**17,865**
24/10/2012	911	3,011	35	2,531	1,547	4,170	240	12,445	224	1,970	333	2,813	965	2,020	87	8,412	1,135	4,981	368	5,344	2,512	6,190	327	**20,857**
25/10/2012	1,203	3,513	353	4,536	1,064	2,609	107	13,385	263	1,926	154	2,583	584	701	26	6,237	1,466	5,439	507	7,119	1,648	3,310	133	**19,622**
26/10/2012	860	2,509	118	3,082	865	2,535	65	10,034	198	1,346	60	2,076	269	843	54	4,846	1,058	3,855	178	5,158	1,134	3,378	119	**14,880**
27/10/2012	344	778	2	676	255	1,223	68	3,346	279	635	2	797	132	395	18	2,258	623	1,413	4	1,473	387	1,618	86	**5,604**
28/10/2012	705	1,407	10	1,448	104	92	3	3,769	751	1,281	9	1,385	148	136	10	3,720	1,456	2,688	19	2,833	252	228	13	**7,489**
29/10/2012	487	1,299	7	1,614	184	170	9	3,770	931	1,940	5	1,827	313	398	7	5,421	1,418	3,239	12	3,441	497	568	16	**9,191**
30/10/2012	391	1'173	25	2,261	387	331	13	4,581	853	2,208	32	2,325	581	1,037	15	7,051	1,244	3,381	57	4,586	968	1,368	28	**11,632**
31/10/2012	306	1,284	139	2,622	607	801	16	5,775	630	2,108	138	3,095	839	1,302	52	8,164	936	3,392	277	5,717	1,446	2,103	68	**13,939**
Total	**8,664**	**42,860**	**886**	**46,745**	**31,553**	**66,595**	**2,202**	**199,505**	**7,176**	**41,384**	**992**	**45,979**	**31,374**	**63,564**	**1,976**	**192,445**	**15,840**	**84,244**	**1,878**	**92,724**	**62,927**	**130,163**	**4,178**	**391,954**
Average	**279**	**1,383**	**29**	**1,508**	**1,018**	**2,148**	**71**	**6,436**	**231**	**1,335**	**32**	**1,483**	**1,012**	**2,050**	**64**	**6,208**	**511**	**2,718**	**61**	**2,991**	**2,030**	**4,199**	**135**	**12,644**

Source: Collected from Bangbandhu Toll Authority, GSIC-SEL-UDCJV(GSUJV)

Table C.2 Traffic data monitoring at Connecting point of Approach Road and National Highway

	LB	SB	LT	ST	LT	ST	LV	LV	MC	LV		LV	Non Categorized vehicle			Manual Driven Vehicle *		
Time	Bus (Large)	Mini Bus	Truck(Large)	Truck (Small)	Lorry	Pickup	Power Tiller	Tractor	Motor cycle	Jeep	Micro	Privet car	CNG *	Battery Driven Auto Rickshaw*	Nasimon / Votvoti*	Cycle	Rickshaw	Van
11.30-12.30	0	0	0	0	4	2	0	1	5	1	0	0	2	1	0	9	0	12
12.30-13.30	0	0	0	0	3	1	0	0	7	2	0	0	2	0	0	5	1	8
13.30-14.30	0	0	0	0	4	1	0	0	5	1	0	0	1	0	0	5	2	6
14.30-15.30	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	1	1	5
15.30-16.30	0	0	0	0	1	0	0	0	12	4	0	0	4	4	0	7	0	23
16.30-17.30	0	0	0	0	1	0	0	0	4	3	0	0	3	1	0	5	1	20
17.30-18.30	0	0	0	0	3	1	0	0	4	1	1	0	4	0	0	0	1	15
18.30-19.30	0	0	0	0	3	0	1	0	4	1	0	0	1	0	0	3	0	3
19.30-20.30	0	0	0	0	1	0	0	0	0	3	0	0	0	1	0	7	0	6
20.30-21.30	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	4	0	3
21.30-22.30	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	3	0	1
22.30-23.30	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	3	0	1
23.30-00.30	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	0
00.30-1.30	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	0
1.30-2.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.30-3.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.30-4.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

4.30-5.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.30-6.30	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	5	0	1
6.30-7.30	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	3	0	2
7.30-8.30	0	0	0	1	4	0	0	0	7	1	0	0	0	0	0	3	0	8
8.30-9.30	0	0	0	0	2	0	0	0	11	1	0	0	7	3	0	13	0	11
9.30-10.30	0	0	1	0	1	0	0	0	3	0	0	0	2	2	0	7	2	18
10.30-11.30	0	2	0	1	1	0	0	0	6	1	0	0	1	2	0	4	0	13

Date of monitoring: 14.01.13-15.01.13

Note:

* forbidden to pass Bangabandhu bridge

MC= Motor cycle, LV= Light Vehicle (car, jeeps and micro), SB= Small bus, LB=Large Bus, ST= Small truck, Lt=Large Truck and

MT=Medium Truck

Annex L

Vegetation details in different habitat studied

Table 1.0 Vegetation occurring in Forest Plantation Area

Family	Life Form	Botanical name	Local Name	Frequency	Relative Frequency	Density	Relative Density	Abundance	Relative Abundance	Conservation Status (IUCN)
Combretaceae	Tree	*Terminaliaarjuna*	Arjun	100.0	1	1.0	9.1	11.5	0.11	-
Meliaceae	Tree	*Azadirachtaindica*	Neem	33.3	0.3	0.3	3.0	20.0	0.19	-
Dipterocarpaceae	Tree	*Dipterocarpusturbinatus*	Gameri	33.3	0.3	0.3	3.0	7.5	0.07	CR
Combretaceae	Tree	*Terminaliabelerica*	Bahera	33.3	0.3	0.3	3.0	7.5	0.07	-
Fabaceae	Tree	*Albiziarichardiana*	Chambal	16.7	0.2	0.2	1.5	1.0	0.01	-
Myrtaceae	Tree	*Eucalyptus citriodora*	Eucalyptus	83.3	0.8	0.8	7.6	7.8	0.07	-
Fabaceae	Tree	*Tamarindusindica*	Tetul	16.7	0.2	0.2	1.5	1.0	0.01	-
Dipterocarpaceae	Tree	*Hopeaodorata*	Telsur	16.7	0.2	0.2	1.5	1.0	0.01	VU
Fabaceae	Tree	*Dalbergiasisso*	Sisso	50.0	0.5	0.5	4.6	5.7	0.05	-
Combretaceae	Tree	*Terminaliachebula*	Harotoki	16.7	0.2	0.2	1.5	2.0	0.02	-
Fabaceae	Tree	*Albiziaprocera*	Korai	16.7	0.2	0.2	1.5	6.0	0.06	-
Fabaceae	Tree	*Albizialebbeck*	Korai	50.0	0.5	0.5	4.6	3.3	0.03	-
Ulmaceae	Tree	*Tremaamboinensis*	Jibon	16.7	0.2	0.2	1.5	1.0	0.01	-
Fabaceae	Tree	*Pongamiapinnata*	Karamja	33.3	0.3	0.3	3.0	7.5	0.07	-
Casuarinaceae	Tree	*Allocasuarinalittoralis*	Jhau	16.7	0.2	0.2	1.5	11.0	0.10	-
Fabaceae	Tree	*Acacia auriculiformis*	Acacia	33.3	0.3	0.3	3.0	8.0	0.08	-
Malvaceae	Tree	*Bombaxceiba*	Shimul	16.7	0.2	0.2	1.5	1.0	0.01	-
Lecythidaceae	Tree	*Barringtoniaacutangula*	Hinzol	16.7	0.2	0.2	1.5	3.0	0.03	-

Source: Field Survey, Jan, 2013

Legend: CR-Critically Endangered, VU-Vulnerable.

Table 2.0. Vegetation occurring in Agriculture Land

Family	Life Form	Botanical name	Local Name	Frequency	Relative Frequency	Density	Relative Density	Abundance	Relative Abundance	Conservation Status (IUCN)
Fabaceae	Climber	*Viciahirsuta*	Mosherchana	100.0	0.23	1.0	0.014	5.0	0.014	-
Poaceae	Grass	*Triticumaestivum*	Gom	33.3	0.08	0.3	0.110	40.0	0.110	-
Verbenaceae	Herb	*Lippia alba*	BhuiOkhra	100.0	0.23	1.0	0.046	16.7	0.046	-
Asteraceae	Herb	*Xanthium indicum*	Gagra	66.7	0.15	0.7	0.003	1.0	0.003	-
Ranunculaceae	Hern	*Rananculus sp.*	JalDhania	33.3	0.08	0.3	0.005	1.7	0.005	-
Convolvulaceae	Climber	*Ipomoea indica*	Kolmi	33.3	0.08	0.3	0.002	0.7	0.002	-
Amaranthaceae	Herb	*Alternantherasesilis*	Hycha	66.7	0.15	0.7	0.027	10.0	0.027	-
Cyperaceae	Sedges	*Cyperusrotundus*	Mutha	100.0	0.23	1.0	0.142	51.7	0.142	-
Poaceae	Grass	*Cynodondactylon*	Durba	66.7	0.15	0.7	0.320	116.7	0.320	-
Asteraceae	Herb	*Grangea sp.*	Grangi	66.7	0.15	0.7	0.002	0.7	0.002	-
Rubiaceae	Herb	*Dentallarepens*	Bhui pat	66.7	0.15	0.7	0.017	6.3	0.017	-
Scrofulariaceae	Herb	*Linderniaciliata*	Bhui	100.0	0.23	1.0	0.011	4.0	0.011	-
Asteraceae	Herb	*Eclipta alba*	Kalokeski	66.7	0.15	0.7	0.019	7.0	0.019	-
Vicieae	Herb	*Lens esculenta*	Mushuri	66.7	0.15	0.7	0.227	82.7	0.227	-
Poaceae	Grass	*Digitariasanguinalis*	-	33.3	0.08	0.3	0.006	2.3	0.006	-
Poaceae	Grass	*Paspalumconjugatum*	Goicha	66.7	0.15	0.7	0.024	8.7	0.024	-
Poaceae	Grass	*Saccharumspontaneum*	Kash	33.3	0.08	0.3	0.013	4.7	0.013	-
Najadaceae	Herb	*Najasindica*	Mazus	33.3	0.08	0.3	0.002	0.7	0.002	-
Fabaceae	Herb	*Vicia sativa*	Ankari	66.7	0.15	0.7	0.004	1.3	0.004	-
Scrophulariaceae	Herb	*Linderniacrustata*	-	66.7	0.15	0.7	0.004	1.3	0.004	-
Scrophulariaceae	Herb	*Linderniaviscosa*	-	33.3	0.08	0.3	0.005	1.7	0.005	-

Source: Field Survey, Jan. 2013

Annex M

Fauna Encountered in the Project AOI

Table 1.0 Mammals in the Project AOI

Common Name	Scientific Name	Habitat	Family	Bangladesh Wildlife Preventon Order,1973	IUCN Category
Bengal Fox	*Vulpesbengalensis*	Forest	Canidae	Sch.-I	LC
Indian Gray Mongoose	*Herpestesedwardsi*	Riverine	Herpestidae	Sch.-III	LC
Golden Jackal	*Canisaureus*	Forest	Canidae	-	LC
House Mouse	*Musmusculus*	Agricultural Land	Muridae	-	LC
Three Striped Squirrel	*Funambuluspalmaram*	Forest & Homestead Plantation	Sciuridae	Sch.-III	LC
Jungle Cat	*Felischaus*	Forest	Felidae	Sch.-III	LC
Asian House Shrew	*Suncusmurinus*	Human Habitation	Soricidae	Sch.-III	LC
Lesser Bandicoot Rat	*Bandicotabengalensis*	Agricultural Land	Muridae	-	LC
Indian Flying-fox	*Pteropusgiganteus*	Forest	Pteropodinae	-	LC
Black Napped Hare	*Lepusnigricolis*	Forest	Leporidae	Sch-I	LC

*Source:*Field Survey and Consultations with locals, January 2013

Table 2.0 Avifauna in the Project Influence Area

Common Name	Scientific Name	Habitat	Family	Bangladesh Wildlife Preventon Order,1973	IUCN Category
Red Vented Bulbul	*Pycnonotuscafer*	Grassland	Pycnonotidae	Sch-III	LC
Black Drongo	*Dicrurusmacrocercus*	Grassland	Dicruridae	Sch-III	LC
Oriental Magpie Robin	*Copsychussaularis*	Grassland	Muscicapidae	Sch-III	LC
Long Tailed Shrike	*Laniusschach*	Grassland	Laniidae	Sch-III	LC
Large Grey Babler	*Turdoidesmalcolmi*	Grassland	Timaliidae	-	LC
Spotted Dove	*Streptopeliachinensis*	Grassland	Columbidae	Sch-III	LC
Black Kite	*Milvusmigrans*	Grassland	Accipitridae	Sch-III	LC
Black Hooded Orioles	*Oriolusxanthornus*	Forest Land	Oriolidae	-	LC
Large Billed Crow	*Corvusmacrorhynchos*	Forest Land	Corvidae	Sch-III	LC
House Crow	*Corvusspeldens*	Homestead Plantation	Corvidae	-	LC
Eurasian Collared Dove	*Streptopeliadecaocto*	Forest Land	Columbidae	-	LC
RufousTreepie	*Dendrocittavagabunda*	Forest Land	Corvidae	Sch-III	LC
Forest Wagtail	*Dendronanthusindicus*	Forest Land	Motacillidae	-	LC
Indian Robin	*Saxicoloidesfulicatus*	Forest Land	Muscicapidae	-	LC
Indian Roller	*Coraciasbenghalensis*	Forest Land	Coraciidae	Sch-III	LC
Asian Pied Starling	*Sturnus contra*	Forest Land	Sturnidae	-	LC
Asian Palm Swift	*Cypsiurusbalasiensis*	Forest Land	Apodidae	-	LC
Paddyfield Pipit	*Anthusrufulus*	Forest Land	Motacillidae	-	LC
Common Hoopee	*Upupaepops*	Forest Land	Upupidae	Sch-III	LC
Black RumpedFlameback	*Dinopiumbenghalense*	Forest Land	Picidae	Sch-III	LC
White Throated Kingfisher	*Halcyon smyrnensis*	Forest Land	Halcyonidae	Sch-III	LC
Pied Kingfisher	*Cerylerudis*	Riverine	Cerylidae	Sch-III	LC
Fulvus breasted Woodpecker	*Dendrocoposmacei*	Forest Land	Picidae	Sch-III	LC
Shikra	*Accipiter badius*	Forest Land	Accipitridae	Sch-III	LC
White Wagtail	*Motacillaflava*	Agricultural Land	Motacillidae	Sch-III	LC
Intermediate Egret	*Mesophoyxintermedia*	Agricultural Land	Ardeidae	-	LC

Common Name	Scientific Name	Habitat	Family	Bangladesh Wildlife Preventon Order,1973	IUCN Category
Red Wattled Lapwing	*Vanellusindicus*	Riverine	Charadriidae	Sch-III	LC
Asian Koel	*Eudynamysscolopacea*	Homestead Plantation	Cuculidae	Sch-III	LC
Northern Shoveler	*Anasclypeata*	Aquatic	Anatidae	Sch-I	LC
Little Cormorant	*Phalacrocoraxniger*	Aquatic	Phalacrocoracidae	-	LC
Common Sandpiper	*Actitishypoleucos*	Aquatic	Scolopacidae	Sch-I	LC
Rock Pigeon	*Columba livia*	Homestead Plantation	Columbidae	Sch-III	LC
Common Stonechat	*Saxicolatorquata*	Homestead Plantation	Muscicapidae	Sch-III	LC
Great Egret	*Casmerodiusalbus*	Aquatic	Ardeidae	-	LC
Common Myna	*Acridotherestristis*	Homestead Plantation	Sturnidae	Sch-III	LC
Jungle Myna	*Acridotheresgrandis*	Forest Land	Sturnidae	Sch-III	LC
Cattle Egret	*Bubulcus ibis*	Grassland	Ardeidae	Sch-I	LC
Indian Pond Heron	*Ardeolagrayii*	Aquatic	Ardeidae	Sch-I	LC
Rose Ringed Parakeet	*Psittaculakrameri*	Homestead Plantation	Psittaculidae	-	LC
Green Beeeater	*Meropsorientalis*	Homestead Plantation	Meropidae	Sch-III	LC

Source: Field Survey, January 2013

Table 3.0 Reptiles in the Project Influence Area

Common Name	Scientific Name	Habitat	Family	Bangladesh Wildlife Preventon Order,1973	IUCN Category
Grey Indian Monitor	*Varanusbenghalensis*	Forest Land	Varanidae	Sch III	LC
House Gecko	*Hemidactylusbrookii*	Habitation	Gekkonidae	-	LC
Ganges Soft Shell	*Nilssoniagangetica*	Riverine	Trionychidae	Sch III	VU
River Terrapin	*Batagurbaska*	Riverine	Geoemydidae		CR
Striped Roof Turtle	*Kachugadhongoka*	Riverine	Geoemydidae		EN
Oriental Ratsnake	*Ptyasmucosus*	Agriculture Land	Colubridae	-	LC
Rat Snake	*Colubermucosus*	Agriculture Land	Colubridae	-	LC
CheckeredKeelback	*Xenochropispiscator*	Forest	Colubridae	-	LC
Buff striped Keelback	*Amphiesmastolata*	Forest	Colubridae	-	LC

Source: Field Survey, January 2013

Table 4.0 Amphibians in the Project Influence Area

Common Name	Scientific Name	Habitat	Family	Bangladesh Wildlife Preventon Order,1973	IUCN Category
Common Tree Frog	*Polypedatesleucomystax*	Forest	Rhacophoridae	-	LC
Common skittering frog	*Euphlyctiscyanophlyctis*	Stagnant Waterbody	Ranidae	-	LC
Common Indian Toad	*Duttaphrynusmelanostictus*	Agricultural Fields	Bufonidae	-	LC
Common Asian Toad	*Bufomelanostictus*	Forest	Bufonidae	-	LC
Short-headed Burrowing Frog	*Tomopternabreviceps*	Agricultural Fields	Ranidae	-	LC

*Source:*Field Survey and Consultations with locals, January 2013

Table 3.0 Vegetation occurring in Fallow Land

Family	Life Form	Botanical name	Local Name	Frequency	Relative Frequency	Density	Relative Density	Abundance	Relative Abundance	Conservation Status (IUCN)
Asteraceae	Herb	*Xanthium indicum*	Gagra	100	0.23	1.0	0.15	56.3	0.146	-
Thelypteridaceae	Herb	*Alternantherasesilis*	Pteris	67	0.15	0.7	0.02	8.7	0.022	-
Poaceae	Grass	*Cynadondactylon*	Durba	100	0.23	1.0	0.62	238.7	0.619	-
Verbenaceae	Herb	*Lipiaciliata*	Bakan	100	0.23	1.0	0.08	31.7	0.082	-
Cyperaceae	Herb	*Cyperusrotundus*	Mutha	100	0.23	1.0	0.04	15.0	0.039	-
Asteraceae	Herb	*Sphaeranthusindicus*	murmuria	33	0.08	0.3	0.00	1.7	0.004	-
Marsileaceae	Herb	*Marsilia sp.*	Susnisak	33	0.08	0.3	0.00	1.7	0.004	-
Poaceae	Grass	*Saccharumspontaneum*	Kash	33	0.08	0.3	0.01	3.3	0.009	-
Polygonaceae	Herb	*Persicariapraetermissa*	BishKathali	100	0.23	1.0	0.00	1.3	0.003	-
Euphorbiaceae	Herb	*Croton caudatus*	Bon Morich	67	0.15	0.7	0.00	1.0	0.003	-
Lamiaceae	Shrub	*Anisomelesindica*	Gobura	67	0.15	0.7	0.01	2.3	0.006	-
Caesalpiniaceae	Shrub	*Cassia sophera*	Kolkasunda	33	0.08	0.3	0.00	0.7	0.002	-
Caesalpiniaceae	Shrub	*Cassia tora*	ChotoChakunda	100	0.23	1.0	0.03	11.3	0.029	-
Labiatae	Herb	*Lencasindica*	DondoKolosh	33	0.08	0.3	0.00	0.7	0.002	-
Poaceae	Grass	*Chrysopogonacuculatus*	Prem Kanta	33	0.08	0.3	0.02	6.7	0.017	-
Fabaceae	Shrub	*Crotalaria pallida*	Jhunjhuni	67	0.15	0.7	0.00	1.0	0.003	-
Fabaceae	Herb	*Desmodiumtriflorum*	Kodalia	100	0.23	1.0	0.00	1.3	0.003	-
Fabaceae	Herb	*Desmodiumgangeticum*	-	33	0.08	0.3	0.00	0.3	0.001	-
Lamiaceae	Herb	*Leonurussibiricus*	Raktodron	33	0.08	0.3	0.00	0.3	0.001	-
Verbenaceae	Herb	*Phyla nodiflora*	Bakkun	33	0.08	0.3	0.00	0.3	0.001	-
Plantaginaceae	Herb	*Scopariadulcis*	Misrirdana	33	0.08	0.3	0.00	0.7	0.002	-
Solanaceae	Shrub	*Solanumvirginianum*	Kantakari	33	0.08	0.3	0.00	0.7	0.002	-

Source: Field Survey, Jan 2013

Table 4.0 Vegetation occurring in Grassland

Family	Life Form	Botanical name	Local Name	Frequency	Relative Frequency	Density	Relative Density	Abundance	Relative Abundance	Conservation Status (IUCN)

Family	Life Form	Botanical name	Local Name	Frequency	Relative Frequency	Density	Relative Density	Abundance	Relative Abundance	Conservation Status (IUCN)
Ephorbiace	Herb	*Euphorbia hirta*	Dhudhia	75	0.21	0.8	0.012	14.3	0.013	-
Solanaceae	Herb	*Solanumxanthocarpum*	Kontikari	75	0.21	0.8	0.004	4.3	0.004	-
Poaceae	Grass	*Sparobollusdiander*	Benajoni	75	0.21	0.8	0.004	5.0	0.005	-
Fabaceae	Herb	*Desmodiumtrifolium*	Tripotri	100	0.28	1.0	0.033	29.5	0.027	-
Poaceae	Grass	*Saccharumspontaneum*	Kash	75	0.21	0.8	0.004	5.0	0.005	-
Euphorbiaceae	Herb	*Croton sp.*	Bon Marich	50	0.14	0.5	0.002	3.5	0.003	-
Linderniaceae	Herb	*Lindernia sp.*	Sukuria	50	0.14	0.5	0.004	7.5	0.007	-
Linderniaceae	Herb	*Linderniaciliata*	Bhui	50	0.14	0.5	0.003	4.5	0.004	-
Poaceae	Grass	*Imperatacylinderica*	Son	100	0.28	1.0	0.849	751.8	0.700	-
Fabaceae	Herb	*Crotalaria sp.*	Jhonjhoni	25	0.07	0.3	0.002	6.0	0.006	-
Lamiaceae	Herb	*Anisoiles sp.*	Gobura	50	0.14	0.5	0.001	1.5	0.001	-
Euphorbiaceae	Herb	*Phyllanthusvirgatus*	BhuiAmla	50	0.14	0.5	0.003	4.5	0.004	-
Solanaceae	Herb	*Physalismicrantha*	Futka	50	0.14	0.5	0.002	3.0	0.003	-
Euphorbiaceae	Herb	*Euphorbia nirifolia*	Dhudhia	25	0.07	0.3	0.001	5.0	0.005	-
Cyperaceae	Sedges	*Fimbristyllis sp.*	-	50	0.14	0.5	0.010	18.0	0.017	-
Cucurbitaceae	Climber	*Mukia sp.*	Mukhia	50	0.14	0.5	0.003	4.5	0.004	-
Tiliaceae	Herb	*Triumfettarhomboidea*	Bon Okra	75	0.21	0.8	0.003	3.3	0.003	-
Lamiaceae	Herb	*Leucasindica*	Dron	50	0.14	0.5	0.001	2.5	0.002	-
Commelinaceae	Herb	***Murdannianudiflora***	Kanduli	25	0.07	0.3	0.003	12.0	0.011	-
Malvaceae	Herb	*Sidarombifolia*	Berela	50	0.14	0.5	0.003	5.5	0.005	-
Plantaginaceae	Herb	*Scopariadulsis*	Misrirdana	50	0.14	0.5	0.001	2.5	0.002	-
Poaceae	Grass	*Cynodondactylon*	Durba	25	0.07	0.3	0.028	100.0	0.093	-
Poaceae	Gass	*Paspalam sp.*	Ghash	25	0.07	0.3	0.001	5.0	0.005	-
Poaceae	Grass	*Panicum sp.*	China	25	0.07	0.3	0.001	5.0	0.005	-
Verbenaceae	Herb	*Phyla nodiflora*	Bhui Okra	25	0.07	0.3	0.001	3.0	0.003	-
Euphorbiaceae	Sedges	*Euphorbia sp.*	Green Dhunia	25	0.07	0.3	0.006	20.0	0.019	-
Cyperaceae	Herb	*Cyperus sp.*	Mutha	25	0.07	0.3	0.008	30.0	0.028	-
Poaceae	Grass	***Eleusineindica***	-	25	0.07	0.3	0.004	13.0	0.012	-
Malvaceae	Herb	*Sidaacuta*	-	50	0.14	0.5	0.002	3.5	0.003	-

Source: Field Survey, Jan 2013

Table 5.0 Vegetation occurring in Homestead Plantation

Family	Life Form	Botanical name	Local Name	Frequency	Relative Frequency	Density	Relative Density	Abundance	Relative Abundance	Conservation Status(IUCN)
Annonaceae	Tree	*Anonasquamosa*	Ata	33	0.04	0.3	0.000011	5.0	0.025	-
Arecaceae	Tree	*Cocosnucifera*	Narikel	100	0.13	1.0	0.000014	2.0	0.010	-
Myrtaceae	Tree	*Eucalyptus citriodora*	Eucalyptus	100	0.13	1.0	0.000064	9.3	0.047	-
Anacardiaceae	Tree	*Mangiferaindica*	Am	100	0.13	1.0	0.000064	9.3	0.047	-
Solanaceae	Shrub	*Solanummelongena*	Begun	67	0.09	0.7	0.000130	28.5	0.143	-
Fabaceae	Shrub	*Cajanuscajan*	Orhor	33	0.04	0.3	0.000002	1.0	0.005	-
Myrtaceae	Tree	*Psidiumguajava*	Peara	100	0.13	1.0	0.000020	3.0	0.015	-
Euphorbiaceae	Tree	*Ricinuscummunis*	Redi	100	0.13	1.0	0.000114	16.7	0.083	-
Sapindaceae	Tree	*Lichichinensis*	Lichi	67	0.09	0.7	0.000007	1.5	0.008	-
Rhmnaceae	Tree	*Ziziphusmauritiana*	Boroi	100	0.13	1.0	0.000027	4.0	0.020	-
Caricaceae	Tree	*Carica papaya*	Pepe	67	0.09	0.7	0.000011	2.5	0.013	-
Anacardiaceae	Tree	*Lanneacoramandelica*	Jiga	100	0.13	1.0	0.000059	8.7	0.043	-
Moringaceae	Tree	*Moringaoleifera*	Sajna	100	0.13	1.0	0.000011	1.7	0.008	-
Oleaceae	Tree	*Oleaeuropaea*	Jalpal	33	0.04	0.3	0.000005	2.0	0.010	-
Rutaceae	Tree	*Citrus aurantifolia*	Lebu	100	0.13	1.0	0.000009	1.3	0.007	-
Meliaceae	Tree	*Sweiteniamahagoni*	Mehogoni	67	0.09	0.7	0.000027	6.0	0.030	EN
Musaceae	Tree	*Musa sapientum*	Kola	100	0.13	1.0	0.000198	29.0	0.145	-
Musaceae	Tree	*Musa paradisica*	Anaj Kola	67	0.09	0.7	0.000068	15.0	0.075	-
Moraceae	Tree	*Atrocarpusheterophyllus*	Kathal	100	0.13	1.0	0.000020	3.0	0.015	-
Moraceae	Tree	*Ficushispida*	Durmur	100	0.13	1.0	0.000016	2.3	0.012	-
Fabaceae	Tree	*Dalbergiasisso*	Sishu	33	0.04	0.3	0.000002	1.0	0.005	-
Cucurbitaceae	Climber	*Lagenaria vulgaris*	Lau	67	0.09	0.7	0.000014	3.0	0.015	-
Myrtaceae	Tree	*Syzygiumcumunii*	Jam	67	0.09	0.7	0.000009	2.0	0.010	-
Lytharaceae	Tree	*Lawsomiainermis*	Mehedi	33	0.04	0.3	0.000002	1.0	0.005	-
Ulmaceae	Tree	*Tremaamboinensis*	Jibon	33	0.04	0.3	0.000005	2.0	0.010	-
Rutaceae	Tree	*Aeglemarmelos*	Bel	33	0.04	0.3	0.000009	4.0	0.020	-
Solanaceae	Shrub	*Capsicum frutescens*	Morich	67	0.09	0.7	0.000011	2.5	0.013	-
Araceae	Shrub	*ocasiaesculenta*	Kochu	100	0.13	1.0	0.000159	23.3	0.117	-
Fabaceae	Tree	*Pithecellobiumdulce*	Khaifal	33	0.04	0.3	0.000002	1.0	0.005	-
Anacardiaceae	Tree	*Spondiasmangifera*	Amra	33	0.04	0.3	0.000005	2.0	0.010	-

Family	Life Form	Botanical name	Local Name	Frequency	Relative Frequency	Density	Relative Density	Abundance	Relative Abundance	Conservation Status(IUCN)
Dioscoreaceae	Climber	*Dioscoria sp.*	KesaurAlu	33	0.04	0.3	0.000002	1.0	0.005	-
Euphorbiaceae	Tree	*Trewiapolycarpa*	Latimgofa	33	0.04	0.3	0.000009	4.0	0.020	-
Nyctaginaceae	Herb	*Mirabilis jalapa*	Sanda Maloti	33	0.04	0.3	0.000002	1.0	0.005	-

Source: Field Survey, Jan 2013

Table 6.0 Vegetation occurring in Riverine Land

Family	Life Form	Botanical name	Local Name	Frequency	Relative Frequency	Density	Relative Density	Abundance	Relative Abundance	Conservation Status(IUCN)
Convolvulaceae	Shrub	*Ipomeafistulosa*	Dolkolmi	33	0.06	0.3	0.0006	20.0	0.04	-
Asteraceae	Climber	*Mikaniacordata*	Asamlata	33	0.06	0.3	0.0003	10.0	0.02	-
Euphorbiaceae	Tree	*Treviapolycarpa*	Latim	33	0.06	0.3	0.0001	2.0	0.00	-
Pontederiaceae	Herb	*Eichorniacrassipes*	Kochuri	33	0.06	0.3	0.0003	10.0	0.02	-
Verbanaceae	Shrub	*Lipiajeminata*	Matmoti	33	0.06	0.3	0.0001	5.0	0.01	-
Scrofulariaceae	Herb	*Linderinaciliata*	Bhui	100	0.19	1.0	0.0022	24.3	0.05	-
Cyperaceae	Sedge	*Cyperusrotundus*	Mutha	100	0.19	1.0	0.0090	100.3	0.20	-
Poaceae	Grass	*Saccharumspontaneum*	Kash	100	0.19	1.0	0.0095	106.0	0.21	-
Amaranthaceae	Herb	*Alternantherasesilis*	Hycha	67	0.13	0.7	0.0009	15.0	0.03	-
Verbanaceae	Herb	*Lippia alba*	nona	100	0.19	1.0	0.0013	14.3	0.03	-
Poaceae	Grass	*Cynodondactylon*	Durba	100	0.19	1.0	0.0057	64.0	0.13	-
Cyperaceae	Sedge	*Fimbristylis sp.*	-	100	0.19	1.0	0.0019	21.7	0.04	-
Lytheraceae	Herb	*Amania sp.*	-	67	0.13	0.7	0.0006	10.5	0.02	-
Onagraceae	Herb	*Ludwigiadecurrens*	Panilong	67	0.13	0.7	0.0003	5.0	0.01	-
Asteraceae	Herb	*Grangia sp.*	-	100	0.19	1.0	0.0013	14.3	0.03	-
Poaceae	Grass	*Phragmiteskarka*	Nil Khagra	33	0.06	0.3	0.0003	10.0	0.02	--
Rananculaceae	Herb	*Rananculus sp.*	JalDhunia	100	0.19	1.0	0.0027	30.0	0.06	--
Polygonaceae	Herb	*Rumax sp.*	Bon Polong	100	0.19	1.0	0.0007	7.7	0.02	-
Mackinlayaceae	Herb	*Hydrocotylasiatica*	-	100	0.19	1.0	0.0004	4.7	0.01	-
Mackinlayaceae	Herb	*Centellaasiatica*	Thankuni	67	0.13	0.7	0.0004	6.0	0.01	-
Rubiaceae	Herb	*Dentella sp.*	Bhuipat	100	0.19	1.0	0.0015	17.0	0.03	-

Source: Field Survey, Jan 2013

Annex N

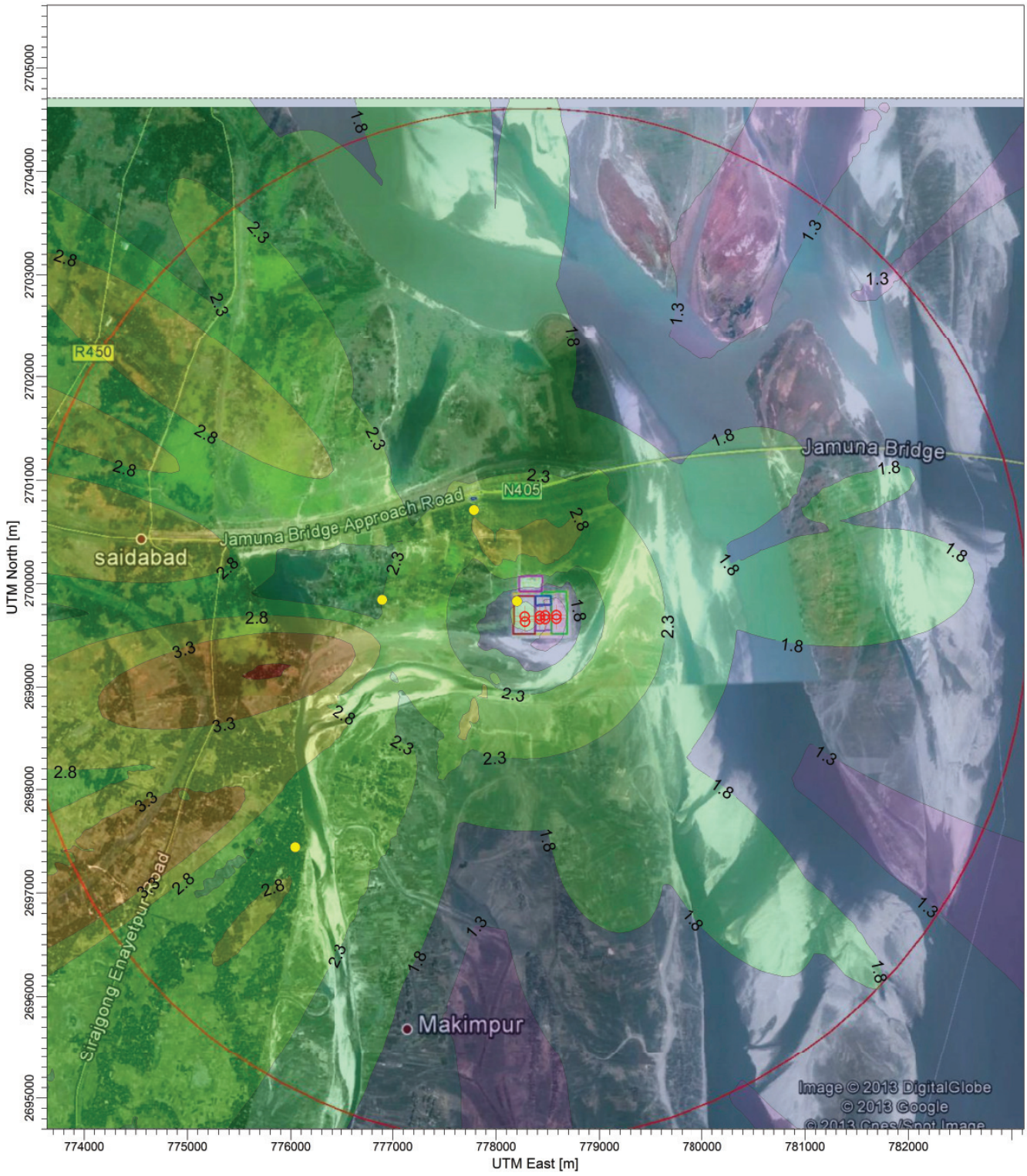
Isopleths of Air Quality Prediction Results

Annex N1

Simple Cycle Operation of S4 Plant

Sirajganj 4 Power Project

1-Hourly Maximum NOx Concentration
Simple Cycle Operation of S4 with NG as Fuel



PLOT FILE OF HIGH 1ST HIGH 1-HR VALUES FOR SOURCE GROUP: SIMPLECY

ug/m^3

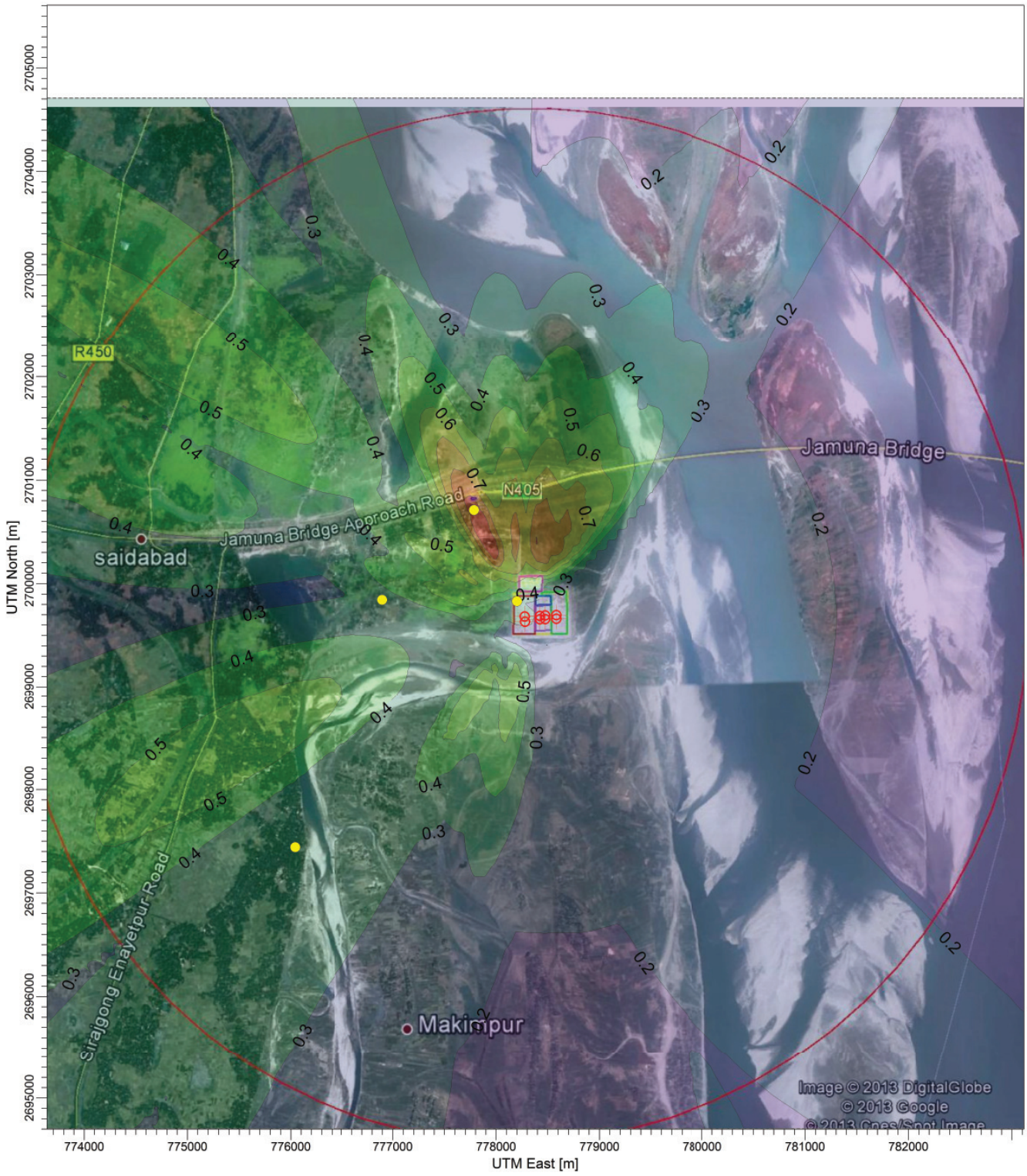
Max: 3.8 [ug/m^3] at (775689.06, 2699108.15)

0.8 1.3 1.8 2.3 2.8 3.3 3.8

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 3.8 ug/m^3	10/27/2015	0276008

Sirajganj 4 Power Project

24-Hourly Maximum NOx Concentration
Simple Cycle Operation of S4 with NG as Fuel



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: SIMPLECY

ug/m^3

Max: 1.0 [ug/m^3] at (777889.06, 2700508.15)

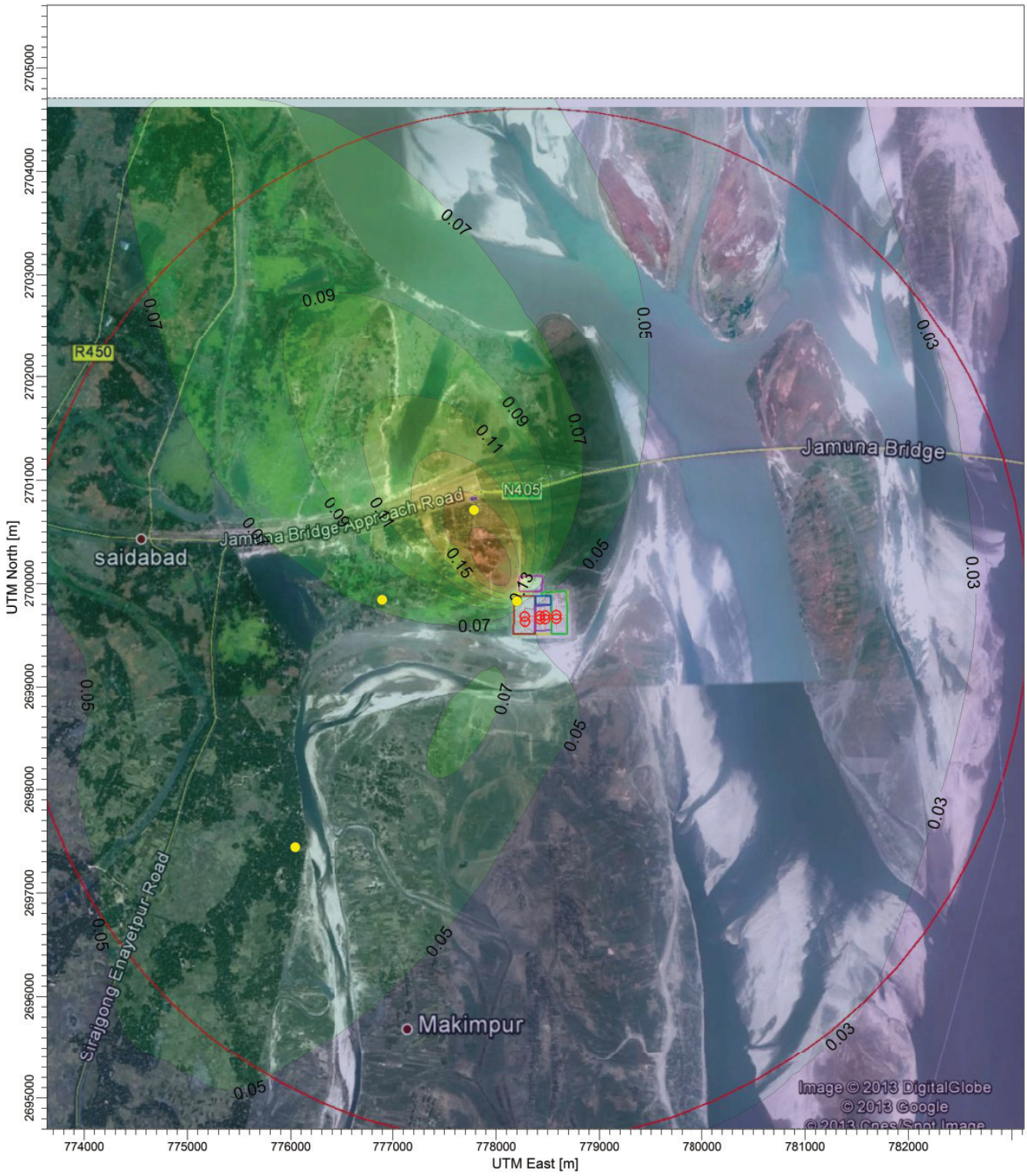
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 1.0 ug/m^3	10/27/2015	0276008

AERMOD View - Lakes Environmental Software

Sirajganj 4 Power Project

Annual Average NOx Concentration
Simple Cycle Operation of S4 with NG as Fuel



PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: SIMPLECY

ug/m^3

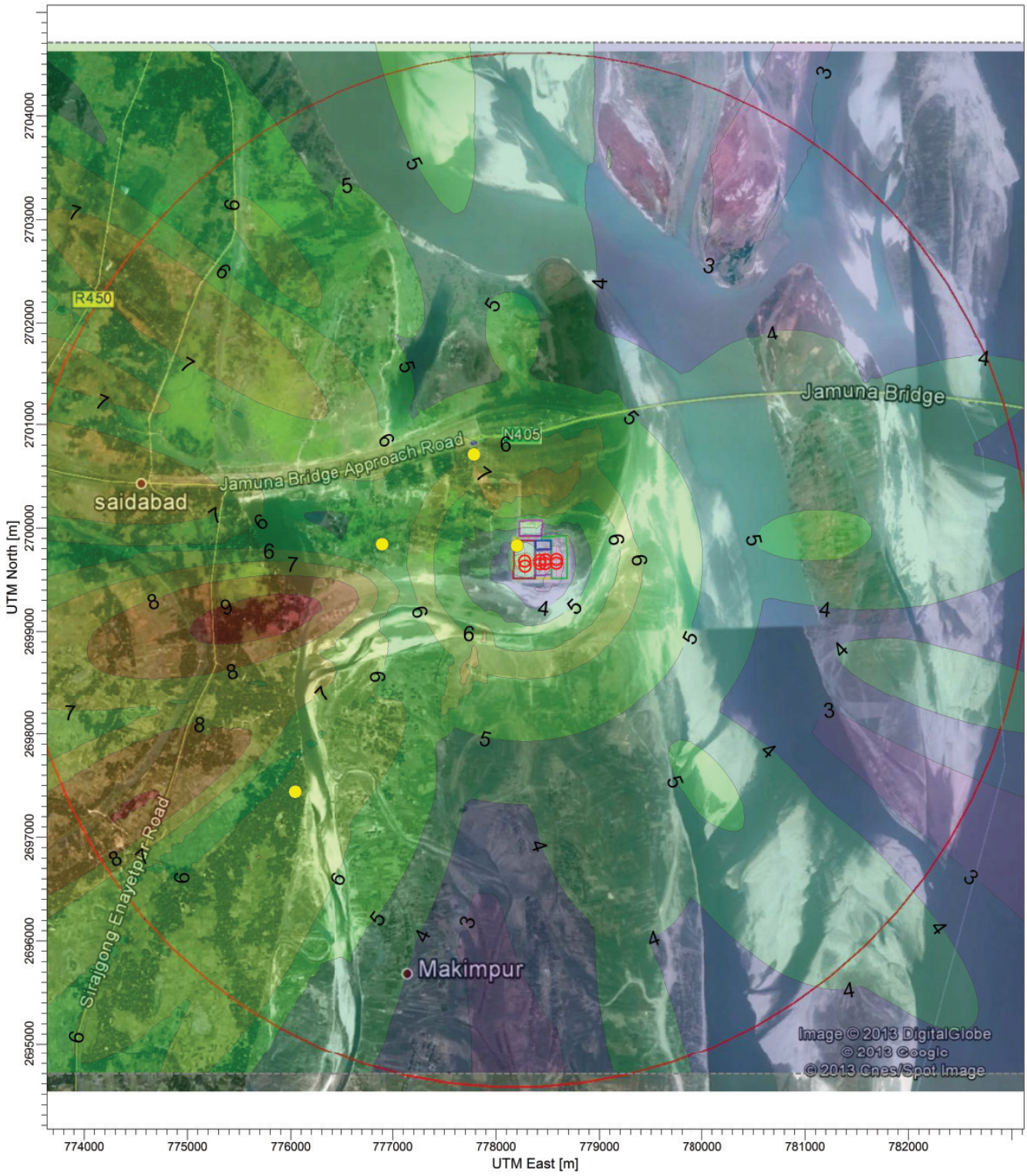
Max: 0.19 [ug/m^3] at (777989.06, 2700208.15)

0.02 0.03 0.05 0.07 0.09 0.11 0.13 0.15 0.17 0.19

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 0.19 ug/m^3	10/27/2015	0276008

Sirajganj 4 Power Project

1-Hourly Maximum CO Concentration
Simple Cycle Operation of S4 with NG



PLOT FILE OF HIGH 1ST HIGH 1-HR VALUES FOR SOURCE GROUP: SIMPLECY

ug/m^3

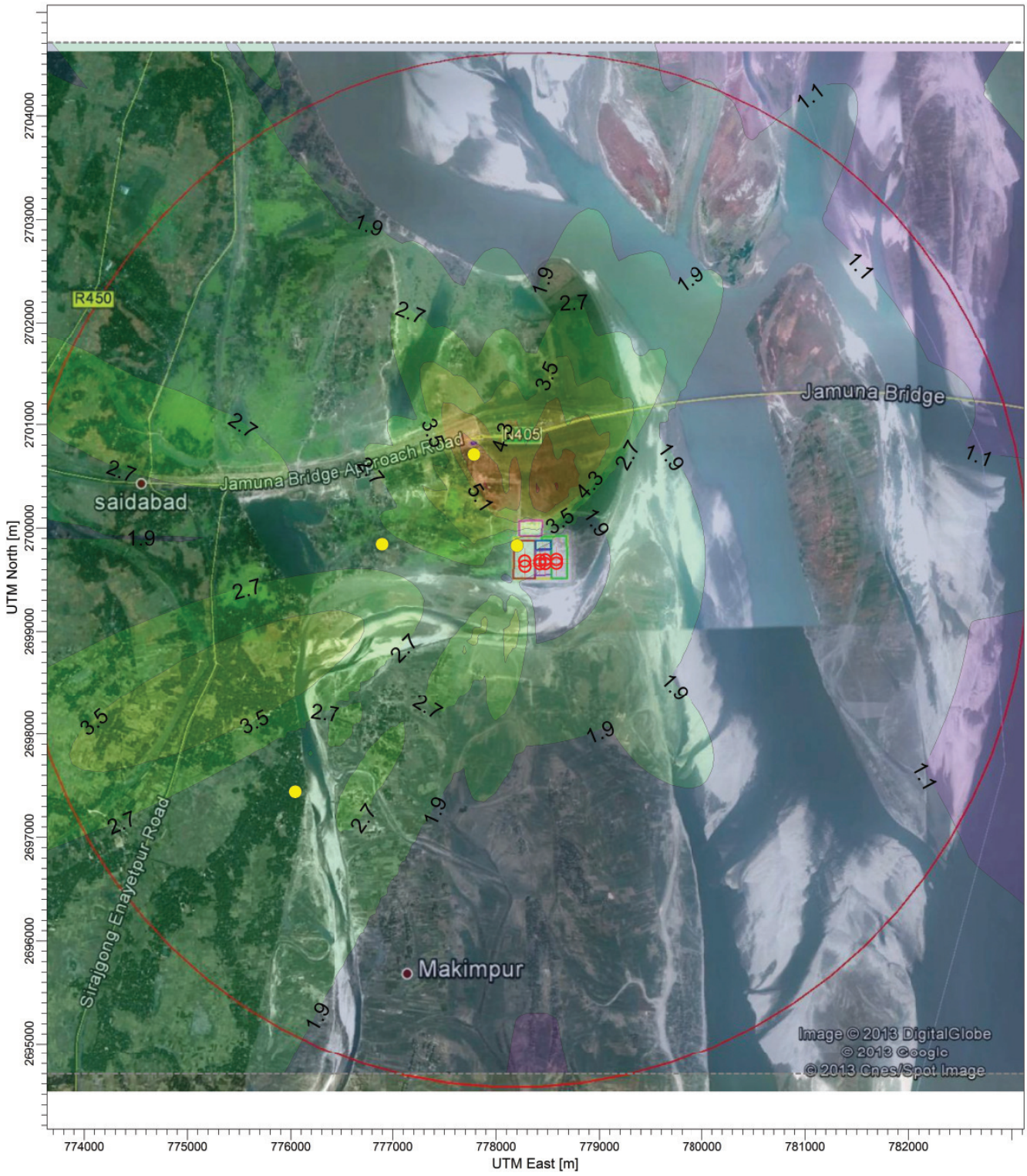
Max: 9 [ug/m^3] at (775689.06, 2699108.15)

2 3 4 5 6 7 8 9

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 9 ug/m^3	10/27/2015	0276008

Sirajganj 4 Power Project

8-Hourly Maximum CO Concentration
Simple Cycle Operation of S4 with NG



PLOT FILE OF HIGH 1ST HIGH 8-HR VALUES FOR SOURCE GROUP: SIMPLECY

ug/m^3

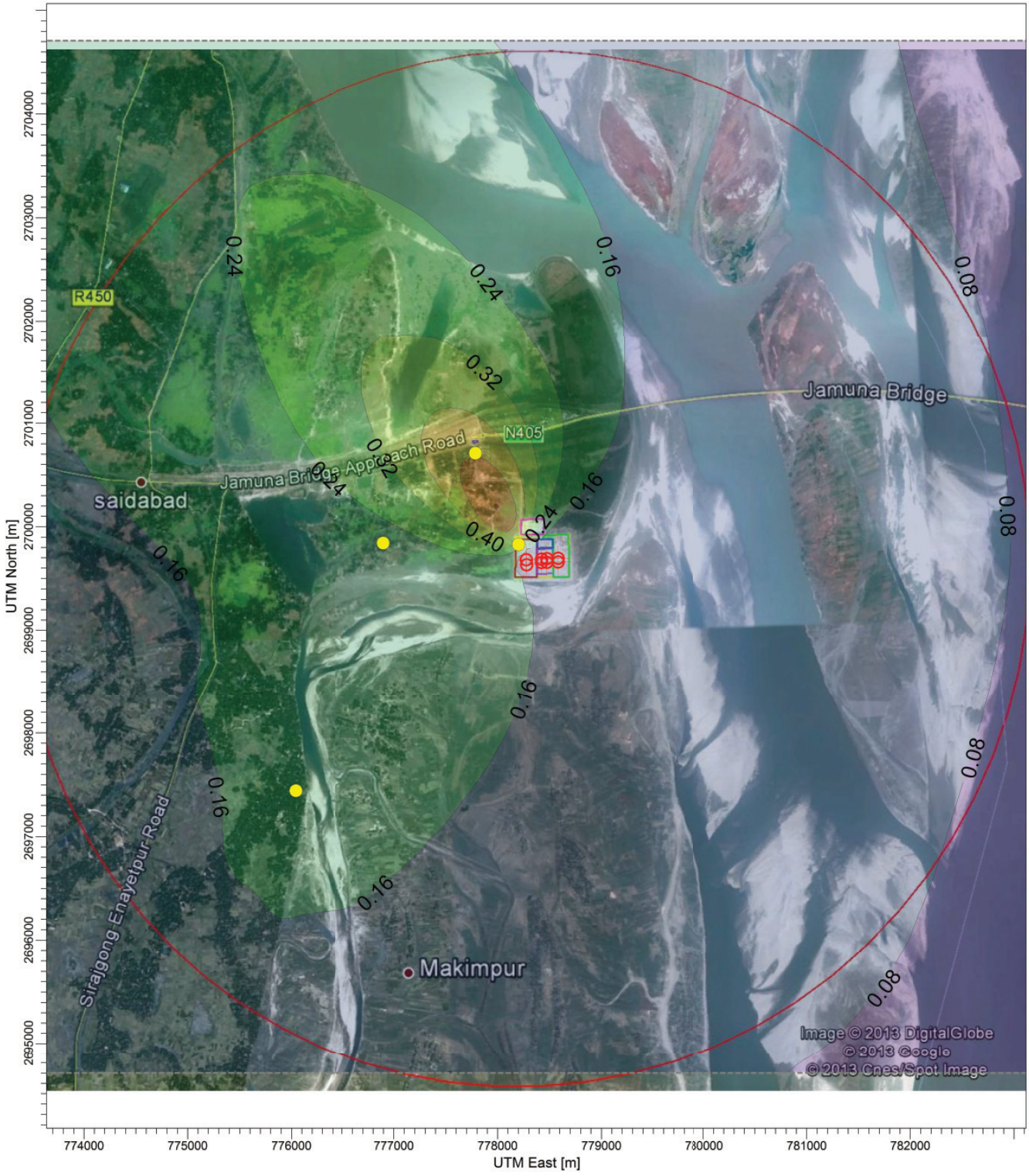
Max: 6.0 [ug/m^3] at (778589.06, 2700408.15)

0.8 | 1.1 | 1.9 | 2.7 | 3.5 | 4.3 | 5.1 | 5.9

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 6.0 ug/m^3	10/27/2015	0276008

Sirajganj 4 Power Project

Annual Average NOx Concentration
Simple Cycle - S4 with HSD as Fuel



PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: SIMFLECY

ug/m^3

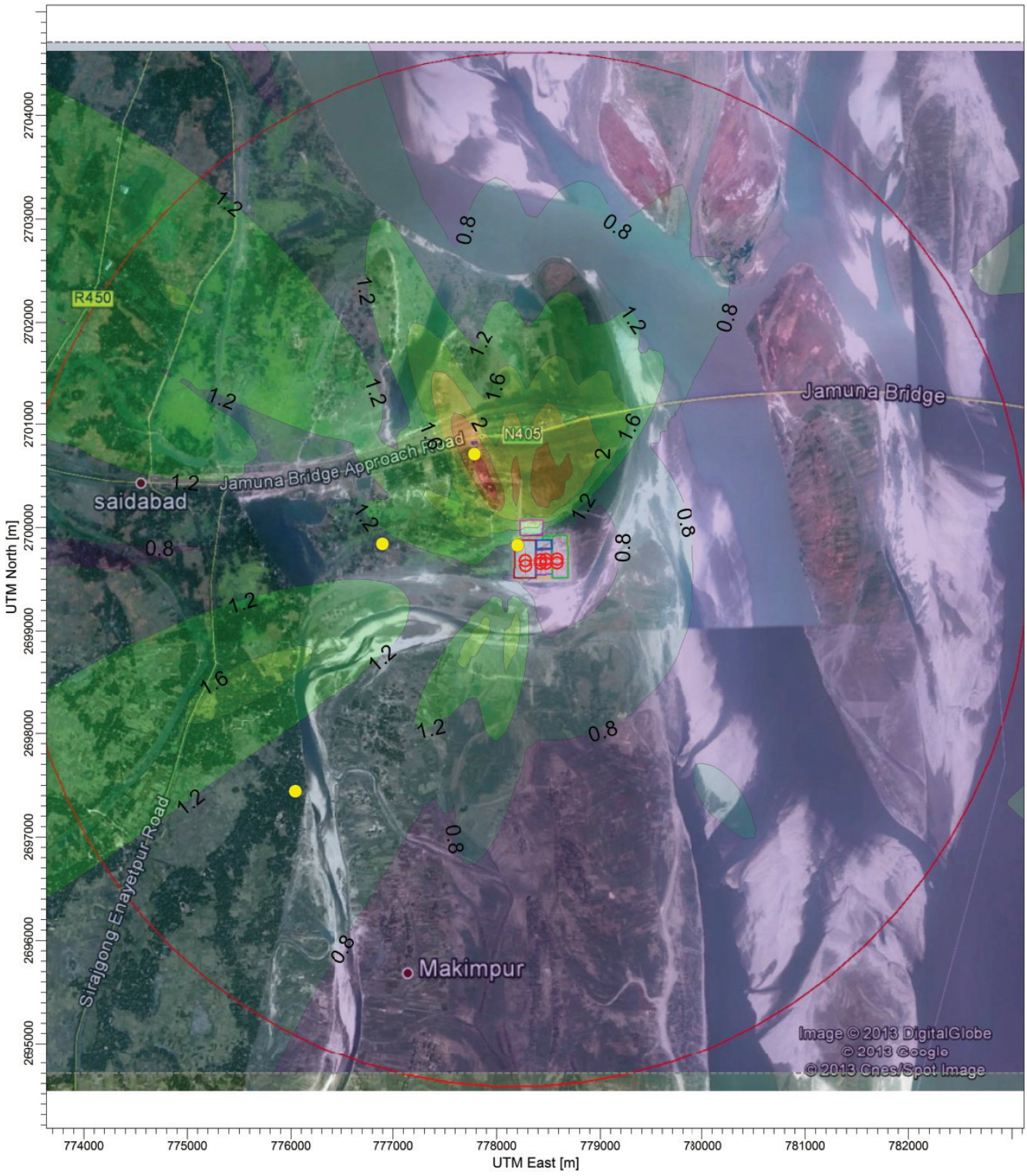
Max: 0.56 [ug/m^3] at (777989.06, 2700208.15)

0.06 0.08 0.16 0.24 0.32 0.40 0.48 0.56

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 0.56 ug/m^3	10/28/2015	0276008

AERMOD View - Lakes Environmental Software

24 Hourly Maximum NOx Concentration
Simple Cycle - S4 with HSD as Fuel



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: SIMPLECY

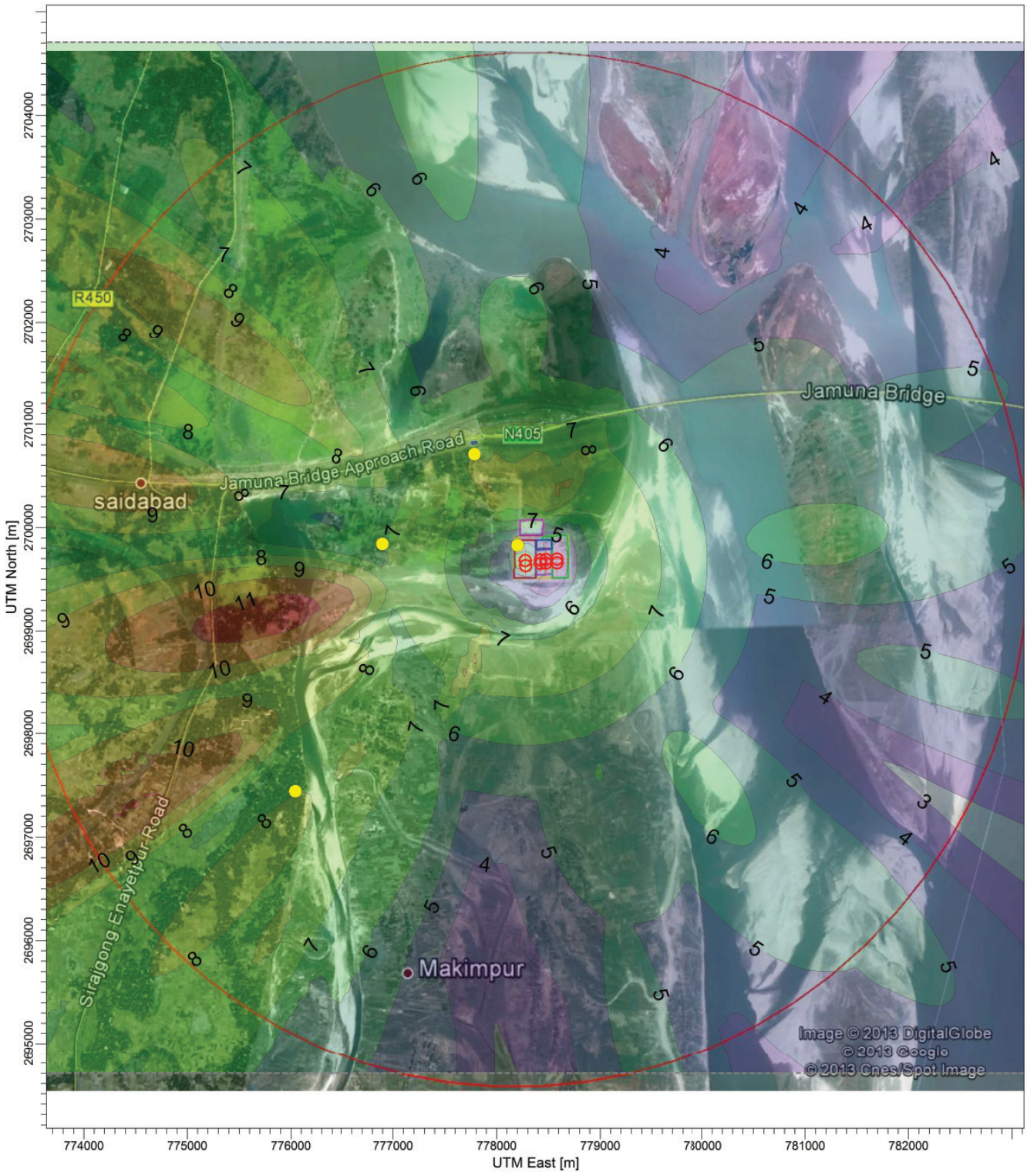
ug/m^3

Max: 3.0 [ug/m^3] at (777889.06, 2700508.15)

0.4 0.8 1.2 1.6 2.0 2.4 2.8

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 3.0 ug/m^3	10/28/2015	0276008

1 Hourly Maximum NOx Concentration
Simple Cycle - S4 with HSD as Fuel



PLOT FILE OF HIGH 1ST HIGH 1-HR VALUES FOR SOURCE GROUP: SIMPLECY

ug/m^3

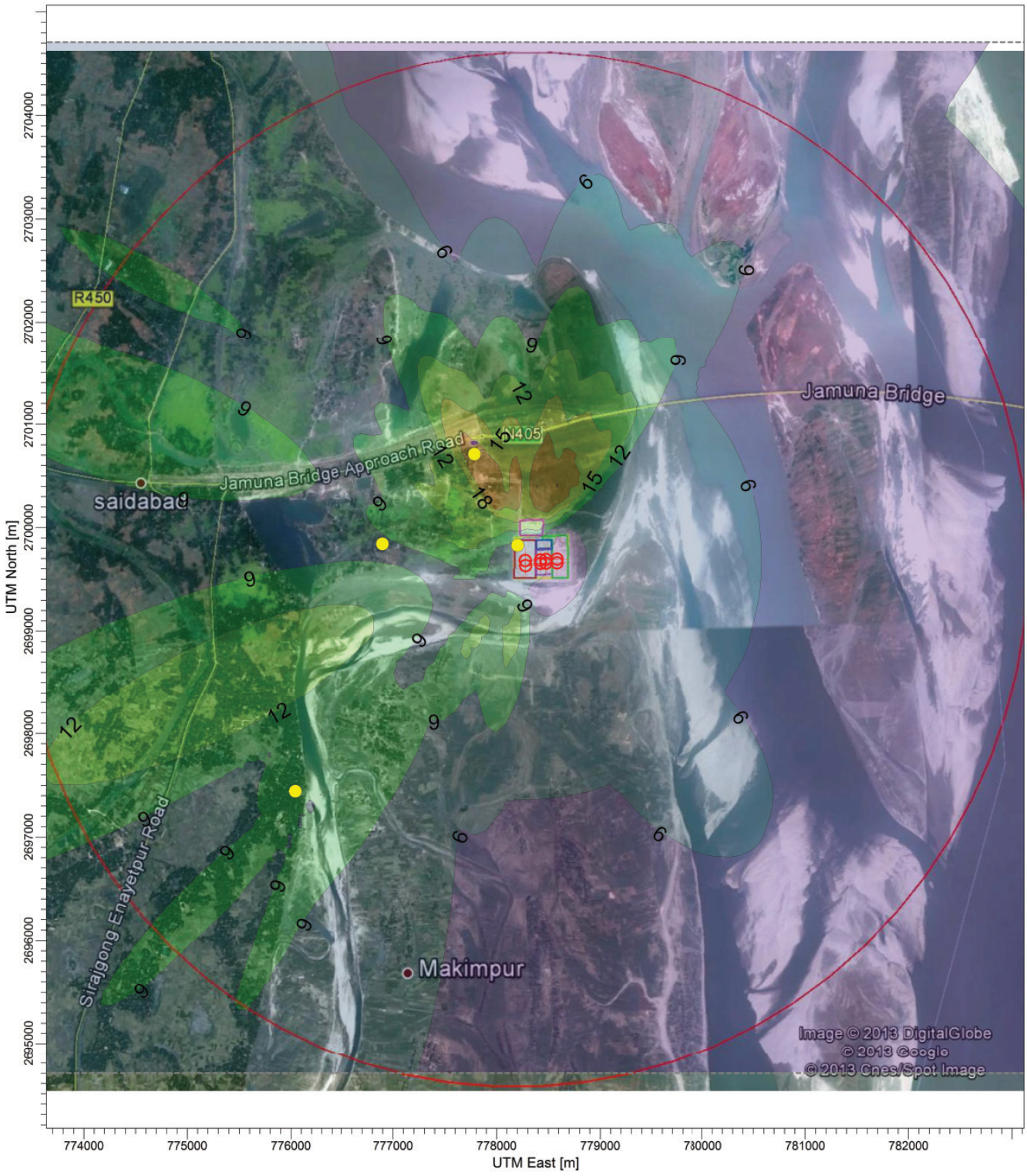
Max: 11 [ug/m^3] at (775689.06, 2699108.15)

3 4 5 6 7 8 9 10 11

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 11 ug/m^3	10/28/2015	0276008

Sirajganj 4 Power Project

8-Hourly Maximum CO Concentration
Simple Cycle Operation of S4 with HSD as Fuel



PLOT FILE OF HIGH 1ST HIGH 8-HR VALUES FOR SOURCE GROUP: SIMPLECY

ug/m^3

Max: 21 [ug/m^3] at (778589.06, 2700408.15)

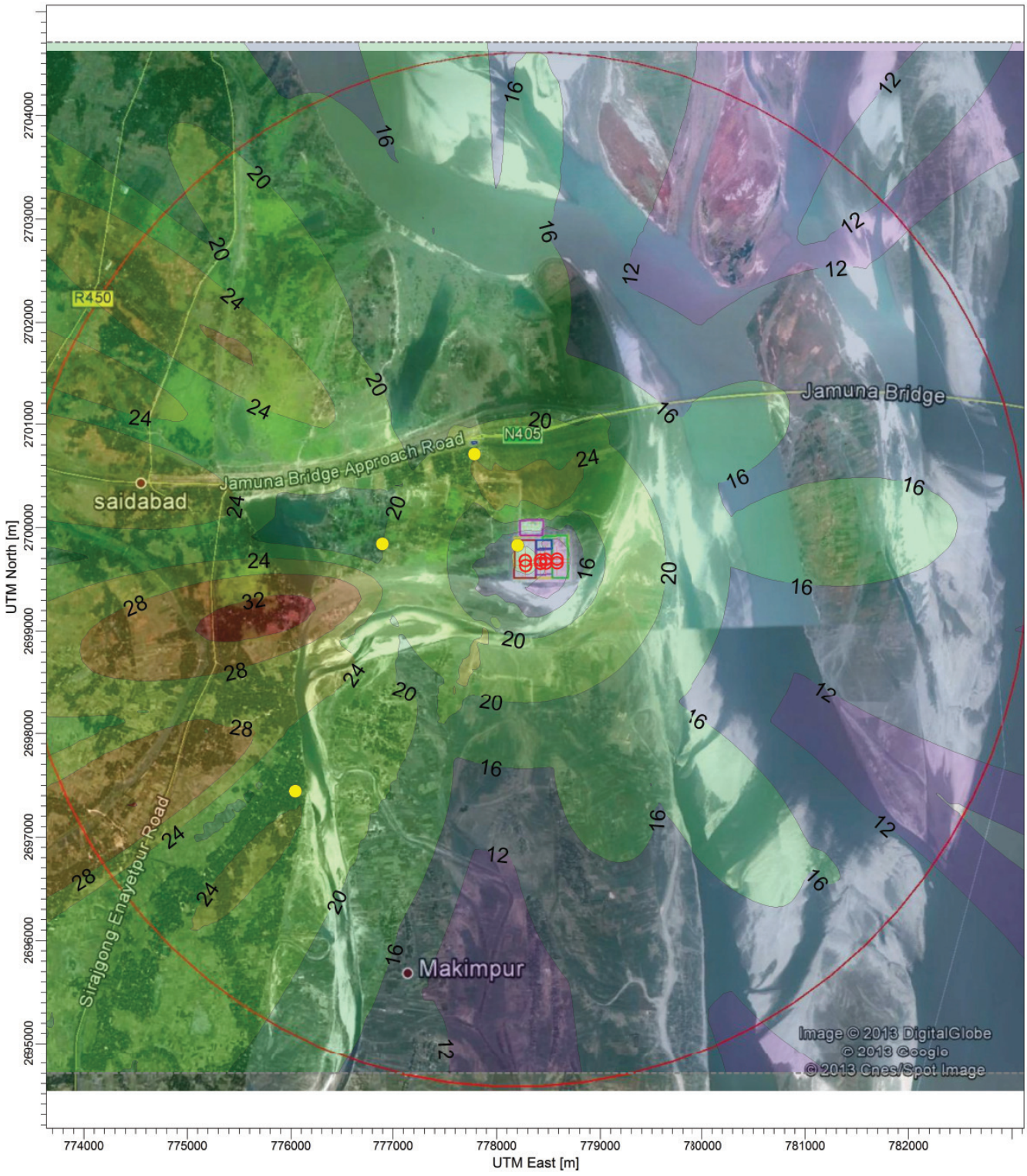
3 6 9 12 15 18 21

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 21 ug/m^3	10/28/2015	0276008

AERMOD View - Lakes Environmental Software

Sirajganj 4 Power Project

1-Hourly Maximum CO Concentration
Simple Cycle Operation of S4 with HSD as Fuel



PLOT FILE OF HIGH 1ST HIGH 1-HR VALUES FOR SOURCE GROUP: SIMPLECY

ug/m^3

Max: 33 [ug/m^3] at (775689.06, 2699108.15)

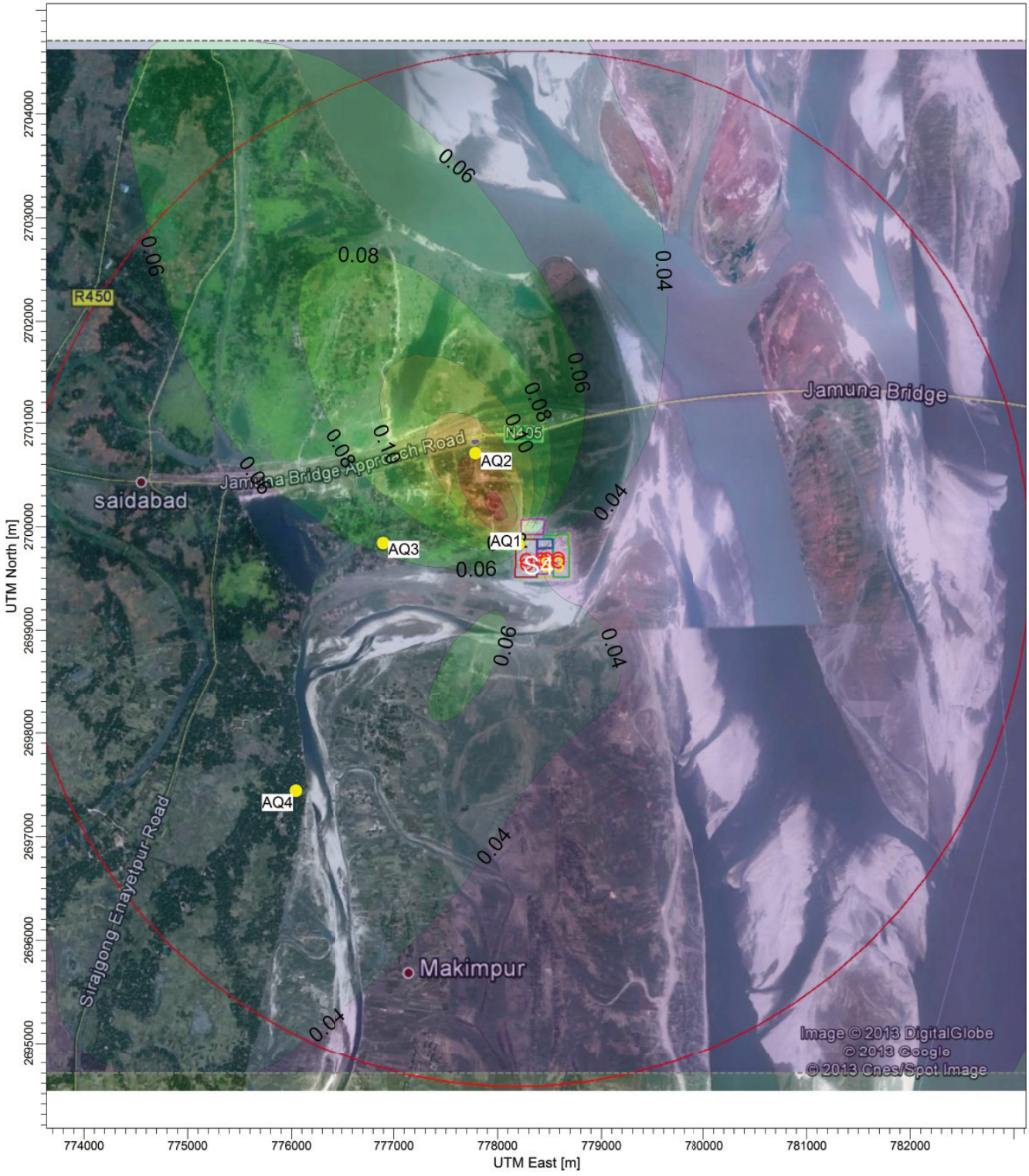
8 12 16 20 24 28 32

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 33 ug/m^3	10/28/2015	0276008

AERMOD View - Lakes Environmental Software

Sirajganj 4 Power Project

Annual Average - PM2.5 Concentration
Simple Cycle - S4 with HSD as Fuel



PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: SIMFLECY

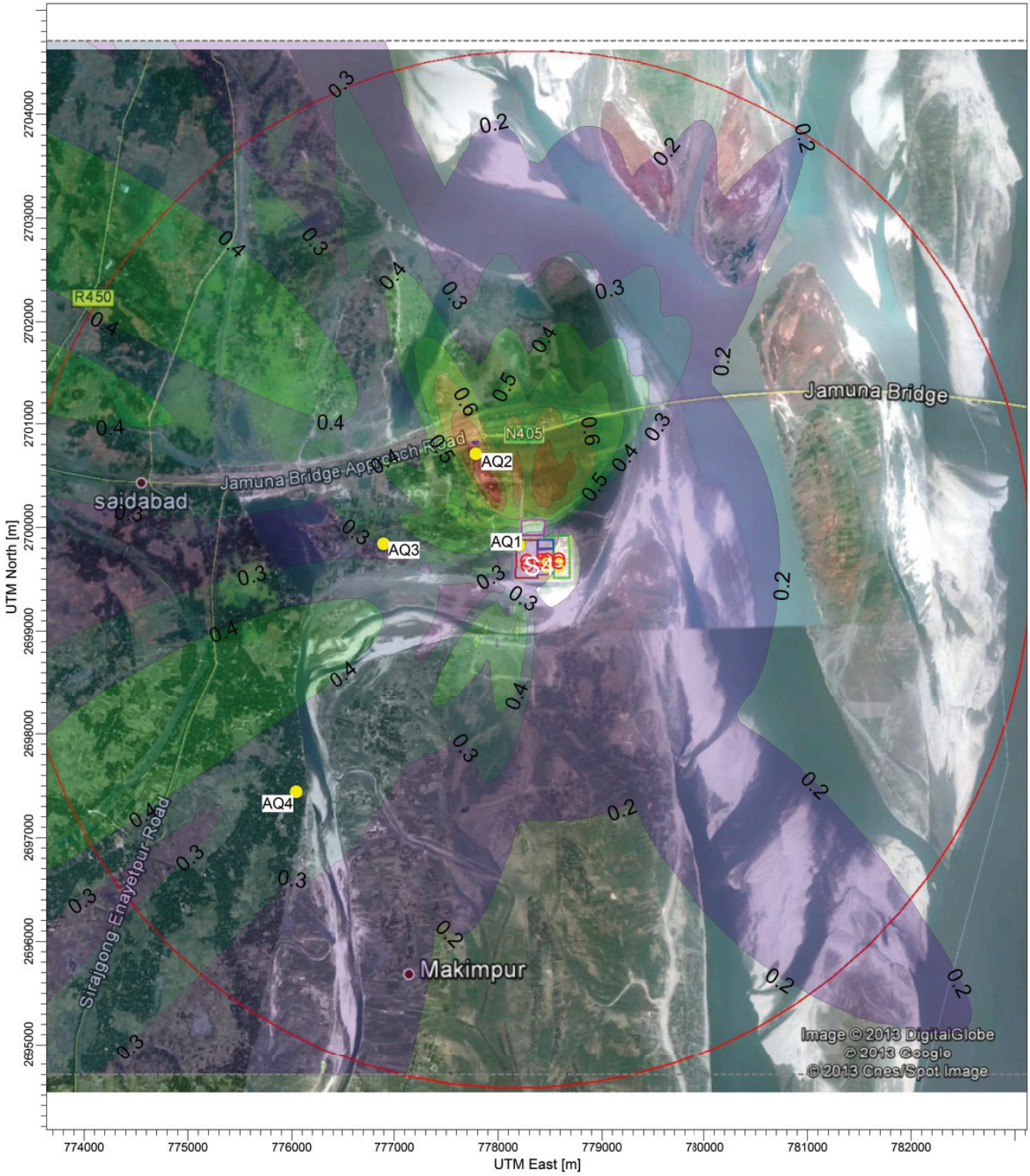
ug/m^3

Max: 0.17 [ug/m^3] at (777989.06, 2700208.15)

0.02 0.04 0.06 0.08 0.10 0.12 0.14 0.16

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 0.17 ug/m^3	10/28/2015	0276008

24 Hourly Maximum - PM2.5 Concentration
Simple Cycle - S4 with HSD as Fuel



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: SIMPLECY

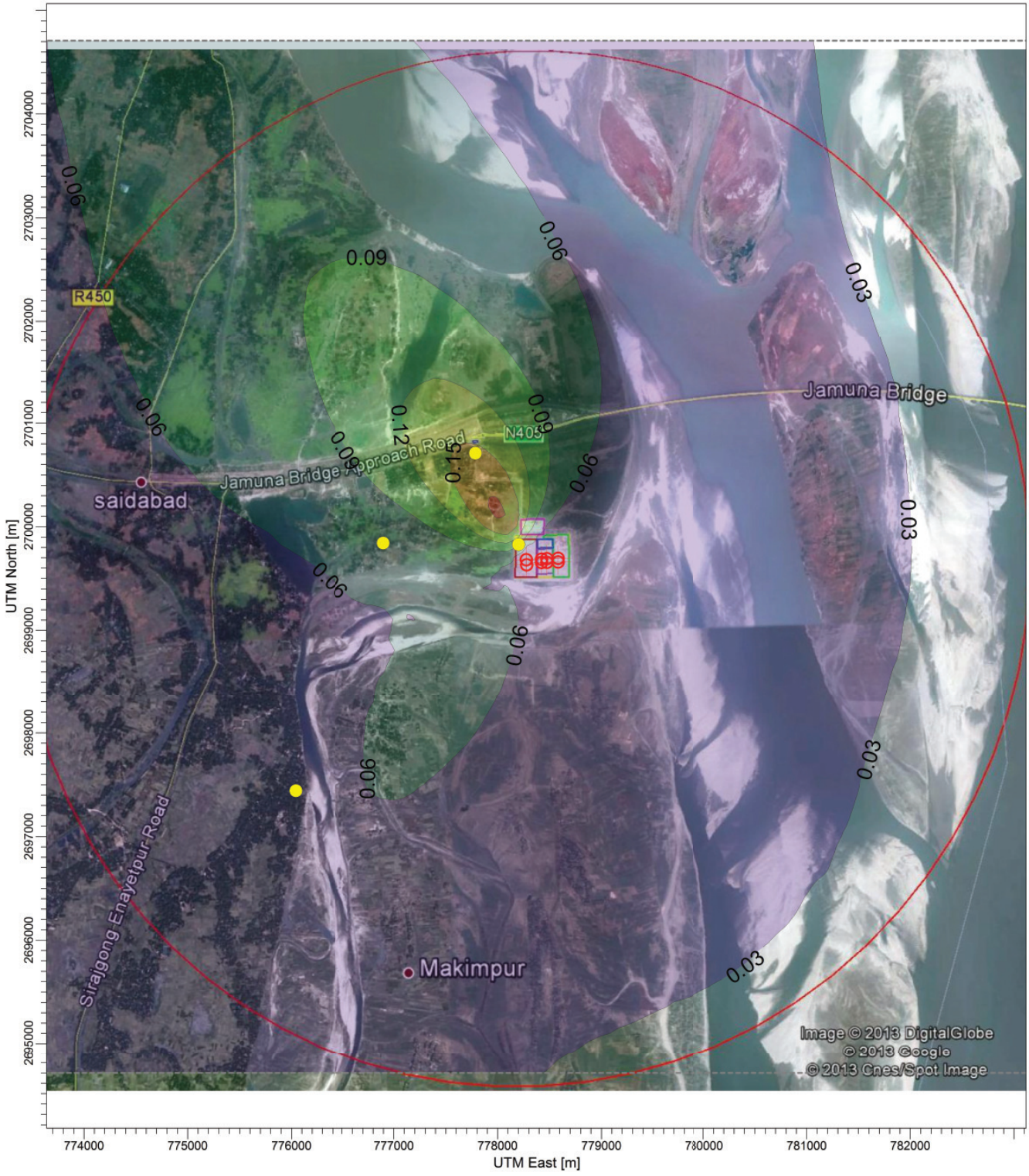
ug/m^3

Max: 0.9 [ug/m^3] at (777889.06, 2700508.15)

0.2 0.3 0.4 0.5 0.6 0.7 0.8

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 0.9 ug/m^3	10/28/2015	0276008

Annual Average - PM10 Concentration
Simple Cycle - S4 with HSD as Fuel



PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: SIMFLECY

ug/m^3

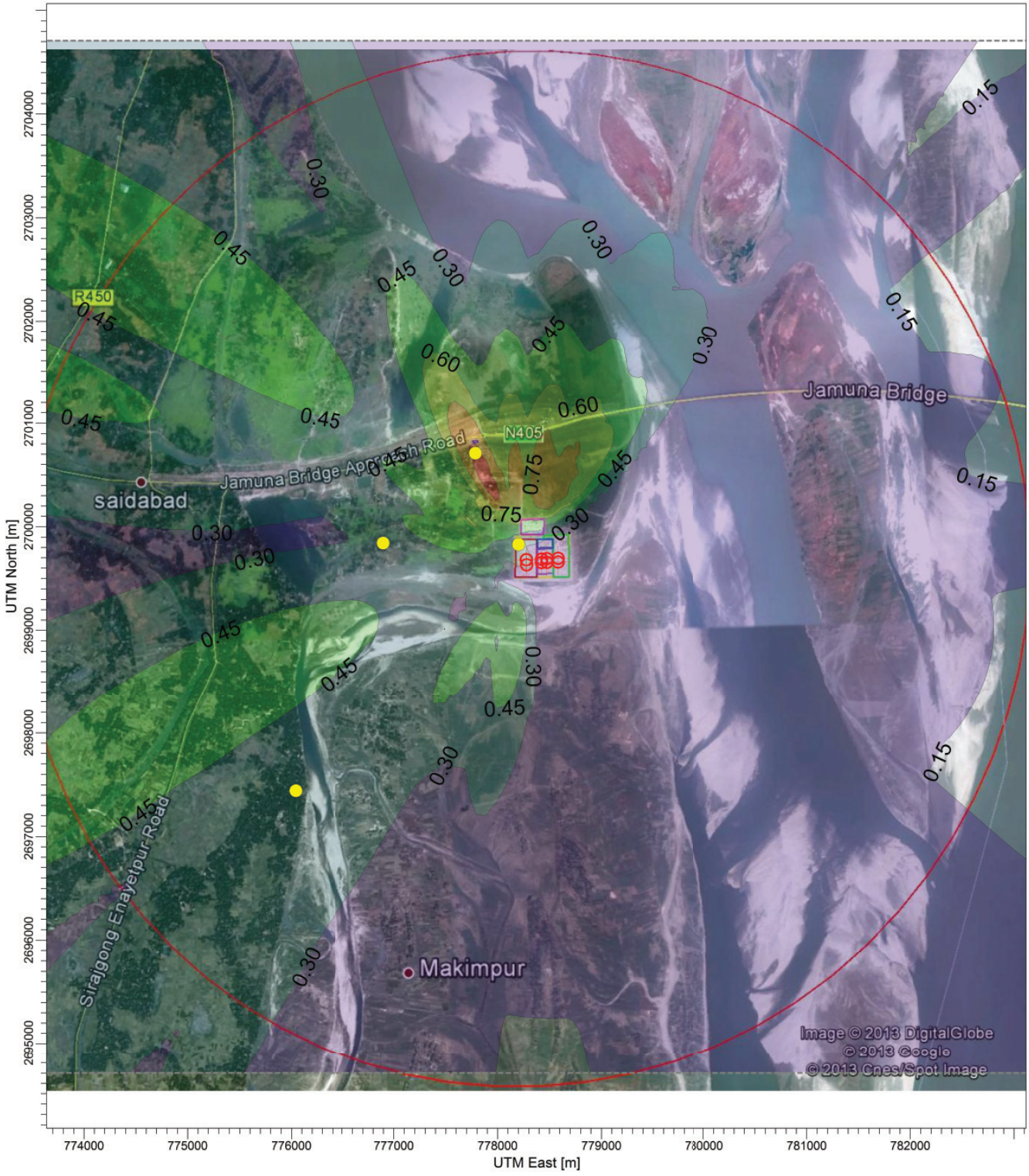
Max: 0.18 [ug/m^3] at (777989.06, 2700208.15)

0.03 0.06 0.09 0.12 0.15 0.18

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 0.18 ug/m^3	10/28/2015	0276008

Sirajganj 4 Power Project

24 Hourly Maximum - PM10 Concentration
Simple Cycle - S4 with HSD as Fuel



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: SIMPLECY

ug/m^3

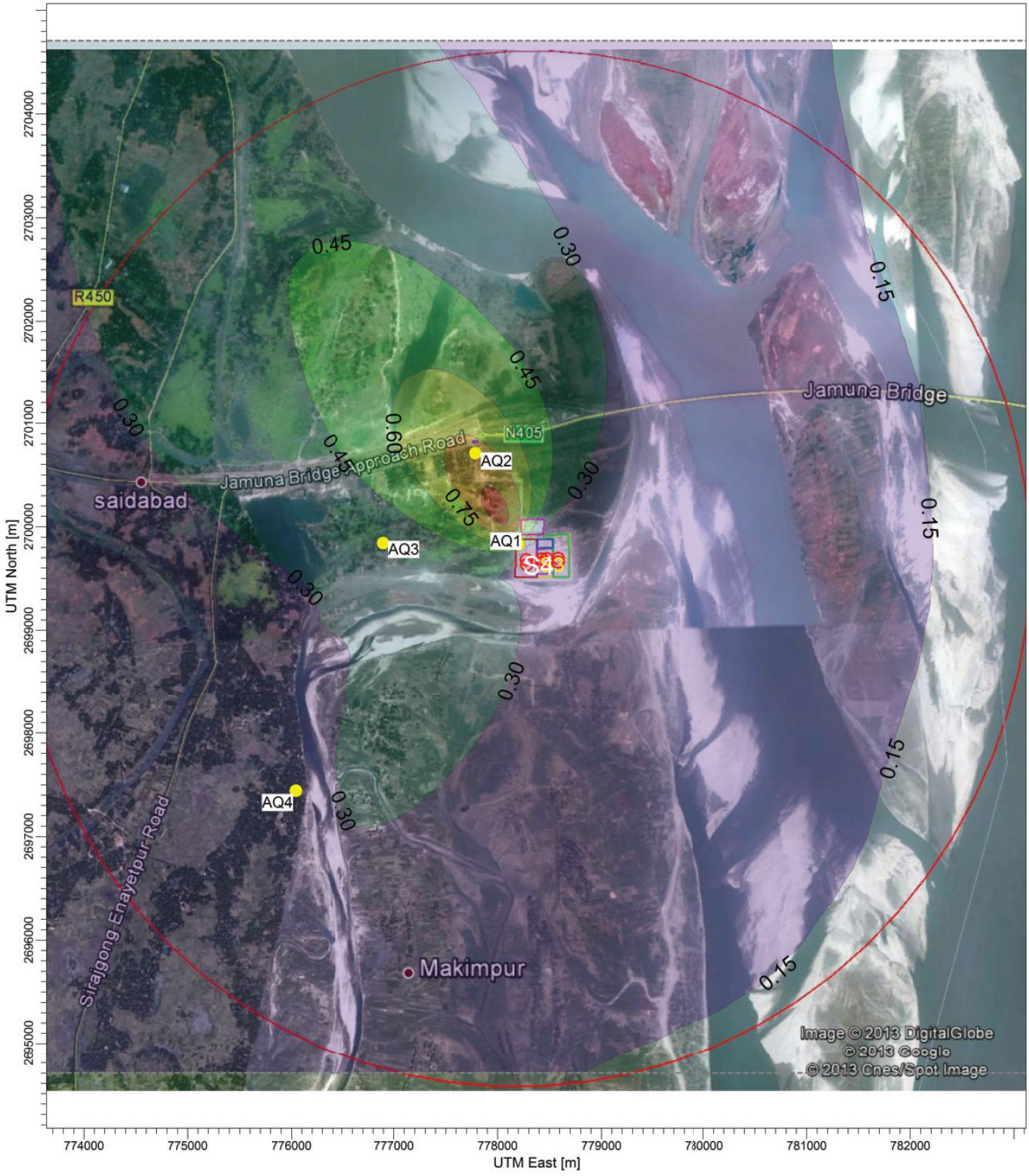
Max: 0.98 [ug/m^3] at (777889.06, 2700508.15)

0.15 0.30 0.45 0.60 0.75 0.90

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 0.98 ug/m^3	10/28/2015	0276008

Sirajganj 4 Power Project

Annual Average - SO2 Concentration
Simple Cycle - S4 with HSD as Fuel



PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: SIMFLECY

ug/m^3

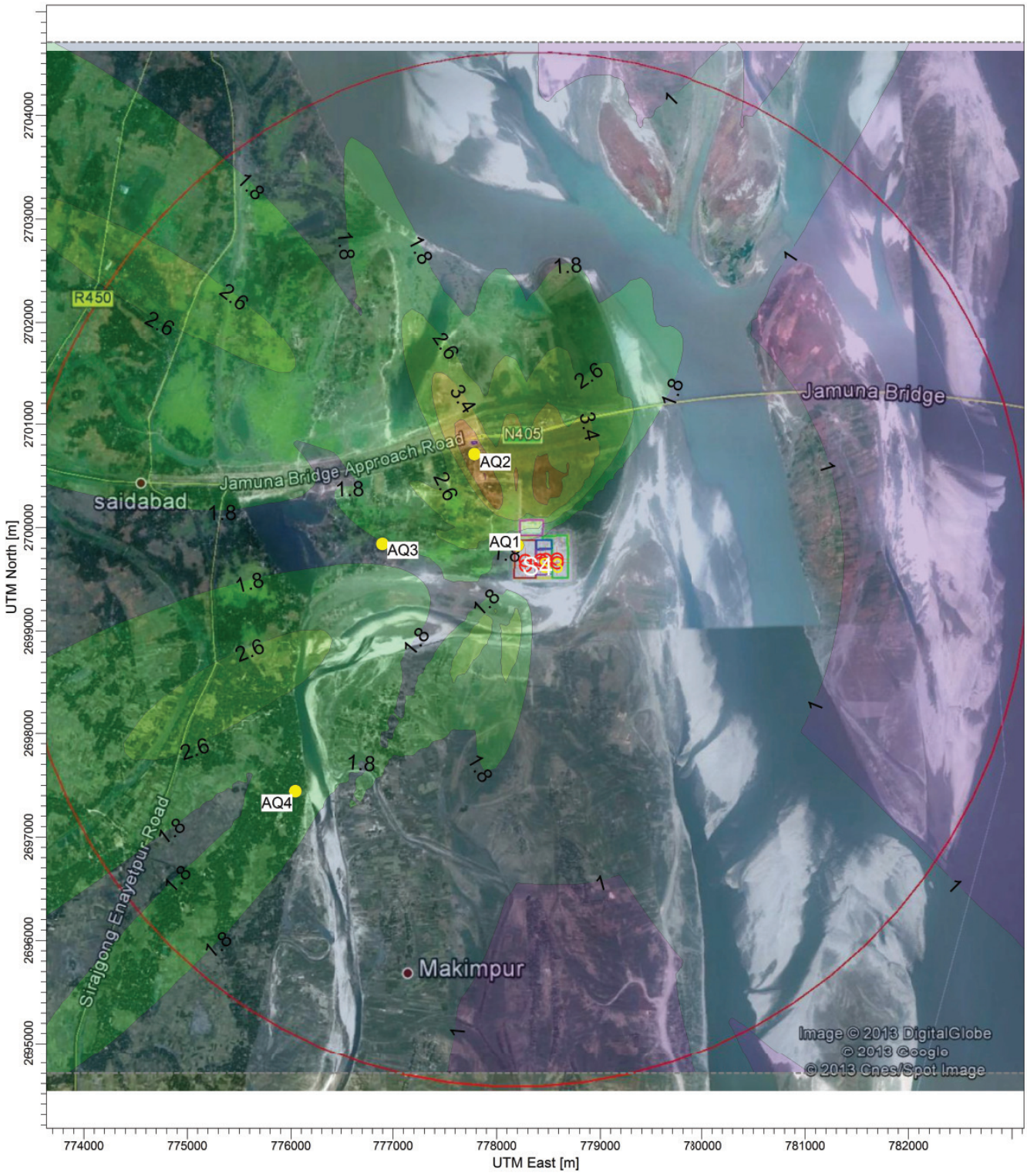
Max: 0.95 [ug/m^3] at (777989.06, 2700208.15)

0.15 | 0.30 | 0.45 | 0.60 | 0.75 | 0.90

	Sources **8**	Sembcorp **ERM**	
	10205	**NC**	
	Output Type: **Concentration**	SCALE: 1:40,000 0 1 km	
	Max Concentration: **0.95 ug/m^3**	**10/28/2015**	**0276008**

Sirajganj 4 Power Project

24-Hourly Maximum - SO2 Concentration
Simple Cycle - S4 with HSD as Fuel



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: SIMPLECY

ug/m^3

Max: 5.0 [ug/m^3] at (777889.06, 2700508.15)

0.6 | 1.0 | 1.8 | 2.6 | 3.4 | 4.2 | 5.0

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 5.0 ug/m^3	10/28/2015	0276008

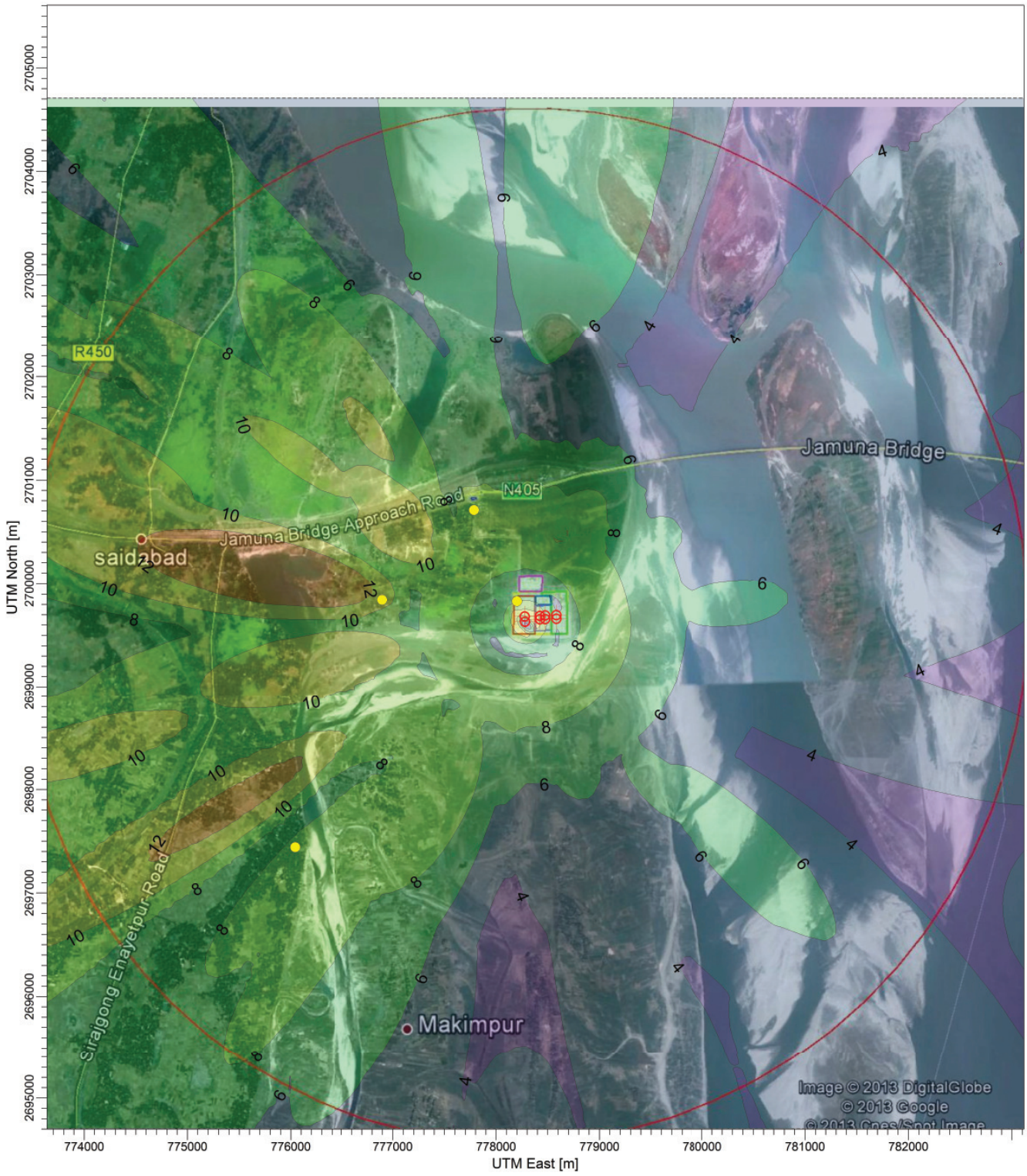
AERMOD View - Lakes Environmental Software

Annex N2

Combined Cycle Operation of S4 Plant

Sirajganj 4 Power Project

1-Hourly Maximum NOx Concentration
Combined Cycle Operation of S4 with NG as Fuel



PLOT FILE OF HIGH 1ST HIGH 1-HR VALUES FOR SOURCE GROUP: COMBINED

ug/m^3

Max: 14 [ug/m^3] at (775889.06, 2700108.15)

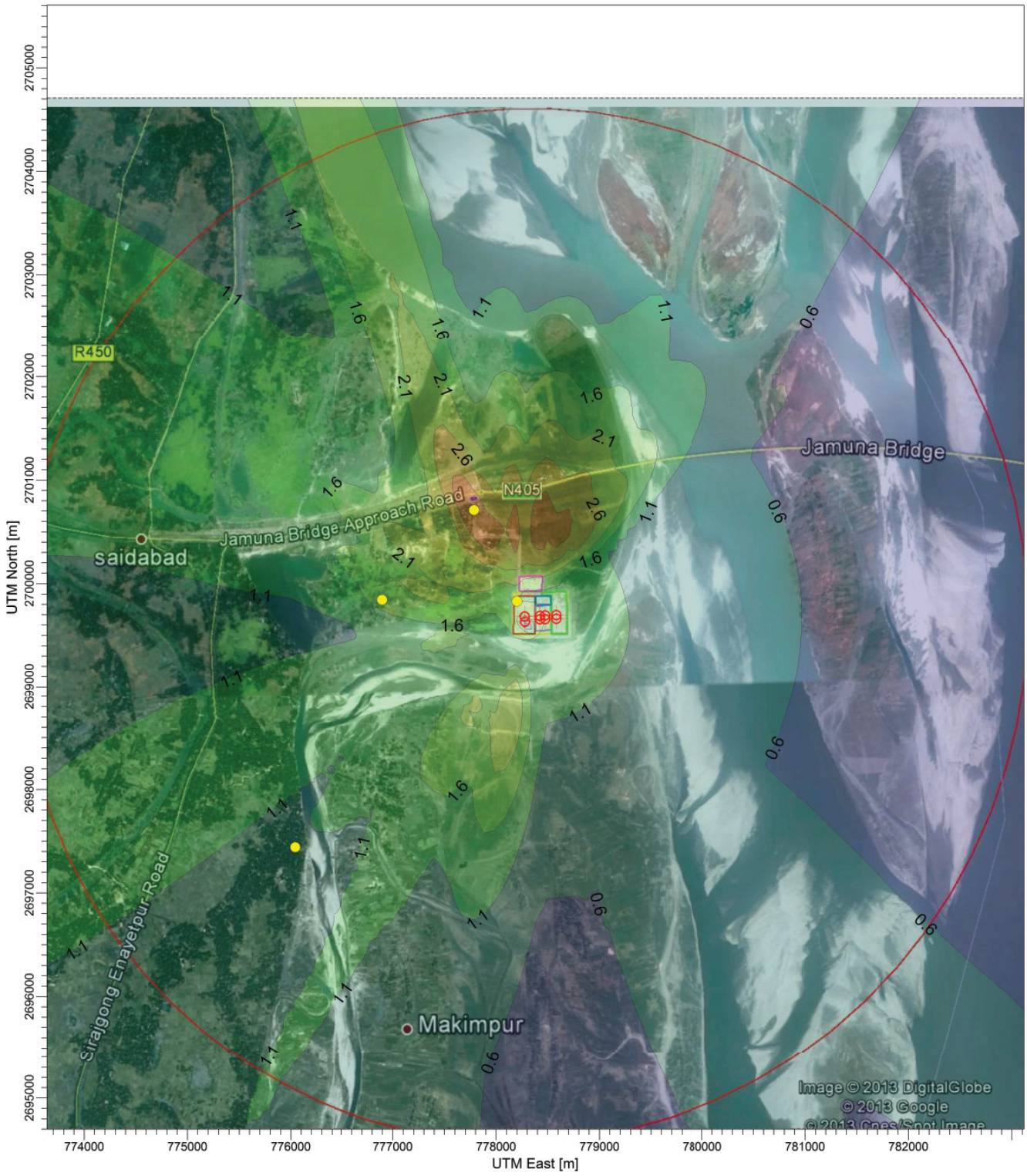
3 4 6 8 10 12 14

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 14 ug/m^3	10/27/2015	0276008

AERMOD View - Lakes Environmental Software

Sirajganj 4 Power Project

24-Hourly Maximum NOx Concentration
Combined Cycle Operation of S4 with NG as Fuel



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: COMBINED

ug/m^3

Max: 3.6 [ug/m^3] at (777789.06, 2700608.15)

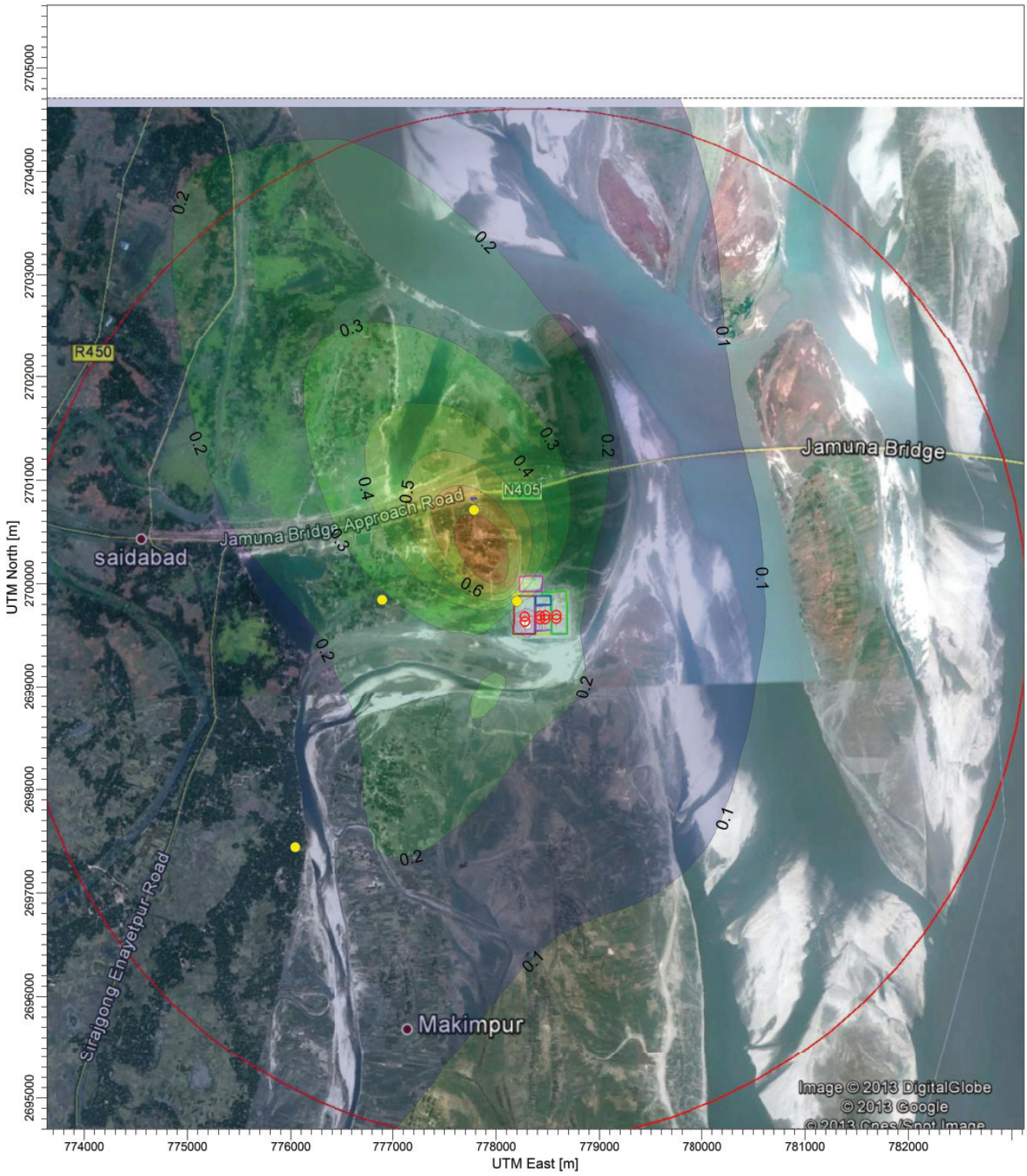
0.3 | 0.6 | 1.1 | 1.6 | 2.1 | 2.6 | 3.1 | 3.6

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 3.6 ug/m^3	10/27/2015	0276008

AERMOD View - Lakes Environmental Software

Sirajganj 4 Power Project

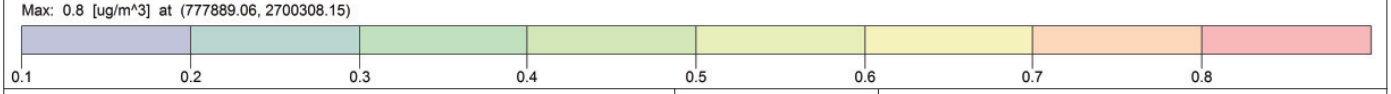
Annual Average NOx Concentration
Combined Cycle Operation of S4 with NG as Fuel



PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: COMBINED

ug/m^3

Max: 0.8 [ug/m^3] at (777889.06, 2700308.15)



Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 0.8 ug/m^3	10/27/2015	0276008

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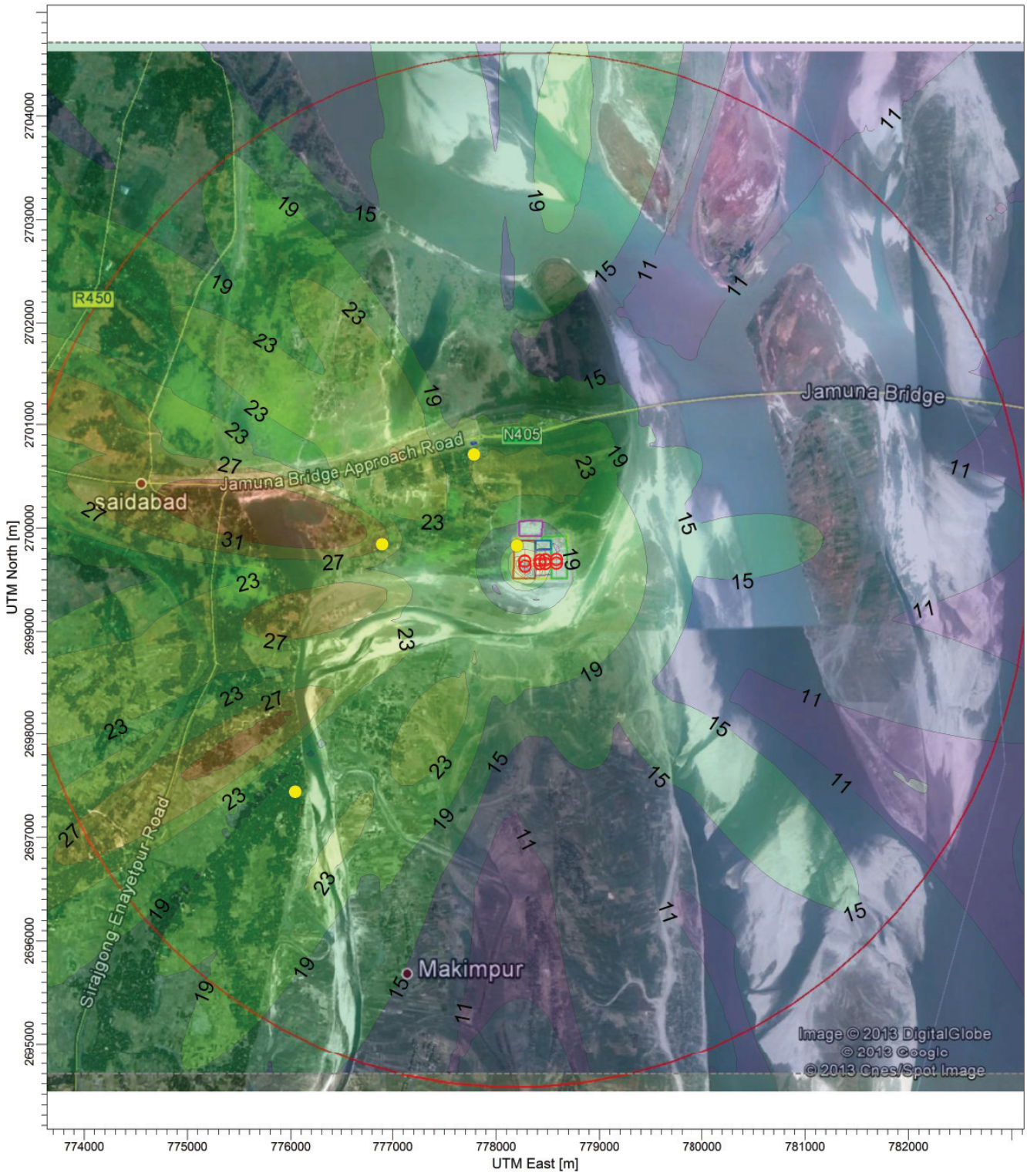
Sirajganj 4 Power Project

1-Hourly Maximum CO Concentration
Combined Cycle Operation of S4 with NG



PLOT FILE OF HIGH 1ST HIGH 1-HR VALUES FOR SOURCE GROUP: COMBINED

ug/m^3

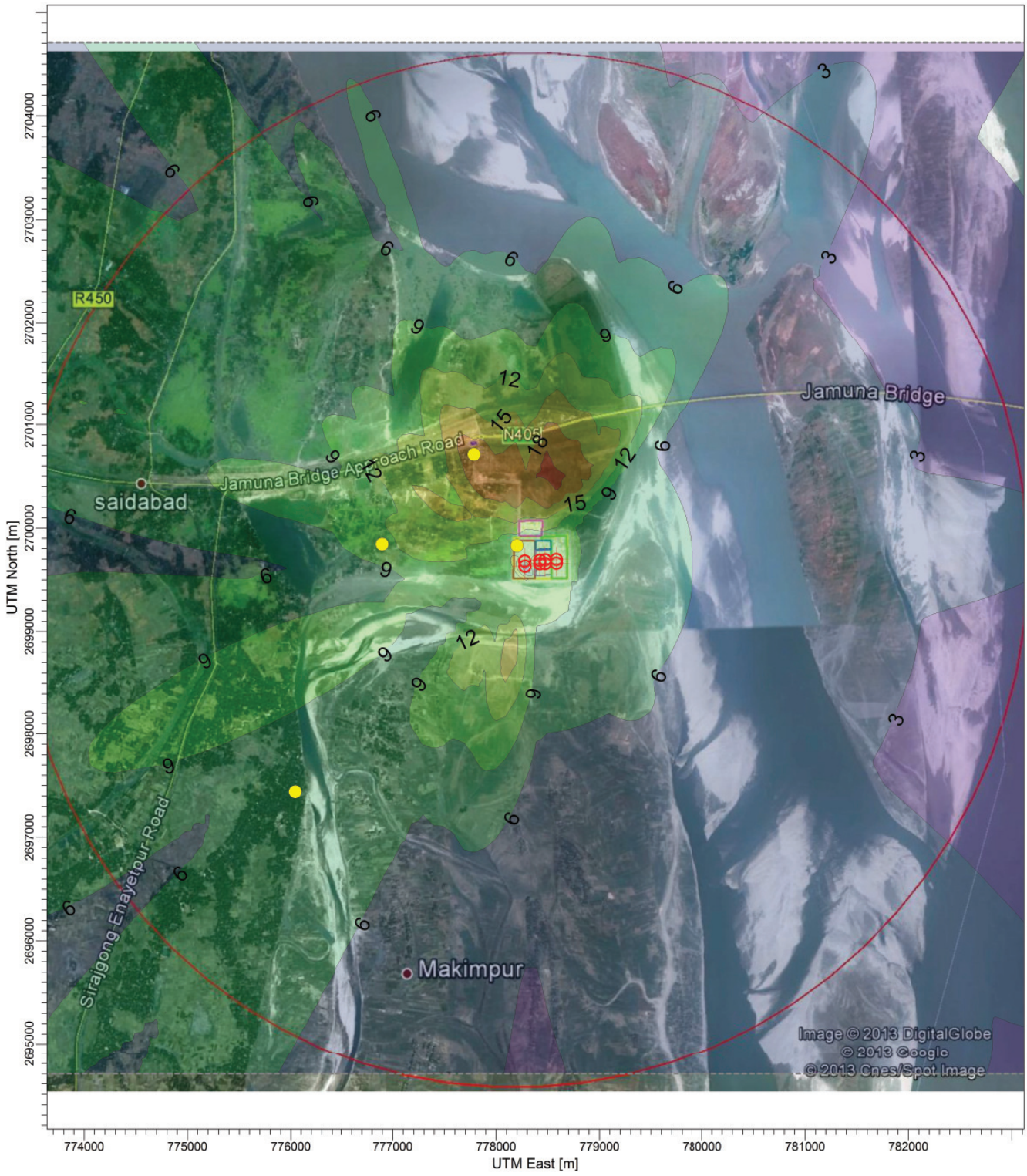
Max: 35 [ug/m^3] at (775889.06, 2700108.15)

7 11 15 19 23 27 31 35

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 35 ug/m^3	10/27/2015	0276008

AERMOD View - Lakes Environmental Software

8-Hourly Maximum CO Concentration
Combined Cycle Operation of S4 with NG



PLOT FILE OF HIGH 1ST HIGH 8-HR VALUES FOR SOURCE GROUP: COMBINED

ug/m^3

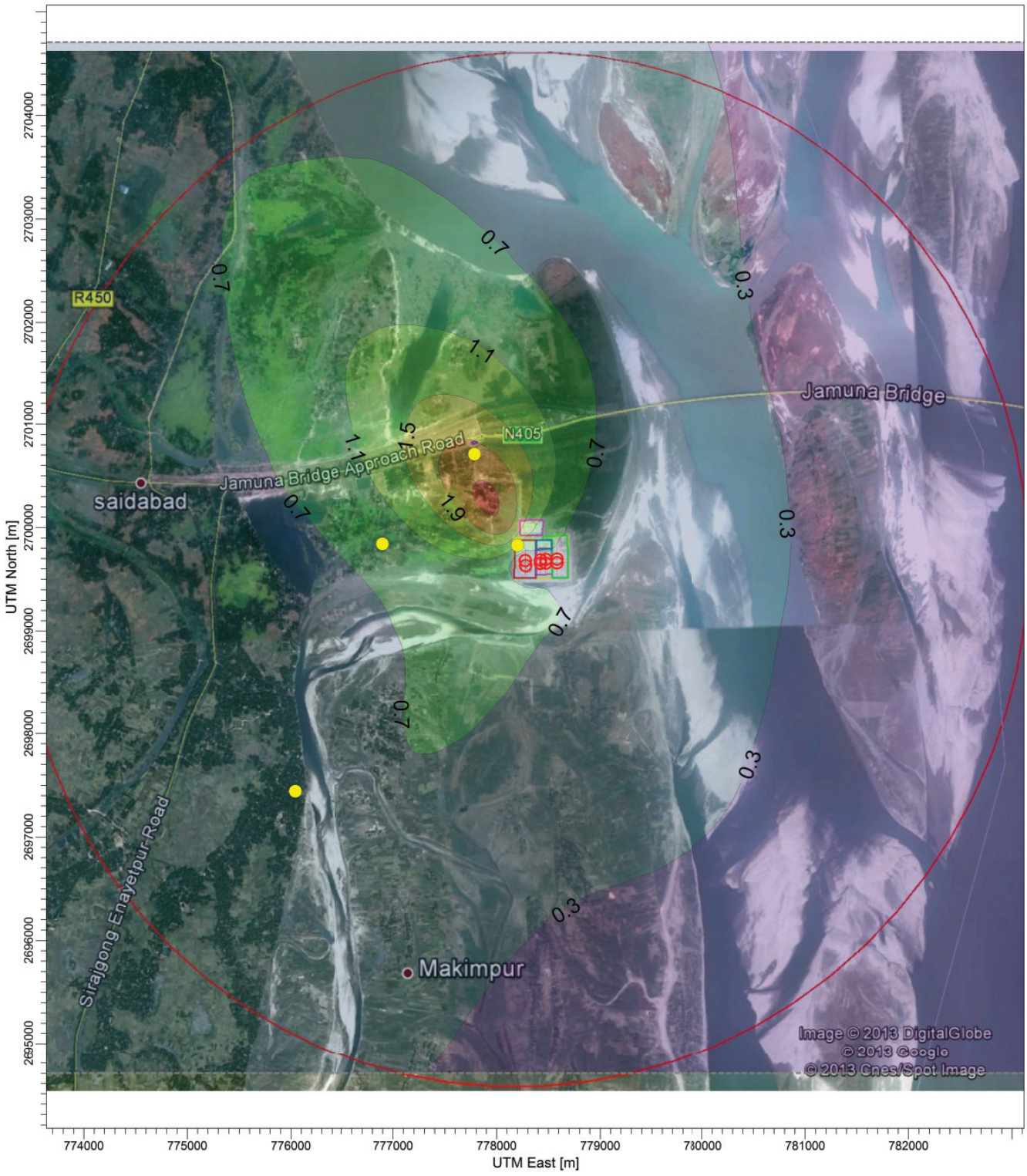
Max: 22 [ug/m^3] at (778489.06, 2700608.15)

2 3 6 9 12 15 18 21

Sources **8**	Sembcorp **ERM**	
10205	**NC**	
Output Type: **Concentration**	SCALE: 1:40,000 0 1 km	
Max Concentration: **22 ug/m^3**	**10/27/2015**	**0276008**

Sirajganj 4 Power Project

Annual Average NOx Concentration
Combined Cycle - S4 with HSD as Fuel



PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: COMBINED

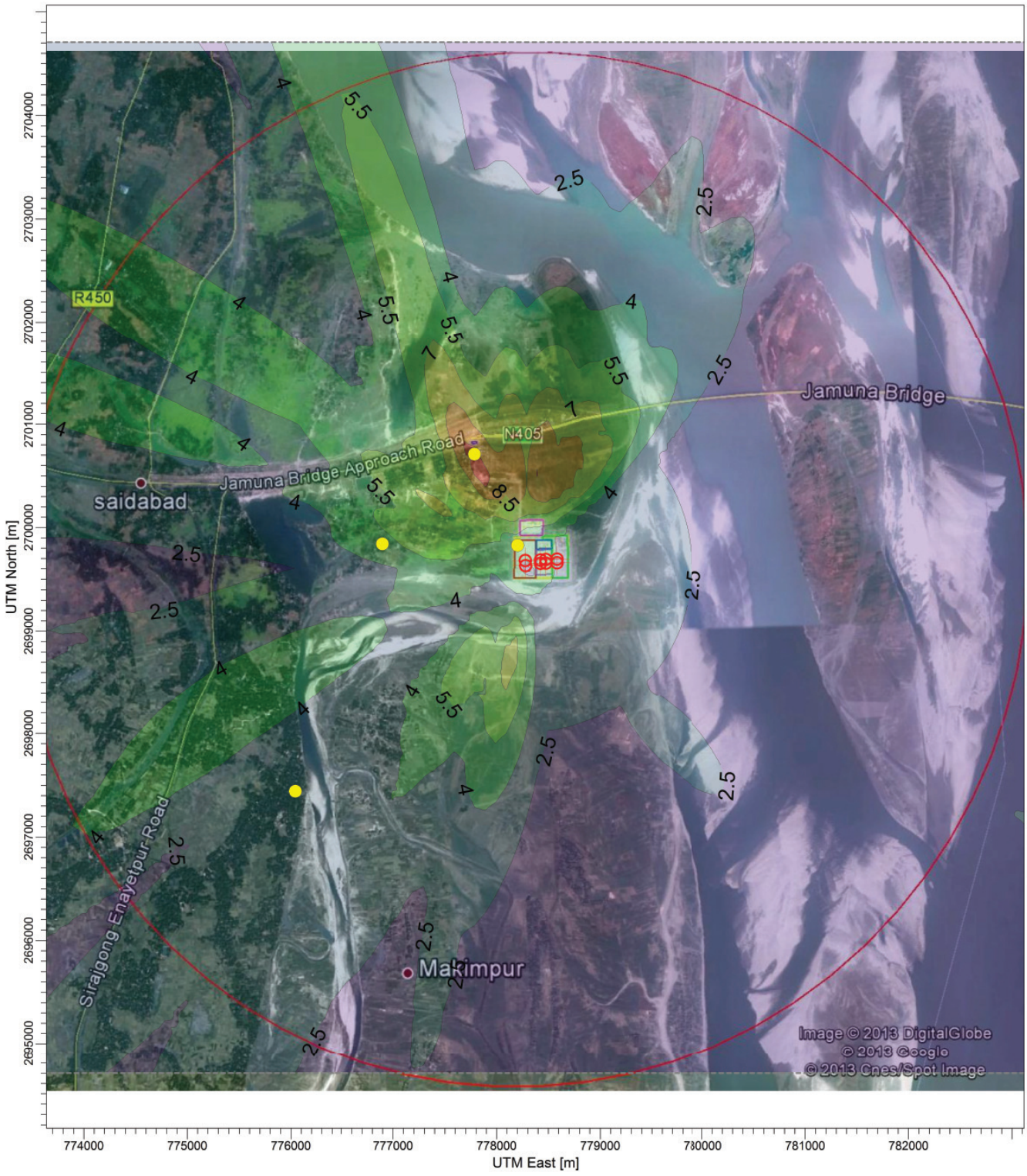
ug/m^3

Max: 2.4 [ug/m^3] at (777889.06, 2700308.15)

0.1 | 0.3 | 0.7 | 1.1 | 1.5 | 1.9 | 2.3

	Sources: 8	Sembcorp ERM	
	10205	NC	
	Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
	Max Concentration: 2.4 ug/m^3	10/28/2015	0276008

24 Hourly Maximum - NOx Concentration
Combined Cycle - S4 with HSD as Fuel



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: COMBINED

ug/m^3

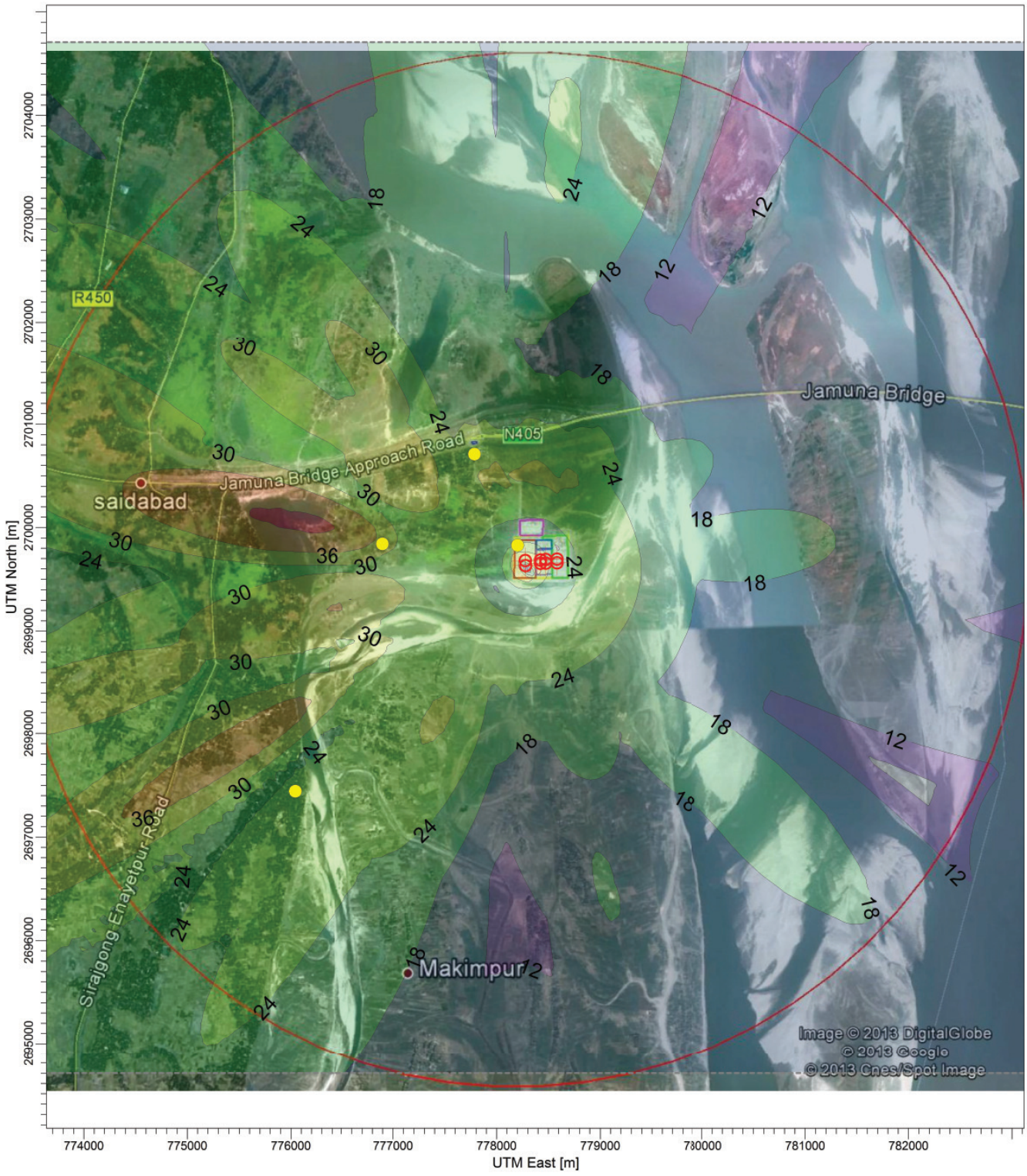
Max: 10.6 [ug/m^3] at (777789.06, 2700608.15)

1.0 2.5 4.0 5.5 7.0 8.5 10.0

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 10.6 ug/m^3	10/28/2015	0276008

Sirajganj 4 Power Project

1 Hourly Maximum - NOx Concentration
Combined Cycle - S4 with HSD as Fuel



PLOT FILE OF HIGH 1ST HIGH 1-HR VALUES FOR SOURCE GROUP: COMBINED

ug/m^3

Max: 43 [ug/m^3] at (775889.06, 2700108.15)

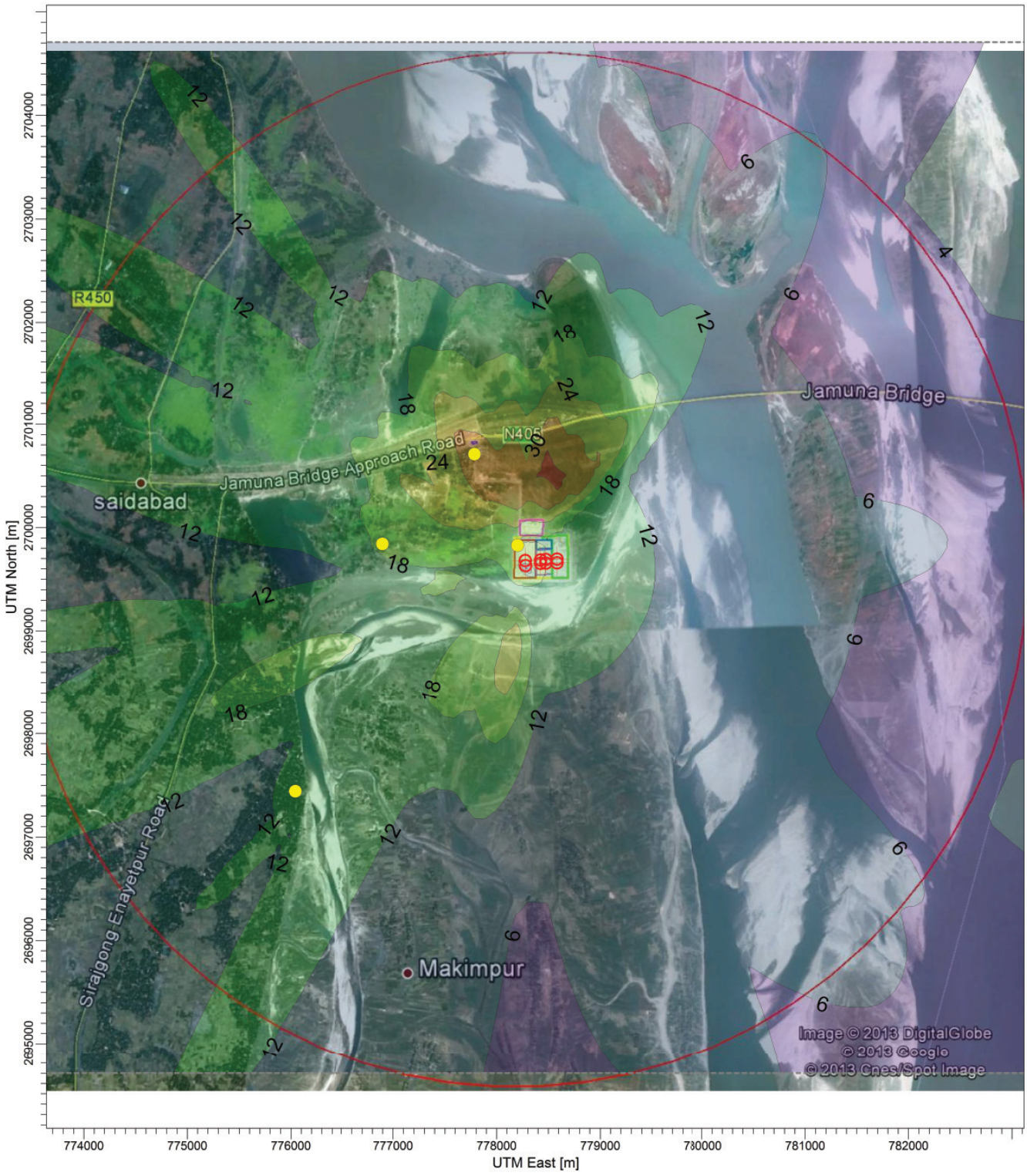
9 12 18 24 30 36 42

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 43 ug/m^3	10/28/2015	0276008

AERMOD View - Lakes Environmental Software

Sirajganj 4 Power Project

8-Hourly Maximum CO Concentration
Combined Cycle Operation of S4 with HSD as Fuel



PLOT FILE OF HIGH 1ST HIGH 8-HR VALUES FOR SOURCE GROUP: COMBINED

ug/m^3

Max: 38 [ug/m^3] at (778489.06, 2700608.15)

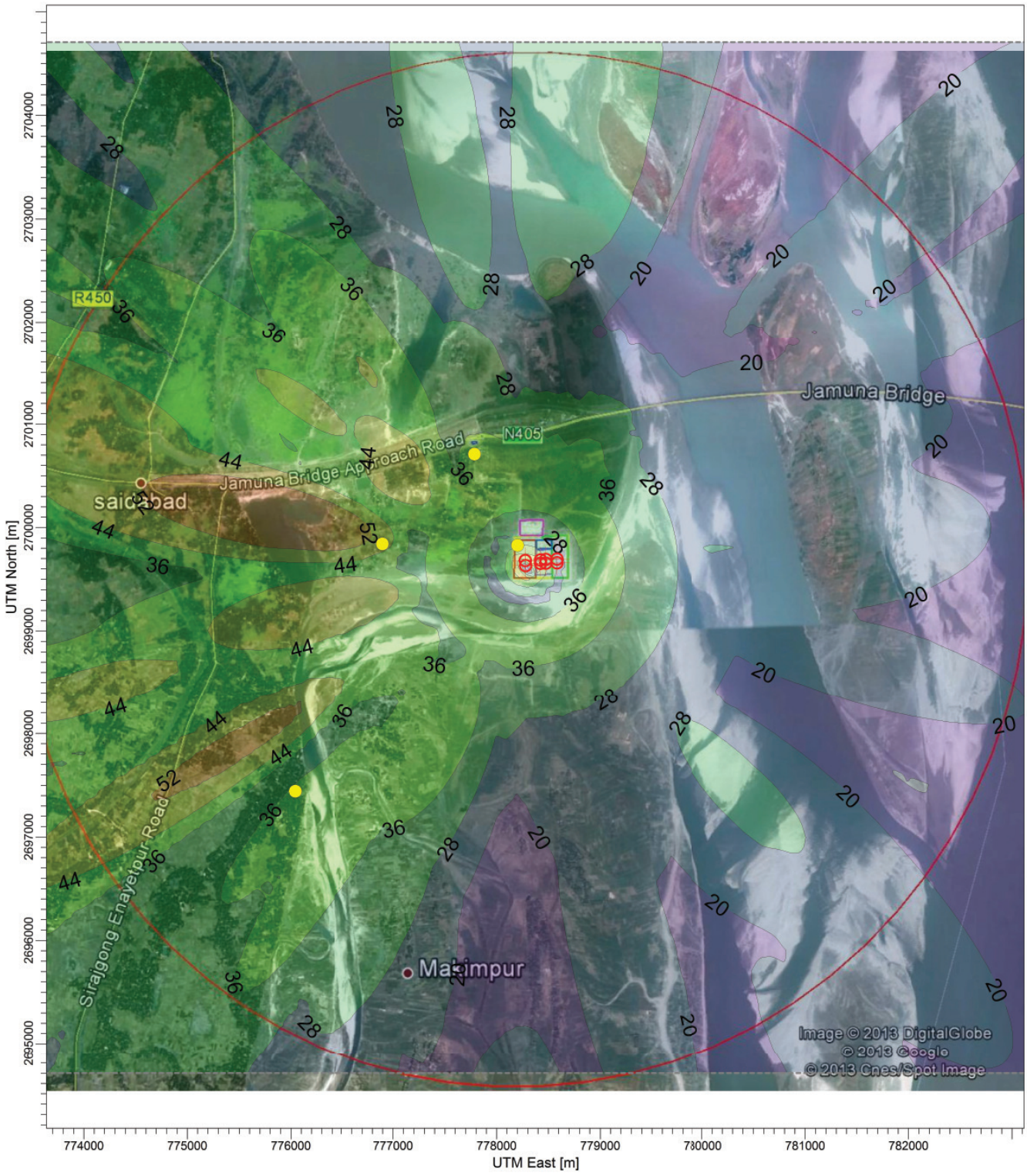
4 6 12 18 24 30 36

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 38 ug/m^3	10/28/2015	0276008

AERMOD View - Lakes Environmental Software

Sirajganj 4 Power Project

1-Hourly Maximum CO Concentration
Combined Cycle Operation of S4 with HSD as Fuel



PLOT FILE OF HIGH 1ST HIGH 1-HR VALUES FOR SOURCE GROUP: COMBINED

ug/m^3

Max: 60 [ug/m^3] at (775889.06, 2700108.15)

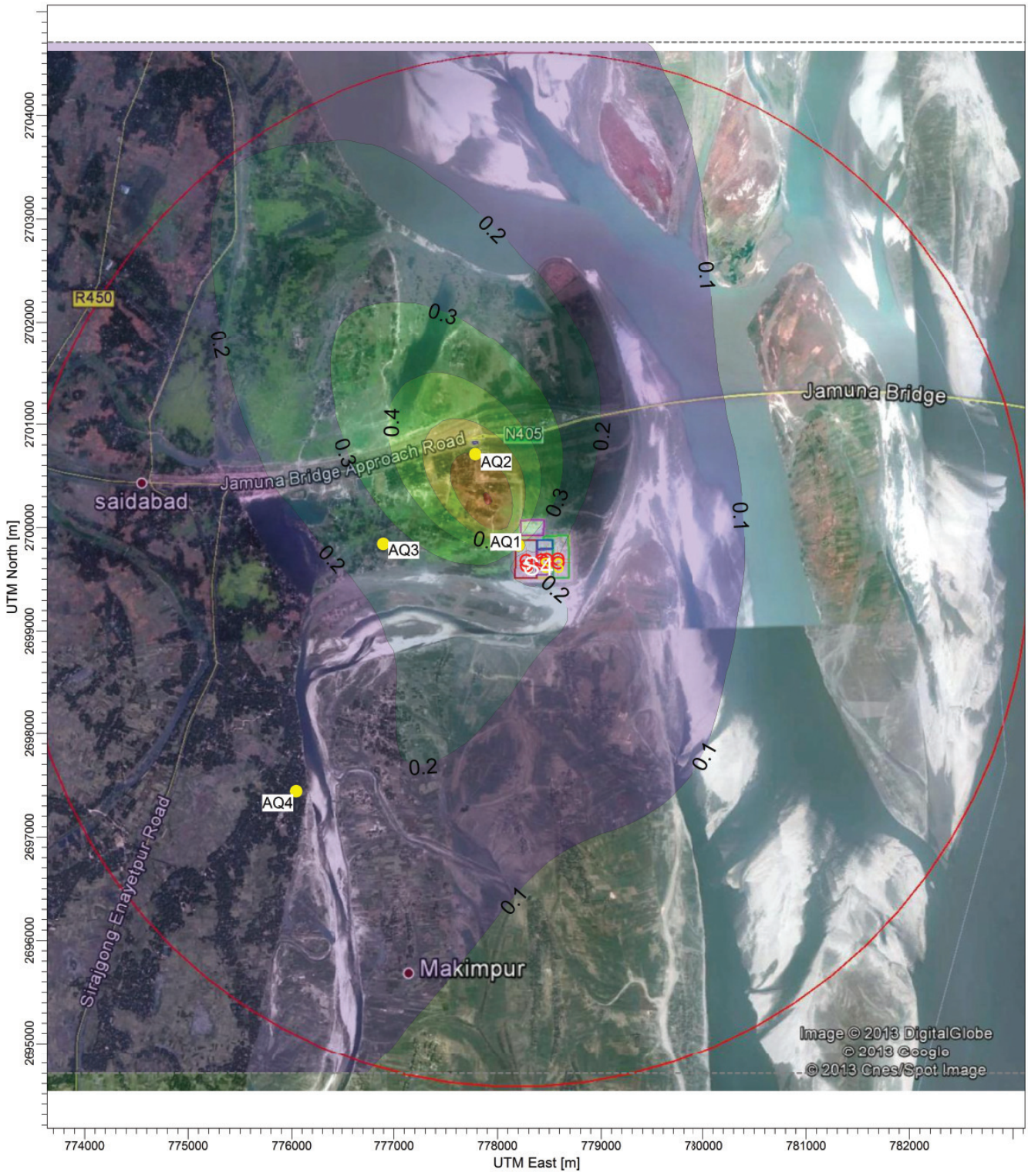
12 20 28 36 44 52 60

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 60 ug/m^3	10/28/2015	0276008

AERMOD View - Lakes Environmental Software

Sirajganj 4 Power Project

Annual Average - PM2.5 Concentration
Combined Cycle - S4 with HSD as Fuel



PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: COMBINED

ug/m^3

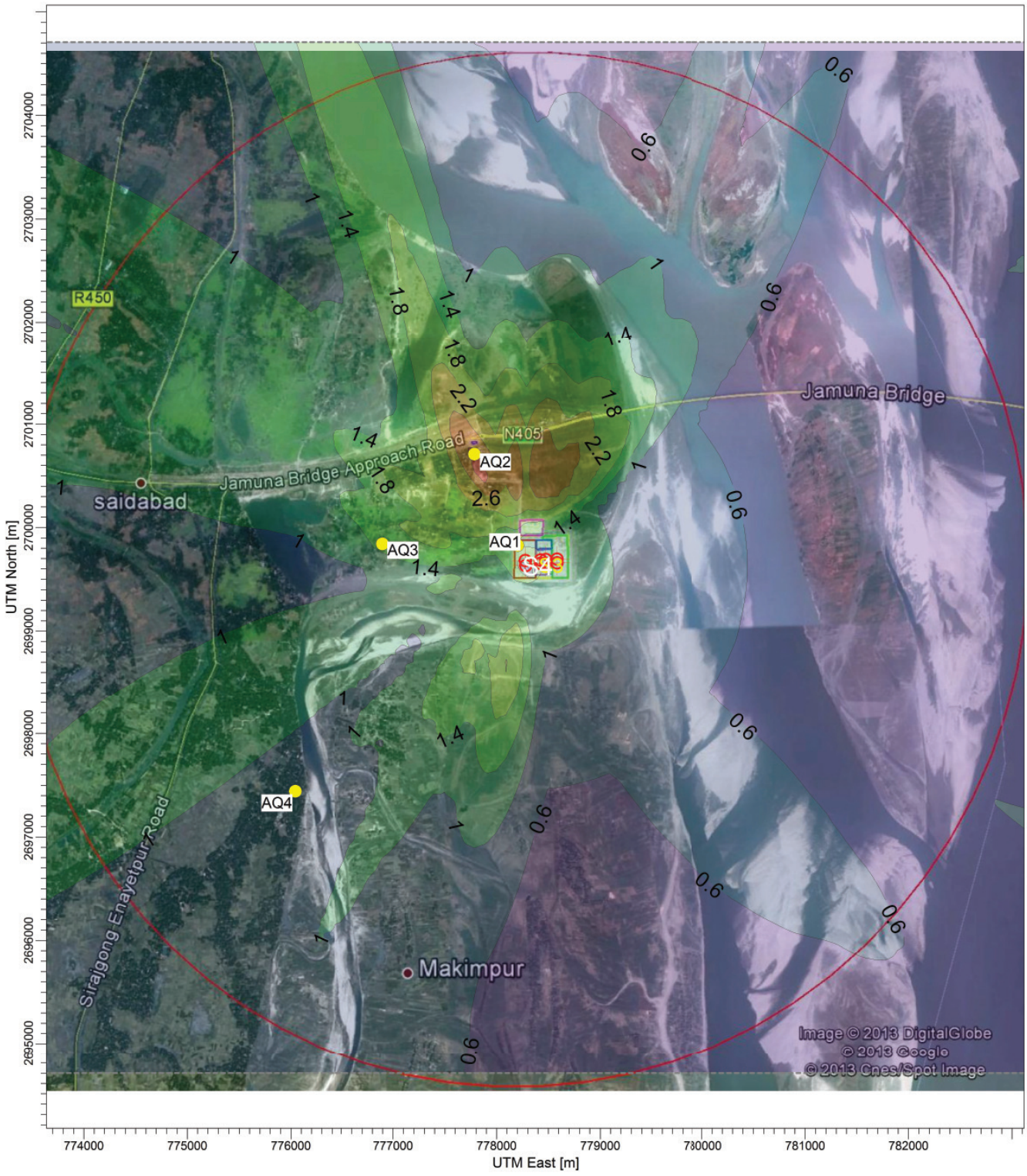
Max: 0.7 [ug/m^3] at (777889.06, 2700308.15)

0.1 0.2 0.3 0.4 0.5 0.6 0.7

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 0.7 ug/m^3	10/28/2015	0276008

Sirajganj 4 Power Project

24 Hourly Maximum - PM2.5 Concentration
Combined Cycle - S4 with HSD as Fuel



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: COMBINED

ug/m^3

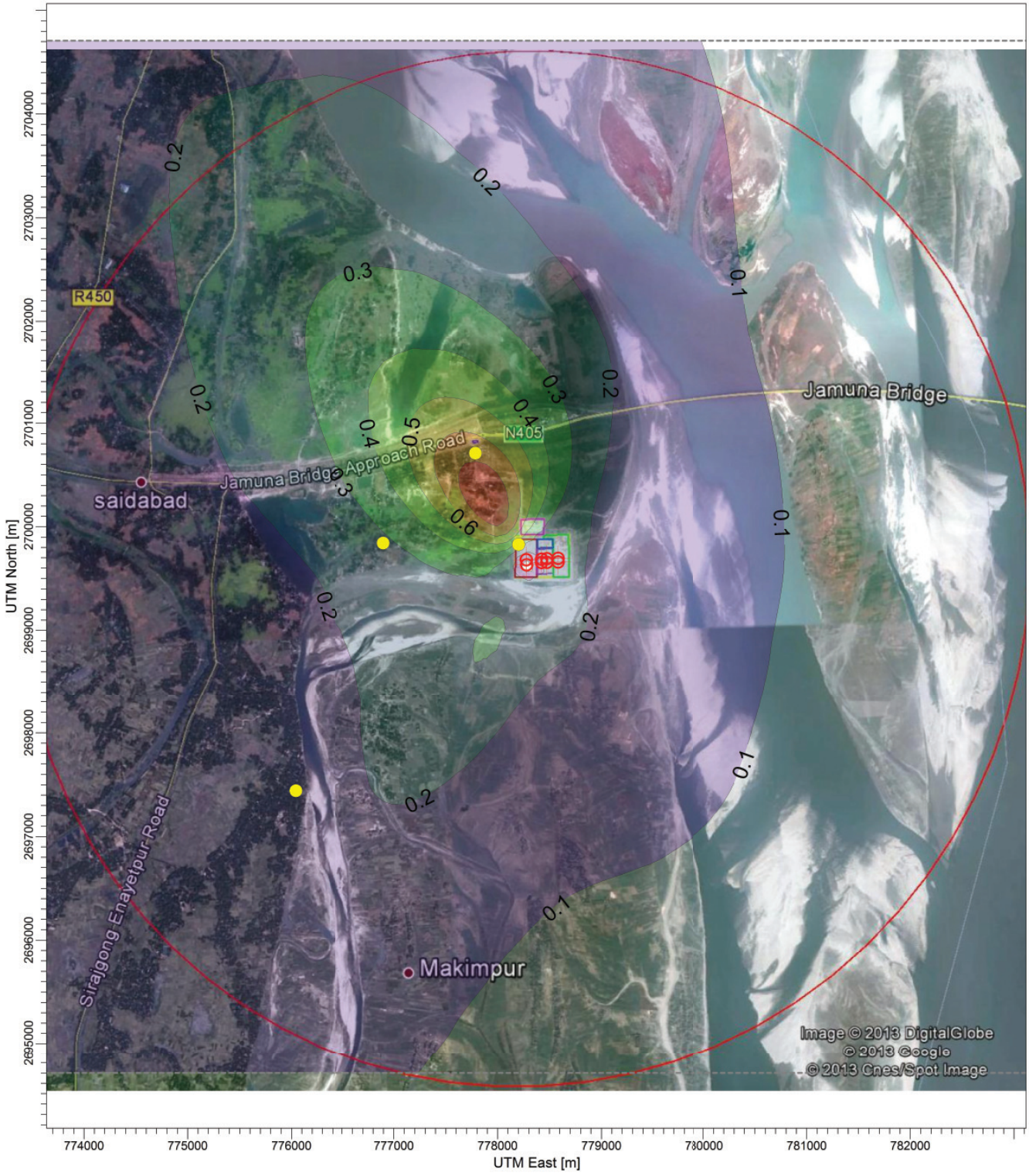
Max: 3.1 [ug/m^3] at (777789.06, 2700608.15)

0.3 | 0.6 | 1.0 | 1.4 | 1.8 | 2.2 | 2.6 | 3.0

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 3.1 ug/m^3	10/28/2015	0276008

Sirajganj 4 Power Project

Annual Average - PM10 Concentration
Combined Cycle - S4 with HSD as Fuel



PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: COMBINED

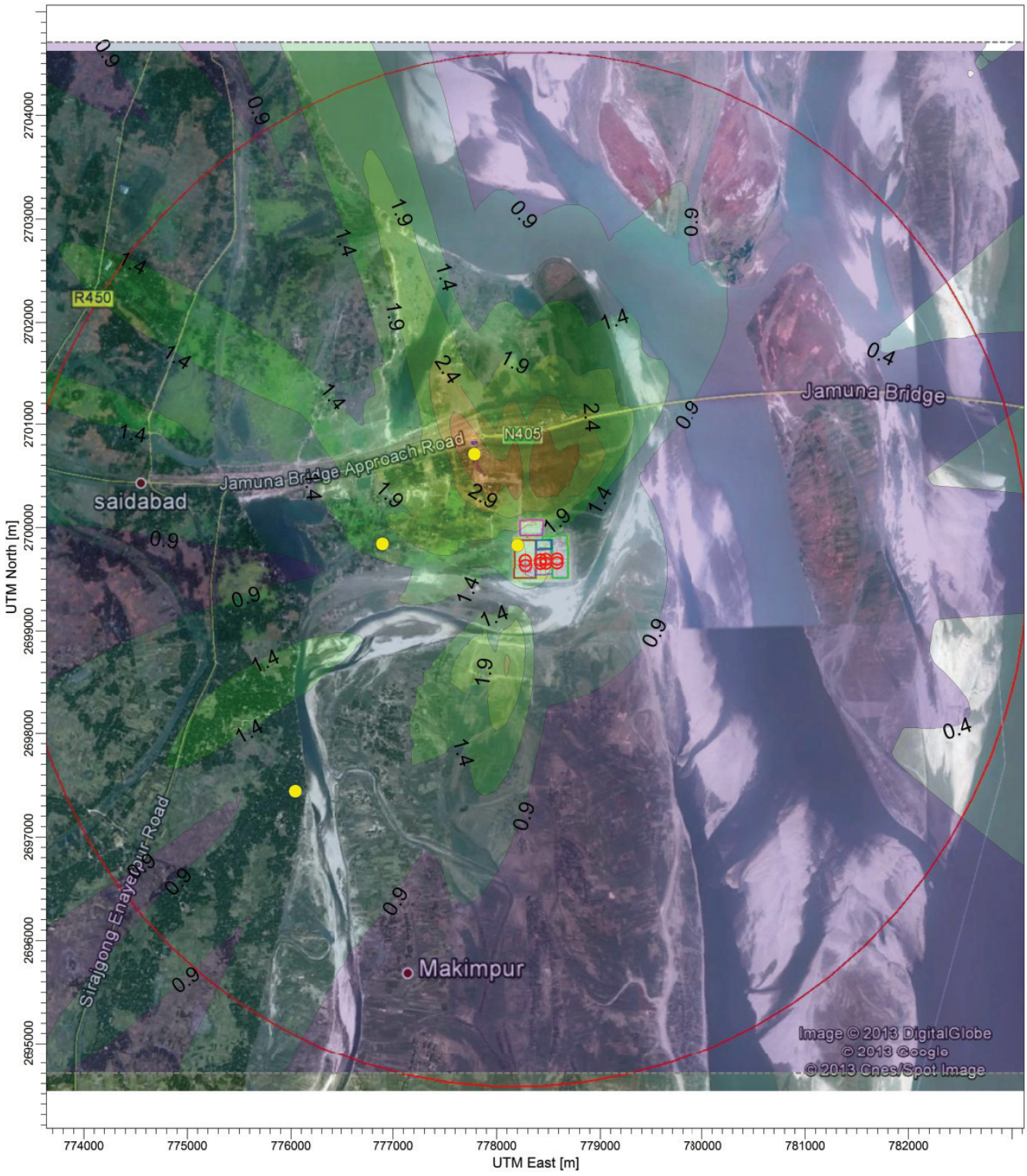
ug/m^3

Max: 0.8 [ug/m^3] at (777889.06, 2700308.15)

0.1 0.2 0.3 0.4 0.5 0.6 0.7

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 0.8 ug/m^3	10/28/2015	0276008

24 Hourly Maximum - PM10 Concentration
Combined Cycle - S4 with HSD as Fuel



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: COMBINED

ug/m^3

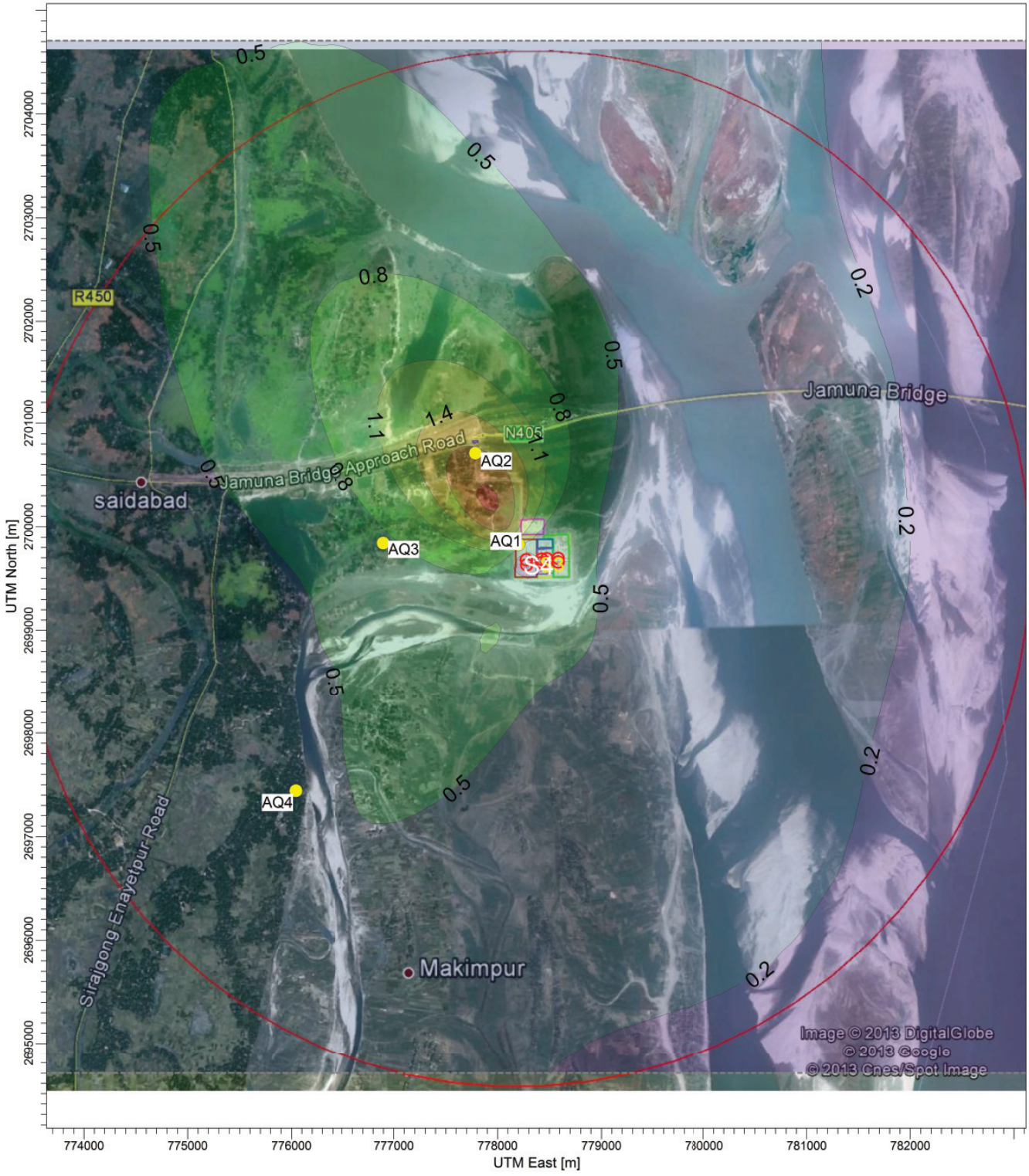
Max: 3.5 [ug/m^3] at (777789.06, 2700608.15)

0.4 0.9 1.4 1.9 2.4 2.9 3.4

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 3.5 ug/m^3	10/28/2015	0276008

Sirajganj 4 Power Project

Annual Average - SO2 Concentration
Combined Cycle - S4 with HSD as Fuel



PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: COMBINED

ug/m^3

Max: 2.1 [ug/m^3] at (777889.06, 2700308.15)

0.1 | 0.2 | 0.5 | 0.8 | 1.1 | 1.4 | 1.7 | 2.0

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 2.1 ug/m^3	10/28/2015	0276008

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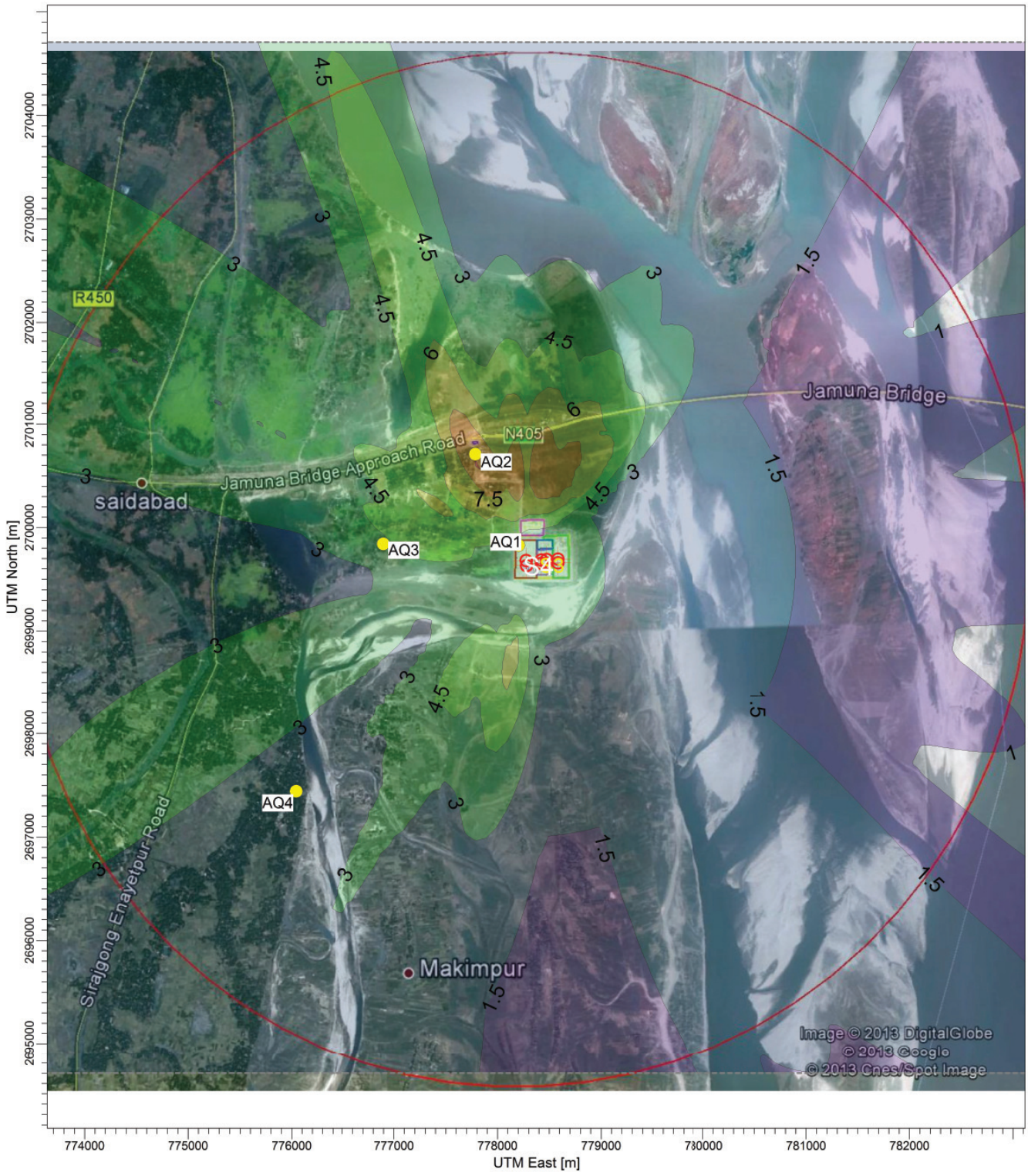
Sirajganj 4 Power Project

24 Hourly Maximum SO2 Concentration
Combined Cycle - S4 with HSD as Fuel



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: COMBINED

ug/m^3

Max: 9.1 [ug/m^3] at (777789.06, 2700608.15)

1.0 1.5 3.0 4.5 6.0 7.5 9.0

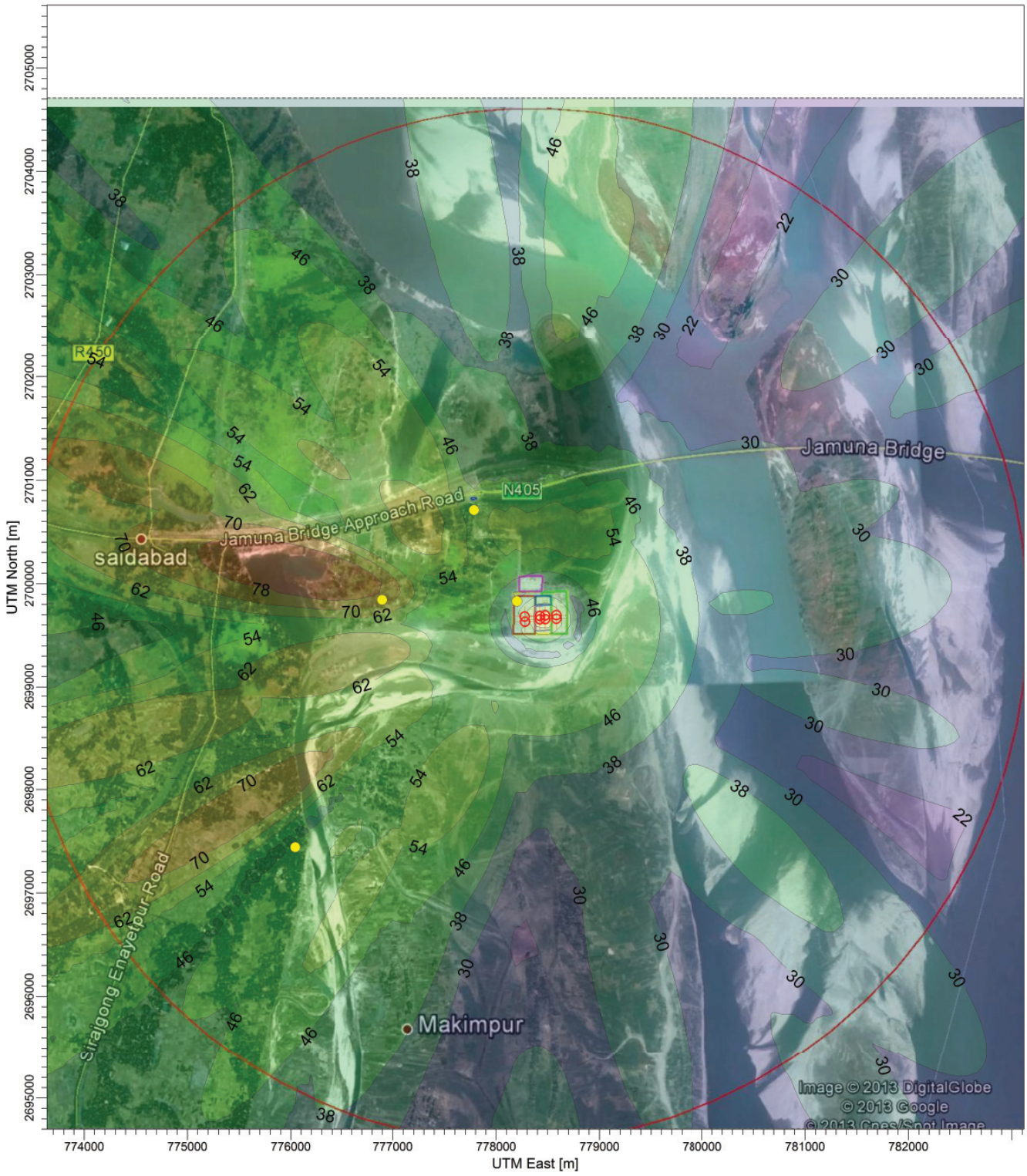
Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 9.1 ug/m^3	10/28/2015	0276008

Annex N3

Combined Cycle Operation of S1, S2, S3 and S4 Plants

Sirajganj 4 Power Project

1-Hourly Maximum NOx Concentration
Combined Cycle Operation of S1, S2, S3 and S4 with NG as Fuel



PLOT FILE OF HIGH 1ST HIGH 1-HR VALUES FOR SOURCE GROUP: COMALL

ug/m^3

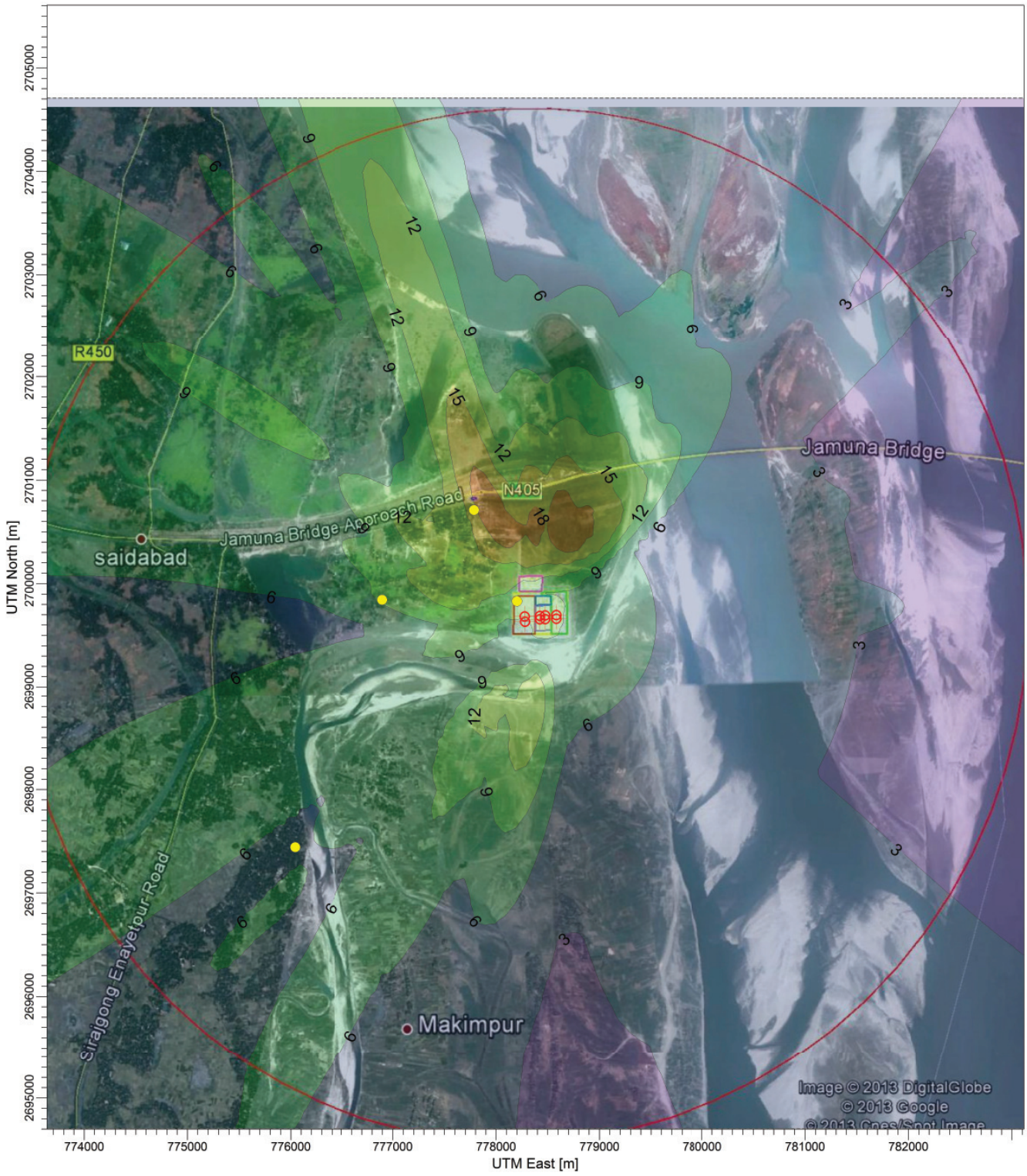
Max: 86 [ug/m^3] at (776289.06, 2700108.15)

16 22 30 38 46 54 62 70 78 86

Sources: 8	Sembcorp ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 86 ug/m^3	10/27/2015	0276008

Sirajganj 4 Power Project

24-Hourly Maximum NOx Concentration
Combined Cycle Operation of S1, S2, S3 and S4 with NG as Fuel



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: COMALL

ug/m^3

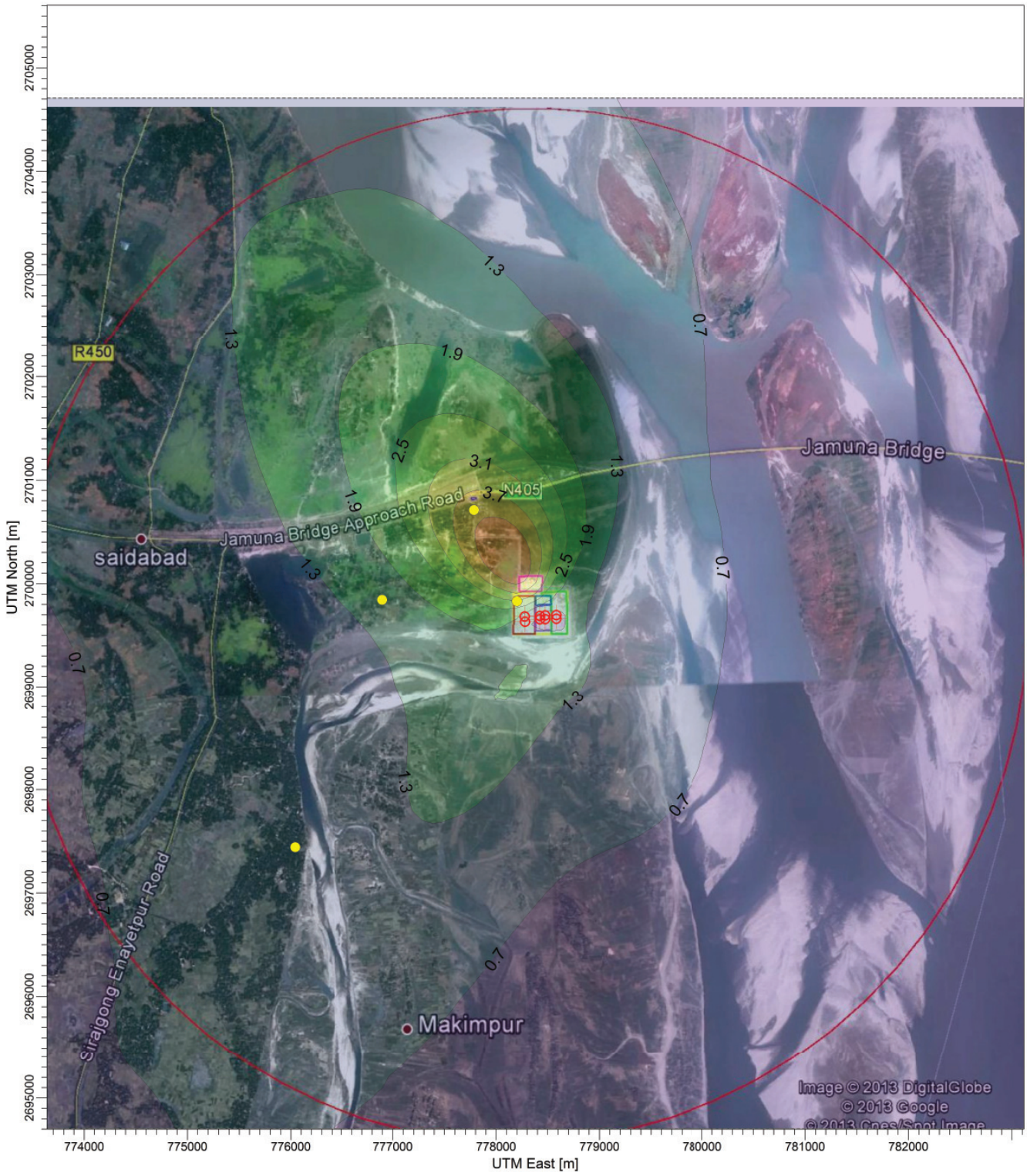
Max: 21 [ug/m^3] at (777989.06, 2700608.15)

2 3 6 9 12 15 18 21

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 21 ug/m^3	10/27/2015	0276008

Sirajganj 4 Power Project

Annual Average NOx Concentration
Combined Cycle Operation of S1, S2, S3 and S4 with NG as Fuel



PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: COMALL

ug/m^3

Max: 4.9 [ug/m^3] at (778189.06, 2700208.15)

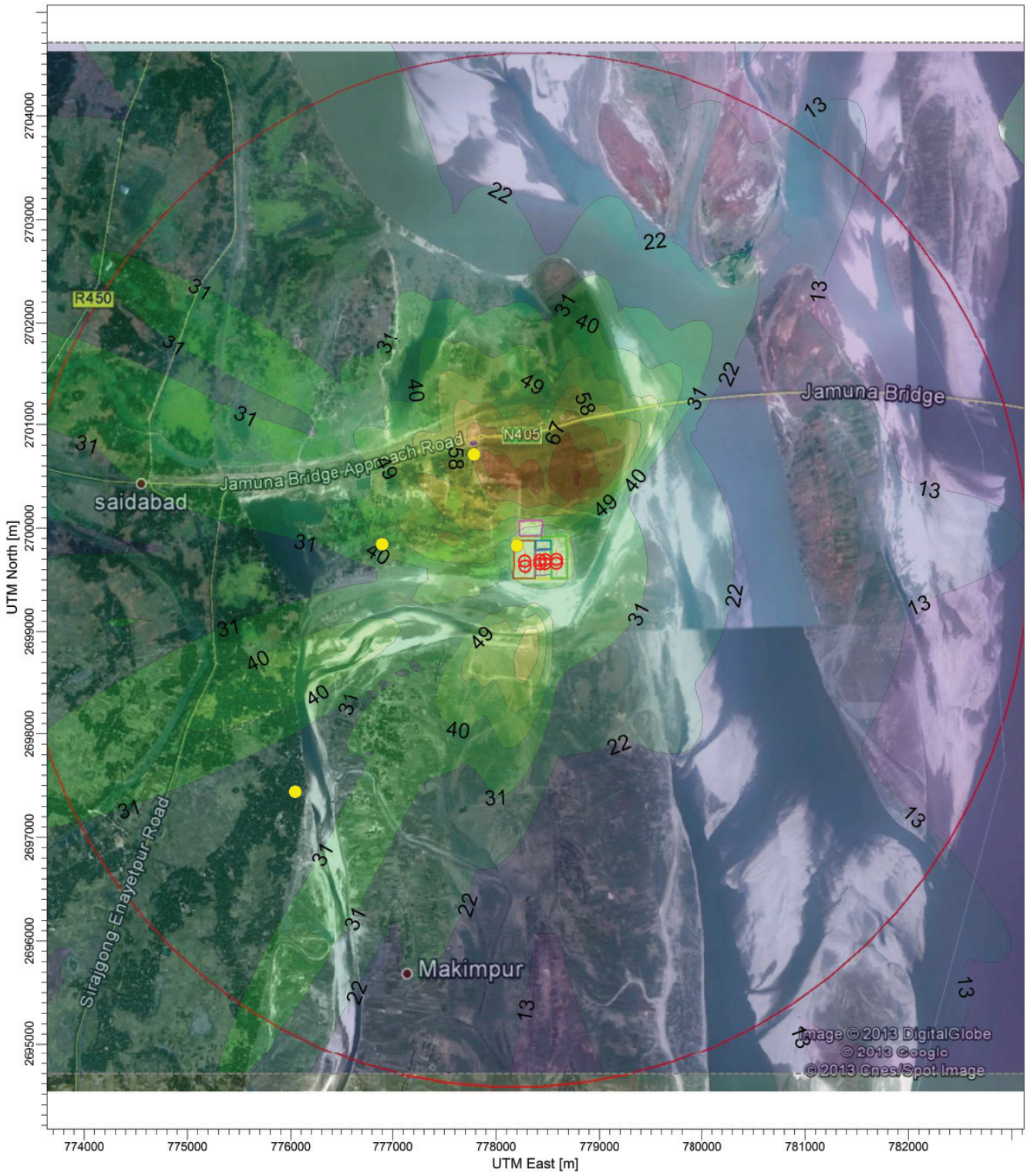
0.3 | 0.7 | 1.3 | 1.9 | 2.5 | 3.1 | 3.7 | 4.3 | 4.9

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 4.9 ug/m^3	10/27/2015	0276008

AERMOD View - Lakes Environmental Software

Sirajganj 4 Power Project

8-Hourly Maximum CO Concentration
Combined Cycle Operation of S1, S2, S3 and S4 with NG



PLOT FILE OF HIGH 1ST HIGH 8-HR VALUES FOR SOURCE GROUP: COMALL

ug/m^3

Max: 86 [ug/m^3] at (778789.06, 2700508.15)

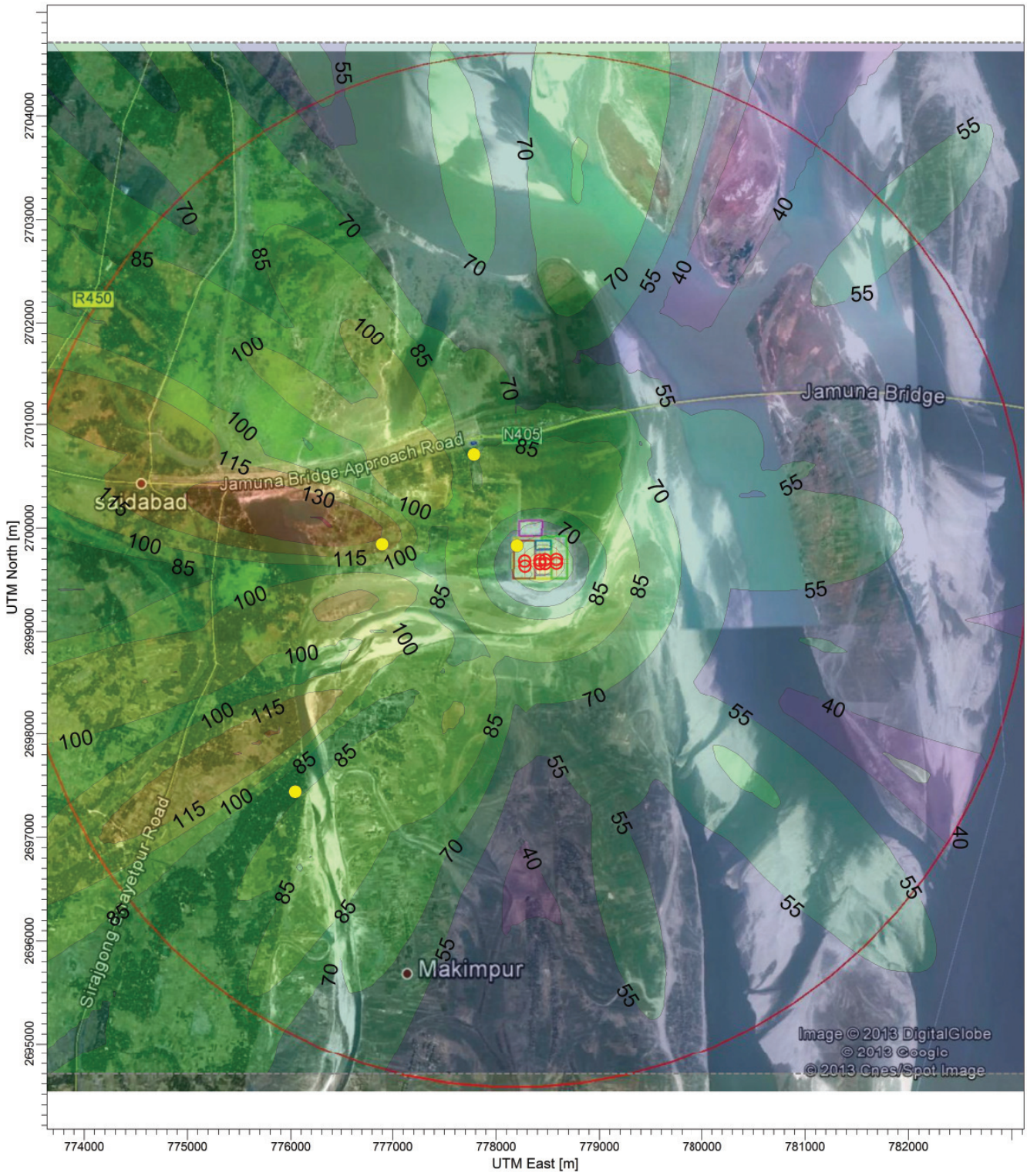
8 13 22 31 40 49 58 67 76 85

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 86 ug/m^3	10/27/2015	0276008

AERMOD View - Lakes Environmental Software

Sirajganj 4 Power Project

1-Hourly Maximum CO Concentration
Combined Cycle Operation of S1, S2, S3 and S4 with NG



PLOT FILE OF HIGH 1ST HIGH 1-HR VALUES FOR SOURCE GROUP: COMALL

ug/m^3

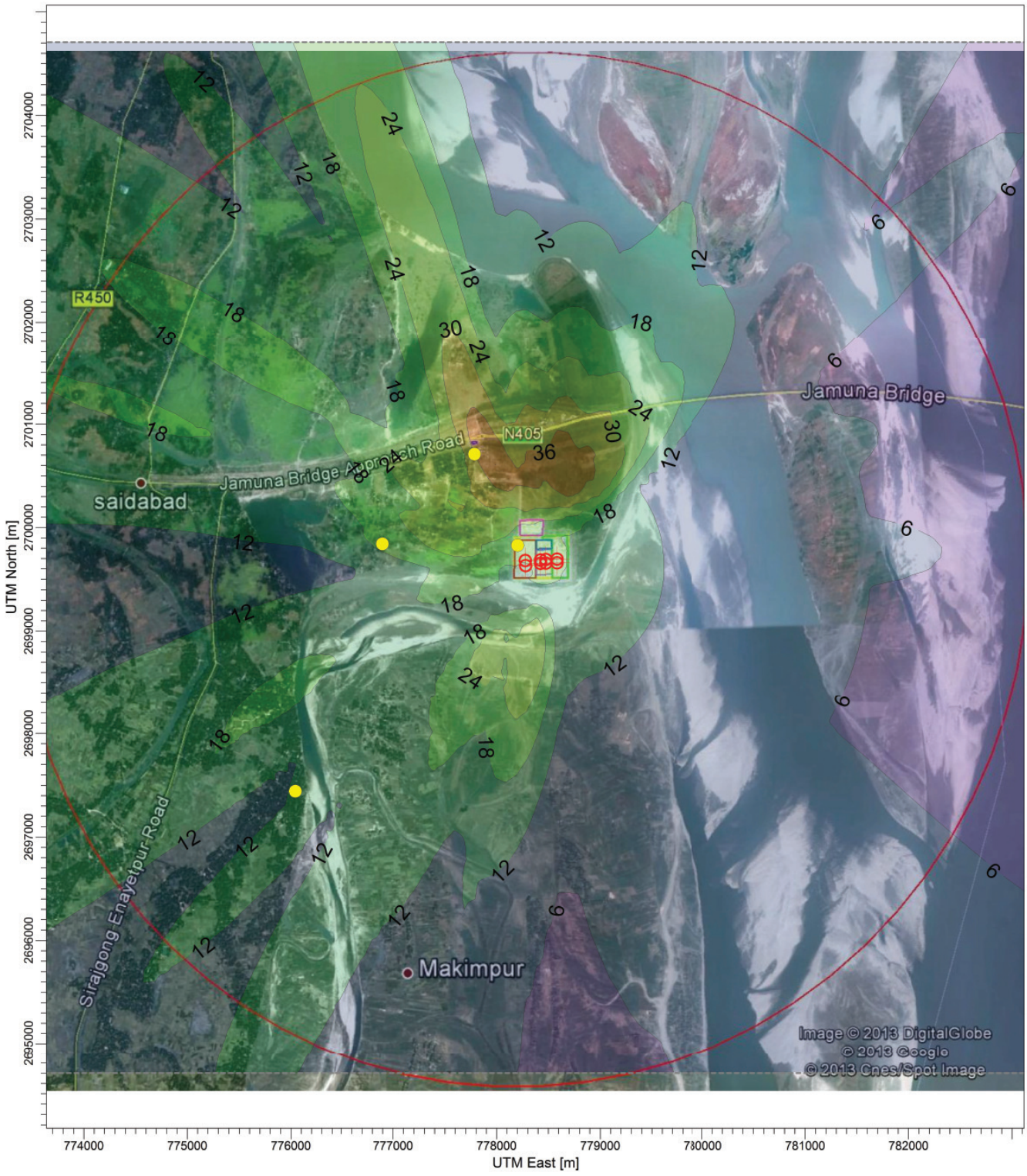
Max: 145 [ug/m^3] at (776389.06, 2700008.15)

30 40 55 70 85 100 115 130 145

	Sources: 8	Sembcorp: ERM
	10205	NC
	Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)
	Max Concentration: 145 ug/m^3	10/27/2015
		0276008

Sirajganj 4 Power Project

24 Hourly Maximum - NOx Concentration
Combined Cycle - S1, S2, S3 and S4 with HSD as Fuel



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: COMALL

ug/m^3

Max: 42 [ug/m^3] at (777989.06, 2700608.15)

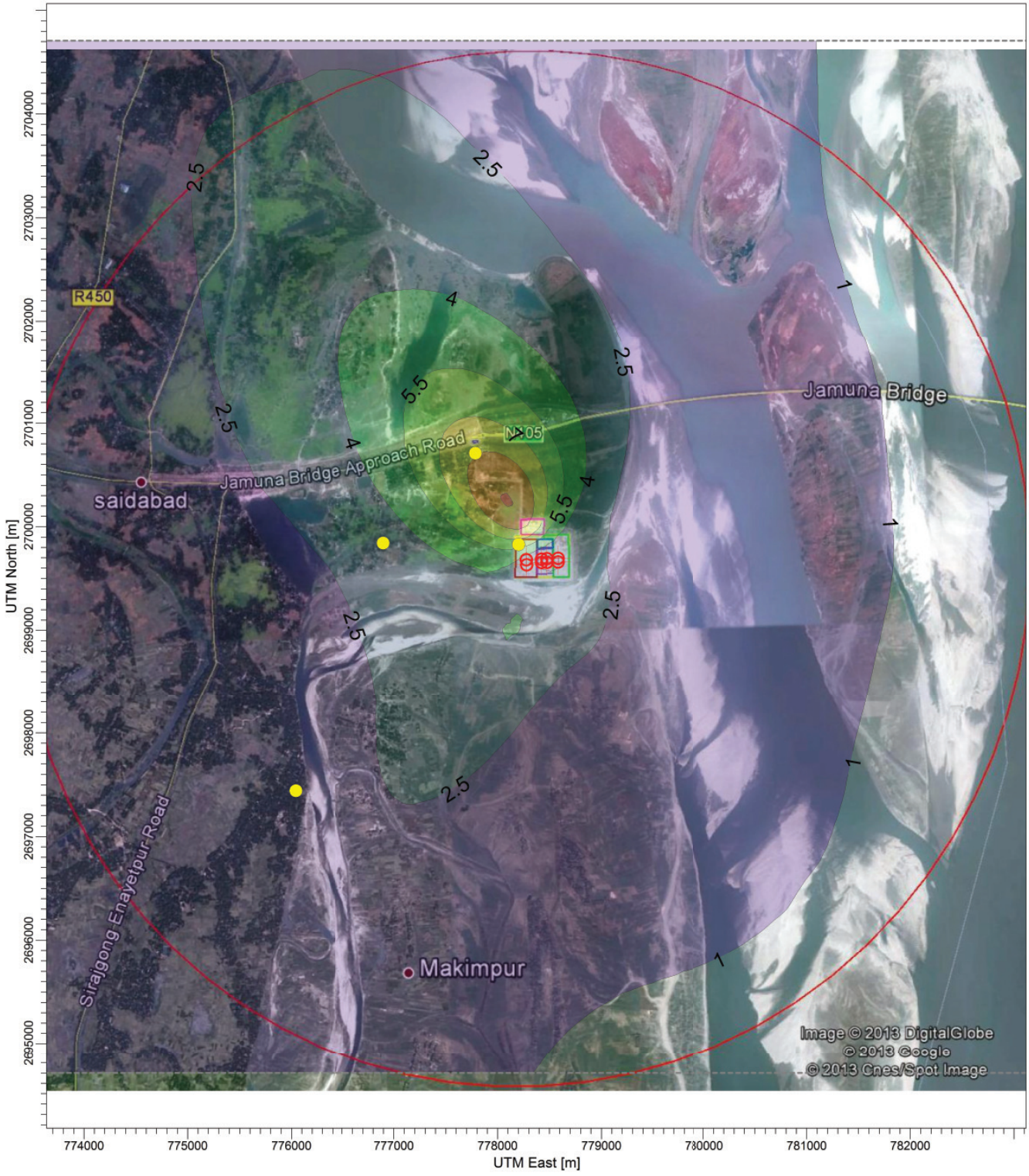
4 6 12 18 24 30 36 42

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 42 ug/m^3	10/28/2015	0276008

AERMOD View - Lakes Environmental Software

Sirajganj 4 Power Project

Annual Average - NOx Concentration
Combined Cycle - S1, S2, S3 and S4 with HSD as Fuel



PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: COMALL

ug/m^3

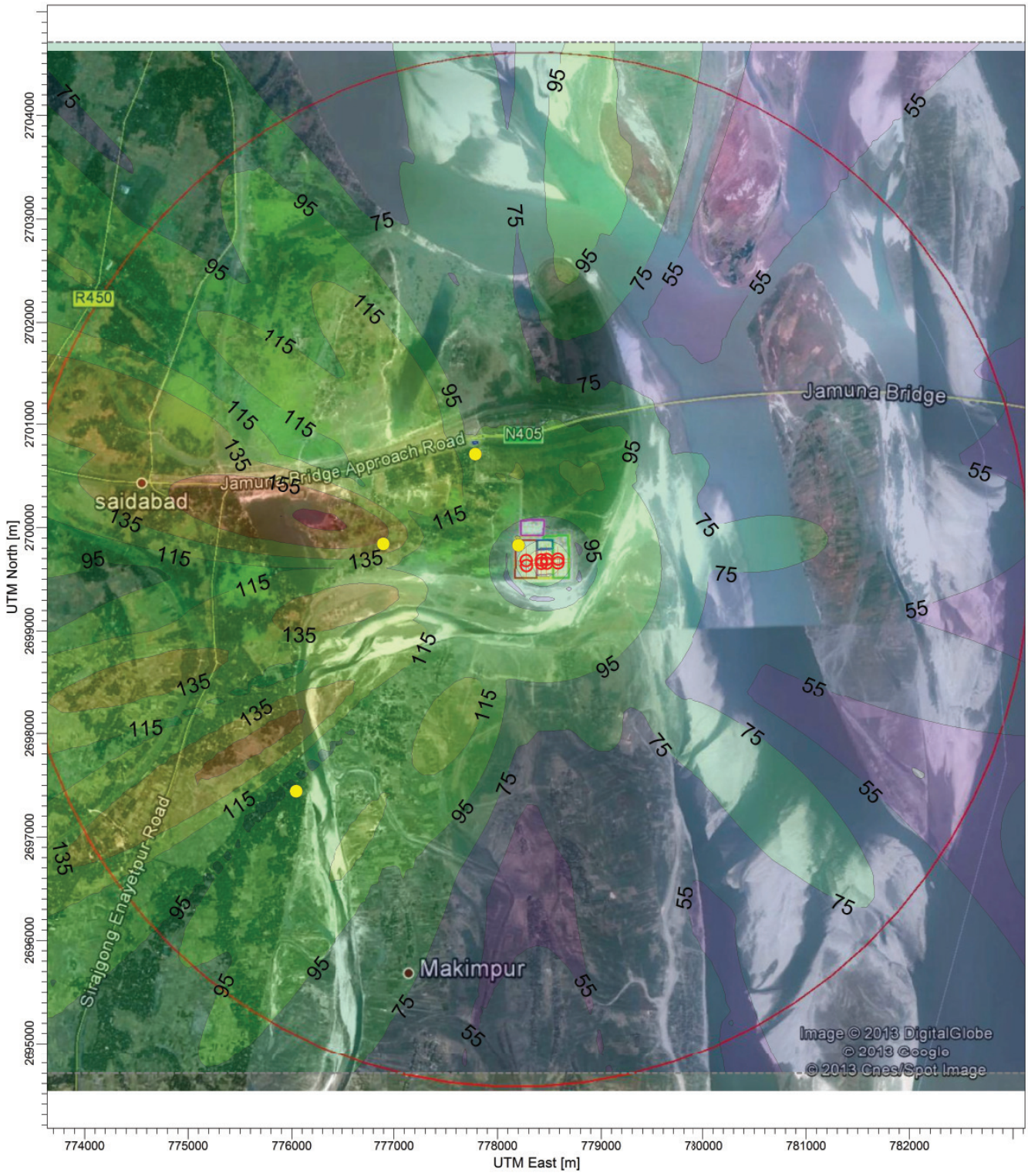
Max: 10.0 [ug/m^3] at (778089.06, 2700208.15)

1.0 2.5 4.0 5.5 7.0 8.5 10.0

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 10.0 ug/m^3	10/28/2015	0276008

AERMOD View - Lakes Environmental Software

1 Hourly Maximum - NOx Concentration
Combined Cycle - S1, S2, S3 and S4 with HSD as Fuel



PLOT FILE OF HIGH 1ST HIGH 1-HR VALUES FOR SOURCE GROUP: COMALL

ug/m^3

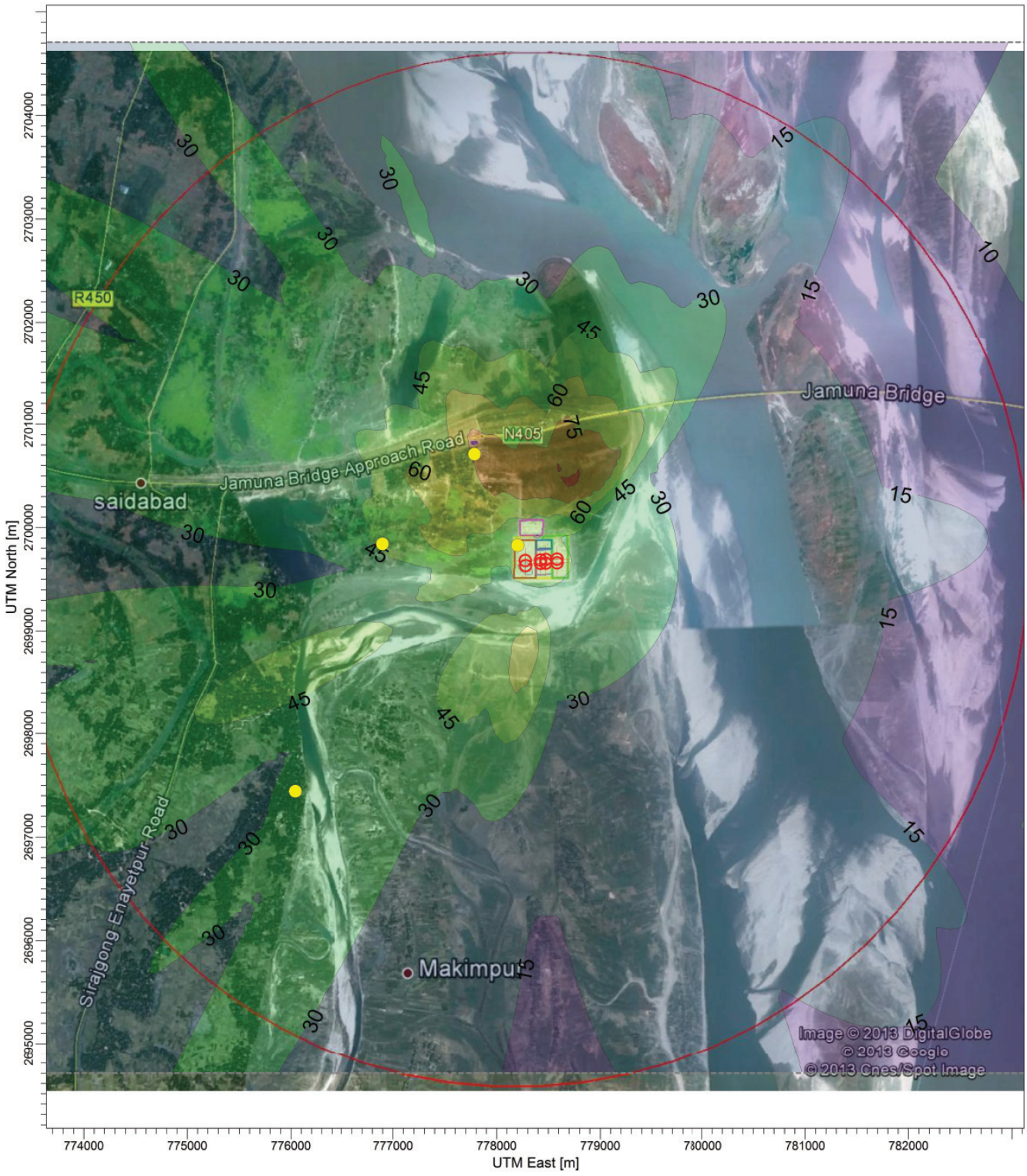
Max: 177 [ug/m^3] at (776389.06, 2700008.15)

35 55 75 95 115 135 155 175

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 177 ug/m^3	10/28/2015	0276008

Sirajganj 4 Power Project

8-Hourly Maximum CO Concentration
Combined Cycle Operation of S1, S2, S3 and S4 with HSD as Fuel



PLOT FILE OF HIGH 1ST HIGH 8-HR VALUES FOR SOURCE GROUP: COMALL

ug/m^3

Max: 91 [ug/m^3] at (778789.06, 2700508.15)

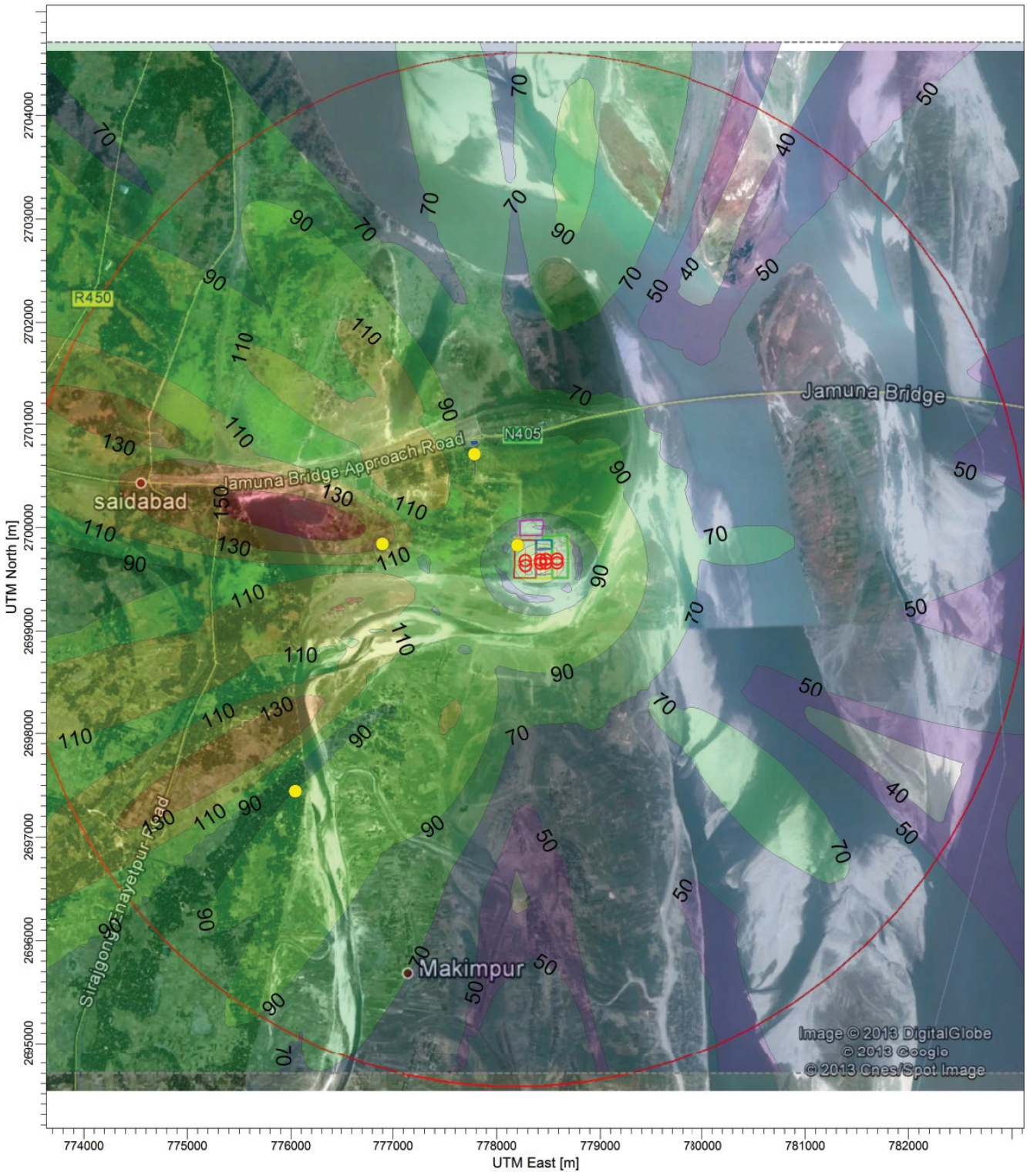
10 15 30 45 60 75 90

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 91 ug/m^3	10/28/2015	0276008

AERMOD View - Lakes Environmental Software

Sirajganj 4 Power Project

1-Hourly Maximum CO Concentration
Combined Cycle Operation of S1, S2, S3 and S4 with HSD as Fuel



PLOT FILE OF HIGH 1ST HIGH 1-HR VALUES FOR SOURCE GROUP: COMALL

ug/m^3

Max: 159 [ug/m^3] at (776389.06, 2700008.15)

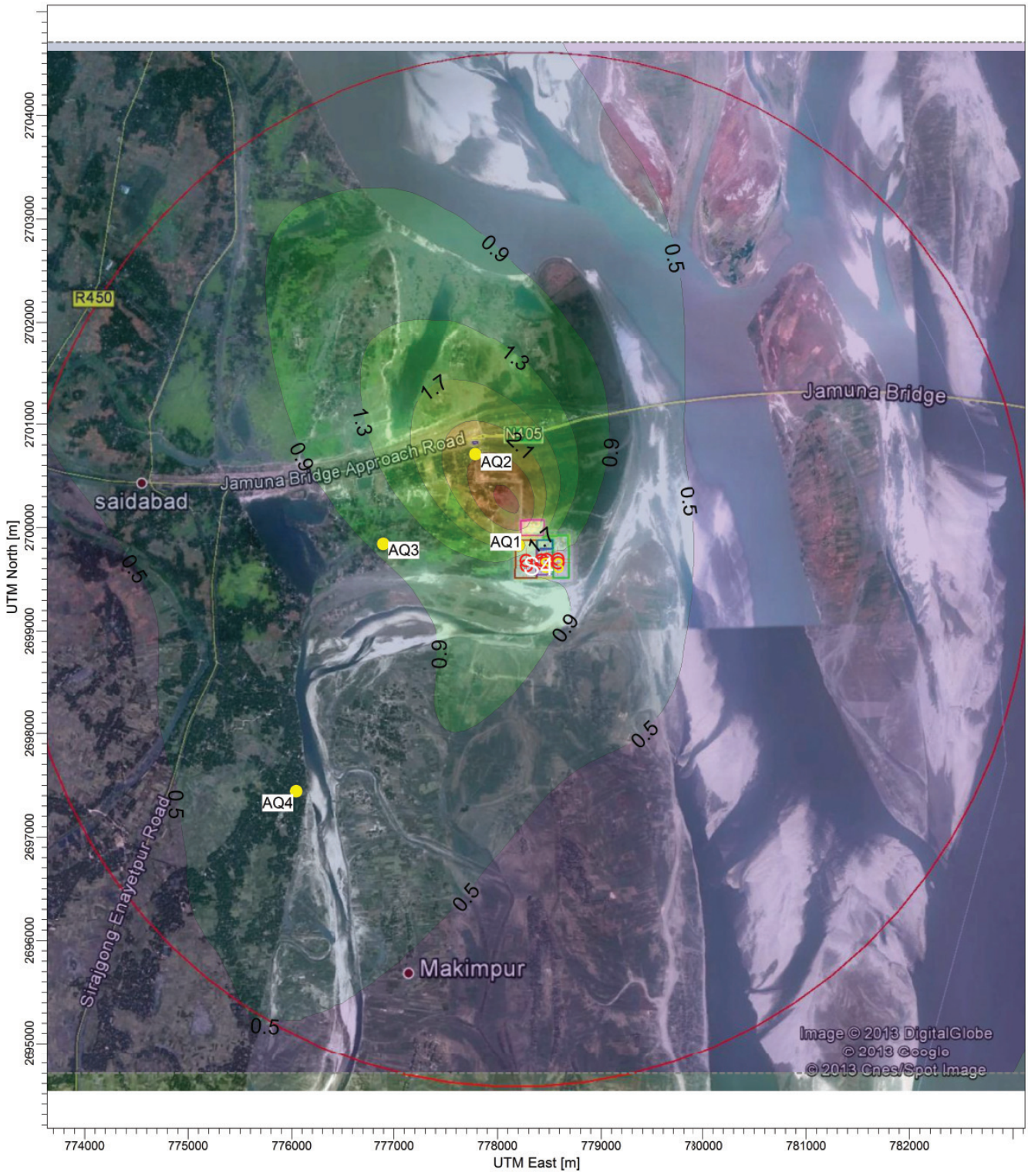
40 50 70 90 110 130 150

Sources: 8	Sembcorp ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 159 ug/m^3	10/28/2015	0276008

AERMOD View - Lakes Environmental Software

Sirajganj 4 Power Project

Annual Average - PM2.5 Concentration
Combined Cycle - S1, S2, S3 and S4 with HSD as Fuel



PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: COMALL

ug/m^3

Max: 3.0 [ug/m^3] at (778089.06, 2700208.15)

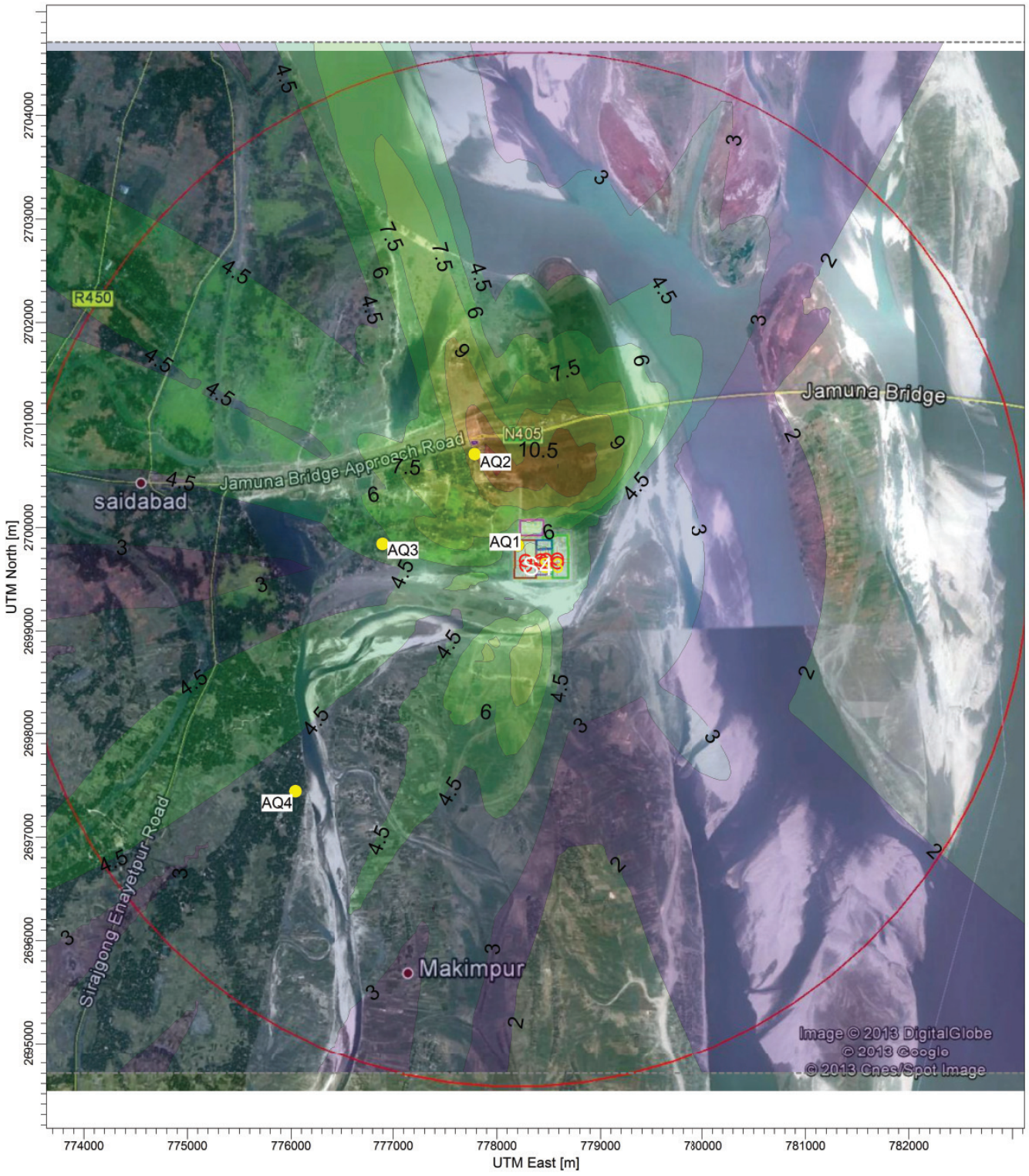
0.2 | 0.5 | 0.9 | 1.3 | 1.7 | 2.1 | 2.5 | 2.9

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 3.0 ug/m^3	10/28/2015	0276008

AERMOD View - Lakes Environmental Software

Sirajganj 4 Power Project

24 Hourly Maximum - PM2.5 Concentration
Combined Cycle - S1, S2, S3 and S4 with HSD as Fuel



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: COMALL

ug/m^3

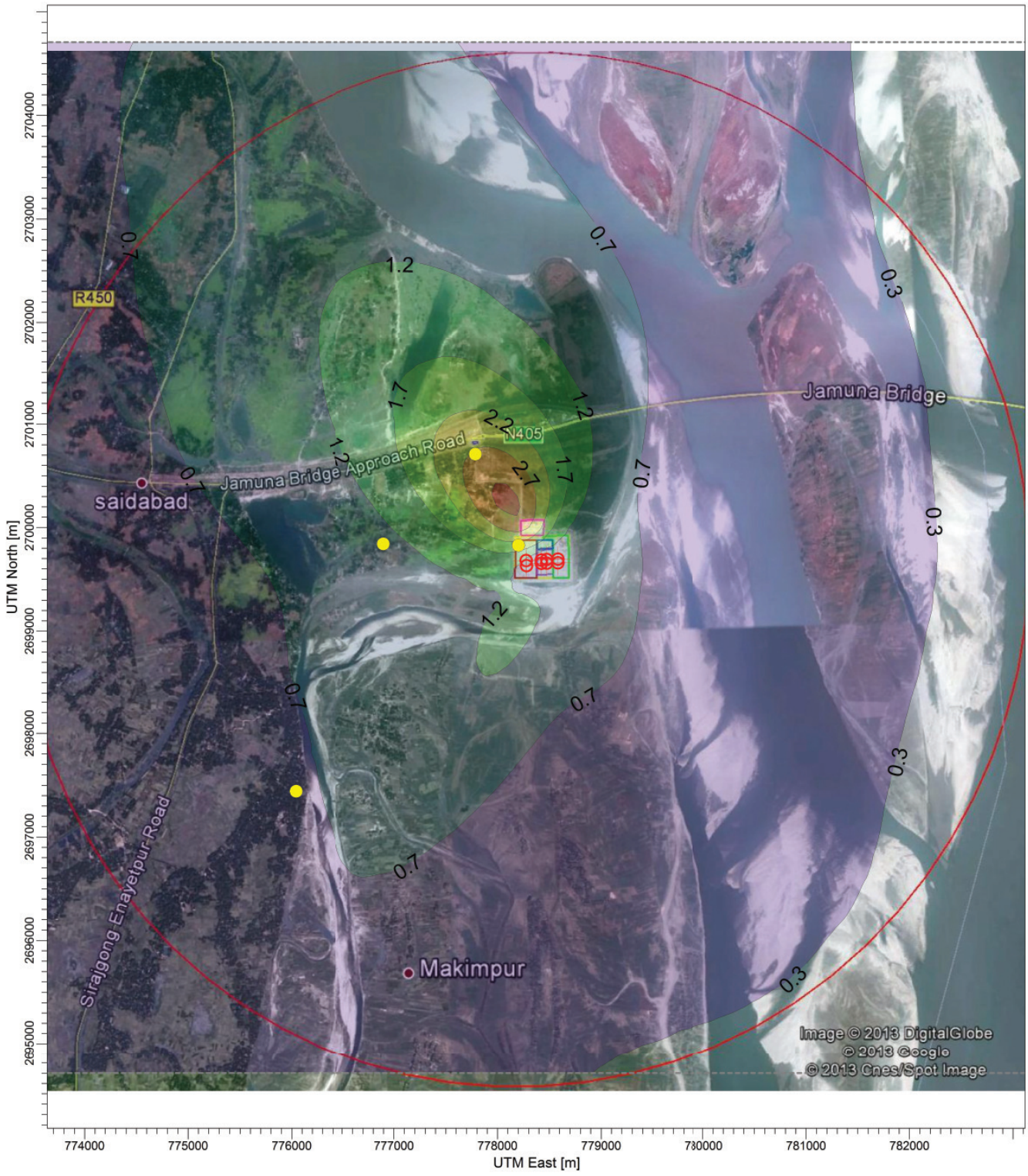
Max: 12.4 [ug/m^3] at (777989.06, 2700608.15)

2.0 3.0 4.5 6.0 7.5 9.0 10.5 12.0

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 12.4 ug/m^3	10/28/2015	0276008

Sirajganj 4 Power Project

Annual Average - PM10 Concentration
Combined Cycle - S1, S2, S3 and S4 with HSD as Fuel



PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: COMALL

ug/m^3

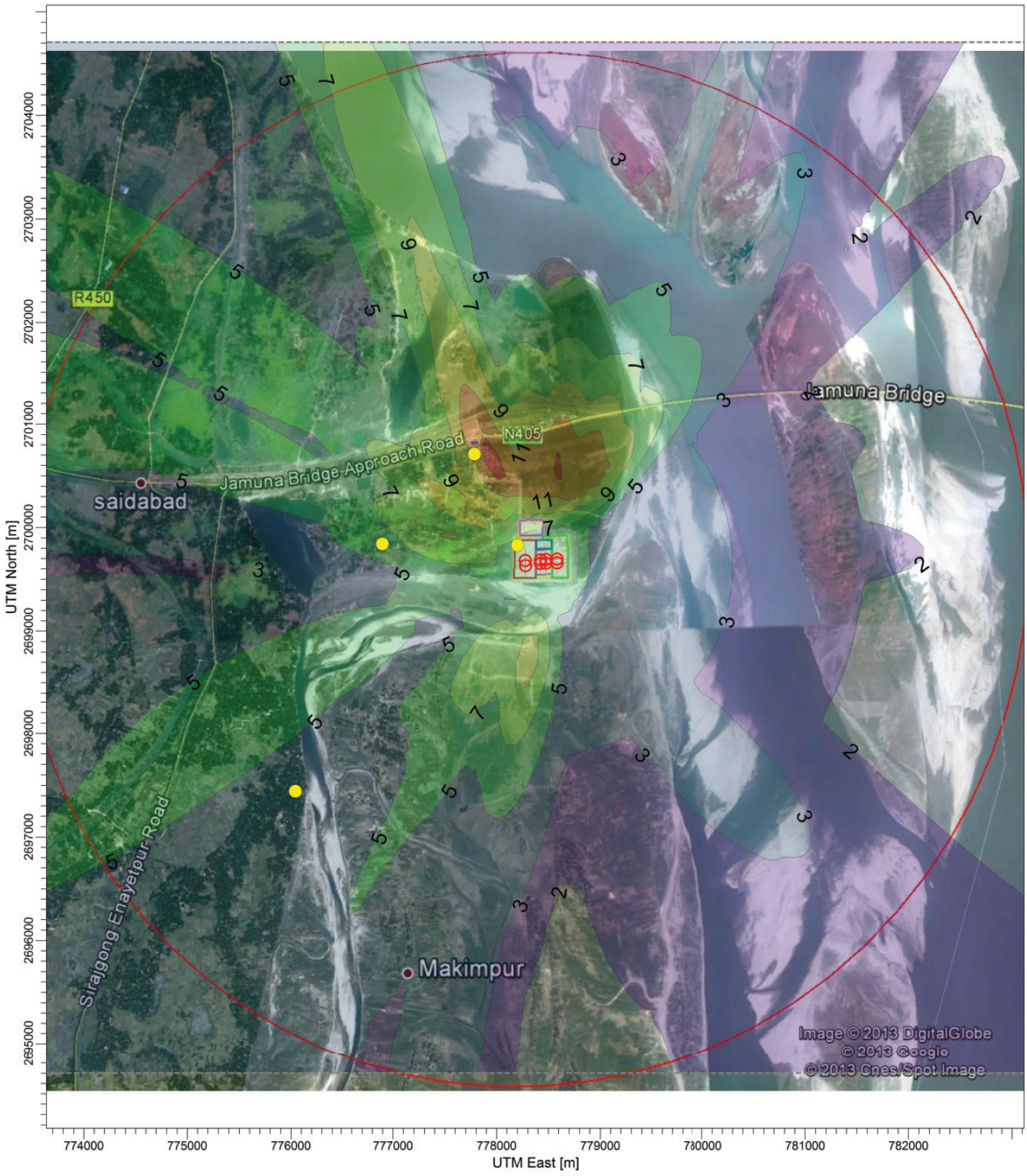
Max: 3.3 [ug/m^3] at (778089.06, 2700208.15)

0.3 | 0.7 | 1.2 | 1.7 | 2.2 | 2.7 | 3.2

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 3.3 ug/m^3	10/28/2015	0276008

Sirajganj 4 Power Project

24 Hourly Maximum - PM10 Concentration
Combined Cycle - S1, S2, S3 and S4 with HSD as Fuel



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: COMALL

ug/m^3

Max: 14 [ug/m^3] at (777989.06, 2700608.15)

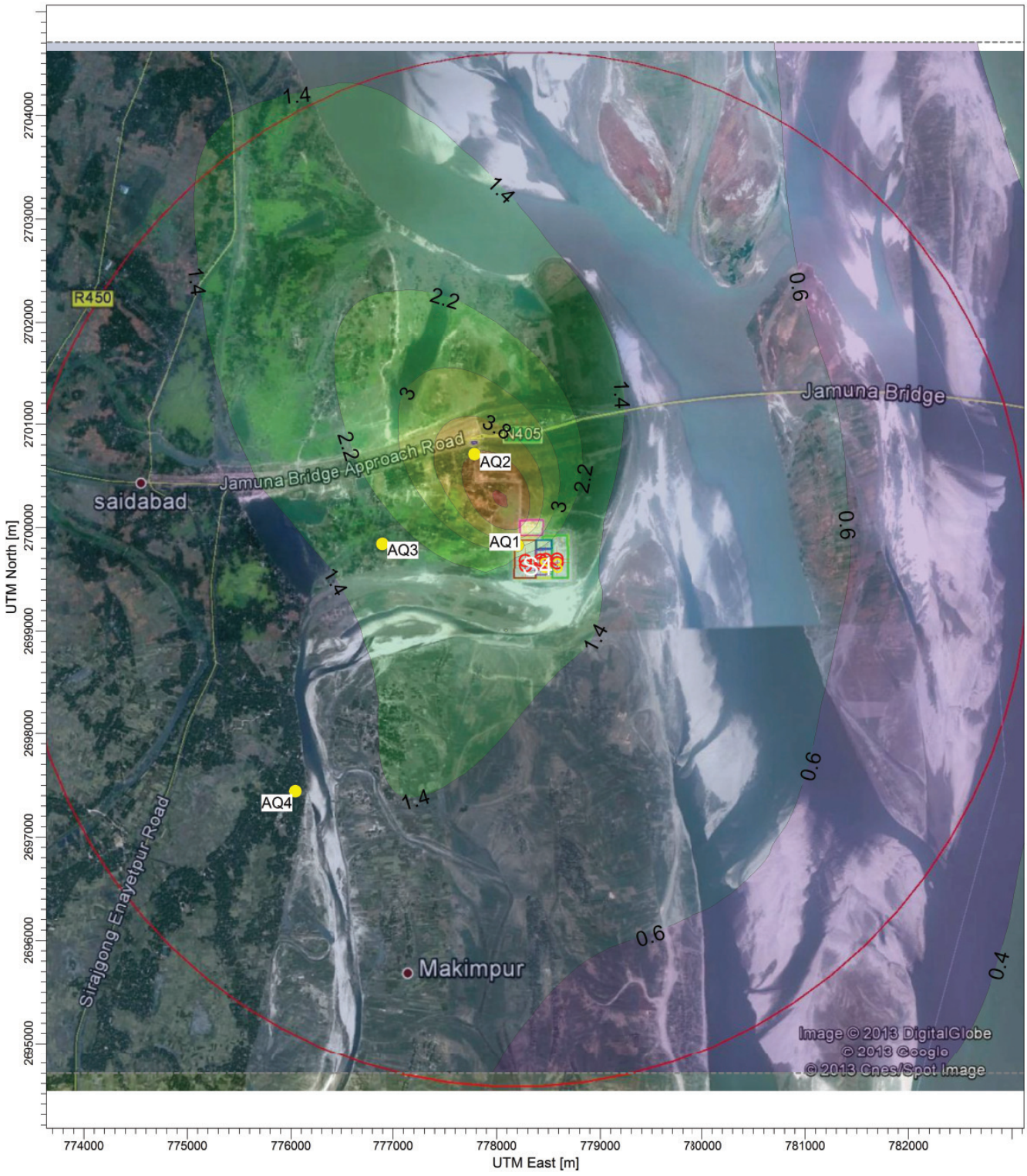
2 3 5 7 9 11 13

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 14 ug/m^3	10/28/2015	0276008

AERMOD View - Lakes Environmental Software

Sirajganj 4 Power Project

Annual Average SO2 Concentration
Combined Cycle - S1, S2, S3 and S4 with HSD as Fuel



PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: COMALL

ug/m^3

Max: 5.5 [ug/m^3] at (777989.06, 2700308.15)

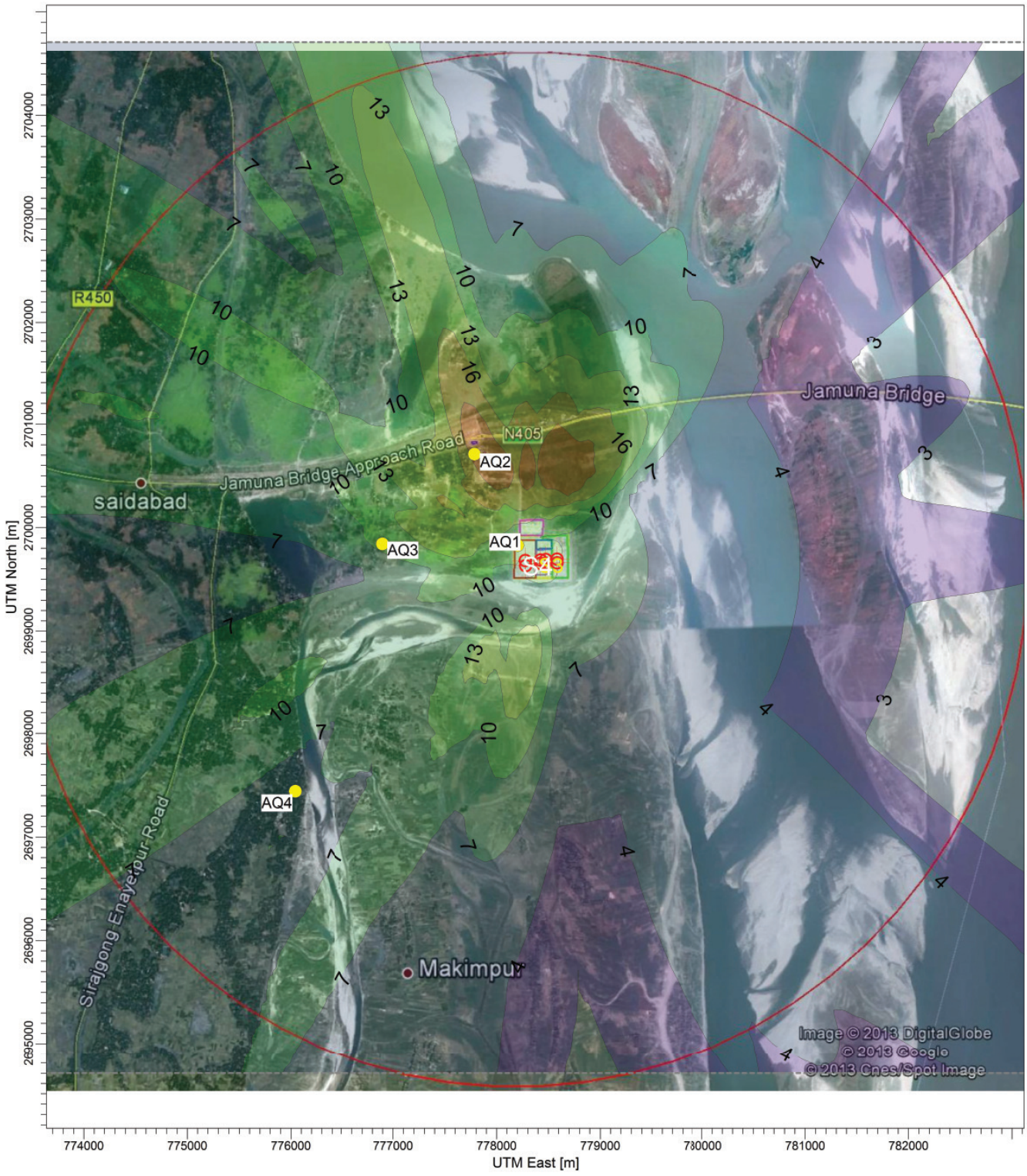
0.4 | 0.6 | 1.4 | 2.2 | 3.0 | 3.8 | 4.6 | 5.4

Sources: 8	Sembcorp: ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 5.5 ug/m^3	10/28/2015	0276008

AERMOD View - Lakes Environmental Software

Sirajganj 4 Power Project

24 Hourly Maximum SO2 Concentration
Combined Cycle - S1, S2, S3 and S4 with HSD as Fuel



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: COMALL

ug/m^3

Max: 22 [ug/m^3] at (777889.06, 2700708.15)

3 4 7 10 13 16 19 22

Sources: 8	Sembcorp ERM	
10205	NC	
Output Type: Concentration	SCALE: 1:40,000 (0 — 1 km)	
Max Concentration: 22 ug/m^3	10/28/2015	0276008

AERMOD View - Lakes Environmental Software

Annex O

Photo-Documentation of Field Surveys and Stakeholder Consultations

		
Photo 1:Project Site	Photo 2: Road next to Project site connecting existing power plant	Photo 3: Existing NWPGCL Power Plantadjacent to Project Site
		
Photo 4 : Consultations with NGO (Manab Mukti Sangstha)	Photo 5: Consultations with BPDB official at Seerajganj	Photo 6:Consultations with DOE officials at Bogra

Source: Field Visit by ERM team

Photo 7: Water Sampling

Photo 8: Sediment Sampling

Photo 9: Agricultural activities on waste lands

Photo 10: Permanent jetty on Jamuna Channel

Photo 11: Cattle grazing on Char lands on River Jamuna

Photo 12Consultations with local villagers on Char

Source: Field Visit by ERM team

		
Photo 13: Use of Char land by Villagers	Photo 14: Boats used for transportation	Photo 15: Water monitoring on site
		
Photo 16: Installation of Air sampler on Project site	Photo 17: Embankment and agricultural fields west of Project site	Photo 18: Access road connecting Project site

Source: Field Visit by ERM team

Photo 19:PGCL gas station about 1.5 km from Project site

Photo 20: Consultations with villagers of Panchosona

Photo 21: Consulationns with villagers of Khas-Boro Simul

Photo 22: Groundwater collection from Tube well

Photo 23: Agricultural field in the AOI

Photo 24:Ecopark

Source: Field Visit by ERM team

ERM India Pvt Ltd
Building 10, Tower A,, DLF Cyber City,
Gurgaon, NCR 1220022
Board: +91- 0124 4170300 Fax: 0124- 4170301

		
Photo 25:Red Vented Bulbul	Photo 26: Oriental Magpie Robin	Photo 27: Long Tail Shrike
		
Photo 28: Large Grey Babler	Photo 29: Large Billed Crow	Photo 30:Rufous Tree Pie

Source: Field Visit by ERM team

		
Photo 31:Black hooded Oriloe	Photo 32: Black Kite	Photo 33: Spotted Dove
		
Photo 34: Pulvus breasted Woodpecker	Photo 35: Black Drongo	Photo 36:Shikra

Source: Field Visit by ERM team

		
Photo 37:**Black Rumped Flameback**	Photo 38: Indian Roller	Photo 39: White Breated Kingfisher
		
Photo 40: Northern Shoveler	Photo 41: Common Sandpiper	Photo 42:Pied Kingfisher
Source: Field Visit by ERM team		

		
Photo 43:***Heteropneustes fossilis***	Photo 44: ***Oreochromis niloticus***	Photo 45: ***Macrobrachium sp.***
		
Photo 46: ***Labeo rohita***	Photo 47: ***Sperata aor***	Photo 48:***Chitala chitala***

Source: Field Visit by ERM team

		
Photo 49:***Tenualosa ilisha***	Photo 50: ***Sperata aor***	Photo 51: ***Heteropneustes fossilis.***
		
Photo 52: ***Labeo calbasu***	Photo 53: ***Corica soborna***	Photo 54:***Gonialosa manmina***

Source: Field Visit by ERM team

		
Photo 55:***Mastacembelus armetus***	Photo 56: ***Bagarius bagarius***	Photo 57: ***Gonialosa manmina***
		
Photo 58: ***Oreochromis niloticus***	Photo 59: ***Gonialosa manmina***	Photo 60:***Anabas testudineus***

Source: Field Visit by ERM team

		
Photo 61:***Litchi chinensis***	Photo 62: ***Moringa oleifera***	Photo 63: ***Neolamarckia cadamba***
		
Photo 64: ***Phoenix sylvestris***	Photo 65: ***Trema orientalis***	Photo 66:***Crotalaria palida***

Source: Field Visit by ERM team

		
Photo 67: ***Artocarpus heterophyllus***	Photo 68: ***Aegle marmelos***	Photo 69: ***Albizia lebbeck***
		
Photo 70: ***Albizia procera***	Photo 71: ***Borassus flabellifer***	Photo 72:***Dalbergia sissoo***

Source: Field Visit by ERM team

Photo 73:***Leucas aspera***

Photo 74: ***Tridex procumbens***

Photo 75: ***Calotropis gigantea***

Photo 76: ***Ranunculus scleratus***

Photo 77: ***Imperata cylinderica***

Photo 78:***Albizia lucida***

Source: Field Visit by ERM team

		
Photo 79:***Terminalia belerica***	Photo 80: ***Terminalia arjuna***	Photo 81***: Clerodendrum viscosum***
		
Photo 82: ***Mikcania cordata***	Photo 83: ***Amaranthus spinosus***	Photo 84:***Lens esculenta***

Source: Field Visit by ERM team

Annex P

Minutes of Stakeholder Consultation

Basic details	
Location: Project Site	**Date:**26-12-2012
Project: Sirajganj Environmental Support	**Time:**
Purpose of the visit: Environmental and Social Consultation	

Kindly Note: This document only provides a working summary of the main facts captured during the meetings held, not formal minutes. It is therefore deliberately not exhaustive or chronological and, being provided for information, is not intended for official review or approval. The views of the informant are theirs only and taken after "free" and "fair" consultation.

Meeting attended by				
No.	*Name*	*Organization*	*Designation*	*Contact*
1	Mr. Souptic Ahmed Methu	Union Parishad, Saidabad Union	Chairman	
2	Dr. Koel Kumar	ERM	Consultant	
3	Mr. Aritra Mazumder	ERM	Assistant Consultant	

Key points discussed:

- Understanding of the union spread within 5km of the Project Site
- Names of villages and Unions falling within 2km and 5km respectively
- General questions on the socio-economic structure of Saidabad including the type of industries around, the typed of occupation and livelihood followed by community, literacy and education system in Saidabad
- Historical information on the development of the existing power plant
- Land prices in Saidabad Union
- Proposed industrial development within the Union
- Impacts of flooding in the union and subsequently on the local community

Detailed Note of Discussion

- The Project Site is completely located within the Saidabad Union of Sirajganj Sub-District in Bara ShimulPanchashonaMouzha (Revenue Village). The key villages within the 2km radius of the site are PurboMohanpur, KhasBoroshimul, Phulwari Char, Saidabad Village, Char Saidabad, Gachchabari and Dukhiabari;
- Two (2) more unions of KaliaHaripur Union and Rajapur Union (Belkuchi Sub-District) falls within the 5km radius
- Loam and textile industries are the maximum (70% of total revenue) contributor to Saidabad's revenue;
- People are engaged in agricultural practices and majority of the same cultivate three cropping seasons in a year. The major crops grown in the area are Rice, Pulses (Masoor, Maash), Peanuts and Til;
- The Char areas are mostly used for grazing and farming pulses and Til;
- There is no fishing village within the Union involved in medium or large scale fishing. Most of the community are involved in small scale fishing practices;
- The major fishing catch in the area are Chapla, Shrimp, Hilsa, Carp amongst others;
- The textile industry in the area produces Saree, Lungi, and exported out to other parts of Bangladesh including Tangail, Dhaka, Bhuat, Baburhaat amongst others;
- The handlooms and textile mills are at the Household level. The industry is mostly a cottage based industry;
- The literacy rate is higher in the Sirajganj area as compared to other places of Bangladesh. There are 30-35 primary schools, 8 high schools and 1 college within Sirajganj Sadar;
- The existing power plant was constructed back in 2001 and the inauguration was carried out back approximately 2 years back. The government provided Khas land for the development of the same;
- The advent of the power plant has improved the electricity scenario in Sirajganj Sadar;
- Industrial Park coming in PurboMohanpur Village is expected to give boost to local economy and create large scale employment opportunities;
- Expectation of the Industrial Park and Economic Zone has fuelled an increase in land prices in the area, especially along the highway. Price of 1 Decimal of land has reached close to Tk 5,00,000-6,00,000 along the highway;
- Landlessness is prominent in the area due to frequent flooding during monsoon season. Government takes over private land in case the land is submerged and is not naturally reclaimed within a period of 30 years;
- A large section of the community has to be rehabilitated during monsoon due to flooding. The last major flood came in 2007;

Data collected:

No data collected from this stakeholder.

Any further follow up decided:

No follow-up or meeting required with this stakeholder.

Basic details	
Location: ManabMuktiSangstha (MMS) Office, Saidabad	**Date:**26.12.12
Project: Sirajganj Environmental Support	**Time:**
Purpose of the visit: Environmental and Social Consultation	

Important Notice: This document only provides a working summary of the main facts captured during the meetings held, not formal minutes. It is therefore deliberately not exhaustive or chronological and, being provided for information, is not intended for official review or approval. The views of the informant are theirs only and taken after "free" and "fair" consultation.

Meeting attended by				
No.	*Name*	*Organization*	*Designation*	*Contact*
1	Md. HabibullahBahar	MMS	Director	+88-01713002850
2	S,M.Amir Hossain	MMS	Deputy Director	+88-01733713790
3	Dr. Koel Kumar	ERM	Consultant	
4	Mr. Aritra Mazumder	ERM	Assistant Consultant	
	Mr. Kazi Farhed Iqubal	EQMS	Executive Director	+88-01911702074

Key points discussed:

- Understating on the NGO landscape in Sirajganj Sadar and initiatives in Saidabad
- Background of MMS as an agency and the type of work it is involved in
- Biggest social challenges and issues in Saidabad. Understanding on the most vulnerable sections of the society
- Type of programs run by the agency and its targeted audience
- Key on-ground issues and Social challenged by the agency

Detailed note of discussion

- MMS is the largest local NGO working in Sirajganj. Although the organization was started back in 1984, the branch in Sirajganj was established back in 2002;
- There primary work is in disaster management, women and children development, poverty reduction, microfinance, minimizing local conflict over resources amongst others. Presently have a staff strength of almost 400 people in Sirajganj;
- Work from bottom most levels (Household) to the organizational level for disaster preparedness and resilience;
- Examples of Household level interventions include homestead plinth area raising, fodder and fuel preservation, equipping households with essential commodities (dry ration, medicine, fuel oil etc.) for managing flood and disaster risks;
- At the organizational level, MMS works with the local administration for Emergency Response Protocol, Capacity building for managing disasters at the institutional level without any donor agency support;
- Common forms of disasters faced include river bank erosion and flooding, cold waves, tornadoes;
- Varying flooding patterns observed over the year resulting in loss of crops, lives, pasture and agricultural land;
- In previous year, the onset of monsoon and subsequent flooding was before the expected time leading to destruction of all the Til and Rice crops in the area;
- Aaush, Amoh, Boro are the traditional varieties of Rice that area grown here with Eeri being the non-traditional breed. Due to premature flooding, Amoh is one of the varieties that gets severely impacted as the plant grows with increasing water levels. However, sudden increase in water levels destroys this breed of crop;
- People are mostly dependant on fishing and agriculture as a source of income. Practices are mostly traditional; not much of problems observed from the establishment of power plants in the area;
- Some form of positive development has been seen from the construction of the previous power plant including proper embankment leading to control of river and lesser river bank erosion, employment of locals for labour work during the construction phase of the project,
- No complaints or community apprehensions have come under notice with respect to the BPDB power plant;
- Primary challenges faced by the local community are natural disasters, unemployment, low income due to traditional agricultural practices, communication, electricity and road connectivity. Health associated problems include mostly water related problems such as Typhoid, Diarrhoea and Cholera being prevalent ;
- One of the largest schemes MMS is presently working in is SDLG which stands for Strengthening Democratic Local Governance (SDLG) in association with (Association for Rural Development), USAID
- This scheme involves MMS working at the local administrative level with the union Parishad and Upazilla members to

help in Rural Governance and better financial planning for Rural Development;

- MMS has identified the most vulnerable factions of the society as people with no regular income, no economic asset, beggars, women headed households, families with family heads with chronic sickness;
- In any given community, the total vulnerability has been classified as 15% of the population.

Data collected
Annual Report of MMS for the year 2011-2012

Any further follow up decided:
Stakeholder can be utilized during later stages of project to implement CSR strategy, development plans as proposed by the project proponent as part of the projects welfare program

Basic details	
Location: Department of Social Welfare, Sirajganj Sadar	**Date:** 26/12/2012
Project: Sirajganj Environmental Support	**Time:**
Purpose of the visit: Social Consultation	

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Meeting attended by				
No.	*Name*	*Organization*	*Designation*	*Contact*
1	Md. ShamchurRehman	Department of Social Welfare	Field Officer	
2	Mr. Aritra Mazumder	ERM	Assistant Consultant	
3	Mr. Tauhid Hasan	EQMS	Consultant	

Key points discussed:

- Role and Responsibility of the Social welfare department in Sirajganj
- Social Welfare schemes and programs that are being undertaken and implemented by the department in Sirajganj Sadar and Saidabad Union
- Primary areas of social concern in Sirajganj and Saidabad
- How is the project beneficial in that area and will it any way have any negative impact as such on the locals
- What is the local public perception about the project
- Participation level of the international and domestic NGO's and welfare organizations

Detailed Note of Discussion

- The primary programmes run by the Social Welfare Department in Sirajganj Districtand funded by Government are as follows
  - Micro credit program
  - Old people pension scheme
  - Divorce women compensation scheme
  - Help less people scheme
  - Freedom fighter scheme
- Any NGO or welfare organization working in the area are required to obtain permit or clearance from the Social welfare department
- Presently the department has a strength of 13 officials within Sirajganj Sadar;
- Status update on few of some of the aforementioned programs are as follows (all figures for Sirajganj Sadar):
  - Presently, 6856 persons above the age of 65 are provided with old age pension of Tk300 per month;
  - Presently, 2325 persons are being paid a widow/widower pension of Tk300 per month;
  - Amongst the disabled, a total of 818 people are receiving a total of Tk300 per month;
  - Under the freedom fighter scheme, a total of 744 individuals are receiving a pension of Tk2000 per month;
- Women specific Social Welfare Department run by the department provides loan of Tk5000 to women group (10-15 person) for poultry rearing, Nakshi Katha (embroidery), local handicraft (earthen work), Local business of raw materials (fruit/ beetle nut) etc .
- Under the microfinance scheme, a total of Tk 69,26,920 was allocated to 1816 households within Sirajganj Sadar;
- Households earning less thenTk 7500 per year are eligible for taking Micro-credit finance from the department. Also, their children are supported via education grant at different levels of schooling right from Primary upto college graduate.
- The primary areas of concern in Sirajganj are destruction due to floods and the resultant loss of property (homes, shelter etc.) and crops which renders a significant no. of people homeless as well as in shortage of food and household resources;
- The department helps in disaster management activities as well as local rehabilitation and reconciliation work
- International humanitarian groups such as WFP, Action Aid, USAID amongst others are actively involved in this region.

Data collected

Scheme related documents have been collected from this stakeholder

Any further follow up decided

Follow up may be required during project implementation phase in case the client wants to initiate CSR and Community Welfare activities. The client is required to receive permission from this agency prior to initialization of any community based

activities.

Basic details	
Location: Department of Fisheries, SirajganjSadar	**Date:**27/12/2012
Project: Sirajganj Environmental Support	**Time:**
Purpose of the visit:	

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Meeting attended by				
No.	*Name*	*Organization*	*Designation*	*Contact*
1	Mr. AlokSaha	Department of Fisheries, Sirajganj Sadar, Upazilla	District Fisheries Officer	+88-01711954738
2	Dr. Koel Kumar	ERM	Consultant	
3	Mr. Aritra Mazumder	ERM	Assistant Consultant	+91-9971290960
4	Mr. Kazi Farhed Iqubal	EQMS	Executive Director	+88-01911702074
7	Mr. Tauhid Hussain	EQMS	Consultant	

Key points discussed:

- Role and responsibility of the local fisheries departments and how is the department structured
- Where are the primary fishing point/ports/sanctuary located in and around in Sirajganj
- Details of Fishing production in Sirajganj Sadar
- Details on the key species of fishes observed in Jamuna River
- Understanding on the Fishermen community and their practices

Detailed Note of Discussion

- The fisheries department is headed by the Director General at the central government level, under which there are directors at divisional and district levels. It is further segregated into District Officers, Sub-Officers and Field Assistants;
- Fishing in Sirajganj Sadar is at a very small scale and involves approximately 1590 fishing households in Sirajganj Sadar;
- The fishing department in Sirajganj Sadar is understaffed and there is shortage of field level workers;
- Due to the shortage of staff, it is difficult to implement the Fish Act within Sirajganj Sadar;
- Some of the key the vulnerable fishes found within the Jamuna river are Maha Sol, Jamuna Dolphin and Olive Barb fish;
- There are no dedicated fishing villages within Saidabad Uniuon or in Sirajganj Sadar;
- No commercial scale fishing culture carried out in Sirajganj Sadar. However, small scale fish culture is carried out in and around Saidabad Union at the household level;
- The fisherman use primitive fishing practices for capturing fish. However, there has been an increase in usage of illegal nets (including current net, bed net and cast nets).
- A major fishing sanctuary located in Saidabad where fishing is prohibited. It is connected to the main river via connecting canal;
- The current activities carried out by the fishing department includes field surveys, support to fishermen with respect to training, awareness and income generation activities;

Data Collected

No data available for fish production and fishing villages for Sirajganj Sadar

Any further follow up decided:

No further follow-up or meeting is required with this stakeholder

Basic details	
Location: Belkuchi	**Date:**27/`12/12
Project: Sirajganj Environmental Support	**Time:**
Purpose of the visit: Baseline Consultation	

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Meeting attended by				
No.	*Name*	*Organization*	*Designation*	*Contact*
1	Mr. Abu Tahir	ManabMuktiSangstha	Field Worker	N/a
2	Mr. Abdul Hasan	Private Handloom	Handloom Worker, Belkuchi	N/a
3	Mr. Aritra Mazumder	ERM	Assistant Consultant	
4	Mr. Tauhid Hassan	EQMS	Consultant	

Key points discussed:

Points discussed with handloom worker include:

- Monthly production and income generated
- Employment prospective in handlooms
- Economic condition of handloom market in Belkuchi

Points Discussed with Field Worker include:

- The key vulnerable groups encountered during field assessments and surveys
- Type of development program engaged in;

Detailed Note of Discussion

Response from Handloom Worker

- Produced approximately 450 sarees in a month;
- Gets approximately Tk60 for every saree produced. In total earns approximately Tk27000 per month;
- The market prices of each saree differs from Tk220 to approximately Tk700;
- Sales increases during festival months;
- Jobs are getting increasingly scarcer due to the advent of mechanised looms because of which a no. of handloom workers are increasing losing their livelihood. Each mechanised looms only requires 2 operatives as against 20 workers engaged in any handloom;

Response from MMS Field Worker:

- The most vulnerable sections of the society observed within Sirajganj Sadar are widows, large families without any permanent source of income; families impacted by river bank erosion, individuals with irregular income such as rickshaw puller, fishermen, van drivers, disabled amongst others;
- Work for the Enhancing Resilience Program amongst the vulnerable group for MMS in association with WFP;
- The primary agendas of the program includes six(6) monthly training on health, women development and disease prevention;
- Presently 100 families are covered within this program

Data collected:

No data collected from these stakeholders

Any further follow up decided:

No follow-up meeting required with these stakeholders

Basic details	
Location: Department of Environment (DoE), Rajshahi Division,Bogra	**Date:**27/12/2012
Project: Sirajganj Environmental Support	**Time:**
Purpose of the visit: Environmental Consultation-Introduction about the proposed project, learning about the environmental scenario in the area and regulatory requirements towards environment	

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Meeting attended by				
No.	*Name*	*Organization*	*Designation*	*Contact*
1	Md. MesbabulAlam, Bogra	DoE	Assistant Director	
2	Md. Saef-ultahTalukdar	DoE	Deputy Director	
3	Dr. Koel Kumar	ERM	Consultant	+91-9711168696
4	Mr. Kazi Farhed Iqubal	EQMS	Executive Director	+88-01911702074

Key points discussed:

- Introduction of the proposed Project
- Information regarding any sensitive zones/polluting industries in the Project Area
- Regulations applicable to the proposed Project/suggestions for the Project
- Information on Dredging permissions
- Information regarding upcoming industrial parks or economic zones in Sirajganj

Detailed Note of Discussion

- Project details were introduced to the DoE officials
- No sensitive zones in the Project area only the BBA eco-park for the protection of the Bridge.
- Few polluting industries upstream of the Project site near Sirajganj town. Many polluting dye units downstream of the Project site near Bagabari.
- Upcoming power plant should be built in consideration of future developments.
- 6 weeks AAQ monitoring should be carried out. Baseline data collection for Flora and Fauna should be Primary.
- Zero discharge technology or closed loop recycling to be applied to the extent possible. Installation of flow measuring device both at inlet and outlet of ETP.
- All applicable standards are required to be complied with in regards to emission and effluent. Consultations with communities in the area.
- As per DoE, dredging is red category and IEE is required.
- No information on any industrial park or economic zones coming up in Sirajganj.

Data collected:

No data collected from these stakeholders but reference of some new environmental gazettes were collected.

Any further follow up decided:

Follow-up meeting required with the stakeholder at the time of the Project going in for environmental clearance as per GOB, ECR.

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Basic details	
Location: Bangbandhu Bridge Authority (BBA), Toll Plaza Office near BBA bridge	**Date:**27/12/2012
Project: Sirajganj Environmental Support	**Time: 4.00 pm**
Purpose of the visit: Environmental Consultation-Introduction about the proposed project and discussions on relevant aspects.	
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Meeting attended by				
No.	*Name*	*Organization*	*Designation*	*Contact*
1	Md.KairudJammal	BBA	Assistant Engineer	
2	Dr. Koel Kumar	ERM	Consultant	+91-9711168696
3	Mr. Kazi Farhed Iqubal	EQMS	Executive Director	+88-01911702074

Key points discussed:
• Introduction on the Proposed Project • Any regulations/permissions required from BBA as their land is just next to Project site and intake pipeline may come through the area • Data about Traffic passing through the Bangbandhu Bridge • Whether Barges can pass under the Bangabandhu Bridge or any permission required regarding the same

Detailed Note of Discussion
• Project details were introduced to the BBA officials • BBA land near the bridge handed over to forest department for plantations and maintenance. The asset belongs to BBA. Any work in the area as for temporary jetty/intake pipeline needs permission from the BBA. Permissions required for any work near guide banks for protection of the Bridge. • Traffic statistics at toll Plaza point of Bangbandhu Bridge collected • Barges can pass if required below the bridge and no permission is required

Data collected:
Traffic data of the Bangbandhu Bridge was collected.

Any further follow up decided:
Follow-up meeting required with the stakeholder at the time of the Project going in construction of temporary jetty and

Basic details	
Location: Bangladesh Water Development Board (BWDB), Near SirajganjHardpoint	**Date:**26/12/2012
Project: Sirajganj Environmental Support	**Time:**4.30 pm
Purpose of the visit: Environmental Consultationtowards understanding therole of BWDB towards flood protection in the area and data collected for the station being maintained by BWDB on River Jamuna.	

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Meeting attended by				
No.	*Name*	*Organization*	*Designation*	*Contact*
1	Mr. RafiqueAlamChoudhary	BWDB	Assistant Divisional Engineer	
2	Dr. Koel Kumar	ERM	Consultant	+91-9711168696
3	Mr. Kazi Farhed Iqubal	EQMS	Executive Director	+88-01911702074

Key points discussed:
• Flood scenario in Sirajganj • Protection /control measures being adopted • Role of BWDB in monitoring of River Jamuna near hardpoint. • The water availability in Jamuna River and its seasonal variation if any to meet the requirement of the industrialization in the area. • Flood risks and flood management efforts in project area.

Detailed Note of Discussion

- Sirajganj is a heavily flood prone area due to the massive flow of the River Jamuna.
- Sirajganj has Brahmaputra Right embankment (BRE) for its protection and during the construction of the Bangbandhu Bridge, a River Bank Protection Project (RBPP) was initiated under which the 2.5 km length of Sirajganj hardpoint was built for protection of the town and bridge. The construction for the same was carried out by Hyundai, Korea from 1195-1999.
- Embankment (BRE) got broken in 2007 so water entered the Sirajganj town and also in 2009-11 slope failure took place at the embankment. About 74 crores was spent for repairing the same and every year GoB invests huge amounts for protection of the embankments. BWDB takes actions as placement of geotextile bags etc for flood protection.
- BWDB monitors the flow of the river Jamuna at Sirajganj harpoint and also does daily monitoring of the hardpoint embankment. BWDB carries out bathymetric survey monitoring and coordinates with (Institute of Water modelling) IWM to keep track on the river flow.
- BWDB also monitors the various dredging activities being carried on the Jamuna river at Sirajganj.

Data Collected
Data collection on water level at the Sirajganj hardpoint and dredging activities in the area

Any further follow up decided:
No further follow-up or meeting is required with this stakeholder

Basic details	
Location: Forest Office, Forest Department, Pabma	**Date:**27/12/2013
Project: Sirajganj Environmental Support	**Time:**
Purpose of the visit: Environmental and Social Consultation	

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Meeting attended by				
No.	*Name*	*Organization*	*Designation*	*Contact*
1	Md. Hossain	Department of Forest	Assistant Conservator of Forest	
2	Mr. Aritra Mazumder	ERM	Assistant Consultant	
3	Mr. Tauhid Hasan	EQMS	Consultant	

Key points discussed:
• Clarification on forests in and around Sirajganj and the project site • Operations of forest department in Sirajganj • Presence of tribal population within Sirajganj and tribal belt • Any species of trees or animals classified as endangered • Clearances and permissions to be obtained by the power plant from the forest department • Discussion on the Ecological park

Detailed Note of Discussion
• It was confirmed by the forest officer that no classified forest, national park or sanctuary are present within Sirajganj • Only an eco-park is managed by the forest department within the 2km radius of the project site • The road side plantation is carried out by the forest department in the area • No trees or animals classified as endangered or critically threatened observed in Sirajganj • Negligible tribal population within Sirajganj or any presence of any tribal belt in the area • The project has to take a no objection certificate from the forest department prior to construction of the plant • Additional measures have to be adhered to with respect to development close to the Eco park as per stipulated norms and guidelines

- The ecological park is spread over 124 acres of land and the buffer is spread over 550 acres
- Animals such as monkeys, deer, peacocks, rabbits and jackals are found in the eco-park
- Migratory birds are also observed during specific seasons. The list of birds is not present

Data collected:
Flyer for the Eco-park was collected from the forest officer

Any further follow up decided:
No follow-up or meeting may be required with this stakeholder.

Basic details	
Location: Char Area parallel to the project site	**Date:**28/12/2012
Project: Sirajganj Environmental Support	**Time:**
Purpose of the visit:FGD with Local Community (KhasBarashimul)	

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Meeting attended by

No.	*Name*	*Organization*	*Designation*	*Contact*
1	Md. Shamshur Ali & Ghulam Sheik & Md. Shadath Hussain, villagers	Villagers and Char Dwellers from KhasBarashimul	N/a	0
2	Dr.Koel Kumar	ERM	Consultant	
3	Mr. Aritra Mazumder	ERM	Assistant Consultant	
4	Mr. Tauhid Hasan,	EQMS	Consultant	

Key points discussed:

- Information on KhasBarashimul village
- Common employment practices
- Facilities within the village
- Common livelihoods and income levels
- Dependency on the char area
- Any implication on livelihood or social capital of the area from the establishment of the existing power plant complex
- Any grievance in respect to power plant operation

Detailed Note of Discussion

- The char area is mostly used for, cultivation of rice, til, pulses and peanuts during the dry season
- It is also used for cattle grazing and collection of firewood for 5 to 6 months in a year
- Most of the villagers are farmers with additional income from dairy sale as well as rearing of cattle for meat
- On an average people earn between Tk 2000 to 5000 per month
- No fishing is carried out
- The village level infrastructure is poor with no medication facilities, electricity supply, kerosene lamps used for lighting
- A school and masjid are the public facilities available within the village
- The village is not susceptible to frequent floods as it is located at an elevated level
- The last major flood happened 14-15 years back when houses got destroyed
- Some of the villagers were displaced as a result of the construction of the BangaBandhu Bridge. A number of villagers also gave land for the construction of the existing power plant.
- No major impact on the local social capital during the construction phase of the Project as such
- Local labour work especially unskilled work was provided during the construction phase at the rate of Tk 200-250 per day.

Data collected:

No data collected

Any further follow up decided:
No further follow-up or meeting is required with this stakeholder

Basic details	
Location: Individual Household in KhasBarashimul	**Date:** 28/12/2012
Project: Sirajganj Environmental Support	**Time:**
Purpose of the visit: Understand Social Baseline	

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Meeting attended by				
No.	*Name*	*Organization*	*Designation*	*Contact*
1	Md. Narul Islam	Villager, KhasBarashimul	N/a	
3	Dr. Koel Kumar	ERM	Consultant	
4	Mr. Aritra Mazumder	ERM	Assistant Consultant	
5	Mr. Tauhid Hasan	EQMS	Consultant	

Key points discussed:
• Understanding of household level indicators • Understanding on social indicators • Understanding on local culture • Understanding on local employment and labour

Detailed Note of Discussion
• Have been staying for 9 years. Family comprises of seven individuals • Primary crops cultivated are rice and mustard. Harvest 2 crops in a year • Works as skilled labour. Earns Tk 250-350 a day and has work for 15-20 days in a month • Father works as an unskilled worker in the power plant complex. Earns Tk 6000 per month • Women in the household do not work. Raises kids and does domestic chores • No current in the area. Use kerosene for lighting and firewood for cooking. Tubewell for drinking water supply • Does use the char for cattle grazing • Uses the river for catching fish • Education system is driven by madarsas in the area. The children also study there • Eid and Pailabaishakh (Bengali New Year) are celebrated every year

Data collected:
No data collected

Any further follow up decided:
No follow-up meeting required with this stakeholder.

Annex Q

Public Consultation Meeting Records

Annex Q1

List of Participants (Meeting 1)

Table 1.1 List of Participants

S. No.	Group	Name	Designation/ Address
1.	Deputy Commissioner office	Md. Billal Hosen	Deputy Commissioner
2.		Brenjon Chambugong	UNO
3.	Bangabandhu Bridge West Police Station	Md. Belal Hosen	
4.		Md. Mostafizur Rahman	
5.	Paschimanchal Gas Company Ltd	Engr. Md. Imam Uddin	Deputy General Manager
6.		Engr. Md. Rubel Hasan	Assistant Engineer
7.	NWPGCL	A.T. M. Jahangir Kabir	Chief Engineer
8.		Upanondo Kumar Biswas	Superintendent Engineer
9.		Shafiqul Islam	Executive Engineer
10.		Shamol Kumar Das	Executive Engineer
11.		Engr. Mizanur Rahman	Executive Engineer
12.		Engr. Mohaymenul Islam	Sub Divisional Engineer
13.	Bangladesh Bridge Authority	Engr. Washim Ali	Sub Divisional Engineer
14.		Md. Habibur Rahman	Sub Divisional Engineer
15.	Fire Service and Civil Defence	Md. Masum Ali	Sub Divisional Engineer
16.	Department of Public Health Engineering	Mahmudul Haque	Sub Divisional Engineer
17.	Fisheries Department	Sardar Mohiuddin	Deputy Director
18.	Elected Representative	Md. Abdul Aziz Mondal	UP Member
19.		Md. Saidul Islam Raja	UP Member
20.		Md. Momin	UP Member
21.		Md Masud Rana	UP Member
22.		Mrs. Mahfuza Khatun	UP Member
23.		Mrs. Eti Rani	UP Member
24.	Non-Government Organisation	S.M. Amir Hossain	Deputy Director
25.		Md. Motaher Hossen	Manager- Admin
26.	Local Institution	Abdul Aziz Mia	School Teacher
27.		Mufti Abdullah	Mosque Imam
28.		Moulana Selim Reza	
29.	Women	Mrs. Moniza Begum	
30.		Chaina Begum	
31.		Foyara Begum	
32.		Mrs. Rehana Begum	
33.		Mrs. Momena Khatun	
34.	Local People	Md. Alhaz Masud Rana	Saidabad Union
35.		Md. Belal Hosen	Saidabad Union
36.		Md. Selim Sheikh	Saidabad Union
37.		Md. Maznu Sheikh	Saidabad Union
38.		Md. Ishrat Modal	Saidabad Union
39.		Abdul Shiddik	Saidabad Union
40.		Md. Abdul Kader	Saidabad Union
41.		Md. Abdul Momin	Saidabad Union
42.		Md. Afzal	Saidabad Union
43.		Md. Nurnabi	Saidabad Union
44.		Moznu	Saidabad Union
45.		Golam Nobi	Saidabad Union
46.		Hasan Arif	Saidabad Union
47.		Md. Harez Ali Sheikh	Saidabad Union
48.		Md. Shahjahan	Saidabad Union
49.		Md. Ishrat Modal	Saidabad Union
50.		Md. Mahmudul Hasan	Saidabad Union

S. No.	Group	Name	Designation/ Address
51.		Engr. Monirul Islam	Saidabad Union
52.	Business Community	Md. Yusuf Molla	Saidabad Union
53.		Md. Iqubal Akhand	Saidabad Union
54.		Manik Mondal	Saidabad Union
55.		Md. Golbar Hosen	Saidabad Union
56.		Md. Abdus Salam	Saidabad Union
57.		Md. Kabirul Islam	Saidabad Union
58.		Md. Aiyub	Saidabad Union
59.		Papiya	Saidabad Union
60.	Sembcorp	Nazmul Ahsan	
61.		Tanjirul Hasan	
62.	ERM	Naval Chaudhary	Principal Consultant
63.	EQMS	Kazi Farhed Iqubal	Executive Director
64.		Tanmay Lahiri	Consultant
65.		Kazi Rashidul Islam	Consultant

Annex Q2

Attendance Sheet -
Stakeholder Consultation (Meeting 1)

"পরিবেশগত ও সামাজিক প্রভাব নিরুপন"

মতবিনিময় সভা

প্রকল্পের নাম: "সিরাজগঞ্জ ৪" - ৪০০ মেগা ওয়াট (±১০%) দ্বৈত জ্বালানি পিপিপি

স্থান: মানব মুক্তি সংস্থা (এম এম এস), খাস বড় শিমুল, বঙ্গবন্ধু সেতু পশ্চিম পুলিশ স্টেশন, সিরাজগঞ্জ, বাংলাদেশ

সময়: সকাল ১০ ঘটিকা

তারিখ: ২১ মার্চ ২০১৫

উপস্থিতি পত্রক

নম্বর	নাম	ঠিকানা	টেলিফোন/মোবাইল নম্বর	স্বাক্ষর
১	KH. NAZMUL AHSAN	Sembcorp-Bangladesh	+88 01819226635	[signature]
2	Brenson Chambugong	UNO office Sirajganj Sadar	+88 01733335030	[signature]
৩	মোঃ ইকবাল আহমেদ	খাস বড় শিমুল	01722400021	ইকবাল
৪	মোঃ বেল্লাল শেখ	মুনপুর	01740561544	বেল্লাল
৫	মোঃ ওমেদ শেখ	মুনপুর	01712696023	ওমেদ
৬	মোঃ [illegible]	বঙ্গবন্ধু সেতু পশ্চিম [illegible]	০১৭২৪২০৬৪৯৪	[signature]
৭	মোঃ [illegible]	বঙ্গবন্ধু সেতু পশ্চিম P/S	01711-575717	[signature]
৮	মাওঃ সেলিম রেজা	পশ্চিম [illegible]	০১৭৬৭৫৭২৬৫৩	সেলিম
১০	মোঃ ইশারত মন্ডল	খাস বড়শিমুল		ইশারত
১১	মোঃ আফজাল	খাস বড়শিমুল		[signature]
১২	মুফতী আব্দুল্লাহ	খাস বড়শিমুল	01763-980214	আব্দুল্লাহ
১৩	মোঃ মাহমুদুল হাছান	পুর্নবাসন [illegible]	01736 703602	[signature]
১৪	মোসাঃ মোমেনা খাতুন	চরমাদারশ		মমেনা
১৫	মোসাঃ রেহানা বেগম	চরমাদারশ		রেহানা
১৫	নুরজাহান বেগম	পশ্চিমমোনা		নুরজাহান
১৭	আনোয়ারা	রেহাই সয়দাবাদ		আনোয়ারা
১৮	চায়না বেগম	রেহাই সয়দাবাদ		চায়না
১৯	ইতি রানী ঘোষ	সয়দাবাদ, ইউনিয়ন ৭,৮,৯ নং ওয়ার্ড	01748976411	[signature]
২০	মোছাঃ মনিরা বেগম	পশ্চিম [illegible] বড় শিমুল	01728 728702	মনিরা
২১	মোছাঃ মাহফুজা খাতুন	সয়দাবাদ ইউ, পি, সদস্য ৪,৫,৬ নং ওয়ার্ড	০১৭৪৬৯৮৬৫৬১	মাহফুজা

"পরিবেশগত ও সামাজিক প্রভাব নিরুপন"

মতবিনিময় সভা

প্রকল্পের নাম: "সিরাজগঞ্জ ৪" - ৪০০ মেগা ওয়াট (±১০%) দ্বৈত জ্বালানি পিপিপি

স্থান: মানব মুক্তি সংস্থা (এম এম এস), খাস বড় শিমুল, বঙ্গবন্ধু সেতু পশ্চিম পুলিশ স্টেশন, সিরাজগঞ্জ, বাংলাদেশ

সময়: সকাল ১০ ঘটিকা

তারিখ: ২১ মার্চ ২০১৫

উপস্থিতি পত্রক

নম্বর	নাম	ঠিকানা	টেলিফোন/মোবাইল নম্বর	স্বাক্ষর
22	[illegible]	"	01711-411822	[illegible]
23	[illegible]	[illegible]	01712575671	[illegible]
24	[illegible]	"	01743932598	[illegible]
25	[illegible]	"	01725567730	[illegible]
26	[illegible]	[illegible]	01718-624488	[illegible]
27	[illegible]	NWPGCL	01777 736432	[illegible]
28	[illegible]	PGCL	01711808521	[illegible]
29	[illegible]	NWPGCL	01730066980	[illegible]
30	[illegible]	NWPGCL	01730066983	[illegible]
31	[illegible]	[illegible]	01765 370540	[illegible]
32	Engr. Washim Ali	Bangladesh Bridge Authority	01717 796132	[illegible]
33	Md. Habibur Rahman	Bangladesh Bridge Authority	01927-369430	[illegible] 21.03.15
34	Md. Masum Ali	Fire service Sirajgonj	01744-641223	[illegible]
35	S.M. Amin o Hossain	Deputy Director MMS	01733-713790	[illegible]
36	Md. Mofiker Hossain	Manager Admin MMS	01714081048	[illegible]
37	Nawal Chaudhary	Principal Consultant ERM	+919811801301	Nawal
38	Kazi Rashedul Islam	EQMS	01917876590	[illegible]
39	Kazi Farhad [illegible]	EQMS	01911702074	[illegible]
40				
41				

"পরিবেশগত ও সামাজিক প্রভাব নিরুপন"

মতবিনিময় সভা

প্রকল্পের নাম: "সিরাজগঞ্জ ৪" - ৪০০ মেগা ওয়াট (±১০%) দ্বৈত জ্বালানি পিপিপি

স্থান: মানব মুক্তি সংস্থা (এম এম এস), খাস বড় শিমুল, বঙ্গবন্ধু সেতু পশ্চিম পুলিশ স্টেশন, সিরাজগঞ্জ, বাংলাদেশ

সময়: সকাল ১০ ঘটিকা | তারিখ: ২১ মার্চ ২০১৫

উপস্থিতি পত্রক

নম্বর	নাম	ঠিকানা	টেলিফোন/মোবাইল নম্বর	স্বাক্ষর
১	মালিক মন্ডল	বড় শিমুল, মন্ডলপাড়া	–	মালিক
২।	মো: [illegible]	বড় শিমুল [illegible]	০১৭১৪ ৪৪৩৩৭৭	[illegible]
৩	আব্দুল [illegible]	,,	01740906438	[illegible]
৪	সেলিম শেখ	পূর্ব মোহনপুর	01790522892	[illegible]
৫	[illegible]	[illegible]	01712-547929	[illegible]
৬	মো: গোলজার হোসেন	বড় শিমুল [illegible]		গোলজার
৭	মো: আ: কাদের	পুনর্বাসন	০১৭৫০১৬৭৭৭৩	কাদের
৮।	মো: ইউসুফ মোল্লা	বড় শিমুল [illegible]	০১৭৪০০৪৮০৭৫	ইউসুফ
৯	মো: নুর নবী	ফুলবাড়ি	০১৭১৮৩১০৮৫২১	মো: নুর নবী
১০	মজনু	ফুলবাড়ি	০১৭২৪৬২৩০০৪	মজনু
১১	গোলাম নবী	সয়দাবাদ	০১৭৩৮৯৪৮৭১৭	[illegible]
১২	মো: [illegible] শেখ	[illegible]	01750936138	মো: [illegible] শেখ
১৩	প্রকৌ. মো: শফিকুল ইসলাম	গোলাবাড়ি	01711015052	[illegible]
১৪	মো: কবিরুল ইসলাম	খাস বড় শিমুল	01862803222	[illegible]
১৫	হাসান আরিফ	"	01918-436253	[illegible]
১৬	মো: [illegible]	ফুলবাড়ি	01747770870	[illegible]
১৭	মো: আনিসুর	[illegible]	01788421545	[illegible]
১৮	মো: আব্দুল হালিম	[illegible]	০১৭৭২৪৪৮২৪০	হালিম
১৯	মাহমুদুল হক	DPHE	01712051101	

“পরিবেশগত ও সামাজিক প্রভাব নিরুপন”

মতবিনিময় সভা

প্রকল্পের নাম: “সিরাজগঞ্জ ৪” - ৪০০ মেগা ওয়াট (±১০%) দ্বৈত জ্বালানি পিপিপি

স্থান: মানব মুক্তি সংস্থা (এম এম এস), খাস বড় শিমুল, বঙ্গবন্ধু সেতু পশ্চিম পুলিশ স্টেশন, সিরাজগঞ্জ, বাংলাদেশ

সময়: সকাল ১০ ঘটিকা

তারিখ: ২১ মার্চ ২০১৫

উপস্থিতি পত্রক

নম্বর	নাম	ঠিকানা	টেলিফোন/মোবাইল নম্বর	স্বাক্ষর
১	সরদার মহীউদ্দিন	সহকারী পরিচালক, স্বাস্থ্য বিভাগ, স্বাস্থ্য ভবন, সিরাজগঞ্জ	01712694173	[illegible]
২	উপানন্দ কুমার বিশ্বাস	আবাসিক প্রকৌ: সিরাজগঞ্জ ২২৫ মেঃ বিদ্যুৎ	01755630003	[illegible]
৩	শফিকুল ইসলাম	নি. প্রঃ সিরাজগঞ্জ ২২৫ মে.ও বিকে	01755630007	[illegible]
৪.	শ্যামল কুমার দত্ত	নিঃ প্রঃ সিরাজগঞ্জ ২২৫ মেঃ ও বিদ্যুৎ কেন্দ্র	01777786401	Shyamal
৫.	তন্ময় লাহিড়ী	EQMS Consulting Ltd. Assistant Consultant	01723406813	Tonmoy
৬.	তানভিরুল হাসান	Sembcorp-Bangladesh	01841093173	Hasan
৭.	বিল্লাল হোসেন	ডেপুটি কমিশনার, সিরাজগঞ্জ		

Annex Q3

Photo-Documentation of Stakeholder Consultation (Meeting 1)

Photo-documentation

Photo 1: Banner of Stakeholder Consultation at the Entrance of Meeting Venue - MMS

Photo 2: View of the Meeting Venue

Photo 3: Participants in the Meeting Venue

Photo 4: Participants in the Meeting Venue

Photo 5: Welcome Address by Mr. Tanjirul Hasan (Sembcorp)

Photo 6: Recitation of the Holy Quran by the Imam

Project: 0276008 – ESIA Study of Sirajganj-4 Project (Stakeholder Consultation)

Client : Sembcorp Utilities Pte Ltd

ERM India Private Limited
Building 10, 4th Floor,
Tower A, DLF Cyber City
Gurgaon – 122 002, India
Board: +91- 0124 4170300
Fax: + 91-0124 - 4170301

Photo-documentation

Photo 7: Introduction of the Project by Mr. Nazmul Ahsan (Sembcorp)

Photo 8: Presentation of ESIA Study by Mr. Kazi Farhed Iqubal (Local Partner of ERM)

Photo 9: Presentation of ESIA Study during Stakeholder Consultation

Photo 10: Md. Saidul Islam Raja (Union Parishad Member, Saidabad)

Photo 11: Md. Masud Rana (Union Parishad Member, Saidabad)

Photo 12: Md. Iqubal Akand (Resident – Khas Baro Shimul, Saidabad)

Project: 0276008 – ESIA Study of Sirajganj-4 Project (Stakeholder Consultation)

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Gurgaon – 122 002, India
Board: +91- 0124 4170300
Fax: + 91-0124 - 4170301

Photo-documentation

Photo 13: Md. Abdus Salam Sheikh (Senior Citizen & Resident, Khas Baro Shimul, Saidabad)

Photo 14: Sardar Mohiuddin (Assistant Director, Fisheries Department, Sirajganj Sadar)

Photo 15: Md. Abdul Aziz Mondol (Union Parishad Member, Saidabad)

Photo 16: Engr. ATM Jahangir Kabir (Chief Engineer, NWPGCL)

Photo 17: Mrs. Eti Rani Ghosh (Union Parishad Member, Saidabad)

Photo 18: Honorable Deputy Commissioner Mr. Billal Hosen

Project: 0276008 – ESIA Study of Sirajganj-4 Project (Stakeholder Consultation)

Client : Sembcorp Utilities Pte Ltd

ERM India Private Limited
Building 10, 4th Floor,
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Gurgaon – 122 002, India
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Photo-documentation

Photo 19: Address by the Deputy Commissioner

Photo 20: Mr. Nazmul Ahsan, responding to the query from Additional Director, Fisheries

Photo 21: Participants in the Meeting Venue

Photo 22: Engr. ATM Jahangir Kabir (Chief Engineer, NWPGCL)

Photo 23: Participants in the Meeting Venue

Photo 24: Participants in the Meeting Venue

Project: 0276008 – ESIA Study of Sirajganj-4 Project (Stakeholder Consultation)

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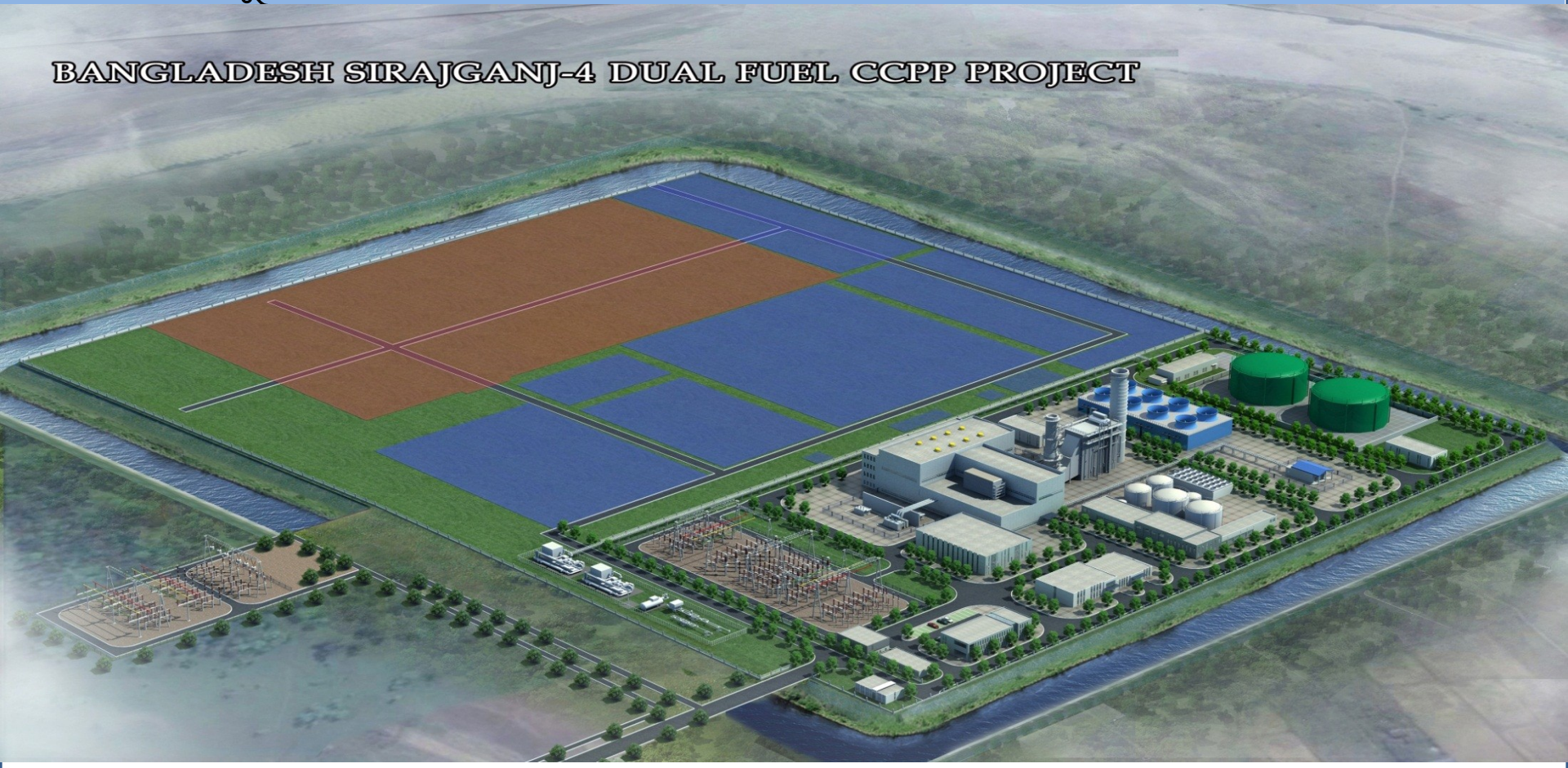
Annex Q4

Public Consultation Presentation (21 March 2015)

মত বিনিময় সভা

প্রস্তাবিত ৪১৩.৮ মেগাওয়াট দ্বৈত জ্বালানি কম্বাইন্ড সাইকেল বিদ্যুৎ প্রকল্প, সয়দাবাদ বিদ্যুৎ উৎপাদন কেন্দ্র, সিরাজগঞ্জ জেলা, রাজশাহী বিভাগ, বাংলাদেশ



বাংলাদেশ সরকারের একটি সরকারি বেসরকারী অংশীদারী উদ্যোগ.

21 মার্চ , 2015

প্রকল্প পটভূমি

- বাংলাদেশ সরকার (জিওবি) 2021 সাল নাগাদ সব নাগরিকের জন্য উপলব্ধ বিদ্যুৎ করা প্রতিশ্রুতিবদ্ধ হয়েছে
- বাংলাদেশ সরকার ব্যক্তিগত অংশগ্রহনে বিদ্যুৎ খাতের উন্নয়নের জন্য একটি কৌশল গ্রহণ করেছে.
- এই কৌশলের সঙ্গে সঙ্গতিপূর্ণ, জিওবি পিপিপি প্রোগ্রামের অধীনে এই প্রকল্প বাস্তবায়ন করার সিদ্ধান্ত নিয়েছে
- বর্তমান প্রকল্প পৃষ্ঠপোষক আগে নির্বাচিত প্রকল্প বাস্তবায়ন করতে ব্যর্থ হয়েছে, এবং তা আগে ভূষিত দর অবস্থার উপর উন্নয়ন প্রস্তাব জমা দিতে আমন্ত্রণ জানানো হয়
- 29% ইকুইটি NWPGCL সাবস্ক্রাইব, ক্রয় এবং মালিকানাধীন করা হবে.
- উত্পন্ন বৈদ্যুতিক ক্ষমতা এবং বিদ্যুৎ বাংলাদেশ বিদ্যুৎ উন্নয়ন বোর্ড (বিপিডিবি) সঙ্গে একটি 22 বছর বিদ্যুৎ ক্রয় চুক্তি ("পিপিএ") অধীনে বিক্রি করা হবে.

ERM

প্রকল্প প্রস্তাবক সম্পর্কে

- Sembcorp ইন্ডাস্ট্রিজ লিমিটেডের 1988 সালে প্রতিষ্ঠিত সিঙ্গাপুর এবং জ্বালানি, পানি ও সামুদ্রিক গ্রুপ হিসেবে বিশ্বব্যাপী ছয়টি মহাদেশ জুড়ে কাজ করছে

- Sembcorp ইউটিলিটি Pte লিমিটেড, (SCU), Sembcorp ইন্ডাস্ট্রিজ লিমিটেডের একটি মালিকানাধীন প্রতিষ্ঠান

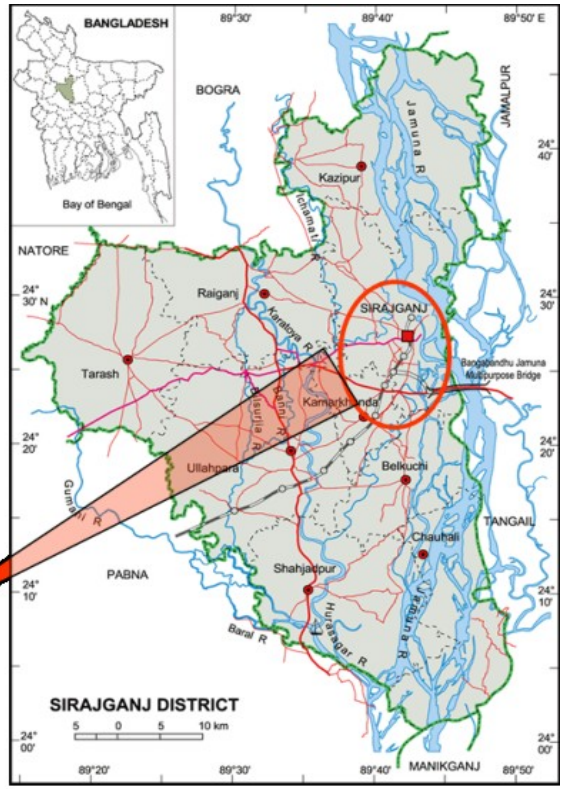
- SCU শক্তি উৎপাদন ক্ষমতা 8GW এর একটি নেতৃস্থানীয় ডেভেলপার, মালিক

- SCU 815 মেগাওয়াট সিঙ্গাপুর বৃহত্তম কোজেনারে শন সুবিধা, যা সিঙ্গাপুর এর প্রথম বেসরকারী-উন্নত স্বাধীন পাওয়ার প্ল্যান্ট, জন্য দায়ী. জুলাই 2014 সালে, SCU সিঙ্গাপুর 400mW তার দ্বিতীয় কম্বাইন্ড সাইকেল গ্যাস টারবাইন কোজেনারেশন সম্পন্ন.

- SCU ডিসেম্বর 7, 2014 একটি RFP অনুবর্তী প্রস্তাব পেশ করে এবং বর্তমানে মন্ত্রিপরিষদ ক্রয় কমিটি থেকে প্রকল্পের নিশ্চিতকরণ জন্য অপেক্ষা করছে

ERM

প্রকল্পের অবস্থান



ERM

আকাশ থেকে দৃশ্যমান: প্রকল্পের অবস্থান

ERM

বিশেষ বিশেষ পারিপার্শ্বিক

ERM

প্রকল্প সম্পর্কে

- প্রাথমিক জ্বালানি হিসেবে প্রাকৃতিক গ্যাস কাজ করবে.
- গ্যাস সরবরাহ বাধা হলে ক্ষেত্রে ব্যাক আপ জ্বালানি হিসেবে অল্প সময়ের জন্য HSD উপর কাজ করার জন্য ডিজাইন করা হয়েছে

❑ প্রকল্প উপাদান

- গ্যাস টারবাইন
- হিট রিকভারি স্টিম জেনারেটরের;
- বাষ্প টারবাইন;
- বাষ্প টারবাইন যন্ত্র;
- জ্বালানি গ্যাস পরিবহন, কম্প্রেশন এবং কন্ডিশনার সিস্টেম;
- HSD পরিবহন এবং স্টোরেজ;
- পানি সিস্টেম সেই সঙ্গে নদীর পানি কুলিং সিস্টেম;
- বৈদ্যুতিক সিস্টেম;
- শীতাতপ নিয়ন্ত্রণ ও বায়ুচলাচল সিস্টেম;
- কন্ট্রোল এবং যন্ত্রানুষঙ্গের সিস্টেম; এবং
- সিভিল কাজ

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প্রকল্প 3-D: ভার্চুয়াল পরিকল্পনা

বিশেষ বিশেষ বৈশিষ্ট্যগুলো

নির্দিষ্ট	বিস্তারিত
ভূমি রিকয়ারমেন্ট	23.6 acres বিপিডিবি / NWPGCL অধিষ্ঠিত ইতিমধ্যে জমি সংখ্যাগরিষ্ঠ. কোন ব্যক্তিগত জমি ক্রয় / অধিগ্রহণ হবে না
পানির প্রয়োজনীয়তা	482 m^3/hr প্রধান উত্স: যমুনা নদী ব্যাকআপ হিসাবে ভূগর্ভস্থ পানির ব্যবস্থা
প্রাকৃতিক গ্যাস	জিটিসিএল ভালভ স্টেশন থেকে প্রকল্পের জন্য আরেকটি গ্যাস পাইপলাইন NWPGCL বিদ্যমান গ্যাস এবং HSD পাইপলাইন এরপাশ স্থাপন করা হবে
HSD সরবরাহ পাইপলাইন	প্রকল্পের জন্য বিন্দু লঘুপাত সাইদাবাদ পাওয়ার জেনারেশন কমপ্লেক্স মধ্যে হতে হবে
সরাসরি কর্মসংস্থান	নির্মাণ ফেজ – 575 জন অপারেশন ফেজ – 50 জন
প্রকল্প খরচ	384 মিলিয়ন ডলার

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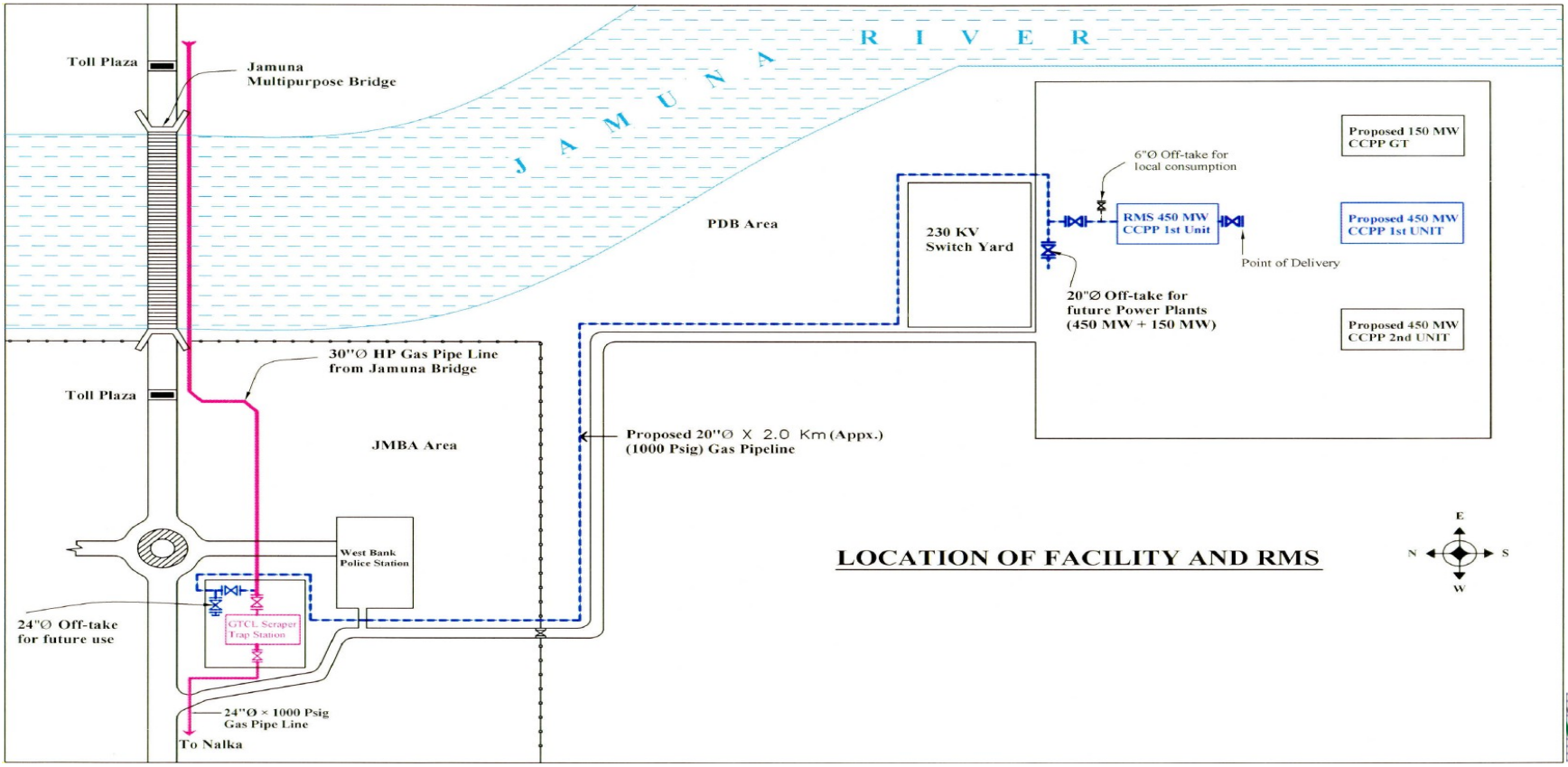
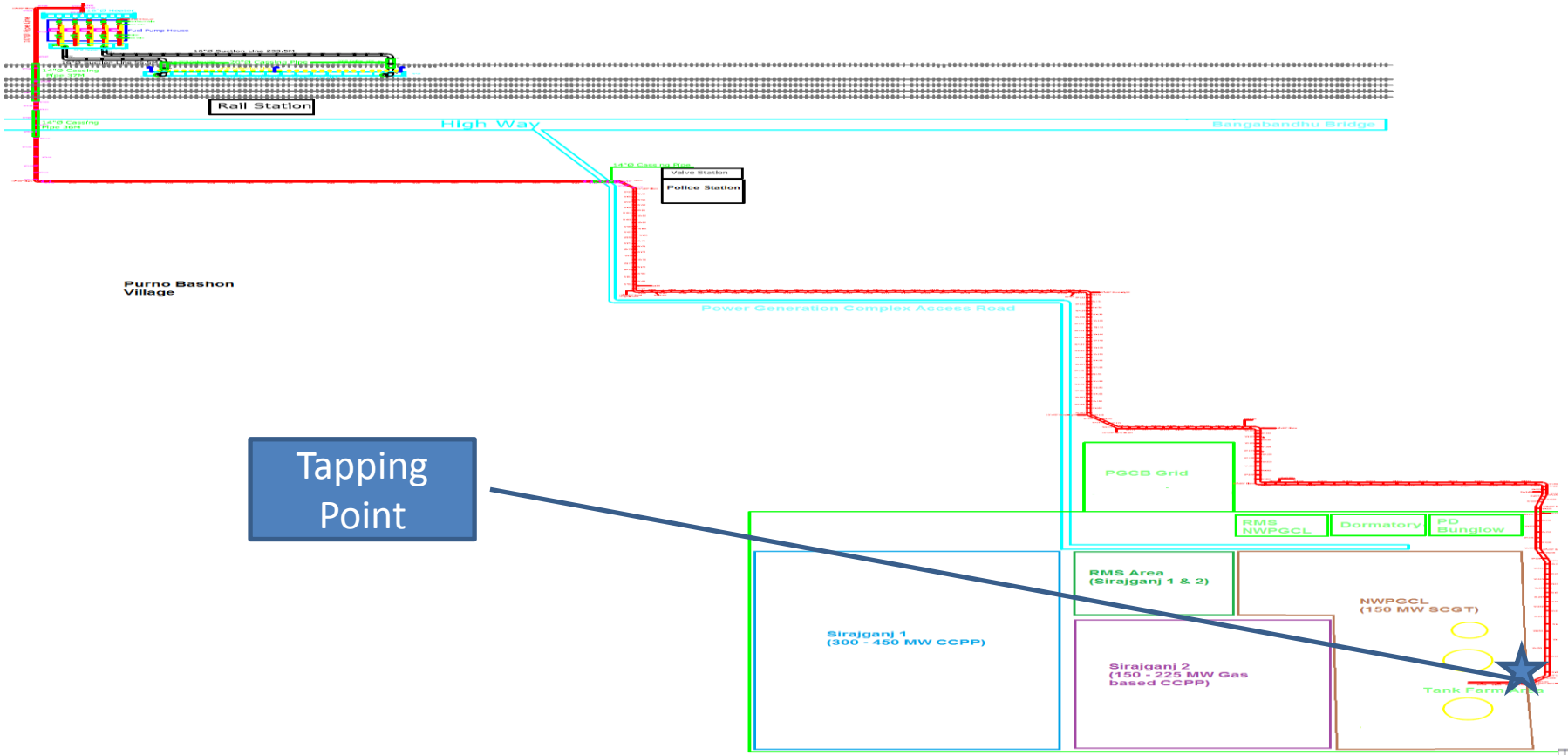
প্রাকৃতিক গ্যাস

- প্রাকৃতিক গ্যাস প্রায় 1.5 কিমি প্রকল্প সাইট থেকে হাইওয়ে কাছাকাছি অবস্থিত, একটি সাধারণ বিন্দু থেকে PGCL দ্বারা সরবরাহ করা হবে;
- একটি প্রাকৃতিক গ্যাস সরবরাহ ও গ্যাস প্রদান করা চিকিত্সা সিস্টেম প্রয়োজনীয় গ্যাস মানের এবং মিটারিং সিস্টেম চাপ শিফট দেখা করতে প্ল্যান্ট উপস্থ ইনস্টল করা হবে;



HSD

- NWPGCL রেলওয়ে স্টেশনে একটি HSD আনলোড এবং পাম্পিং স্টেশন নির্মাণ করা হয়েছে
- HSD সরবরাহ পাইপলাইন NWPGCL দ্বারা সাইদাবাদ পাওয়ার জেনারেশন কমপ্লেক্স পর্যন্ত নির্মাণ করা হয়েছে;



পানি পাইপলাইন রুট

জল নেওয়ার জন্য বিপিডিবি এবং বিবিএ ও বিপিডিবি এবং BEZA মধ্যে একটি ভূমি লিজ চুক্তি মাধ্যমে প্রাপ্ত করা হবে. অবশেষে প্রকল্প কোম্পানিকে বিপিডিবি দ্বারা প্রদান করা হবে.

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প্রকল্প সূচি

#	বর্ণনা	ক্যালেন্ডার মাস নং	
		শুরু	সম্পূর্ণ
1	প্রধান যন্ত্রপাতি সংগ্রহ	1	23
2	সিম্পল সাইকেল বাণিজ্যিক অপারেশন জন্য এবং পরীক্ষা শুরু	23	24
3	সিম্পল সাইকেল বাণিজ্যিক অপারেশন	24	24
4	কম্বাইন্ড সাইকেল বাণিজ্যিক অপারেশন জন্য এবং পরীক্ষা শুরু	28	29
5	কম্বাইন্ড সাইকেল বাণিজ্যিক অপারেশন	30	30

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এমবেডেড নিয়ন্ত্রণ ব্যবস্থা

- বায়ু দূষণ
  - প্রাথমিক জ্বালানি হিসাবে প্রাকৃতিক গ্যাস ব্যবহার
  - NOx নির্গমন নিয়ন্ত্রণের জন্য শুকনো নিম্ন NOx বার্নার্স.
  - গ্যাস ডিটেকশন সিস্টেম যদি কোন গ্যাস ফুটা অবিলম্বে তথ্যের জন্য.
  - লম্বা প্রধান স্ট্যাক (60 মিটার) - ভাল বিচ্ছুরণ নির্গমন জন্য

- পানি দূষণ
  - অন সাইট পানি পরিশোধন - বিশ্বব্যাংকের / আইএফসি নির্দেশিকা এবং ECR এর শাখানদী বৈঠক প্রবহমাণ স্রাব মানদণ্ড
  - পানির তাপমাত্রা নিয়ন্ত্রণের জন্য কুলিং টাওয়ার
  - প্রায় 5 টা এর COC ব্যবহার করে পানি খরচ কমানো

- শব্দ
  - নিম্ন শব্দ ক্ষমতা মাত্রা সঙ্গে সরঞ্জাম নির্বাচন.
  - ইঞ্জিন নিষ্কাশন এবং সংকোচকারী উপাদান উপযুক্ত মাফলার ইনস্টলেশন.
  - শব্দ দীপক সরঞ্জাম আবরণ জন্য শাব্দ পরিবেষ্টনের ইনস্টলেশন.

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নিরাপত্তা ব্যবস্থা

- গ্যাস টারবাইন এবং তার সহায়ক সরঞ্জাম জন্য থেকে CO2 গ্যাস নির্বাপক ব্যবস্থা.
- ফায়ার সুরক্ষা এবং সনাক্তকরণ সিস্টেম, যন্ত্রপাতি, ইত্যাদি
- আন্তর্জাতিক মান মেনে নিরাপত্তা এবং প্রতিরক্ষামূলক রিলে একটি earthing সিস্টেম,
- বাজ সুরক্ষা সিস্টেম
- স্বাস্থ্য ও নিরাপত্তা
  - একটি EHS প্রোগ্রাম সম্মতি সমস্ত সম্পর্কিত আইন, প্রবিধান, কোড এবং বাংলাদেশ ও বিশ্ব ব্যাংকের আইন বিধিবদ্ধ চাহিদা জন্য ব্যবহার করা হবে.

পরিবেশগত ও সামাজিক প্রভাব

- ইতিবাচক প্রভাব
  - স্থানীয় মানুষের জন্য কর্মসংস্থান ও ব্যবসার সুযোগ,
  - পাওয়ার সাপ্লাই, নতুন অবকাঠামো উন্নয়ন ইত্যাদি বৃদ্ধি এবং প্রাপ্যতা
- পরিবেশগত প্রভাব
  - নির্মাণ কার্যক্রম কারণে শব্দ এবং ধুলো
  - অপারেশন সময়ে বিশেষ করে NOx বায়বীয় নির্গমন.
  - spillage কারণে মাটি ও ভূ দূষণ সম্ভাবনা
  - নির্মাণ সময় বর্জ্য
  - গার্হস্থ্য নিকাশী এবং অন্যান্য তরল বর্জ্য
- সামাজিক প্রভাব
  - কমিউনিটি স্বাস্থ্য এবং নিরাপত্তা উপর প্রভাব
  - শ্রম অভিবাসনের জন্য স্থানীয় সম্প্রদায়, স্বাস্থ্য এবং নিরাপত্তা বিষয় ও প্রভাব
  - গাড়ির ট্রাফিক বৃদ্ধি

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পরিবেশগত ও সামাজিক প্রভাব

- ESIA গবেষণা এরপ্রকল্প নিরূপণ
  - সবচেয়ে বেশি প্রতিকূল প্রভাব স্থানীয়, স্বল্পমেয়াদী বা অস্থায়ী.
  - প্রস্তাবিত প্রশমন ব্যবস্থা প্রয়োগ দ্বারা প্রকল্প চিহ্নিত ঝুঁকি হ্রাস করা হবে
  - স্থানীয় সম্প্রদায়ের সাথে পরামর্শ একটি সুসম্পর্ক রক্ষণাবেক্ষণ সমর্থন করবে
  - কমিউনিটি স্বাস্থ্য এবং নিরাপত্তা সম্পর্কিত প্রভাব পদাঙ্ক কমানো হবে

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পরিবেশগত ও সামাজিক ব্যবস্থাপনা পরিকল্পনা

- নির্মাণ ধাপ
  - ESIA প্রস্তাবিত প্রশমন ব্যবস্থা বাস্তবায়ন
  - জরুরী রেসপন্স পরিকল্পনা
  - নির্মাণ কার্যক্রম জন্য স্বাস্থ্য ও নিরাপত্তা পরিকল্পনা

পরিবেশগত ও সামাজিক ব্যবস্থাপনা পরিকল্পনা

- অপারেশন ধাপ
  - ESIA প্রস্তাবিত প্রশমন ব্যবস্থা বাস্তবায়ন
  - স্বাস্থ্য ও নিরাপত্তা ম্যানেজমেন্ট সিস্টেম উন্নয়ন
  - জরুরী প্রতিক্রিয়া ও দুর্যোগ ব্যবস্থাপনা পরিকল্পনা (ERDMP)
    - যথাযথ প্রোটোকল অনুসরণ করা হবে - কর্মচারী এবং স্থানীয় সম্প্রদায়ের উপর প্রভাব রোধ করার জন্য
    - কোনো ধরনের জরুরী ঘটনা হলে যথাযথ পরিকল্পনা ও বিপর্যয় এবং সম্ভাব্য ঝুঁকি প্রকাশ করা হবে - স্থানীয় সম্প্রদায়ের কাছে
    - প্ল্যান্ট কর্মীদের, স্থানীয় কমিউনিটি এবং স্থানীয় প্রশাসনের জন্য সচেতনতা প্রোগ্রাম অন্তর্ভুক্তি

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পরিবেশগত ও সামাজিক ব্যবস্থাপনা পরিকল্পনা বাস্তবায়ন

এই প্রকল্পের ESMP -
প্রতিকূল পরিবেশ ও সামাজিক প্রভাব / ঝুঁকি এড়ানো, হ্রাস ও প্রশমিত করা উদ্দেশ্য নিয়ে উন্নত করা হয়েছে.

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পরিবেশগত ও সামাজিক ব্যবস্থাপনা পরিকল্পনা বাস্তবায়ন

- প্রকল্প ডেভেলপার ভূমিকা -
  - প্রকল্প প্রাক নির্মাণ পর্যায়ে প্রয়োজন সংবিধিবদ্ধ ছাড়পত্র প্রাপ্ত করার পদ্ধতি
  - সামগ্রিক প্রকল্প সমন্বয় এবং ব্যবস্থাপনা ইপিসি মাধ্যমে এবং তৃতীয় পক্ষের পরিবেশগত কনসালট্যান্ট / গুলি দ্বারা সমর্থিত
  - যোগাযোগ এবং প্রতিবেদন - জিওবি এবং ঋণ দাতা
  - কার্যকরী ESMP বাস্তবায়ন এবং ESMP বাস্তবায়ন পর্যবেক্ষণ
  - প্রকল্প নির্মাণ সময়ে ESMP বাস্তবায়নের জন্য যাচাই / তত্ত্বাবধানে অনুশীলন
  - ইপিসি ঠিকাদার দ্বারা প্রাপ্ত সব পারমিট রেকর্ড রাখা
  - ESMP বাস্তবায়ন সার্বিক তত্ত্বাবধানে
  - ইপিসি ঠিকাদার দ্বারা প্রস্তুত পরিকল্পনা অনুমোদন
  - স্থানীয় কমিউনিটির অভিযোগএবং তথ্য প্রচার
  - পরীক্ষাগার মাধ্যমে পরিবেশগত পর্যবেক্ষণ

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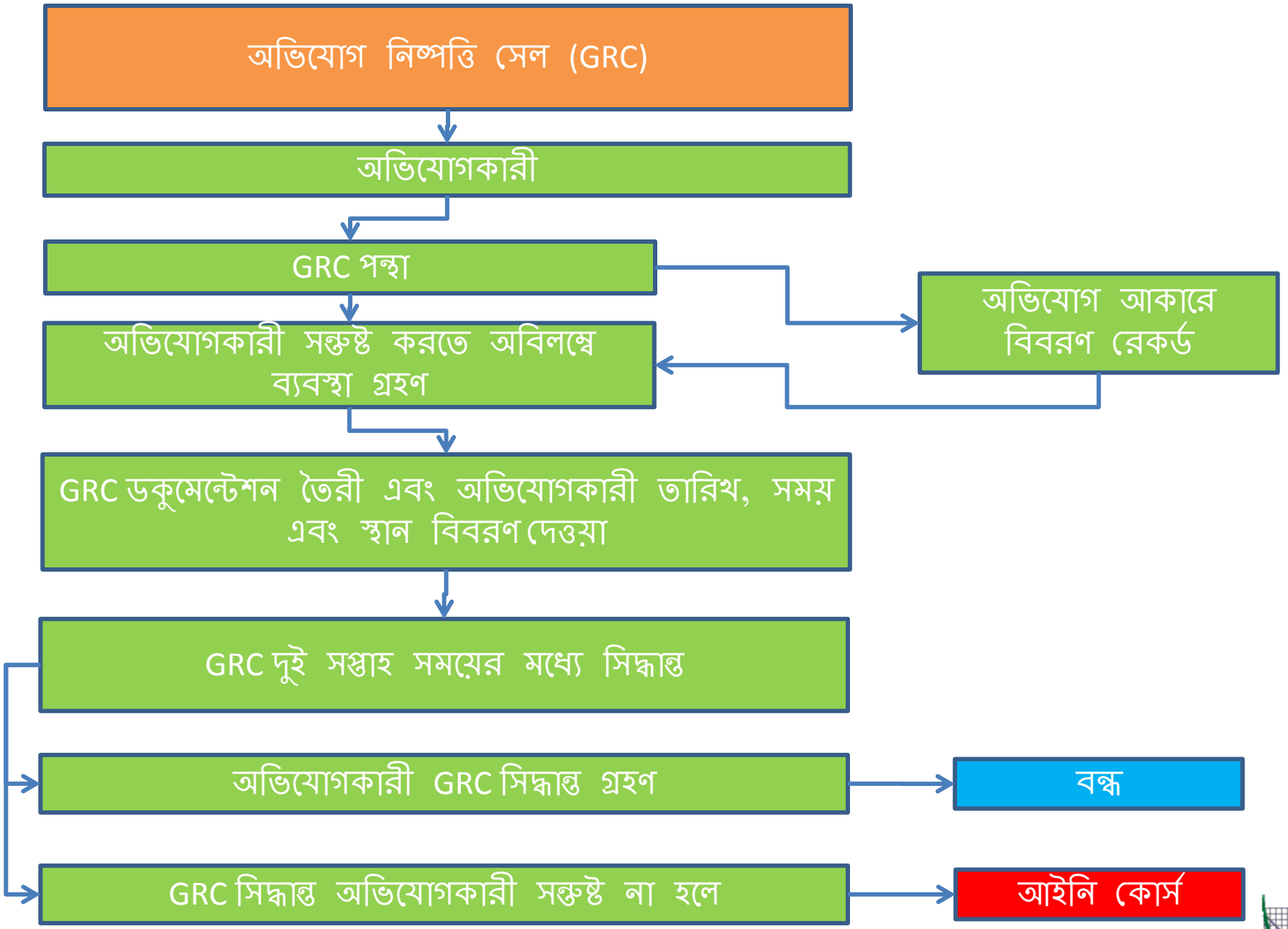
ESMP বাস্তবায়ন

- ইপিসি ঠিকাদারের ভূমিকা
  - নির্মাণ পর্যায়ে প্রয়োজনীয় অনুমতি প্রাপ্তি
  - ESMP বাস্তবায়ন পর্যালোচনার জন্য প্রকল্প ডেভেলপার এবং তৃতীয় পক্ষের পরিবেশগত কনসালটেন্টর সঙ্গে যৌথ যাচাই
  - প্রকল্প ডেভেলপার এবং নিযুক্ত তত্ত্বাবধান পরামর্শকের সঙ্গে যোগাযোগ
  - প্রতিবেদনর সময়সূচী অনুযায়ী প্রতিবেদন পূরণ করা এবং প্রকল্প ডেভেলপার এর কাছে জমা দেওয়া
  - তৃতীয় পক্ষ দ্বারা পরিবেশগত ল্যাবরেটরির মাধ্যমে পরিবেশগত পর্যবেক্ষণ
  - প্রকল্প ডেভেলপার দ্বারা "স্পেসিফিকেশন ম্যানুয়াল" আউট বিস্তারিত ঊঝগচ কার্যকর বাস্তবায়নের জন্য বিভিন্ন পরিকল্পনা প্রণয়ন
  - শ্রম শিবির, ব্যাচ মিক্স প্ল্যান্ট, কার্যবিপত্তি এলাকাসমূহ জন্য সাইট সনাক্ত করন
  - শ্রম শিবির ব্যবস্থাপনা ও পানীয় জল প্রদান, স্যানিটেশন সুবিধা

ERM


অভিযোগ নিষ্পত্তি সেল (GRC)
অভিযোগকারী
GRC পন্থা
অভিযোগ আকারে বিবরণ রেকর্ড
অভিযোগকারী সন্তুষ্ট করতে অবিলম্বে ব্যবস্থা গ্রহণ
GRC ডকুমেন্টেশন তৈরী এবং অভিযোগকারী তারিখ, সময় এবং স্থান বিবরণ দেওয়া
GRC দুই সপ্তাহ সময়ের মধ্যে সিদ্ধান্ত
অভিযোগকারী GRC সিদ্ধান্ত গ্রহণ
বন্ধ
GRC সিদ্ধান্ত অভিযোগকারী সন্তুষ্ট না হলে
আইনি কোর্স

প্রকল্পের উপকারিতা

- এই অঞ্চলের নির্ভরযোগ্য বিদ্যুৎ সরবরাহ প্রদান
- ছোট এবং মাঝারি মাপের উত্পাদন খাতে শিল্পায়ন সহ আরও উন্নয়ন
- প্রকল্পে অন্যান্য সুবিধা
  - অর্থনৈতিক অঞ্চলের প্রবৃদ্ধি সমর্থন,
  - কর্মসংস্থান (প্রত্যক্ষ ও পরোক্ষ) এবং
  - স্থানীয় অবকাঠামো উন্নতি.

প্রকল্পের প্রতিশ্রুতি

- পরবর্তী কয়েক মাস, প্রকল্প কোম্পানি স্থানীয় এনজিওর সঙ্গে ঘনিষ্ঠভাবে কাজ করে পার্শ্ববর্তী সম্প্রদায়ের প্রয়োজনীয়তা চিহ্নিত করবে এবং প্রকল্প কোম্পানি তা সমাধান করতে সমাধান করতে সহায়তা করবে
- উদাহরণস্বরূপ, সমষ্টিগত প্রয়োজনীয়তা (1) পরিষ্কার পানীয় জল (2) ডাক্তারের পরামর্শ (3) শিক্ষা, ইত্যাদি
- উপরোক্ত উপরন্তু, প্রকল্প কোম্পানি যথাসম্ভব, স্থানীয় জনসংখ্যার ব্যবহার করে কর্মসংস্থানের সুযোগ বাড়াতে উপক্রম হবে
- নির্মাণ শুরুর আগে প্রকল্প কোম্পানি, তার প্রতিবেশী সম্প্রদায়ের কল্যাণ উন্নত করতে কার্যভার গ্রহণ করা প্রস্তাব কার্যক্রম জন্য একটি পরিষ্কার পরিকল্পনা গ্রহণ করা

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প্রশ্ন ও পরামর্শ

ধন্যবাদ

Public Consultation

Proposed 413.8 MW (net) dual fuel combined cycle power project at Saidabad Power Generation Complex, Sirajganj District, Rajshahi Division, Bangladesh

A Public Private Partnership initiative of the Govt. of Bangladesh

March 21, 2015

Project Background

- Government of Bangladesh (GoB) has committed to make electricity available to all citizens by 2021
- The GOB has adopted a strategy for the development of the power sector which envisages private participation in the sector.
- In line with this strategy, the GOB decided to implement this Project under PPP Program
- The current project sponsor was invited to submit the development proposal on the terms and conditions of the earlier awarded bid, after the earlier selected bidder failed to implement the Project.
- Twenty nine percent (29%) of the equity interest in the Project will be subscribed, purchased and owned by NWPGCL.
- The electrical capacity and electricity generated will be sold under a 22 year Power Purchase Agreement ("PPA") with the Bangladesh Power Development Board (BPDB).

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About Project Proponent

- Sembcorp Industries Limited was established in 1988 in Singapore and is a leading energy, water and marine group operating across six continents worldwide

- Sembcorp Utilities Pte Ltd, (*SCU*), is a wholly owned subsidiary of Sembcorp Industries Limited

- SCU is a leading developer, owner and operator of energy and water assets having over 8GW of power capacity installed and under development

- SCU is responsible for Singapore's first privately-developed independent power plant, which is also Singapore's largest cogeneration facility at 815 megawatts. In July 2014, SCU completed its second combined-cycle gas turbine cogeneration plant of 400MW in Singapore.

- SCU submitted an RFP compliant proposal on 7 Dec 2014 and is currently awaiting confirmation on the project award from the Cabinet Purchase Committee

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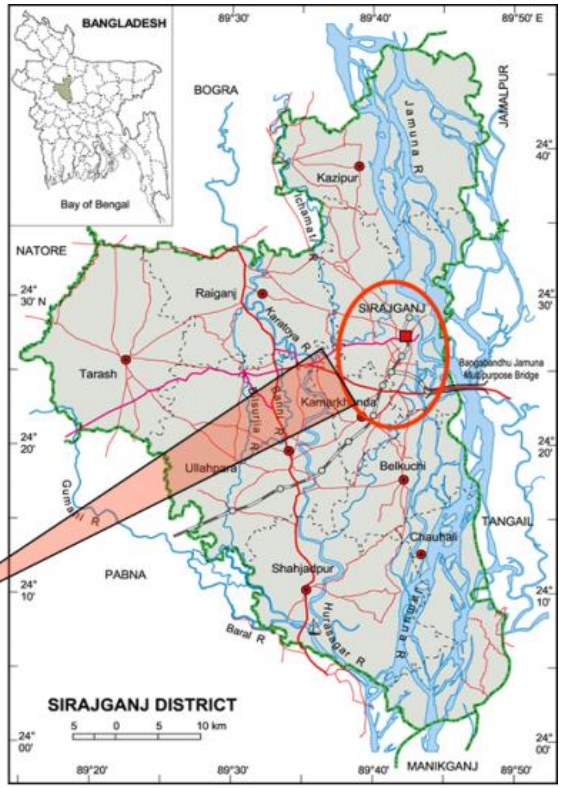
Project Location



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Aerial View of Project site

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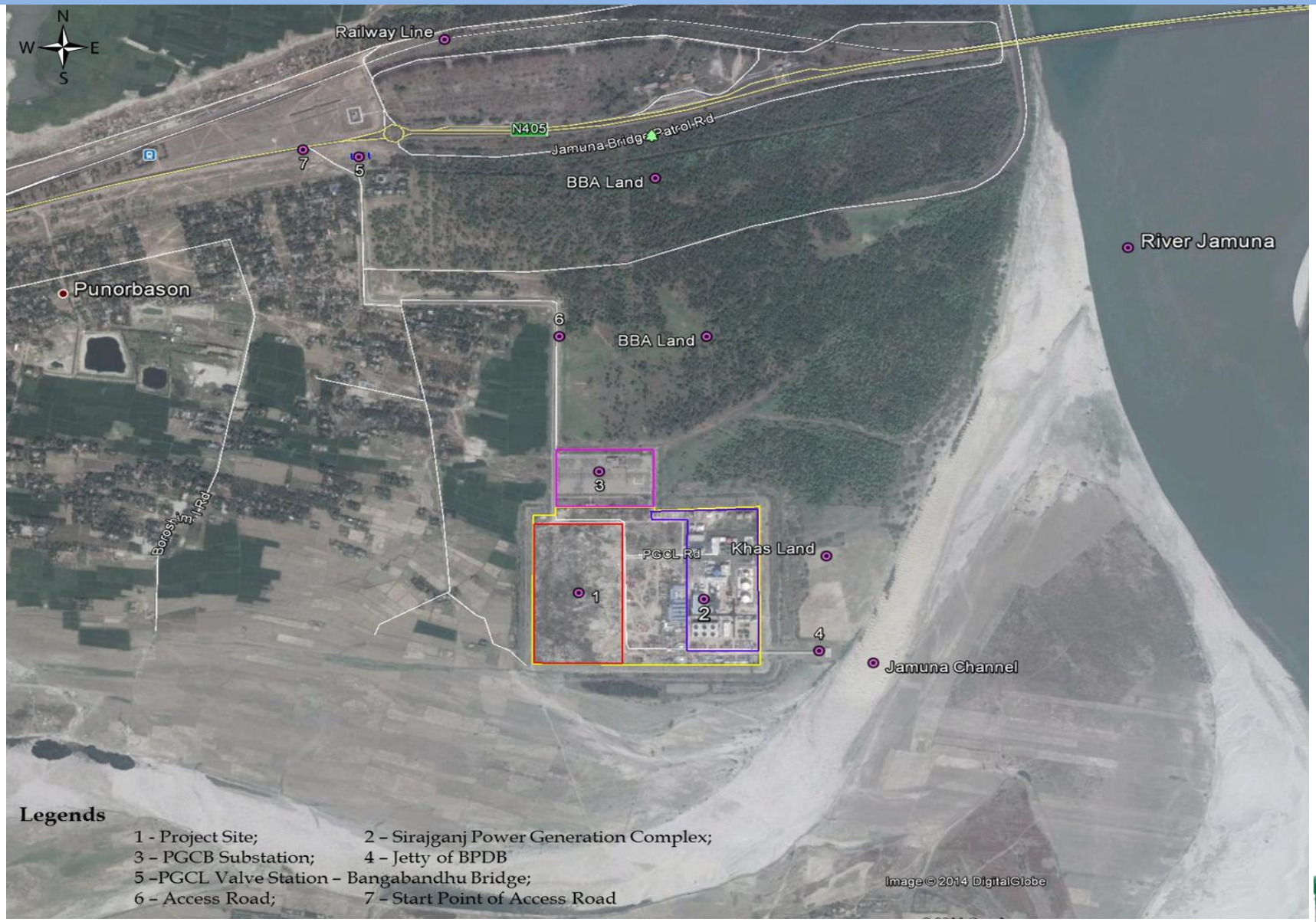
Surrounding Key Features



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About Project

- The Plant will operate on natural gas as its primary fuel.
- It is designed to operate on HSD for short periods of time as the back-up fuel in case of interruptions in gas supply.

- Key Components of the Project are:
  - Gas Turbine
  - Heat Recovery Steam Generator;
  - Steam Turbine;
  - Steam Turbine Condenser;
  - Fuel Gas Transportation, Compression and Conditioning System;
  - HSD Transportation and Storage;
  - Water System including river water cooling system;
  - Electrical System;
  - Air Conditioning and Ventilation System;
  - Control and Instrumentation System; and
  - Civil Works

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3-D Virtual Plan of the Project

Key Features

Particular	Detail
Land Requirement	23.6 acres Majority of land already in possession of BPDB/NWPGCL. No purchase/ acquisition of private land involved.
Water Requirement	482 m^3/hr Main Source: River Jamuna with ground water as a back up
Natural Gas	From GTCL Valve Station Another gas pipeline for the Project will be laid next to the existing gas and HSD pipelines of NWPGCL
HSD Supply Pipeline	Already in possession of NWPGCL Tapping point for the project will be within Saidabad Power Generation Complex
Direct Employment Generation	Construction Phase – 575 persons Operation Phase – 50 persons
Project Cost	USD 384 million

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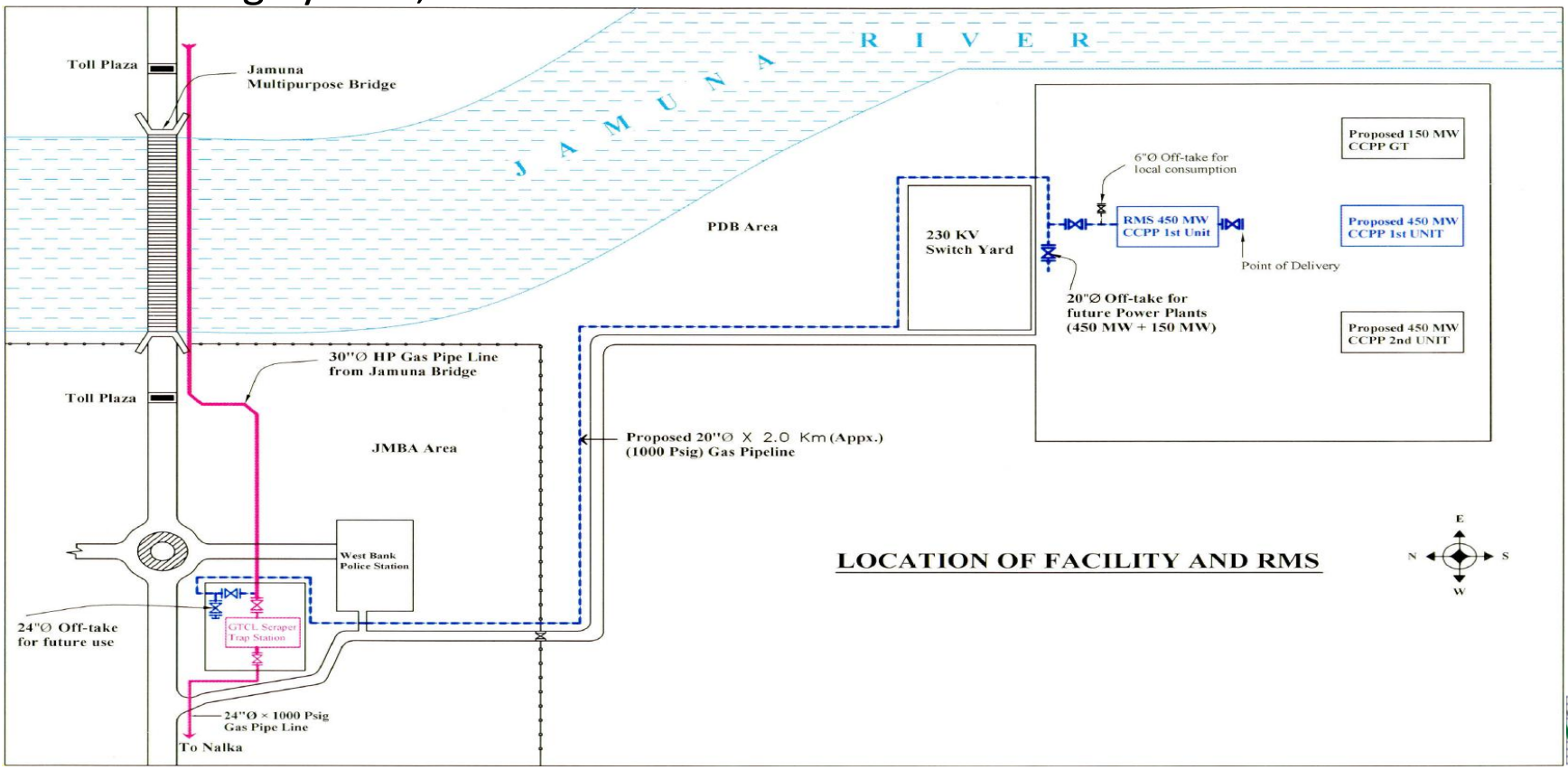
Natural Gas

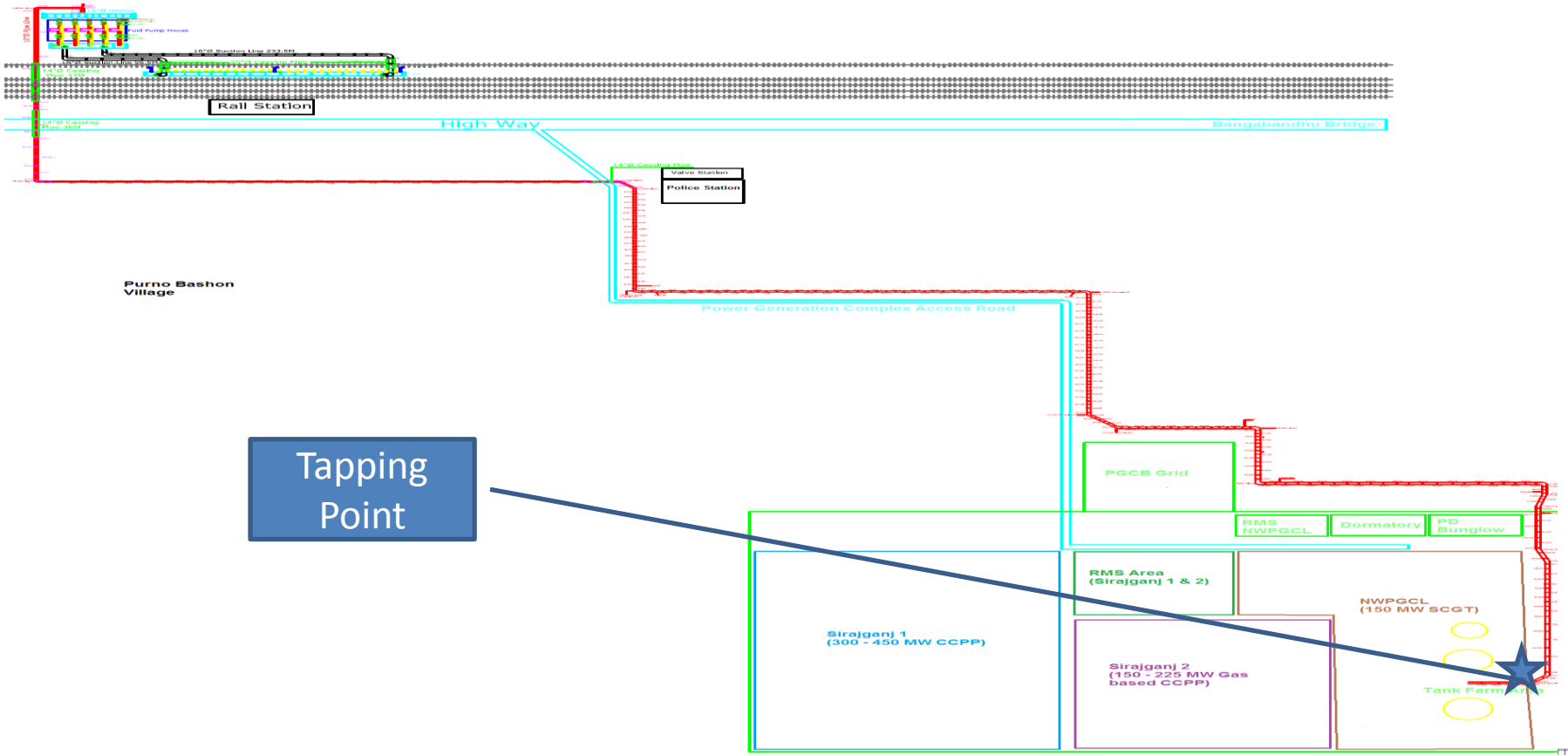
- Natural gas will be supplied by PGCL from a common point, located near the highway approximately 1.5 km from the Project site;

- A natural gas supply and treatment system to deliver gas will be installed in the vicinity of the Plant to meet the required gas quality and pressure Shift to the Metering System;



HSD

- NWPGCL has constructed an HSD unloading and pumping station at the railway station
- HSD supply pipeline has been constructed up to the Saidabad Power Generation Complex by NWPGCL;



Water Pipeline Route

The RoW for water intake will be obtained through a Land Lease Agreement between BPDB and BBA & BPDB and BEZA. Finally RoW will be granted by BPDB to the Project Company.

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Project Schedule

#	Description	No. of Calendar Months	
		Start	Complete
1	Procurement of major equipment	1	23
2	Start-up and testing for commercial operation in Simple Cycle	23	24
3	Commercial Operation of Simple Cycle Facility	24	24
4	Start-up and testing for commercial operation in Combined Cycle	28	29
5	Commercial Operation of Combined Cycle Facility	30	30

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Embedded Control Measures

- Air Pollution
  - Use of Natural Gas as Primary Fuel.
  - Dry Low NOx burners for NOx emission control.
  - Gas Detection System for immediate information of any gas leakage.
  - Tall main stack (about 60 m) for better dispersion of emissions.
- Water Pollution
  - On-site treatment of the effluent meeting effluent discharge criteria of WB/IFC guidelines and ECR
  - Cooling towers for temperature control
  - Reduction in water consumption by using COC of approximately 5
- Noise
  - Selection of equipment with lower sound power levels.
  - Installation of suitable mufflers on engine exhausts and compressor components.
  - Installation of acoustic enclosures for equipment casing radiating noise.

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Safety Provisions

- CO_2 gas extinguishing system for Gas Turbine and its auxiliary equipment.
- Fire protection and detection system for the rest of the plant including buildings, equipment, etc.
- An earthing system of safety and protective relaying, complied with international standards
- Lightning Protection System
- Health and Safety
  - An EHS programme will be used for compliance all related acts, regulations, codes and statutory requirements of the Laws of Bangladesh and of the World Bank.

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Environmental and Social Impacts

- Positive impacts
  - employment and business opportunities for the local people,
  - increased availability of power supply, new infrastructure development etc
- Environmental Impacts
  - Noise and dust generation due to construction activities.
  - Gaseous emissions particularly NOx during operation phase.
  - Possibility of soil and groundwater contamination due to accidental spillage
  - Generation of waste during construction
  - Generation of sewage and other liquid waste
- Social Impacts
  - impact on community health and safety
  - impact from migration of labor into the Project area resulting in conflicts with the local community, health and safety issues
  - increased movement of traffic resulting in inconvenience due to vehicle movements
- The ESIA study of the Project ascertains that
  - Most of the adverse impacts are localized, short-term or temporary.
  - By implementing the recommended mitigation measures the Project will minimize the identified risks whereas on-going consultation and engagement will support the maintenance of a harmonious relation with the local community.
  - Community health and safety related impacts will be managed at source to reduce the footprint.

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Environmental and Social Management Plan

- Construction Phase
  - Implementation of the mitigation measures suggested in ESIA
  - Emergency Response Plan
  - Health and Safety Plan for construction activities
- Operation Phase
  - Implementation of the mitigation measures suggested in ESIA
  - Health and safety management system development
  - Emergency response and disaster management plan (ERDMP)
    - Proper protocols to be followed in the event of any disaster in order to limit the impact on the employees and the local community.
    - Plan will disclose potential disasters and potential risks from the plant to the local community as well as the plan of action on emergency protocol in the event of any such eventuality.
    - Include awareness programs for the Plant personnel, local community and local administration.

ESMP Implementation

- The ESMP for the Project is being developed with an aim to avoid, reduce, mitigate, or compensate for adverse environmental and social impacts/risks and to propose enhancement measures.
- Role of Project Developer
  - Obtaining statutory clearances required during pre-construction stage of the Project
  - Overall project co-ordination and management through EPC and supported by the third party environmental consultant/s
  - Interaction and reporting to the respective departments of GOB and Lenders
  - Effective implementation of ESMP and monitoring of ESMP implementation
  - Carryout verification/ supervision exercises during the construction phase of the Project for implementation of ESMP
  - Keeping records of all permits obtained by EPC Contractor
  - Overall supervision of ESMP implementation
  - Approval of plans prepared by EPC Contractor
  - Addressing grievances of local community and information dissemination
  - Environmental monitoring through laboratory

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ESMP Implementation

- Role of EPC Contractor
  - Obtaining permits required during the construction stage
  - Joint verification with Project Developer and Third Party Environmental Consultant for review of ESMP implementation
  - Interaction with Project Developer and appointed supervision consultant
  - Filling of reporting formats as per the reporting schedule and submission to Project Developer
  - Environmental monitoring through Third Party Environmental Laboratory
  - Preparation of various plans for effective implementation of ESMP as detailed out in the “Specification Manual” by the Project Developer
  - Identification of site for labour camp, batch mix plant, laydown areas
  - Management of labour camp and to provide drinking water, sanitation facility

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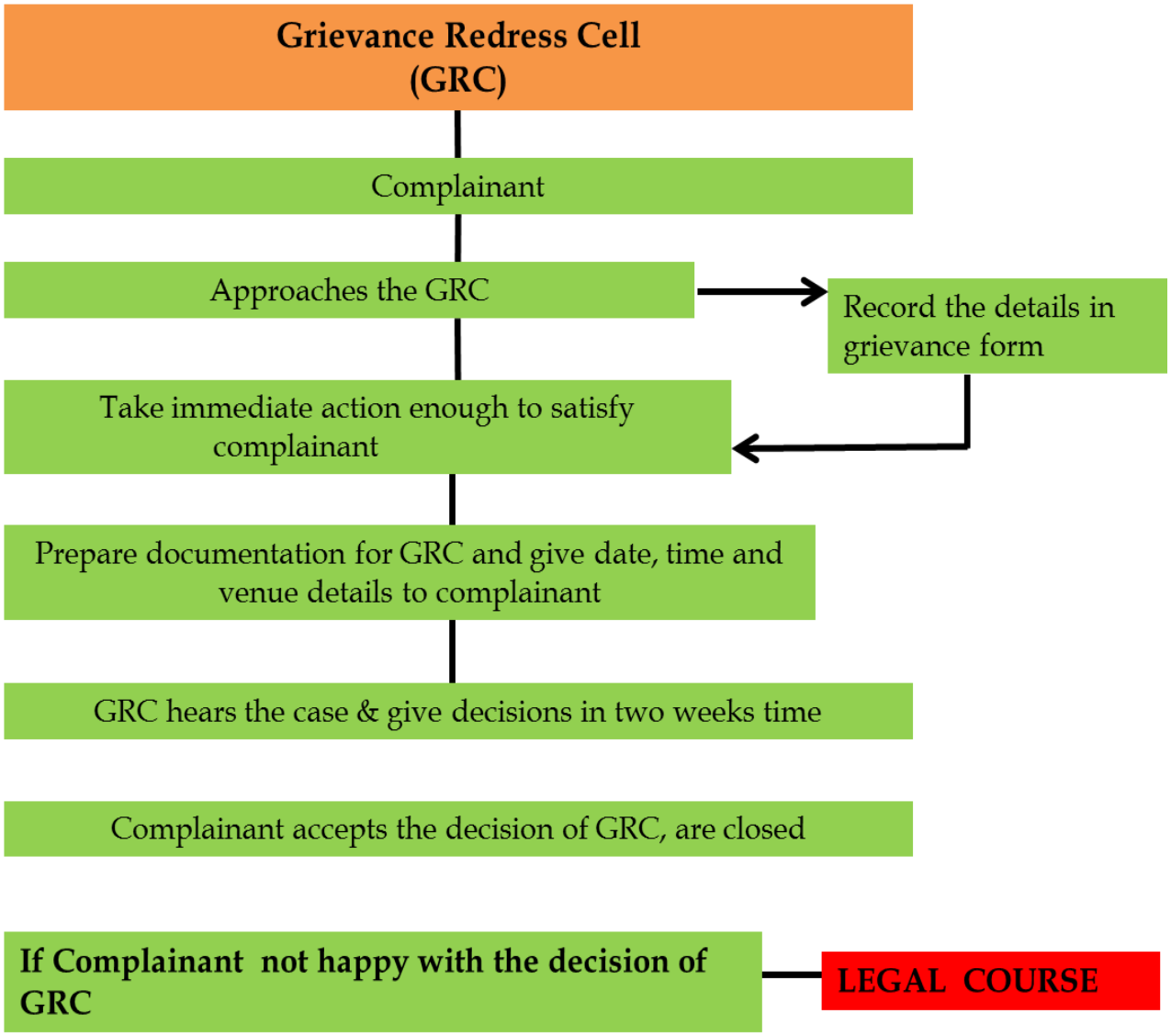
Grievance Redressal



Project Benefits

- Provide a reliable power supply to the region

- The Project in its entirety can bring prosperity and development into the region and pave the way for further development, including industrialization in sectors such as small and medium scale manufacturing.

- The Project will have several other benefits such as
  - supporting economic growth in the region by opening avenues for further development,
  - employment (direct and indirect) and
  - improving local infrastructure.

Project Commitments

- Over the next few months, the Project Company will work closely with local NGOs to understand the key collective requirements of the surrounding community and identify one or more of the highlighted concerns which the Project Company will support to resolve.

- To give an example, some of the collective requirements could be access to (i) clean drinking water (ii) medical consultation (iii) education, etc.

- In addition to the above, the Project Company will endeavor to enhance employment opportunities by maximizing utilization of the local population, as far as possible.

- The Project Company will communicate a clear plan of action for activities its proposes to undertake to improve the welfare of the neighboring community, before commencing construction works on site

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Questions and Suggestions

THANK YOU

Annex Q5

Attendance Sheet -
Stakeholder Consultation (Meeting 2)

পরিবেশগত ও সামাজিক প্রভাব নিরুপন এর জন্য

মতবিনিময় সভা

প্রকল্পের নাম: "সিরাজগঞ্জ ৪"-৪০০ মেগাওয়াট (±১০%) পিপিপি

A PPP Project by NWPGCL and Sembcorp Utilities Pte Ltd

স্থান: মানব মুক্তি সংস্থা (এম এম এস), খাস বড় শিমুল, বঙ্গবন্ধু সেতু পশ্চিম পুলিশ স্টেশন, সিরাজগঞ্জ, বাংলাদেশ

তারিখ: ১৮ এপ্রিল ২০১৫ সময়: সকাল ১০:০০-১২:৩০

উপস্থিতি তালিকা

No/ নং	Name/নাম	Occupation/ পেশা	Address/ঠিকানা	Mobile/Telephone no মোবাইল/ টেলিফোন নম্বর	Signature/ স্বাক্ষর
1	ICHIRO AOKI	ADB officer			
2	TANG SJ	AVP-Sembcorp			
3	Ruchika	Manager Sembcorp			
4	Jennifer	AVP- HR Sembcorp			
5	Abu Bakar	AVP - Sembcorp			
6	Shotaro Sasaki	ADB officer			
7	Ranelíza Samiano	ADB officer			
8	Paresh Chi Sarker Jennifer Nott	Director (Prog.) NDP	NDP Bhaban, Baglooi Kamarkhanda, Sirajganj	01713-383101	
9	Md-Motaleb Hossain	Manager Admn. MMS	MMS, Sirajganj Sadar	01714-080408	
10	[illegible]	[illegible]	[illegible]	01740906438	[illegible]
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20	[illegible]	[illegible]	[illegible]		[illegible]

পরিবেশগত ও সামাজিক প্রভাব নিরুপন এর জন্য

মতবিনিময় সভা

প্রকল্পের নাম: "সিরাজগঞ্জ ৪"-৪০০ মেগাওয়াট (±১০%) পিপিপি

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তারিখ: ১৮ এপ্রিল ২০১৫ সময়: সকাল ১০:০০-১২:৩০

উপস্থিতি তালিকা

No/ নং	Name/নাম	Occupation/ পেশা	Address/ঠিকানা	Mobile/Telephone no মোবাইল/ টেলিফোন নম্বর	Signature/ স্বাক্ষর
২১	মুজিবর রহমান	কৃষক	সয়দাবাদ		মুজিবর
২২	মাহবুবা আকতার	শিক্ষক	বঙ্গবন্ধু সেতু পশ্চিম, প্রা. বিদ্যালয়	01717-013087	[illegible]
23	নুরুন্নাহার	শিক্ষক	ঐ		নুরুন্নাহার
24	ফুয়ারা				ফুয়ারা
25					নুরুন্নাহার
26	মো: ইউসুফ মোল্লা	ব্যবসা	পশ্চিমভোলা	০১৭৪৫-০৪৬০৭৫	[illegible]
27	মো: ইকবাল আকন্দ	ব্যবসা	বড় শিমুল	01722৫0002	ইকবাল
28	মো: রবিউল	ব্যবসা		০১৭২০২৩২৪৪০	রবিউল
29	মজনু	ব্যবসা	মুলিবাড়ি	০১৭২৪৬২৬০১৪	মজনু
30	মো: মজনু	ব্যবসা	পুর্ব মোহনপুর	01712-696023	মজনু
31	মো: কলিমুর রহমান	লেবার	গোবিন্দা	01960857485	কলিমুর
32	মোসা: মনিরা বেগম	গৃহিনী	পশ্চিমভোলা	০১৭১৪ ৭২৮৭০২	মনিরা
33	প্রকৌ. মো: মনিরুল ইসলাম	Service holder	গোলাবাড়ি	01911015052	[illegible]
34	আবু ইউসুফ আলী	ব্যবসা	পশ্চিমভোলা	01788421545	আবু ইউসুফ
35	প্রকৌ: মোহাম্মদ সিরাজুল ইসলাম	Exen/ NWPGCL	Sirajganj 225 MW CCPP Soydabad, Sirajganj	01730066783	[illegible]
36	প্রকৌ: জাহিদুল হক	Asst. Engineer PGCL	PGCL, Nalka, Sirajganj	01717856354	[illegible]
37	মো: আজিজ মন্ডল	মেম্বার	পশ্চিমভোলা	01725567730	আজিজ
38	মো: জিন্না	ব্যবসায়ী		01748362231	মো: জিন্না
39					
40					

পরিবেশগত ও সামাজিক প্রভাব নিরুপন এর জন্য

মতবিনিময় সভা

প্রকল্পের নাম: "সিরাজগঞ্জ ৪"-৪০০ মেগাওয়াট (±১০%) পিপিপি

A PPP Project by NWPGCL and Sembcorp Utilities Pte Ltd

স্থান: মানব মুক্তি সংস্থা (এম এম এস), খাস বড় শিমুল, বঙ্গবন্ধু সেতু পশ্চিম পুলিশ স্টেশন, সিরাজগঞ্জ, বাংলাদেশ

তারিখ: ১৮ এপ্রিল ২০১৫ সময়: সকাল ১০:০০-১২:৩০

উপস্থিতি তালিকা

No/ নং	Name/নাম	Occupation/ পেশা	Address/ঠিকানা	Mobile/Telephone no মোবাইল/ টেলিফোন নম্বর	Signature/ স্বাক্ষর
1	Naval K. Chaudhary	Consultant	ERM India	+919811801301	Naval
2	Tanjimul Hasan	Engineer	Sembcorp - Dhaka	01841093173	
3	Swayam Panda	consultant	ERM India	+91-8454042111	Swayam
4	Touqi Tahmed Rahman	Consultant	EQMS	01911116407	Touqi
5	Kazi Fashadul Islam	Consultant	EQMS	01917876590	
6	KAZI FARHED REZA	JOB	EQMS.	01911702074	
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পরিবেশগত ও সামাজিক প্রভাব নিরুপন এর জন্য

মতবিনিময় সভা

প্রকল্পের নাম: "সিরাজগঞ্জ ৪"-৪০০ মেগাওয়াট (±১০%) পিপিপি

A PPP Project by NWPGCL and Sembcorp Utilities Pte Ltd

স্থান: মানব মুক্তি সংস্থা (এম এম এস), খাস বড় শিমুল, বঙ্গবন্ধু সেতু পশ্চিম পুলিশ স্টেশন, সিরাজগঞ্জ, বাংলাদেশ

তারিখ: ১৮ এপ্রিল ২০১৫ সময়: সকাল ১০:০০-১২:৩০

উপস্থিতি তালিকা

No/ নং	Name/নাম	Occupation/ পেশা	Address/ঠিকানা	Mobile/Telephone no মোবাইল/ টেলিফোন নম্বর	Signature/ স্বাক্ষর
21	মো: রিপন আলী	ব্যবসা	শিদির	01722657384	[signature]
22	মো: খাইরুল মোল্লা,	ব্যবসা -	পুন: বাসন,	01725-698994	[signature]
23	" সেলিম হোসেন	ব্যবসা,	পুন: বাসন পু.	01704453054	[signature]
24	মো: আব্দুল মমিন	ব্যবসা,	পঞ্চসোনা	01715-391740	[signature]
25	মো: গোলাম নবী	ব্যবসা.	সয়দাবাদ	[illegible]	[signature]
26	মো: আব্দুল কাদের	ব্যবসা -	পুনর্বাসন	[illegible]	[signature]
27	আব্দুস সামাদ	কৃষক	পঞ্চসোনা	NIL	[signature]
28	হাবিবুর রহমান	চাকুরী	পঞ্চসোনা	[illegible]	[signature]
29	উদ্যানন্দ কুমার বিশ্বাস	চাকুরী	সিরাজগঞ্জ ২২৫ মে.ও. বিদ্যুৎ কেন্দ্র, সয়দাবাদ	01922660006	[signature]
30	প্রকৌ: এম. [illegible] মজুমদার	চাকুরী	"	01922660[illegible]	[signature]
31	শফিকুল ইসলাম	চাকুরী	সিরাজগঞ্জ বিদ্যুৎ কেন্দ্র	01755830007	[signature]
32	শ্যামল কুমার দাস	"	"	01777736401	Shyamal
33	মো: মিজানুর রহমান	চাকুরী	"	01777736432	[signature]
34	এস.এম. মনিরুজ্জামান	চাকুরী	সয়দাবাদ স্বাস্থ্য কেন্দ্র	01716 323018	[signature]
35	আবুল হাসিম	সরকারী চাকুরী	সয়দাবাদ স্বাস্থ্য ও প. প. কেন্দ্র	01711353925	[signature]
36	প্রকৌ. কমল চন্দ্র পাল	চাকুরী	পিজিসিবি, সয়দাবাদ ২২৫ মে.ও. বিদ্যুৎ কেন্দ্র, সিরাজগঞ্জ	01753918928	[signature]
37	[illegible]	চাকুরী	UNO Office Sirajganj Sadar	01733335030	[signature]
38	মুহাম্মদ মাহমুদুল [illegible]	"	Sembcorp - Bangladesh	01819226635	[signature]
39	মো: আ. মুমিনুল হক	চাকুরী -	AE (DPHE) SIRAJGONJ	01712-051101	[signature] ১৮/৪/১৫

পরিবেশগত ও সামাজিক প্রভাব নিরুপন এর জন্য

মতবিনিময় সভা

প্রকল্পের নাম: "সিরাজগঞ্জ ৪"-৪০০ মেগাওয়াট (±১০%) পিপিপি

A PPP Project by NWPGCL and Sembcorp Utilities Pte Ltd

স্থান: মানব মুক্তি সংস্থা (এম এম এস), খাস বড় শিমুল, বঙ্গবন্ধু সেতু পশ্চিম পুলিশ স্টেশন, সিরাজগঞ্জ, বাংলাদেশ

তারিখ: ১৮ এপ্রিল ২০১৫ সময়: সকাল ১০:০০-১২:৩০

উপস্থিতি তালিকা

No/ নং	Name/নাম	Occupation/ পেশা	Address/ঠিকানা	Mobile/Telephone no মোবাইল/ টেলিফোন নম্বর	Signature/ স্বাক্ষর
১	সাইদুল ইসলাম [illegible]	চাকুরী	ইউ, বি সদস্য [illegible]	01711-411822	[illegible]
২	আব্দুল মোমিন	"	"	0171257567/	[illegible]
৩	[illegible]	চাকুরী	SAAO, [illegible]	01718785345	[illegible]
৪	গোলাবার হোসেন	কৃষি কাজ	বড় শিমুল পঞ্চসোনা	01741060160	গোলবার
৫	মুফতি আব্দুল্লাহ [illegible]	চাকুরী/ইমাম	বড় শিমুল পঞ্চসোনা	01735255850	[illegible]
৬	মুহাম্মদ মানিক মন্ডল	কৃষি	বড় শিমুল পঞ্চসোনা	NIL	মানিক
৭/	মোঃ আব্দুল [illegible]	কৃষি	বড় শিমুল পঞ্চসোনা	01719849999	[illegible]
৮/	মুফতী আব্দুল্লাহ	ইমাম	বড়শিমুল	01763-980214	আব্দুল্লাহ
৯/	মোঃ আঃ মালেক	ইমাম	পুনর্বাসন	০১৯১৯২৫৩৪০৯	[illegible]
১০/	মোঃ রেজাউল করিম	চাকুরী	পুনর্বাসন	01728779312	[illegible]
১১	আবু সিদ্দীক	কৃষি	খাস বড় শিমুল	01765370540	[illegible]
১২	মোঃ বুদ্ধু মন্ডল	কৃষি	খাস বড় শিমুল	017[illegible]2073[illegible]	বুদ্ধু
১৩	মোঃ [illegible]	ব্যবসা	মুন্সী বাড়ি	01712-547929	[illegible]
১৪	মোঃ বেলাল হোঃ	ব্যবসা	পুনর্বাসন	0174056154[illegible]	[illegible]
১৫	মোঃ আনোয়ারুল হোসেন	চাকুরী	ULAO [illegible]	01716-899889	[illegible]
১৬	[illegible] মন্ডল	কৃষি	খাস বড় শিমুল	NIL	[illegible]
১৭	মোঃ আফজাল	কৃষক	খাস বড় শিমুল	NIL	
১৮	ডাঃ সেলিম রেজা	ইমাম	পঞ্চসোনা	০১৭৬৯[illegible]	[illegible]
১৯	মোঃ [illegible] আলী	ব্যবসা	পঞ্চসোনা	01750936138	
২০	মোঃ আঃ আলিম	ব্যবসা	পঞ্চসোনা	01914101950	[illegible]

Annex Q6

Disclosure of Public Consultation Meeting

Photo-documentation

Photo 1: Advertisement at MMS, Khas Baro Shimul

Photo 2: Advertisement at Jamunabali Government Primary School

Photo 3: Advertisement at Baroshimul Panchosona Primary School

Photo 4: Advertisement at ARCHES Message Board (NGO)

Photo 5: ARCHES NGO

Photo 6: Advertisement at SUK NGO

Project: 0276008 – ESIA Study of Sirajganj-4 Project (Stakeholder Consultation Meeting Disclosure)

Client : Sembcorp Utilities Pte Ltd

ERM India Private Limited
Building 10, 4th Floor,
Tower A, DLF Cyber City
Gurgaon – 122 002, India
Board: +91- 0124 4170300
Fax: + 91-0124 - 4170301

Photo-documentation

Photo 7: Advertisement at NDP (NGO)

Photo 8: Advertisement at NDP Message Board

Photo 9: Advertisement at MMS Entrance

Project: 0276008 – ESIA Study of Sirajganj-4 Project (Stakeholder Consultation Meeting Disclosure)

Client : Sembcorp Utilities Pte Ltd

ERM India Private Limited
Building 10, 4th Floor,
Tower A, DLF Cyber City
Gurgaon – 122 002, India
Board: +91- 0124 4170300
Fax: + 91-0124 - 4170301

Annex Q7

Photo-documentation (Meeting 2)

Photo-documentation

Photo 1: Introduction and Purpose of Consultation Described by Mr. Ichiro Aoki (ADB Officer)

Photo 2: Banner of Stakeholder Consultation at the Meeting Venue - MMS

Photo 3: Welcome Address by Mr. Tanjirul Hasan (Sembcorp)

Photo 4: Participants in the Meeting Venue

Photo 5: Participants in the Meeting Venue

Photo 6: Md. Saidul Islam Raja (Union Parishad Member, Saidabad)

Project: 0276008 – ESIA Study of Sirajganj-4 Project (Stakeholder Consultation)

Client : Sembcorp Utilities Pte Ltd

ERM India Private Limited
Building 10, 4th Floor,
Tower A, DLF Cyber City
Gurgaon – 122 002, India
Board: +91- 0124 4170300
Fax: + 91-0124 - 4170301

Photo-documentation

Photo 7: Introduction of the Project by Mr. Nazmul Ahsan (Sembcorp)

Photo 8: Presiding Officers – Mr. Tonmoy Das (ADC – General Admin) and Mr. Protap Chandra Biswas (ADC – Revenue), District Sirajganj

Photo 9: Foyej Shorkar, Director – LDP (NGO), Sirajganj

Photo 10: Md. Iqubal Akand (Resident – Khas Baro Shimul, Saidabad and Businessman)

Photo 11: Participants in the Meeting

Photo 12: Participants in the Meeting

Project: 0276008 – ESIA Study of Sirajganj-4 Project (Stakeholder Consultation)

Client : Sembcorp Utilities Pte Ltd

ERM India Private Limited
Building 10, 4th Floor,
Tower A, DLF Cyber City
Gurgaon – 122 002, India
Board: +91- 0124 4170300
Fax: + 91-0124 - 4170301

Photo-documentation

Photo 13: Md. Abdul Aziz Mondol (Union Parishad Member, Saidabad)

Photo 14: Abdul Momen (Union Parishad Member, Saidabad)

Photo 15: Mrs. Eti Rani Ghosh (Union Parishad Member, Saidabad)

Photo 16: Engr. Md Motahar Hossain , Manager – MMS (NGO), Khas Baro Shimul, Saidabad

Photo 17: Engr. Upananda Kr. Biswas (Superindent Engineer Incharge, NWPGCL)

Photo 18: Sardar Mohiuddin (Assistant Director, Fisheries Department, Sirajganj Sadar)

Project: 0276008 – ESIA Study of Sirajganj-4 Project (Stakeholder Consultation)

Client : Sembcorp Utilities Pte Ltd

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Building 10, 4th Floor,
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Gurgaon – 122 002, India
Board: +91- 0124 4170300
Fax: + 91-0124 - 4170301

Photo-documentation

Photo 19: Address by Mr. Ichiro Aoki (ADB Officer)

Photo 20: Meeting with ADC (Revenue), District Sirajganj

Photo 21: Informal Discussion with BBA Representative

Photo 22: Participants in the Meeting Venue

Photo 23: Participants in the Meeting Venue

Photo 24: Mr. Shotaro Sasaki (ADB Safeguard Team)

Project: 0276008 – ESIA Study of Sirajganj-4 Project (Stakeholder Consultation)

Client : Sembcorp Utilities Pte Ltd

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Gurgaon – 122 002, India
Board: +91- 0124 4170300
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Annex Q8

Public Consultation Presentation (18 April 2015)

মত বিনিময় সভা

প্রস্তাবিত ৪১৩.৮ মেগাওয়াট কম্বাইন্ড সাইকেল বিদ্যুৎ প্রকল্প (সিরাজগঞ্জ-৪), সয়দাবাদ বিদ্যুৎ উৎপাদন কেন্দ্র, সিরাজগঞ্জ জেলা, রাজশাহী বিভাগ, বাংলাদেশ

বাংলাদেশ সরকারের একটি সরকারি বেসরকারী অংশীদারী উদ্যোগ.

১৮ এপ্রিল, ২০১৫

প্রকল্প পটভূমি

- বাংলাদেশ সরকার (জিওবি) 2021 সাল নাগাদ সব নাগরিকের জন্য উপলব্ধ বিদ্যুৎ করা প্রতিশ্রুতিবদ্ধ হয়েছে
- বাংলাদেশ সরকার ব্যক্তিগত অংশগ্রহনে বিদ্যুৎ খাতের উন্নয়নের জন্য একটি কৌশল গ্রহণ করেছে.
- এই কৌশলের সঙ্গে সঙ্গতিপূর্ণ, জিওবি পিপিপি প্রোগ্রামের অধীনে এই প্রকল্প বাস্তবায়ন করার সিদ্ধান্ত নিয়েছে
- বর্তমান প্রকল্প পৃষ্ঠপোষক আগে নির্বাচিত প্রকল্প বাস্তবায়ন করতে ব্যর্থ হয়েছে, এবং তা আগে ভূষিত দর অবস্থার উপর উন্নয়ন প্রস্তাব জমা দিতে আমন্ত্রণ জানানো হয়
- 29% ইকুইটি NWPGCL সাবস্ক্রাইব, ক্রয় এবং মালিকানাধীন করা হবে.
- উত্পন্ন বৈদ্যুতিক ক্ষমতা এবং বিদ্যুৎ বাংলাদেশ বিদ্যুৎ উন্নয়ন বোর্ড (বিপিডিবি) সঙ্গে একটি 22 বছর বিদ্যুৎ ক্রয় চুক্তি ("পিপিএ") অধীনে বিক্রি করা হবে.

sembcorp

ERM

প্রকল্প প্রস্তাবক সম্পর্কে

- Sembcorp ইন্ডাস্ট্রিজ লিমিটেডের 1988 সালে প্রতিষ্ঠিত সিঙ্গাপুর এবং জ্বালানি, পানি ও সামুদ্রিক গ্রুপ হিসেবে বিশ্বব্যাপী ছয়টি মহাদেশ জুড়ে কাজ করছে

- Sembcorp ইউটিলিটি Pte লিমিটেড, (SCU), Sembcorp ইন্ডাস্ট্রিজ লিমিটেডের একটি মালিকানাধীন প্রতিষ্ঠান

- SCU শক্তি উৎপাদন ক্ষমতা 8GW এর একটি নেতৃস্থানীয় ডেভেলপার, মালিক

- SCU 815 মেগাওয়াট সিঙ্গাপুর বৃহত্তম কোজেনারে শন সুবিধা, যা সিঙ্গাপুর এর প্রথম বেসরকারী-উন্নত স্বাধীন পাওয়ার প্ল্যান্ট, জন্য দায়ী. জুলাই 2014 সালে, SCU সিঙ্গাপুর 400mW তার দ্বিতীয় কম্বাইন্ড সাইকেল গ্যাস টারবাইন কোজেনারেশন সম্পন্ন.

- SCU ডিসেম্বর 7, 2014 একটি RFP অনুবর্তী প্রস্তাব পেশ করে এবং বর্তমানে মন্ত্রিপরিষদ ক্রয় কমিটি থেকে প্রকল্পের নিশ্চিতকরণ জন্য অপেক্ষা করছে

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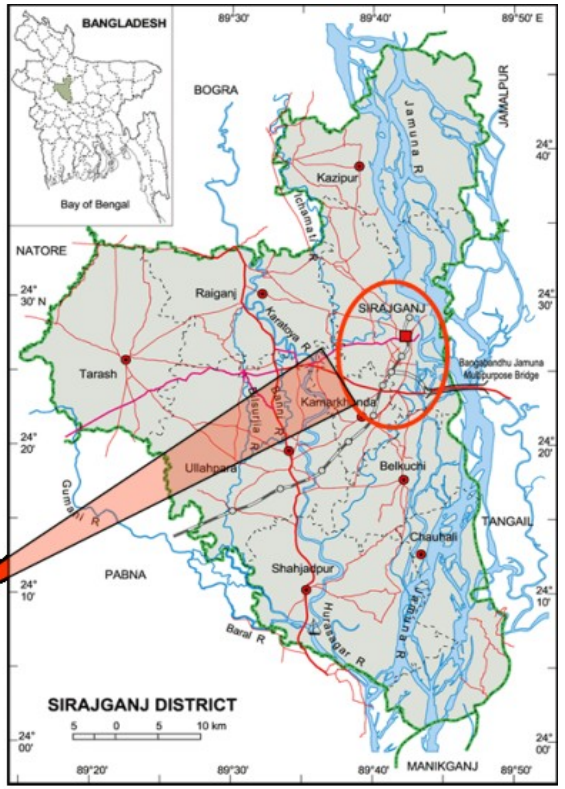
প্রকল্পের অবস্থান



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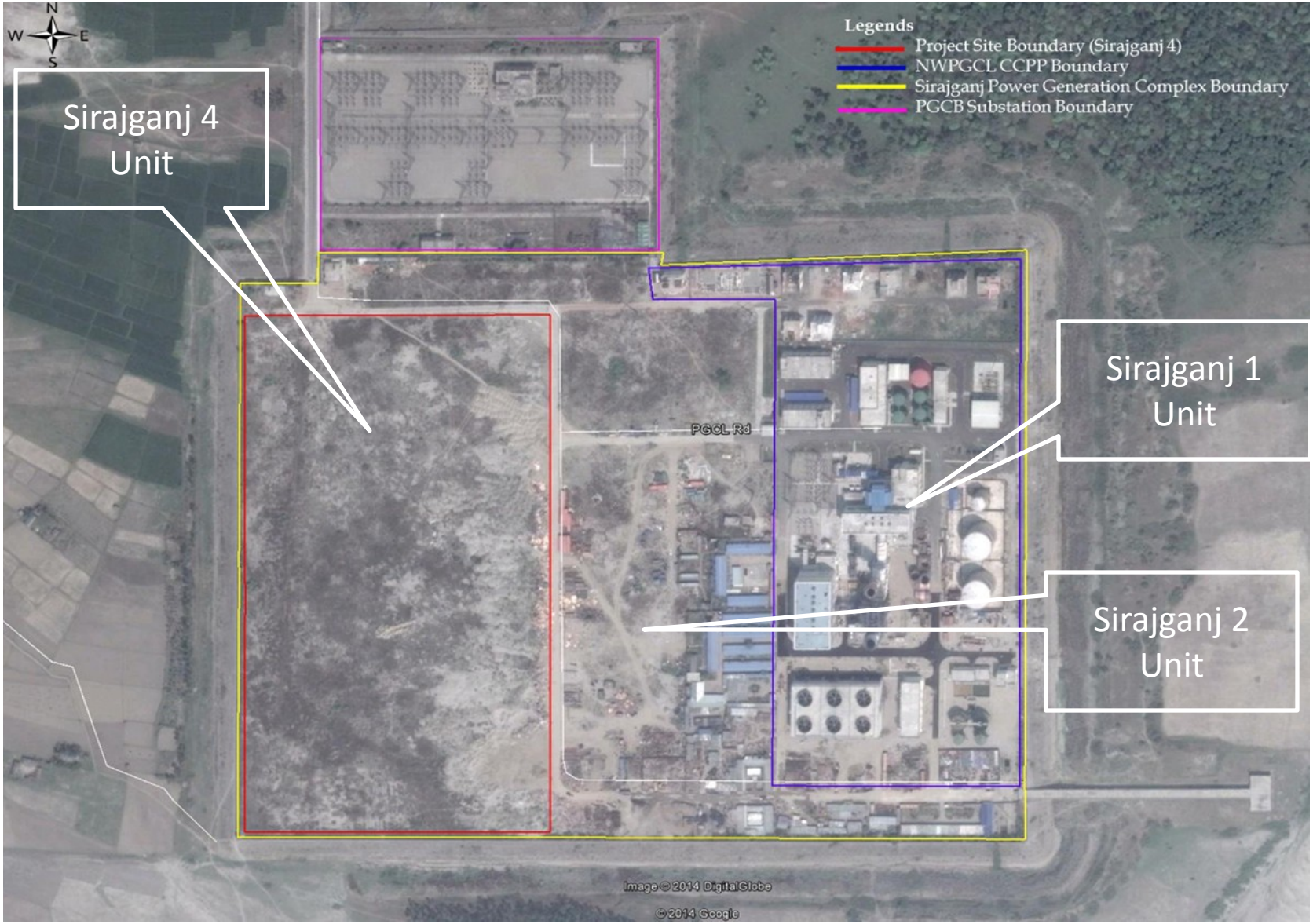
আকাশ থেকে দৃশ্যমান: প্রকল্পের অবস্থান



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বিশেষ বিশেষ পারিপার্শ্বিক

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প্রকল্প সম্পর্কে

- প্রাথমিক জ্বালানি হিসেবে প্রাকৃতিক গ্যাস কাজ করবে.
- গ্যাস সরবরাহ বাধা হলে ক্ষেত্রে ব্যাক আপ জ্বালানি হিসেবে অল্প সময়ের জন্য HSD উপর কাজ করার জন্য ডিজাইন করা হয়েছে

❑ প্রকল্প উপাদান

- গ্যাস টারবাইন
- হিট রিকভারি স্টিম জেনারেটরের;
- বাষ্প টারবাইন;
- বাষ্প টারবাইন যন্ত্র;
- জ্বালানি গ্যাস পরিবহন, কম্প্রেশন এবং কন্ডিশনার সিস্টেম;
- HSD পরিবহন এবং স্টোরেজ;
- পানি সিস্টেম সেই সঙ্গে নদীর পানি কুলিং সিস্টেম;
- বৈদ্যুতিক সিস্টেম;
- শীতাতপ নিয়ন্ত্রণ ও বায়ুচলাচল সিস্টেম;
- কন্ট্রোল এবং যন্ত্রানুষঙ্গের সিস্টেম; এবং
- সিভিল কাজ

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প্রকল্প 3-D: ভার্চুয়াল পরিকল্পনা

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বিশেষ বৈশিষ্ট্যগুলো

নির্দিষ্ট	বিস্তারিত
ভূমি রিকয়ারমেন্ট	23.6 acres বিপিডিবি / NWPGCL অধিষ্ঠিত ইতিমধ্যে জমি সংখ্যাগরিষ্ঠ. কোন ব্যক্তিগত জমি ক্রয় / অধিগ্রহণ হবে না
পানির প্রয়োজনীয়তা	482 m^3/hr প্রধান উত্স: যমুনা নদী ব্যাকআপ হিসাবে ভূগর্ভস্থ পানির ব্যবস্থা
প্রাকৃতিক গ্যাস	জিটিসিএল ভালভ স্টেশন থেকে প্রকল্পের জন্য আরেকটি গ্যাস পাইপলাইন NWPGCL বিদ্যমান গ্যাস এবং HSD পাইপলাইন এরপাশ স্থাপন করা হবে
HSD সরবরাহ পাইপলাইন	প্রকল্পের জন্য বিন্দু লঘুপাত সাইদাবাদ পাওয়ার জেনারেশন কমপ্লেক্স মধ্যে হতে হবে
অপেক্ষিত কর্মসংস্থান	নির্মাণ ফেজ – 575 জন (ইপিসি ঠিকাদার) অপারেশন ফেজ – 50 জন (প্রকল্প কোম্পানি)
প্রকল্প খরচ	384 মিলিয়ন ডলার

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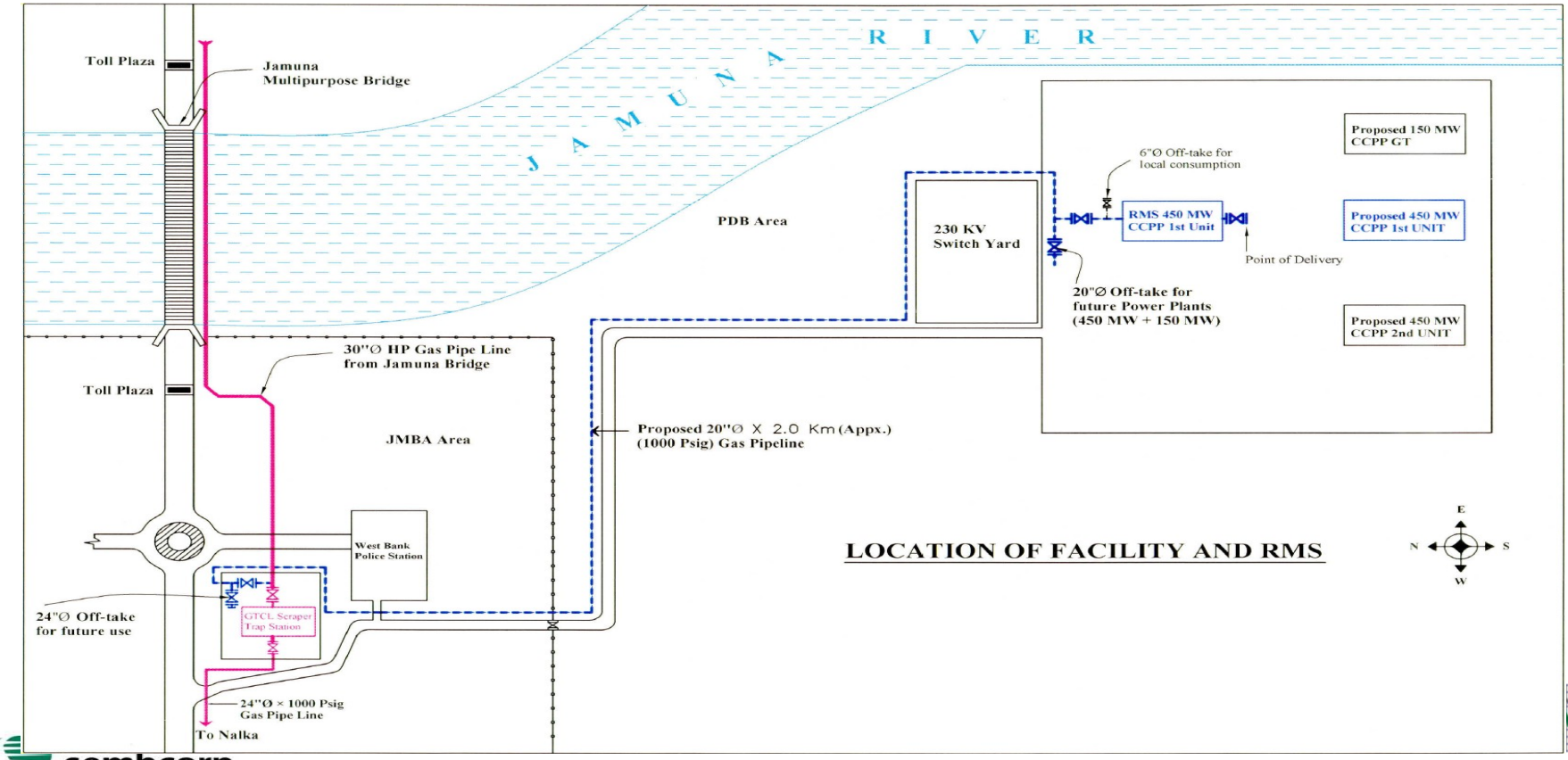
প্রাকৃতিক গ্যাস (প্রাথমিক জ্বালানি)

- প্রাকৃতিক গ্যাস প্রায় 1.5 কিমি প্রকল্প সাইট থেকে হাইওয়ে কাছাকাছি অবস্থিত, একটি সাধারণ বিন্দু থেকে PGCL দ্বারা সরবরাহ করা হবে;
- একটি প্রাকৃতিক গ্যাস সরবরাহ ও গ্যাস প্রদান করা চিকিত্সা সিস্টেম প্রয়োজনীয় গ্যাস মানের এবং মিটারিং সিস্টেম চাপ শিফট দেখা করতে প্ল্যান্ট উপস্থ ইনস্টল করা হবে;



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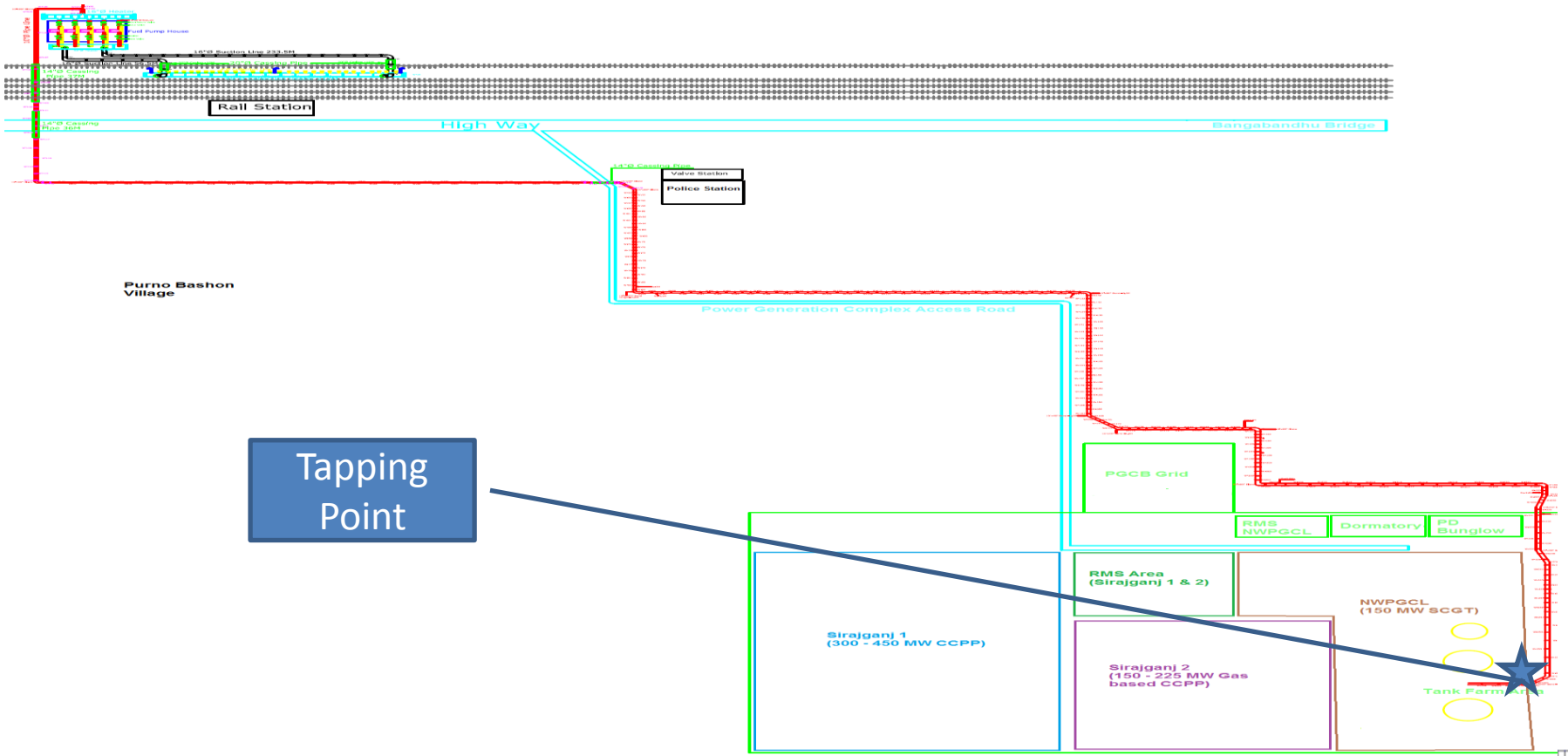
HSD (ব্যাক-আপ জ্বালানি)

- NWPGCL রেলওয়ে স্টেশনে একটি HSD আনলোড এবং পাম্পিং স্টেশন নির্মাণ করা হয়েছে
- HSD সরবরাহ পাইপলাইন NWPGCL দ্বারা সাইদাবাদ পাওয়ার জেনারেশন কমপ্লেক্স পর্যন্ত নির্মাণ করা হয়েছে;



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পানি পাইপলাইন রুট

পানি নেওয়ার জন্য বিপিডিবি এবং বিবিএ মধ্যে একটি ভূমি লিজ চুক্তি মাধ্যমে প্রাপ্ত করা হবে. অবশেষে প্রকল্প কোম্পানিকে বিপিডিবি দ্বারা প্রদান করা হবে.

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প্রকল্প সূচি

#	বর্ণনা	ক্যালেন্ডার মাস নং	
		শুরু	সম্পূর্ণ
1	প্রধান যন্ত্রপাতি সংগ্রহ	1	23
2	সিম্পল সাইকেল বাণিজ্যিক অপারেশন জন্য এবং পরীক্ষা শুরু	23	24
3	সিম্পল সাইকেল বাণিজ্যিক অপারেশন	24	24
4	কম্বাইন্ড সাইকেল বাণিজ্যিক অপারেশন জন্য এবং পরীক্ষা শুরু	28	29
5	কম্বাইন্ড সাইকেল বাণিজ্যিক অপারেশন	30	30

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পরিবেশগত ও সামাজিক প্রভাব

- পরিবেশগত প্রভাব
  - নির্মাণ কার্যক্রম কারণে শব্দ এবং ধুলো
  - অপারেশন সময়ে বিশেষ করে NOx বায়বীয় নির্গমন.
  - spillage কারণে মাটি ও ভূ দূষণ সম্ভাবনা
  - নির্মাণ সময় বর্জ্য
  - গার্হস্থ্য নিকাশী এবং অন্যান্য তরল বর্জ্য
  - স্থলজ ও জলজ বাস্তুসংস্থান এবং সুরক্ষিত প্রজাতির প্রভাব
    - প্রকল্পের প্রভাবিত এলাকায় কোন সমালোচনামূলক বাসস্থান উপস্থিত নাই
    - কোন নেট জীব বৈচিত্র্য হ্রাস নাই
    - স্থলজ ও জলজ আবাসস্থল থেকে দূরে প্রকল্পের কার্যক্রম (ভারী ওপরও পরিবহন জন্য অস্থায়ী জেটি, জল পাইপলাইন গ্রহণ এবং রুট গ্রহণ)

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পরিবেশগত ও সামাজিক প্রভাব

- সামাজিক প্রভাব
  - কমিউনিটি স্বাস্থ্য এবং নিরাপত্তা উপর প্রভাব
  - শ্রম অভিবাসনের জন্য স্থানীয় সম্প্রদায়, স্বাস্থ্য এবং নিরাপত্তা বিষয় ও প্রভাব
  - গাড়ির ট্রাফিক বৃদ্ধি

- ইতিবাচক প্রভাব
  - স্থানীয় মানুষের জন্য কর্মসংস্থান ও ব্যবসার সুযোগ,
  - পাওয়ার সাপ্লাই, নতুন অবকাঠামো উন্নয়ন ইত্যাদি বৃদ্ধি এবং প্রাপ্যতা

পরিবেশগত ও সামাজিক প্রভাব

- ESIA গবেষণা এরপ্রকল্প নিরূপণ
  - সবচেয়ে বেশি প্রতিকূল প্রভাব স্থানীয়, স্বল্পমেয়াদী বা অস্থায়ী.
  - প্রস্তাবিত প্রশমন ব্যবস্থা প্রয়োগ দ্বারা প্রকল্প চিহ্নিত ঝুঁকি হ্রাস করা হবে
  - স্থানীয় সম্প্রদায়ের সাথে পরামর্শ একটি সুসম্পর্ক রক্ষণাবেক্ষণ সমর্থন করবে
  - কমিউনিটি স্বাস্থ্য এবং নিরাপত্তা সম্পর্কিত প্রভাব পদাঙ্ক কমানো হবে

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নিয়ন্ত্রণ ব্যবস্থা

- বায়ু দূষণ
  - প্রাথমিক জ্বালানি হিসাবে প্রাকৃতিক গ্যাস ব্যবহার
  - NOx নির্গমন নিয়ন্ত্রণের জন্য শুকনো নিম্ন NOx বার্নার্স.
  - গ্যাস ডিটেকশন সিস্টেম যদি কোন গ্যাস ফুটা অবিলম্বে তথ্যের জন্য.
  - লম্বা প্রধান স্ট্যাক (60 মিটার) - ভাল বিচ্ছুরণ নির্গমন জন্য

- পানি দূষণ
  - অন সাইট পানি পরিশোধন - বিশ্বব্যাংকের / আইএফসি নির্দেশিকা এবং ECR এর শাখানদী বৈঠক প্রবহমাণ স্রাব মানদণ্ড
  - পানির তাপমাত্রা নিয়ন্ত্রণের জন্য কুলিং টাওয়ার
  - প্রায় 5 টা এর COC ব্যবহার করে পানি খরচ কমানো

- শব্দ
  - নিম্ন শব্দ ক্ষমতা মাত্রা সঙ্গে সরঞ্জাম নির্বাচন.
  - ইঞ্জিন নিষ্কাশন এবং সংকোচকারী উপাদান উপযুক্ত মাফলার ইনস্টলেশন.
  - শব্দ দীপক সরঞ্জাম আবরণ জন্য শাব্দ পরিবেষ্টনের ইনস্টলেশন.

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নিয়ন্ত্রণ ব্যবস্থা

- বায়ু দূষণ
  - প্রাথমিক জ্বালানি হিসাবে প্রাকৃতিক গ্যাস ব্যবহার
  - NOx নির্গমন নিয়ন্ত্রণের জন্য শুকনো নিম্ন NOx বার্নার্স.
  - গ্যাস ডিটেকশন সিস্টেম যদি কোন গ্যাস ফুটা অবিলম্বে তথ্যের জন্য.
  - লম্বা প্রধান স্ট্যাক (60 মিটার) - ভাল বিচ্ছুরণ নির্গমন জন্য

- পানি দূষণ
  - অন সাইট পানি পরিশোধন - বিশ্বব্যাংকের / আইএফসি নির্দেশিকা এবং ECR এর শাখানদী বৈঠক প্রবহমাণ স্রাব মানদণ্ড
  - পানির তাপমাত্রা নিয়ন্ত্রণের জন্য কুলিং টাওয়ার
  - প্রায় 5 টা এর COC ব্যবহার করে পানি খরচ কমানো

- শব্দ
  - নিম্ন শব্দ ক্ষমতা মাত্রা সঙ্গে সরঞ্জাম নির্বাচন.
  - ইঞ্জিন নিষ্কাশন এবং সংকোচকারী উপাদান উপযুক্ত মাফলার ইনস্টলেশন.
  - শব্দ দীপক সরঞ্জাম আবরণ জন্য শাব্দ পরিবেষ্টনের ইনস্টলেশন.

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নিয়ন্ত্রণ ব্যবস্থা

- জীব বৈচিত্র্য
  - নদী কোন সরাসরি স্রাব
  - বিশ্বব্যাংকের / আইএফসি নির্দেশিকা সম্মান সঙ্গে বায়ু নির্গমন এবং সম্মতি কন্ট্রোল
  - এই এলাকায় কাজের সময় প্রকল্প কোম্পানি এবং ইপিসি ঠিকাদার দ্বারা পর্যবেক্ষণ

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নিরাপত্তা ব্যবস্থা

- গ্যাস টারবাইন এবং তার সহায়ক সরঞ্জাম জন্য থেকে CO2 গ্যাস নির্বাপক ব্যবস্থা.
- ফায়ার সুরক্ষা এবং সনাক্তকরণ সিস্টেম, যন্ত্রপাতি, ইত্যাদি
- আন্তর্জাতিক মান মেনে নিরাপত্তা এবং প্রতিরক্ষামূলক রিলে একটি earthing সিস্টেম,
- বাজ সুরক্ষা সিস্টেম
- স্বাস্থ্য ও নিরাপত্তা
  - একটি EHS প্রোগ্রাম সম্মতি সমস্ত সম্পর্কিত আইন, প্রবিধান, কোড এবং বাংলাদেশ ও বিশ্ব ব্যাংকের আইন বিধিবদ্ধ চাহিদা জন্য ব্যবহার করা হবে.

পরিবেশগত ও সামাজিক ব্যবস্থাপনা পরিকল্পনা

- নির্মাণ ধাপ
  - ESIA প্রস্তাবিত প্রশমন ব্যবস্থা বাস্তবায়ন
  - জরুরী রেসপন্স পরিকল্পনা
  - নির্মাণ কার্যক্রম জন্য স্বাস্থ্য ও নিরাপত্তা পরিকল্পনা

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পরিবেশগত ও সামাজিক ব্যবস্থাপনা পরিকল্পনা

- অপারেশন ধাপ
  - ESIA প্রস্তাবিত প্রশমন ব্যবস্থা বাস্তবায়ন
  - স্বাস্থ্য ও নিরাপত্তা ম্যানেজমেন্ট সিস্টেম উন্নয়ন
  - জরুরী প্রতিক্রিয়া ও দুর্যোগ ব্যবস্থাপনা পরিকল্পনা (ERDMP)
    - যথাযথ প্রোটোকল অনুসরণ করা হবে - কর্মচারী এবং স্থানীয় সম্প্রদায়ের উপর প্রভাব রোধ করার জন্য
    - কোনো ধরনের জরুরী ঘটনা হলে যথাযথ পরিকল্পনা ও বিপর্যয় এবং সম্ভাব্য ঝুঁকি প্রকাশ করা হবে - স্থানীয় সম্প্রদায়ের কাছে
    - প্ল্যান্ট কর্মীদের, স্থানীয় কমিউনিটি এবং স্থানীয় প্রশাসনের জন্য সচেতনতা প্রোগ্রাম অন্তর্ভুক্তি

পরিবেশগত ও সামাজিক ব্যবস্থাপনা পরিকল্পনা বাস্তবায়ন

এই প্রকল্পের ESMP -
প্রতিকূল পরিবেশ ও সামাজিক প্রভাব / ঝুঁকি এড়ানো, হ্রাস ও প্রশমিত করা উদ্দেশ্য নিয়ে উন্নত করা হয়েছে.

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পরিবেশগত ও সামাজিক ব্যবস্থাপনা পরিকল্পনা বাস্তবায়ন

- প্রকল্প ডেভেলপার ভূমিকা -
  - প্রকল্প প্রাক নির্মাণ পর্যায়ে প্রয়োজন সংবিধিবদ্ধ ছাড়পত্র প্রাপ্ত করার পদ্ধতি
  - সামগ্রিক প্রকল্প সমন্বয় এবং ব্যবস্থাপনা ইপিসি মাধ্যমে এবং তৃতীয় পক্ষের পরিবেশগত কনসালট্যান্ট / গুলি দ্বারা সমর্থিত
  - যোগাযোগ এবং প্রতিবেদন - জিওবি এবং ঋণ দাতা
  - কার্যকরী ESMP বাস্তবায়ন এবং ESMP বাস্তবায়ন পর্যবেক্ষণ
  - প্রকল্প নির্মাণ সময়ে ESMP বাস্তবায়নের জন্য যাচাই / তত্ত্বাবধানে অনুশীলন
  - ইপিসি ঠিকাদার দ্বারা প্রাপ্ত সব পারমিট রেকর্ড রাখা
  - ESMP বাস্তবায়ন সার্বিক তত্ত্বাবধানে
  - ইপিসি ঠিকাদার দ্বারা প্রস্তুত পরিকল্পনা অনুমোদন
  - স্থানীয় কমিউনিটির অভিযোগএবং তথ্য প্রচার
  - পরীক্ষাগার মাধ্যমে পরিবেশগত পর্যবেক্ষণ

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ESMP বাস্তবায়ন

- ইপিসি ঠিকাদারের ভূমিকা
  - নির্মাণ পর্যায়ে প্রয়োজনীয় অনুমতি প্রাপ্তি
  - ESMP বাস্তবায়ন পর্যালোচনার জন্য প্রকল্প ডেভেলপার এবং তৃতীয় পক্ষের পরিবেশগত কনসালটেন্টর সঙ্গে যৌথ যাচাই
  - প্রকল্প ডেভেলপার এবং নিযুক্ত তত্ত্বাবধান পরামর্শকের সঙ্গে যোগাযোগ
  - প্রতিবেদনর সময়সূচী অনুযায়ী প্রতিবেদন পূরণ করা এবং প্রকল্প ডেভেলপার এর কাছে জমা দেওয়া
  - তৃতীয় পক্ষ দ্বারা পরিবেশগত ল্যাবরেটরির মাধ্যমে পরিবেশগত পর্যবেক্ষণ
  - প্রকল্প ডেভেলপার দ্বারা "স্পেসিফিকেশন ম্যানুয়াল" আউট বিস্তারিত ঊঝগচ কার্যকর বাস্তবায়নের জন্য বিভিন্ন পরিকল্পনা প্রণয়ন
  - শ্রম শিবির, ব্যাচ মিক্স প্ল্যান্ট, কার্যবিপত্তি এলাকাসমূহ জন্য সাইট সনাক্ত করন
  - শ্রম শিবির ব্যবস্থাপনা ও পানীয় জল প্রদান, স্যানিটেশন সুবিধা

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পরামর্শ এবং প্রকাশ

- পরামর্শ ব্যায়াম একটি সংখ্যা এই ESIA তৈরী করার সময় পরিচালিত হয়.
- পরামর্শ স্টেকহোল্ডারের যেমন প্রাসঙ্গিক সরকারি বিভাগ ও এনজিও হিসেবে সিরাজগঞ্জ ও বাইসাইকেলে চালিয়ে ইউনিয়ন, এবং অন্যান্য বহিরাগত স্টেকহোল্ডারের ইউনিয়ন চেয়ারম্যান জেলা প্রশাসক হিসাবে প্রকল্পের এলাকা, স্থানীয় নির্বাচিত প্রতিনিধি সরাসরি সান্নিধ্যের মধ্যে সম্প্রদায় অন্তর্ভুক্ত.
- একটি পাবলিক পরামর্শ সভা সাইট কাছাকাছি 21 মার্চ 2015 অনুষ্ঠিত হয়.
- এই পাবলিক পরামর্শ সভা সিরাজগঞ্জ 4 প্রকল্পের প্রকল্প বৈশিষ্ট্য নিয়ে আলোচনা করার জন্য আহবান করা হয়, ESIA গবেষণা ফলাফল হিসেবে (সরকারি কর্মকর্তা, নির্বাচিত প্রতিনিধি, এনজিও, নারী সহ গ্রামের মানুষ সহ) কী স্টেকহোল্ডারের একটি মতামত পেতে

- 9 অংশগ্রহণকারীদের একটি মোট তাদের মতামত ও পরামর্শ প্রদান করা হয়েছে.
- মূল মন্তব্য পেয়েছেন:
  - এটা স্থানীয়দের জন্য কর্মসংস্থান এবং অন্যান্য ব্যবসায়িক সুযোগ উৎপন্ন হবে, যেমন প্রকল্প, পার্শ্ববর্তী মানুষের জন্য ভাল.
  - প্রকল্প মৃত্যুদন্ড নিযুক্ত করা হবে শ্রমিক দক্ষতাপূর্ণ এবং বিশেষজ্ঞ হতে হবে.
  - জল পরিবেশ পালনের আগে শান্ত হতে হবে.
  - শব্দ সমস্যা প্রতিরোধ করা উচিত, যা তৈরি করা হবে.
  - প্রকল্প থেকে নির্গত হবে যে ধোঁয়া পরিবেশ এবং স্থানীয় মানুষের সমস্যা সৃষ্টি না করে. এটা প্রতিরোধ করা উচিত.

পরামর্শ এবং প্রকাশ

- কি প্রকল্প থেকে NOx নির্গমন হবে? NOx নির্গমন কিভাবে নিয়ন্ত্রণ করা হবে.
- প্রকল্প থেকে উত্পন্ন ধূসর পানি কোনো ক্ষতিকর উপাদান আছে হবে কি না.
- প্রকল্প কিনা প্রসেস থেকে উত্পন্ন ধূসর পানি ব্যবহার করতে কোনো পরিকল্পনা নেই. কাজ লোকেদের দেওয়া প্রতিশ্রুতি অনুযায়ী সুন্দরভাবে সম্পন্ন করতে হবে. এটা দেরি করা উচিত নয়.
- আমরা এই উপস্থাপনা পরিবেশগত ও সামাজিক প্রভাব পরিচালনার জন্য প্রতিশ্রুতি অনেক দেখা যায়. আমরা প্রকল্প কোম্পানির প্রকল্প বাস্তবায়ন বা উন্নয়ন সময় এই প্রতিশ্রুতি পূর্ণ করা আবশ্যক যে আশা. উপস্থাপনা উল্লেখ প্রতিশ্রুতি পূর্ণ করা আবশ্যক.
- সামগ্রিকভাবে স্টেকহোল্ডারের এলাকায় প্রকল্প স্বাগত করেনি.

পরামর্শ এবং প্রকাশ

Consultations with NGO (Manab Mukti Sangstha)

Consultations with BPDB official at Seerajganj

Consultations with DOE officials at Bogra

Consultations with local villagers on Char

Consultations with villagers of Panchosona

Consolations with villagers of Khas-Boro Simul

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পরামর্শ এবং প্রকাশ

Introduction of the Project by Mr. Nazmul Ahsan (Sembcorp)

Presentation of ESIA Study by Mr. Kazi Farhed Iqubal (Local Partner of ERM)

Presentation of ESIA Study during Stakeholder Consultation

Md. Saidul Islam Raja (Union Parishad Member, Saidabad)

Md. Masud Rana (Union Parishad Member, Saidabad)

Md. Iqubal Akand (Resident – Khas Baro Shimul, Saidabad)

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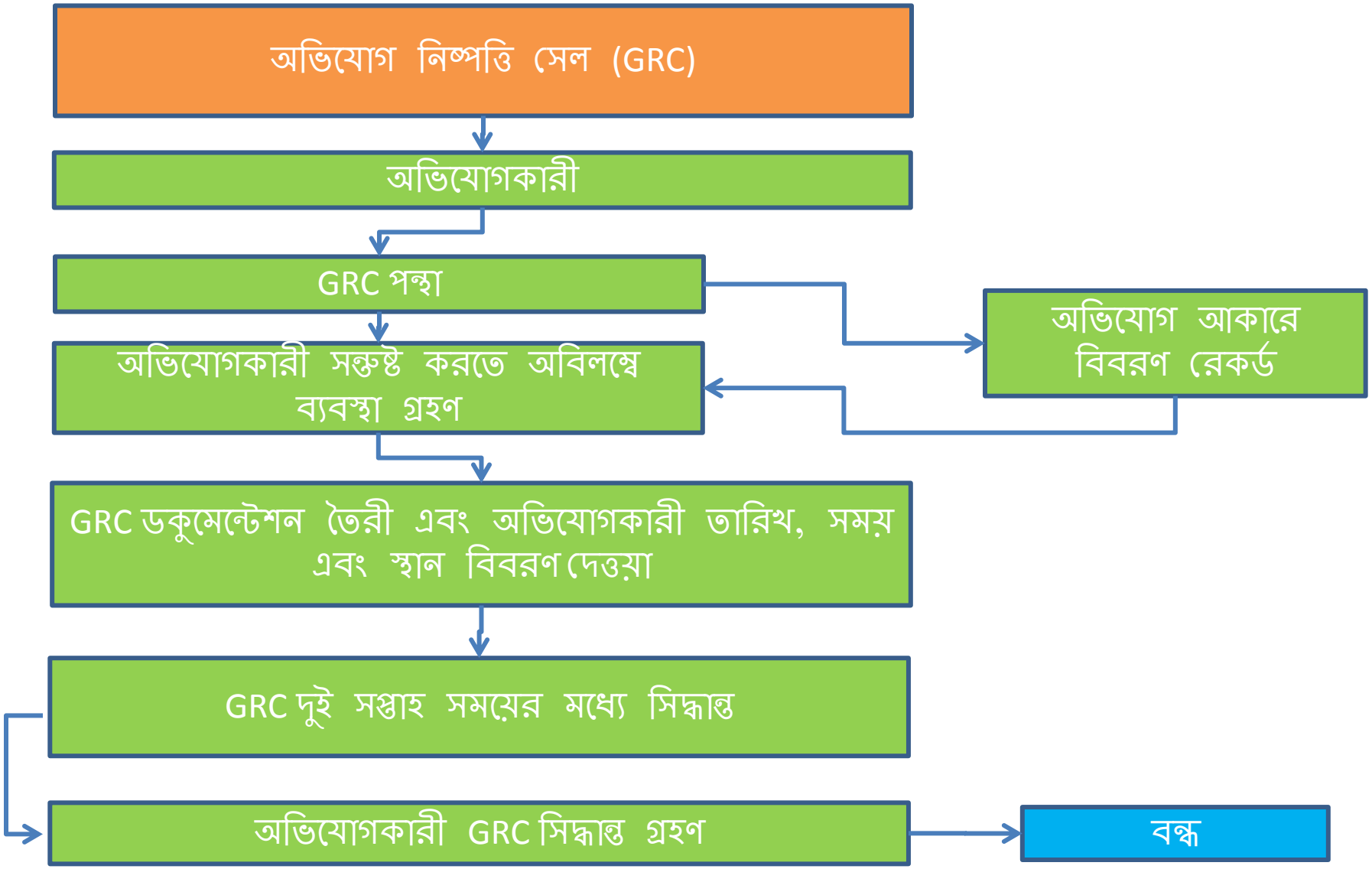
অভিযোগ নিষ্পত্তি



GRC বিবরণ সাইট এ প্রকল্পের কার্যক্রম শুরু করার আগে যোগাযোগ করা হবে.

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প্রকল্পের উপকারিতা

- এই অঞ্চলের নির্ভরযোগ্য বিদ্যুৎ সরবরাহ প্রদান
- ছোট এবং মাঝারি মাপের উত্পাদন খাতে শিল্পায়ন সহ আরও উন্নয়ন
- প্রকল্পে অন্যান্য সুবিধা
  - অর্থনৈতিক অঞ্চলের প্রবৃদ্ধি সমর্থন,
  - কর্মসংস্থান (প্রত্যক্ষ ও পরোক্ষ) এবং
  - স্থানীয় অবকাঠামো উন্নতি.

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প্রকল্পের প্রতিশ্রুতি

- পরবর্তী কয়েক মাস, প্রকল্প কোম্পানি স্থানীয় এনজিওর সঙ্গে ঘনিষ্ঠভাবে কাজ করে পার্শ্ববর্তী সম্প্রদায়ের প্রয়োজনীয়তা চিহ্নিত করবে এবং প্রকল্প কোম্পানি তা সমাধান করতে সমাধান করতে সহায়তা করবে
- উদাহরণস্বরূপ, সমষ্টিগত প্রয়োজনীয়তা (1) পরিষ্কার পানীয় জল (2) ডাক্তারের পরামর্শ (3) শিক্ষা, ইত্যাদি
- উপরোক্ত উপরন্তু, প্রকল্প কোম্পানি যথাসম্ভব, স্থানীয় জনসংখ্যার ব্যবহার করে কর্মসংস্থানের সুযোগ বাড়াতে উপক্রম হবে
- নির্মাণ শুরুর আগে প্রকল্প কোম্পানি, তার প্রতিবেশী সম্প্রদায়ের কল্যাণ উন্নত করতে কার্যভার গ্রহণ করা প্রস্তাব কার্যক্রম জন্য একটি পরিষ্কার পরিকল্পনা গ্রহণ করা

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প্রশ্ন ও পরামর্শ

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Public Consultation

Proposed 413.8 MW (net) combined cycle power project (Sirajganj – 4) at Saidabad Power Generation Complex, Sirajganj District, Rajshahi Division, Bangladesh

A Public Private Partnership initiative of the Govt. of Bangladesh

April 18, 2015

Project Background

- Government of Bangladesh (GoB) has committed to make electricity available to all citizens by 2021
- The GOB has adopted a strategy for the development of the power sector which envisages private participation in the sector.
- In line with this strategy, the GOB decided to implement this Project under PPP Program
- The current project sponsor was invited to submit the development proposal on the terms and conditions of the earlier awarded bid, after the earlier selected bidder failed to implement the Project.
- Twenty nine percent (29%) of the equity interest in the Project will be subscribed, purchased and owned by NWPGCL.
- The electrical capacity and electricity generated will be sold under a 22 year Power Purchase Agreement ("PPA") with the Bangladesh Power Development Board (BPDB).

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About Project Proponent

- Sembcorp Industries Limited was established in 1988 in Singapore and is a leading energy, water and marine group operating across six continents worldwide

- Sembcorp Utilities Pte Ltd, (*SCU*), is a wholly owned subsidiary of Sembcorp Industries Limited

- SCU is a leading developer, owner and operator of energy and water assets having over 8GW of power capacity installed and under development

- SCU is responsible for Singapore's first privately-developed independent power plant, which is also Singapore's largest cogeneration facility at 815 megawatts. In July 2014, SCU completed its second combined-cycle gas turbine cogeneration plant of 400MW in Singapore.

- SCU submitted an RFP compliant proposal on 7 Dec 2014 and is currently awaiting confirmation on the project award from the Cabinet Purchase Committee

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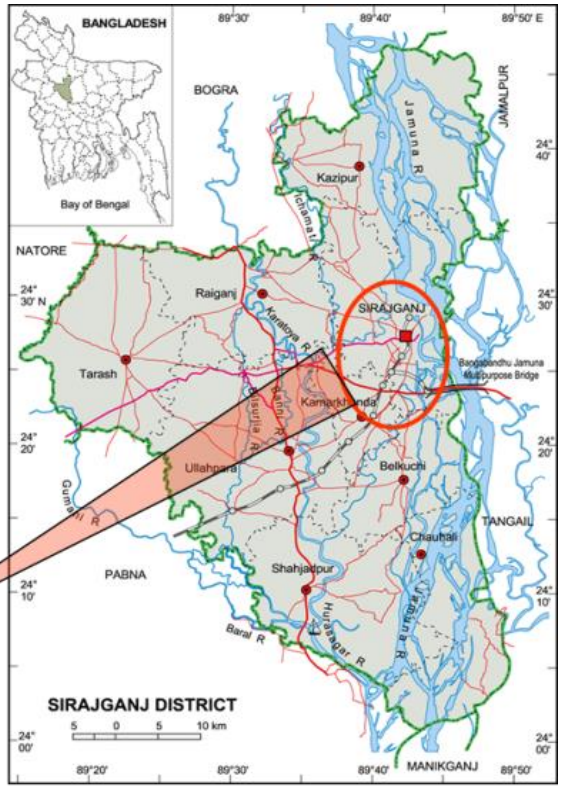
Project Location



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Aerial View of Project site

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Surrounding Key Features

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About Project

- The Plant will operate on natural gas as its primary fuel.
- It is designed to operate on HSD for short periods of time as the back-up fuel in case of interruptions in gas supply.

- Key Components of the Project are:
  - Gas Turbine
  - Heat Recovery Steam Generator;
  - Steam Turbine;
  - Steam Turbine Condenser;
  - Fuel Gas Transportation, Compression and Conditioning System;
  - HSD Transportation and Storage;
  - Water System including river water cooling system;
  - Electrical System;
  - Air Conditioning and Ventilation System;
  - Control and Instrumentation System; and
  - Civil Works

3-D Virtual Plan of the Project

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Key Features

Particular	Detail
Land Requirement	23.6 acres Majority of land already in possession of BPDB/NWPGCL. No purchase/ acquisition of private land involved. No economic or physical displacement involved.
Water Requirement	482 m^3/hr Main Source: River Jamuna with ground water as a back up
Natural Gas	From GTCL Valve Station Another gas pipeline for the Project will be laid next to the existing gas and HSD pipelines of NWPGCL
HSD Supply Pipeline	Already in possession of NWPGCL Tapping point for the project will be within Saidabad Power Generation Complex
Anticipated Employment Generation	Construction Phase – 575 persons (EPC Contractor) Operation Phase – 50 persons (Project Company)
Project Cost	USD 384 million

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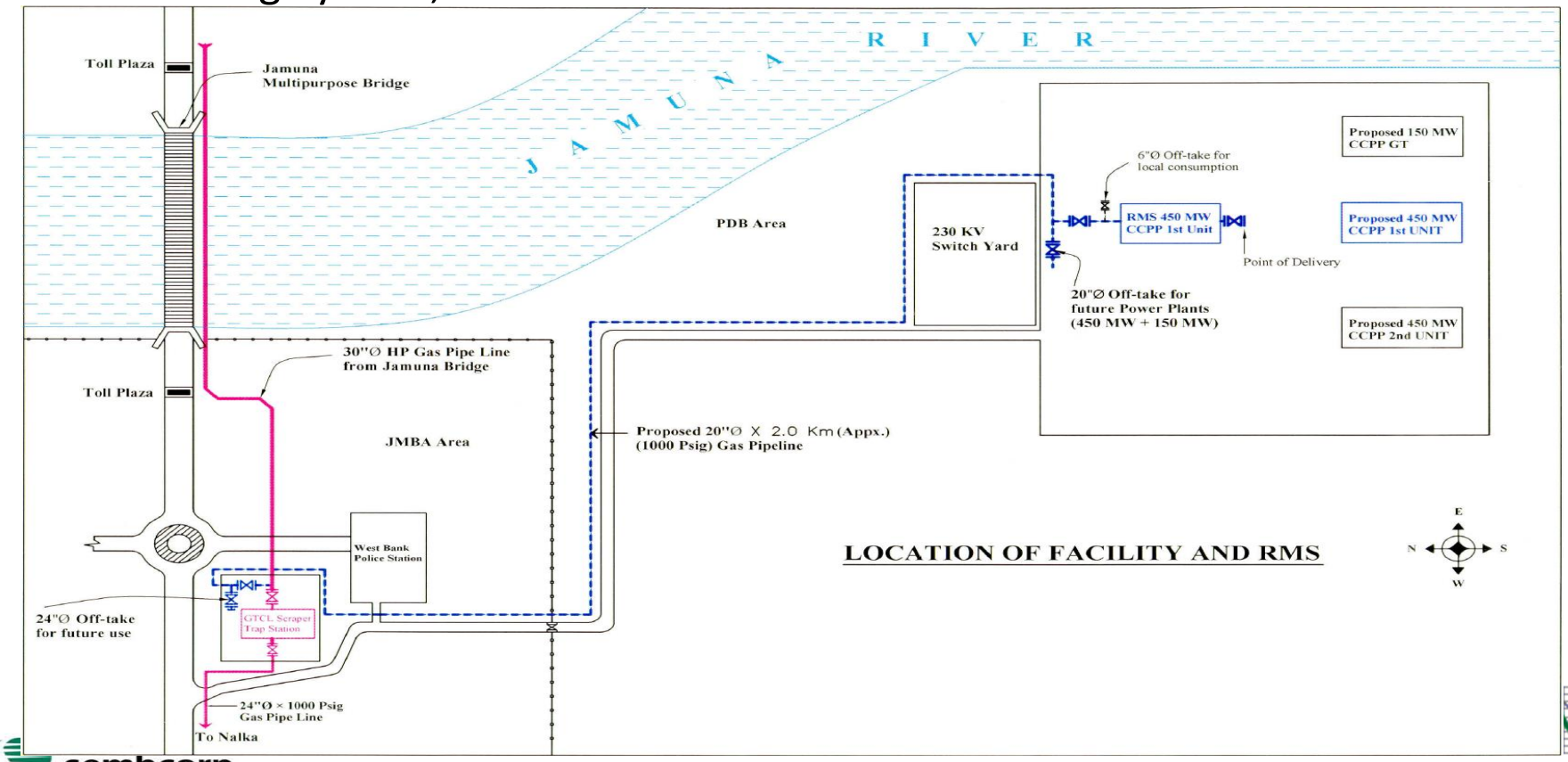
Natural Gas (Primary Fuel)

- Natural gas will be supplied by PGCL from a common point, located near the highway approximately 1.5 km from the Project site;

- A natural gas supply and treatment system to deliver gas will be installed in the vicinity of the Plant to meet the required gas quality and pressure Shift to the Metering System;



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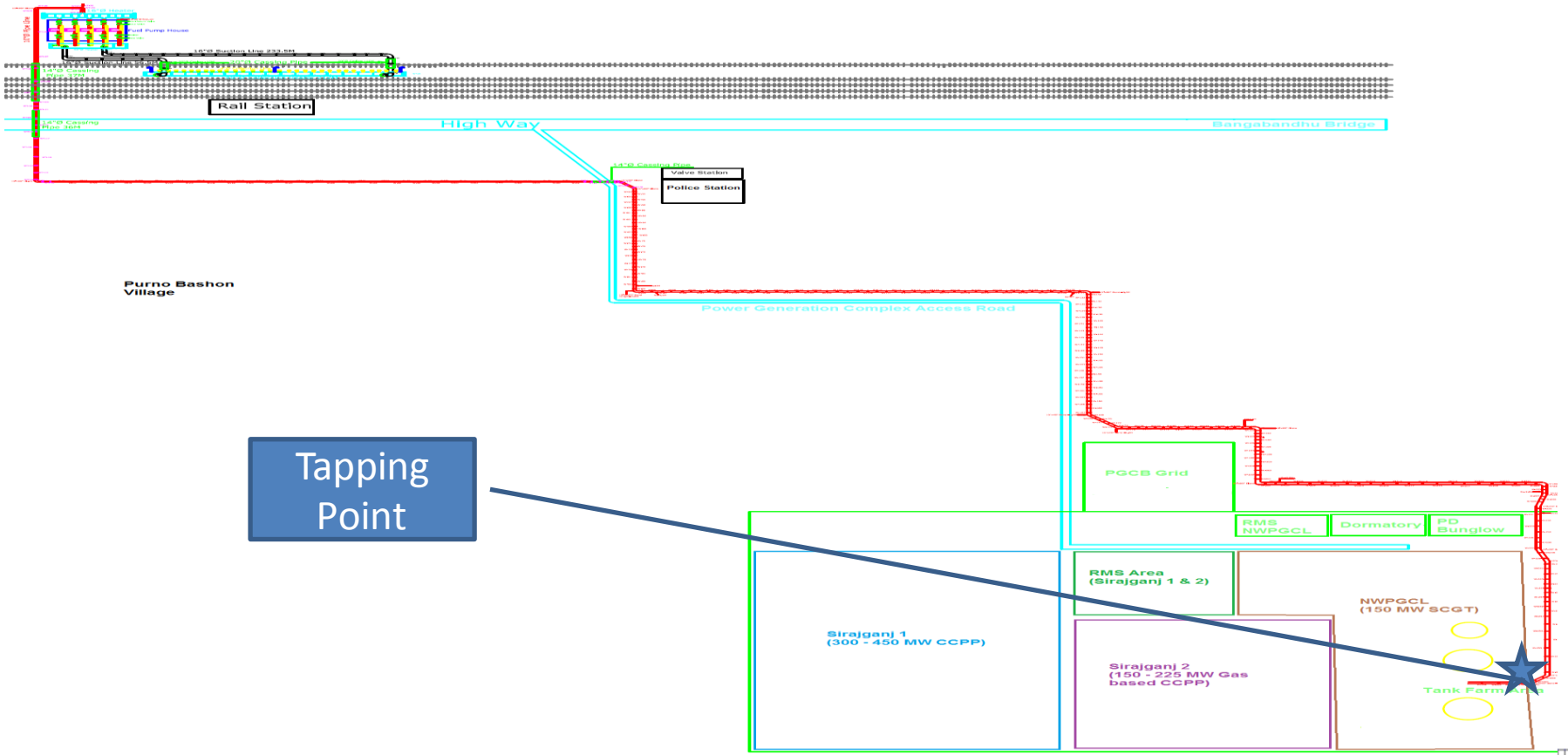
HSD (Back-up Fuel)

- NWPGCL has constructed an HSD unloading and pumping station at the railway station
- HSD supply pipeline has been constructed up to the Saidabad Power Generation Complex by NWPGCL;



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Water Pipeline Route

The RoW for water intake will be obtained through a Land Lease Agreement between BPDB and BBA. Finally RoW will be granted by BPDB to the Project Company.

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Tentative Project Schedule

#	Description	No. of Calendar Months	
		Start	Complete
1	Procurement of major equipment	1	23
2	Start-up and testing for commercial operation in Simple Cycle	23	24
3	Commercial Operation of Simple Cycle Facility	24	24
4	Start-up and testing for commercial operation in Combined Cycle	28	29
5	Commercial Operation of Combined Cycle Facility	30	30

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Environmental and Social Impacts

- Environmental Impacts
  - Noise and dust generation due to construction activities.
  - Gaseous emissions particularly NOx during operation phase.
  - Possibility of soil and groundwater contamination due to accidental spillage
  - Generation of waste during construction
  - Generation of sewage and other liquid waste
  - Impact to the terrestrial and aquatic ecology and protected species
    - No critical habitat present in the project affected area
    - No net biodiversity loss
    - Project activities away from terrestrial and aquatic habitats (except temporary jetty, water pipeline intake and route for transportation of heavy lifts)

Environmental and Social Impacts

- Social Impacts
  - impact on community health and safety
  - impact from migration of labor into the Project area resulting in conflicts with the local community, health and safety issues
  - increased movement of traffic resulting in inconvenience due to vehicle movements
- Positive impacts
  - employment and business opportunities for the local people,
  - increased availability of power supply, new infrastructure development etc
- The ESIA study of the Project ascertains that
  - Most of the adverse impacts are localized, short-term or temporary.
  - By implementing the recommended mitigation measures the Project will minimize the identified risks whereas on-going consultation and engagement will support the maintenance of a harmonious relation with the local community.
  - Community health and safety related impacts will be managed at source to reduce the footprint.

Control Measures

- Air Pollution
  - Use of Natural Gas as Primary Fuel.
  - Dry Low NOx burners for NOx emission control.
  - Gas Detection System for immediate information of any gas leakage.
  - Tall main stack (about 60 m) for better dispersion of emissions.
- Water Pollution
  - On-site treatment of the effluent meeting effluent discharge criteria of WB/IFC guidelines and ECR
  - Cooling towers for temperature control
  - Reduction in water consumption by using COC of approximately 5
- Noise
  - Selection of equipment with lower sound power levels.
  - Installation of suitable mufflers on engine exhausts and compressor components.
  - Installation of acoustic enclosures for equipment casing radiating noise.
- Biodiversity
  - No direct discharge to the river
  - Control of air emission and compliance with respect to WB/IFC Guidelines
  - Close monitoring by the Project Company and EPC contractor during activities in these areas

Safety Provisions

- CO_2 gas extinguishing system for Gas Turbine and its auxiliary equipment.
- Fire protection and detection system for the rest of the plant including buildings, equipment, etc.
- An earthing system of safety and protective relaying, complied with international standards
- Lightning Protection System
- Health and Safety
  - An EHS programme will be used for compliance all related acts, regulations, codes and statutory requirements of the Laws of Bangladesh and of the World Bank.

Environmental and Social Management Plan

- Construction Phase
  - Implementation of the mitigation measures suggested in ESIA
  - Emergency Response Plan
  - Health and Safety Plan for construction activities

- Operation Phase
  - Implementation of the mitigation measures suggested in ESIA
  - Health and safety management system development
  - Emergency response and disaster management plan (ERDMP)
    - Proper protocols to be followed in the event of any disaster in order to limit the impact on the employees and the local community.
    - Plan will disclose potential disasters and potential risks from the plant to the local community as well as the plan of action on emergency protocol in the event of any such eventuality.
    - Include awareness programs for the Plant personnel, local community and local administration.

ESMP Implementation

- The ESMP for the Project is being developed with an aim to avoid, reduce, mitigate, or compensate for adverse environmental and social impacts/risks and to propose enhancement measures.
- Role of Project Developer
  - Obtaining statutory clearances required during pre-construction stage of the Project
  - Overall project co-ordination and management through EPC and supported by the third party environmental consultant/s
  - Interaction and reporting to the respective departments of GOB and Lenders
  - Effective implementation of ESMP and monitoring of ESMP implementation
  - Carryout verification/ supervision exercises during the construction phase of the Project for implementation of ESMP
  - Keeping records of all permits obtained by EPC Contractor
  - Overall supervision of ESMP implementation
  - Approval of plans prepared by EPC Contractor
  - Addressing grievances of local community and information dissemination
  - Environmental monitoring through laboratory

ESMP Implementation

- Role of EPC Contractor
  - Obtaining permits required during the construction stage
  - Joint verification with Project Developer and Third Party Environmental Consultant for review of ESMP implementation
  - Interaction with Project Developer and appointed supervision consultant
  - Filling of reporting formats as per the reporting schedule and submission to Project Developer
  - Environmental monitoring through Third Party Environmental Laboratory
  - Preparation of various plans for effective implementation of ESMP as detailed out in the “Specification Manual” by the Project Developer
  - Identification of site for labour camp, batch mix plant, laydown areas
  - Management of labour camp and to provide drinking water, sanitation facility

Consultation and Disclosure

- Disclosure and Consultation
  - A number of consultation exercises were conducted during preparation of this ESIA.
  - The stakeholders consulted include the community in the direct vicinity of the Project area, local elected representative such as the district commissioner of Sirajganj and the Union Chairman of Saidabad Union, and other external stakeholders such as relevant government departments and NGOs.
  - A public consultation meeting was held on 21st March 2015 near to the site.
  - This public consultation meeting was convened to discuss the project features of Sirajganj 4 project, findings of the ESIA study as well as to get an opinion of the key stakeholders (including government officials, elected representatives, NGOs, village people including women).
- A total of 9 attendees have provided their comments and suggestions.
- Key comments received:
  - The project is good for the surrounding people, as it will generate employment and other business opportunities for the locals.
  - The workers that will be employed in the project execution should be skilful and expert.
  - Water must be cool before discharging to the environment.
  - Noise problem will be created which should be prevented.
  - Smoke that will emit from the project should not create problem to the environment and local people. It should be prevented.

Consultation and Disclosure

- What will be the NOx emission from the Project? How the NOx emission will be controlled.
- Whether the grey water generated from the project will have any harmful elements.
- Whether the project has any plans to use grey water generated from the processes.
- Work should be done nicely according to the promise given to the people. It should not be delayed.
- We have seen lot of promises for management of environmental and social impacts in this presentation. We expect that the project company must fulfil these promises during the project implementation or development. The promises mentioned in the presentation must be fulfilled.

- Overall the stakeholders had welcomed the project in the area.

Consultation and Disclosure

Consultations with NGO (Manab Mukti Sangstha)

Consultations with BPDB official at Seerajganj

Consultations with DOE officials at Bogra

Consultations with local villagers on Char

Consultations with villagers of Panchosona

Consolations with villagers of Khas-Boro Simul

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Consultation and Disclosure

Introduction of the Project by Mr. Nazmul Ahsan (Sembcorp)

Presentation of ESIA Study by Mr. Kazi Farhed Iqubal (Local Partner of ERM)

Presentation of ESIA Study during Stakeholder Consultation

Md. Saidul Islam Raja (Union Parishad Member, Saidabad)

Md. Masud Rana (Union Parishad Member, Saidabad)

Md. Iqubal Akand (Resident – Khas Baro Shimul, Saidabad)

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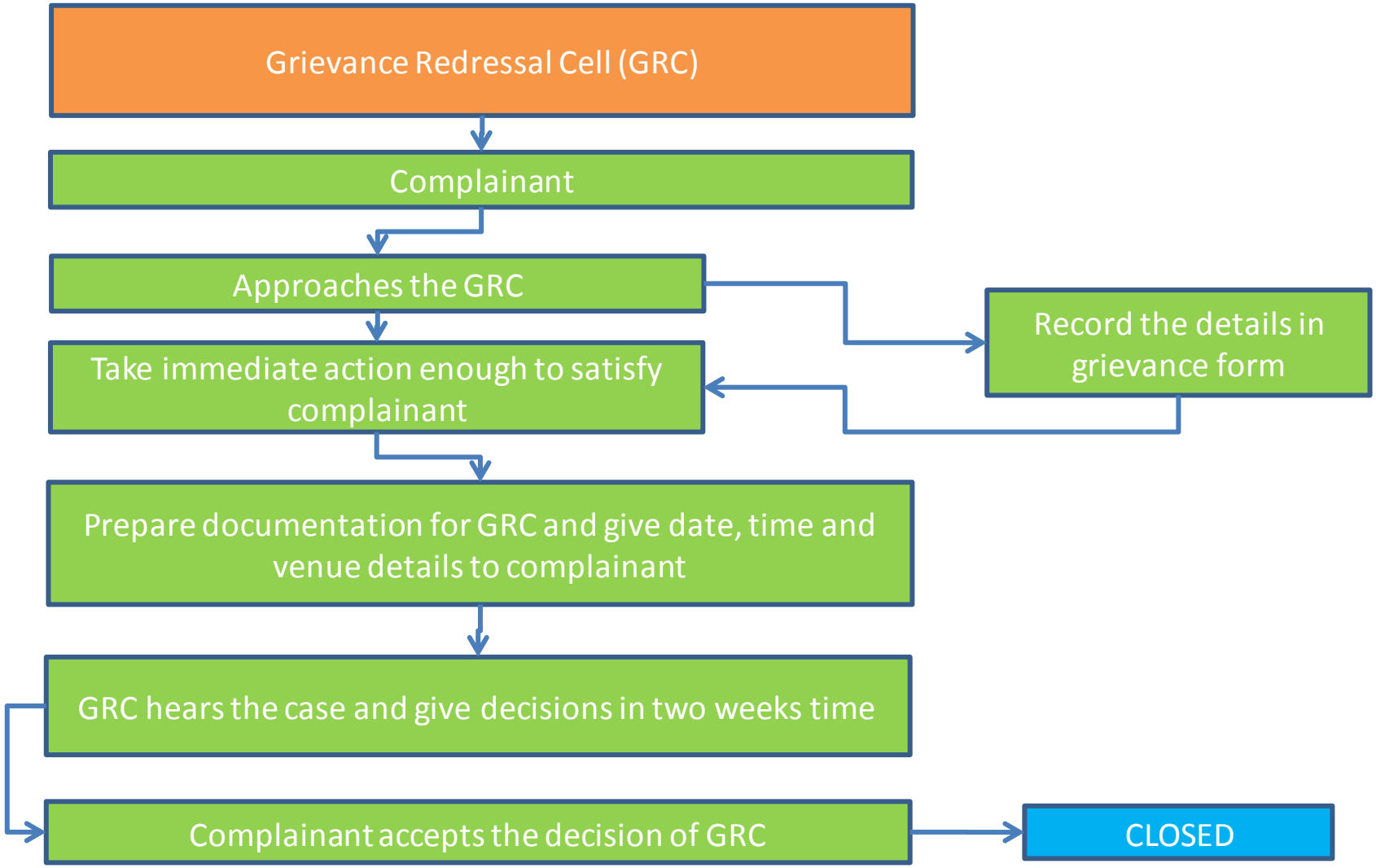
Grievance Redressal



Details of GRC will be communicated before the start of project activities at site.

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Project Benefits

- Provide a reliable power supply to the region

- The Project in its entirety can bring prosperity and development into the region and pave the way for further development, including industrialization in sectors such as small and medium scale manufacturing.

- The Project will have several other benefits such as
  - employment (direct and indirect) and
  - Social contributions

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Project Commitments

- Over the next few months, the Project Company will work closely with local NGOs to understand the key collective requirements of the surrounding community and identify one or more of the highlighted concerns which the Project Company will support to resolve.

- To give an example, some of the collective requirements could be access to (i) clean drinking water (ii) medical consultation (iii) education, etc.

- In addition to the above, the Project Company will endeavor to enhance employment opportunities by maximizing utilization of the local population, as far as possible.

- The Project Company will communicate a clear plan of action for activities its proposes to undertake to improve the welfare of the neighboring community, before commencing construction works on site

Questions and Suggestions

THANK YOU

Annex R

HSE Requirements for Contractors

EXHIBIT D
HSE REQUIREMENTS FOR CONTRACTORS

CONTENTS

1. TITLE

HSE Requirements for Contractors

2. PURPOSE

Sembcorp Industries Ltd (Sembcorp) is committed to continuously improve its HSE performance and managing HSE risks associated with its activities, products and services for its employees and contractors. Sembcorp requires its Contractor to adopt, implement and enforce HSE rules and practices necessary for the safe and environmentally responsible performance of the Contract work scope.
The Contractor is required to comply with all local authorities' requirements, regulations, codes, as well as Sembcorp's HSE requirements set out in this document.

3. SCOPE

This document is applicable to all contract work scope and contractor personnel performing work for Sembcorp.

4. DEFINITIONS

4.1 ALARP- As Low As Reasonably Practicable

4.2 Dangerous Occurrence - A dangerous occurrence is a serious workplace incident in which no one is killed or injured. Please refer to Appendix 1 on the Types of Reportable Dangerous Occurrence Cases.

5. ROLES AND RESPONSIBILITIES

5.1 Contractor Management Representatives

The Contractor's Management Representatives shall:

- Corporate with Sembcorp's personnel to ensure compliance with Sembcorp's HSE requirements.
- Ensure that work related risks and hazards associated with the scope of the project are proactively identified and managed.
- Ensure that resources and HSE responsibilities are allocated and that effective Contractor HSE plans are developed and implemented to managed identified risks.
- Comply with the HSE requirements stipulated in the Contract and Sembcorp's Group HSE Guidelines. Develop plans and allocate resources to ensure that non-compliance issues identified in HSE audits, inspections and performance evaluations are understood and that corrective action plans are put in place and tracked to completion.

5.2 Sub-Contractor HSE Requirements

The Contractor shall ensure that all subcontractors working under the Contractor's management control are skilled and qualified and are properly managed within the scope of this document.

Contractor must have in place HSE system, procedures and safe work practices for the management and control of sub-contractors, including:

- Evaluation process for Sub Contractor's demonstrated HSE capability, HSE performance and compliance.
- Risks and Hazards associated with the Sub Contractor's work are identified and controlled to 'ALARP' levels and that subcontractors employ the required safe systems of work.
- Sub-Contractor HSE Management System to be integrated to the Contractor's HSE Management System.
- Sub Contractor's work is supervised and monitored by the Contractor to ensure that safe practices are employed and work is conducted with strict compliance to the relevant Contractor and Sembcorp's HSE requirements.

The Contractor shall represent and warrant that its management and supervisors are responsible for ensuring that the work is performed in accordance with all applicable HSE regulatory requirements, industrial best practices and/or any guidelines or operating standards provided to the Contractor by Sembcorp.

The Contractor is required to provide Sembcorp with Organization Charts, specifying any dedicated HSE resources and the areas of HSE responsibility of line management.

6. HSE REQUIREMENTS

6.1 Policy and Commitment

The Contractor shall maintain a HSE Policy that is aligned with Sembcorp Group HSE Policy and demonstrates commitment to the people, environment and the protection of assets.

The Contractor is required to provide the following information / documentation under this contract work scope for assessment on the HSE understanding and capability in undertaking the project contract:

1. A statement from the Contractor's CEO providing a statement of commitment to HSE.
2. HSE organization chart for the contract.
3. All above designated persons must be briefed by the project manager of their roles / responsibilities / accountability in term of safety and signed a statement to accept their appointments. A copy of the statements must be submitted as well.
4. Copy of HSE Management System/ Manual

6.1.1 Termination and Suspension for Breach of HSE Requirements

Any breach or violation of Sembcorp HSE requirements for Contractors shall be considered as a material and substantial breach of the Contract, including without limitation, a breach of the following:

- The Contractor shall not cause, or permit a hazardous or unsafe condition or activity over which it has control at the work site.
- If the Contractor is aware of any hazardous or unsafe condition, including a violation of any of the HSE standards with which the Contractor must comply in accordance

with the Contract, it shall immediately inform Sembcorp and take whatever steps necessary and as agreed between Sembcorp and the Contractor to eliminate, terminate, abate and rectify the condition.

- If remedial action is not implemented within the agreed timeframe, Sembcorp or the Contractor has the right to stop work immediately.
- The Contractor shall take all necessary HSE precautions related to the performance of the Contract in order to protect the work site, including all personnel and property of Sembcorp, the Contractor and all third parties.
- Should Sembcorp observe an unsafe act or condition and is aware of a planned activity or condition which may be unsafe, it shall be entitled to direct the Contractor to stop, or not to proceed with the unsafe work activity. The Contractor shall at his own cost, modify its method of work in order to work safely. The Contractor and/or its Sub Contractors shall not claim for additional costs or extension of time or any kind of recourse whatsoever against Sembcorp.
- If the Contractor fails to undertake the necessary measures to eliminate or control such breach or violation promptly or to otherwise comply with Sembcorp's HSE requirements, Sembcorp may terminate the Contract without prior notice.

6.2 Risk Management

6.2.1 Hazard and Risk Assessment

Prior to the commencement of the work, the Contractor shall demonstrate to the satisfaction of Sembcorp that the Contractor has performed a detailed HSE hazard and risk assessment of the work to be undertaken.

The Contractor shall:

- Ensure the hazard assessment evaluates all risks specific to the work site and nature of work to be conducted under the Contract (e.g. equipment, facilities, competency of personnel, complexity of the work involved and activities associated with the contractual requirements).
- Maintain a detailed hazard register that is relevant to the contracted work scope. The hazard register shall identify hazards and controls in place to manage the residual risks to ALARP level.
- Monitor HSE risks and update risk assessment and hazard registers as necessary during the term of the Contract.
- Be responsible and accountable for ensuring effective procedures and safe system of work is place to meeting all legal and applicable requirements and Sembcorp's HSE requirements under the Contract.

6.3 Legal Requirements

The Contractor shall comply fully with all relevant HSE laws and regulations currently enforced by the local authorities and the requirements laid down by Sembcorp and any other new HSE requirements at times introduced by the local authorities.
The Contractor must ensure that all its employees, Sub Contractors and visitors shall comply fully with the HSE laws and regulations, operating standard and policies. The Contractor further shall agrees that in the event of violation, it shall be corrected

promptly, with steps taken to avoid recurrence, and any person or persons responsible for the violation shall be removed from the work site upon Sembcorp's request.

6.4 HSE Objectives and Targets

The Contractor shall be committed to achieve zero fatalities and zero lost time incidents and instill care for environment. Contractors shall set challenging HSE targets and Objectives to strive for continuous improvements in HSE performance.
These objectives and targets shall be incorporated into the Contractor's site specific HSE Management plans and cascaded to the Sub Contractors.

6.5 Programs and Procedures

6.5.1 Contractor Site Specific HSE Plans

Sembcorp may require the Contractor to prepare the Site Specific HSE Plan for the work contract. This plan must be developed by the Contractor to meet all statutory and Sembcorp's HSE requirements including:

- The HSE Plan shall be in a format which permits cross-referencing between the Contractor and Sembcorp Group HSE Guidelines.
- The HSE Plan shall also include a description of the Contractor's organization, procedures and methods of communication to and from all appropriate personnel.
- The Contractor's management system to include reference to documented processes and procedures to identify, assess and manage HSE and other hazards and risks that may affect their personnel and assets as well as those of Sembcorp and third parties.
- The Contractor's HSE Plan shall be jointly used by Sembcorp and the Contractor in the execution of the Contract. Performance against agreed HSE objectives and key performance indicators (KPIs) will be monitored and reviewed, and the HSE Plan shall be updated when required for ensuring continual improvement.

6.5.2 HSE Awareness, Training and Competency

Prior to the commencement of the work, the Contractor must provide documentation regarding the competency of its personnel (e.g. site project manager, civil work site foreman, scaffold supervisor, lifting supervisor, licensed electrical worker etc.) to the satisfaction of Sembcorp. The documentation must include details that show that the Contractors and its Sub Contractors are competent and have the appropriate qualifications, skills and training as required by the scope of the work contract and legal requirements.

The Contractor and its Sub Contractor shall implement, at their own expenses (unless otherwise formally agreed by Sembcorp), prior to the commencement of works, any specialist HSE related training program, applicable to their job scope (including supervisory personnel). Such training programs must be run by recognized training organizations, or by the Contractor's own field supervisory staff with experience and expertise in the relevant area of discipline.

The Contractor shall, if required, provide Sembcorp with details of the ongoing training programs and all related revisions during the term of the Contract.

6.5.3 Security

The Contractor is required to put in place effective security arrangements for the duration of the Contract. Where warranted, Sembcorp may require a documented security plan including the following security arrangement:

- Provision of full time security personnel, round the clock if necessary, for the project work.
- Use of hoarding to fence the worksite to isolate the construction worksite and public areas/ plant.
- Issuance of security passes for control of access and egress.
- Ensure all workers employed are legal as per local legislations.

Worker compensation and insurance shall be purchased by the Contractor.
The Contractor shall periodically review and update the Security arrangements to ensure its ongoing relevance to the Scope of Work. Any updates to the Security arrangements shall be submitted in writing to Sembcorp.

6.5.4 Permit to Work

Work activities within the work site which requires daily permit to work shall include:-

- Hot Work
- Lifting operation
- Confined Space Work
- Radiation Work
- Excavation and Piling Work
- Work at height (above 2 metres)
- Any other work not specified above, as required

All responsible personnel shall ascertain the work condition at site before issuing PTW.

Permit shall be displayed at point of work and complied with HSE requirements.

Permit to work application shall be accompanied by relevant documents such as method statement, job safety analysis, drawing, P & ID, design and engineering calculation, third party endorsement on permit to work for indirect work, authority clearance etc.

6.5.5 Non-conformance, Investigation and Corrective Action

All hazards and incidents (near miss incidents, property damages, first-aid injuries, lost time injury accident cases) must be reported, these include:

- Any hazard or incident (including near miss and dangerous occurence) involving Sembcorp, Contractor or any third party personnel, property, plant or equipment with respect to this Contract, shall be reported immediately to Sembcorp irrespective of whether injury to personnel, damage to property or equipment or environmental damage has resulted.
- All unplanned or unauthorized spills (without secondary containment) and releases are to be reported, regardless of volume.
- All incidents and near misses shall be investigated and findings to be reported to Sembcorp.

- The local authorities shall be sought for assistance for all emergencies.
- Where requested, Sembcorp and the Contractor (jointly) shall investigate the cause of all work hazards and incidents using Sembcorp's investigation requirements. The findings shall provide both Sembcorp and the Contractor management with corrective actions to prevent recurrence.

6.5.6 HSE Meetings and Communications

The Contractor shall set out a communication process showing lines of reporting and methods of reporting, at all levels within the Contactor organization and to Sembcorp.

The Contractor will be required to communication and consult with its workforce on a regular basis on HSE Matters. This is essential for ensuring that its personnel are informed and aware of relevant information, work hazards, safe work practices and responsibilities. To enable effective communication, the Contactor shall conduct / attend the activities as follows:

1. **Project Kick-off Meeting**

   The Contractor is required to participate in the project kick-off meeting with Sembcorp to discuss HSE expectations, potential HSE Management System interfaces and specific HSE issues and requirements in accordance to the Contract. The kick-off meeting shall be held as soon as reasonably practicable after contract reward and before the performance of any work.

   The agenda to be discussed may include but not limited to:

   - Review of Contractor HSE Policy and Sembcorp's expectations.
   - Review of HSE requirements for contracts and any additional specific HSE requirements identified in the Contract.
   - Review basic HSE rules and HSE Management System requirements.
   - Review of any agreed HSE key performance objectives, targets and indicators.
   - Review management of high risk activities and controls (include permit to work requirements and key procedures).
   - Review Contractor HSE site specific plan and emergency response plans etc. (or if not complete, plans for completion).
   - Review HSE roles and responsibilities
   - Review HSE orientation processes to be implemented (e.g. site HSE requirements, subcontractor orientations and work site specific orientations for new personnel and visitors.)
   - HSE Reporting and Communication requirements
   - Confirmation of scope and schedule of key HSE activities including: HSE orientation/induction, HSE Meetings, audits and review.
   - Environmental and Waste Management Plan (includes environmental management and impact mitigation requirements.)
   - Communication plan on key information and outcomes from the kick-off meeting.

2. **Pre-start Meetings**
   Pre-start meetings are held to discuss the planned work tasks, review risk assessments and Permit to Work requirements, and communicate any relevant HSE Matters.

3. **HSE Meetings**
   Contractors are required to plan and conduct regular HSE meetings to:
   - Ensure personnel are informed of hazards and required safe work practices and regulations associated with their work
   - Communicate about past accidents, lesson learnt and share relevant HSE information
   - Provide an opportunity for personnel to raise HSE issues and concerns, and provide a feedback forum.

   The frequency of the HSE meetings should be determined by the nature of the work and related level of risks. Contractors shall ensure that their workforce are given time to attend HSE meetings. This includes compulsory attendance at routine toolbox meeting, pre-start up meetings. Contractors are also responsible for inviting company representatives to their HSE meetings and ensure that the meeting minutes and actions arising from the meeting are maintained and submitted to Sembcorp. Sembcorp representatives may without prior notice attend such HSE Meetings.

6.5.7 HSE Measuring and Reporting

The Contractor shall submit a monthly HSE performance report to Sembcorp. This monthly report shall specifically report on HSE performance for the contract only (not the Contractor's company-wide performance).

Sembcorp will monitor the Contractor's HSE performance against agreed HSE KPI's, requirements and expectations to identify trends, areas of strong performance and areas of concern requiring corrective action. At a minimum, the monthly HSE reports shall include the following:

- Monthly man-hours worked on the Contract
- Monthly company site exposure hours
- Number of near miss and dangerous occurence incidents reported
- Number of recordable incidents (fatalities, medical treatment cases, occupational diseases cases, lost workday cases – including number of days lost and date of last workday case, restricted work cases)
- Total Recordable Incident Rate
- Number of first aid cases
- Number of environmental incidents (spills and releases from primary containment of more than 500 litres)
- Number of property damage lost incidents of more than SGD 500,000
- Additional HSE reporting requirements which shall be specified in the site HSE Plan as required by Sembcorp.

6.5.8 Personal Protective Equipment

The Contractor, shall, at its own expense, provide its workmen (inclusive of vendors and suppliers), where required in connection with the safe performance of the work, adequate PPE and protective clothing. PPE must be maintained in good condition or replaced, and must be worn on all relevant occasions as indicated by signages, notices and instruction. The Contractor must ensure that all members of the Contractors (including senior personnel and visitors to the work location) wear protective garments and equipment in the appropriate circumstances, even if not actively engaged in any work activities.

The basic PPE requirements in the Plant and construction site shall include:

- Approved safety helmet
- Approved safety shoes
- Approved safety glasses
- Fire Resistant Clothing (for activities at process areas)

Additional PPE equipment must be provided by the Contractor depending on the work related hazards. The following equipment shall be provided and used by trained / qualified personnel (where applicable):

- Hearing Protection
- Welding related PPE requirements
- Fall protection PPE for any work at height where there is risk of falling
- Approved respiratory protection and or breathing air apparatus for confined space entry (to be used by trained and qualified personnel)
- High visibility vests for safety watchers and standby persons
- Any other PPE as directed by signages, risk assessments, safety data sheets or by Sembcorp's HSE representative.

6.5.9 Tools and Equipment

The Contractor must comply with the following requirements with regard to the safe use and maintenance of plants, equipment and tools:

- Ensure that all machinery, plants, tools and equipment are maintained in operable, safe conditions
- Ensure that the users of machinery, plant, tools and equipment are trained, experienced and where required, licensed and certified
- Ensure all electrical plant and equipment is regularly inspected and records maintained to show compliance with all regulations.
- Ensure all rotating and moving parts of all tools and equipment are adequately guarded to prevent accidental contact by personnel
- All power drive machinery should be equipped with appropriate means of shutting down the equipment quickly, and preventing from being started again. The mechanism must be clearly identifiable and accessible to the Operators.
- Ensure inspection of safety critical items is undertaken in compliance with manufacturer's requirements.
- Ensure that the erection, installation or modification is carried out in accordance with the information provided by the designer, manufacturer, or supplier of the

machinery or equipment regarding its erection, installation, or modification, provided that it is reasonable for the person to rely on such information.

- Ensure that the precautions to be taken for the safe use of the machinery, plant, tool, or equipment and the health hazard associated with the machinery, plant, tool, or equipment is available to any person using the machinery, plant, tool, or equipment.

6.5.10 Lifting equipment and Safe Lifting Practices

Contractors must maintain a register of all lifting and rigging equipment. The register will include such details as safe working load (SWL), identification number and precise location of any equipment recorded. Contractor must ensure all equipment is tested, inspected and certified in accordance with all statutory requirements. This includes annual inspection and tagging of all lifting and rigging equipmen.

Contractor must develop and implement relevant work instructions to manage safe lifting, loading, unloading and handling operations. Contractors must ensure full compliance with the following requirements:

- The Contractor's lifting and rigging related procedures
- Risk and hazards associated with lifting activities must be identified and controlled via risk assessments prior to commencement of any lifts. This include effective communication of requirements to personnel involved in the work
- All lifting / rigging equipment must be inspected for wear and tear and have a current inspection tag from an authorized inspector prior to each use.
- A competent rigger must be present where rigging equipment is used to secure and lift the load and tag lines must be used where there is a possibility of a load swinging.
- A load must not be left suspended when a crane or lifting apparatus is shut down or unattended other than during an emergency.
- All unnecessary personnel must be prevented from entering the lifting area.
- No personnel shall place themselves under a suspended load.

6.5.11 Working at Height (above 2 metres)

The Contractor shall ensure that its workmen requiring working at height are trained in safe work at height practices. The Contractor shall ensure that fall restraint and fall protection equipment is provided for all work at height activities, and that the equipment is certified in a safe and operable condition. The Contractor shall comply with the following requirements:

- Risks and hazards associated with work at height must be identified and controlled via risks assessment prior to work activity.
- Any work where there is unacceptable risk of a fall that could result in a injury should be provided with a suitable fall arrest system
- All personnel responsible for, involved in, or supervising works at height must be trained. Only personnel formally trained in height safety hazards, personal and fixed fall arrest equipment and rescue from heights are to undertake such tasks.
- Fall protection equipment must be inspected for wear and tear and have a current inspection tag from an authorized supervisor prior to use.
- Areas where work at height is undertaken must be suitably barricaded and appropriate signages installed to eliminate risk of injury from falling objects.

Contractors must ensure that risks associated with falling objects while working at height with hand tools and equipment is controlled at all times.

- Height safety rescue plan and equipment must be in place prior to work at height activities.

6.5.12 Confined Space Works

The Contractor shall ensure that its workmen required to work in confined space are trained in safe work in confined space practices. The Contractor shall comply with the following requirements:

- Risks and hazards associated with confined space works must be identified and controlled via risks assessment prior to work activity.
- All personnel responsible for, involved in, or supervising confined space must be trained. Only personnel formally trained in confined space hazards, personal gas meters and rescue procedures to undertake such tasks.
- Full body harness with lanyard must be inspected for wear and tear and have a current inspection tag from an authorized supervisor prior to use.
- Confined space must be certified fit for entry by competent personnel with proper equipment prior to entry by any persons.
- Confined space safety rescue plan and equipment must be in place prior to work in confined space activities.

6.5.13 Excavation Works

The contractor shall comply with the following:
Appointment of a competent person who fully understands the dangers and necessary precautions required for inspecting the excavation at the start of each shift. Excavations should also be inspected after any event that may have affected their strength or stability, or after a fall of rock or earth. A record of the inspections will be required. All faults shall be corrected.

Before digging any trenches, pits, tunnels, or other excavations, the contractor shall decide what temporary support will be required and plan the precautions that are going to be taken against:

- collapse of the sides;
- people and vehicles falling into the excavation;
- materials falling onto people working in the excavation;
- undermining nearby structures;
- underground and overhead services; and
- the inflow of ground and surface water.

The Contractor shall ensure that the equipment and precautions needed (such as trench sheets, props, baulks etc) are available on site before work starts. If information such as results of soil tests or trial holes is available, it may provide useful data on conditions likely to be found on site, which can assist planning.

6.5.14 Environment Control and Management Program

The Contractor shall be responsible for ensuring that the handling, storage, transportation and disposal of waste are conducted in accordance to local statutory requirements and any additional company requirements: Specific requirements include:

- Adherence to the site Environmental and Waste Management Plan
- Minimization of resource usage and waste generation during the Contract. All packaging and waste products shall be kept to a safe minimum, and where practicable shall be reusable, recyclable or suitable for environmentally safe disposal at a licensed waste handling facility.
- Use of waste segregation receptables, as provided on Company facilities, and compliance with site waste segregation, handling and labelling requirements.
- Obtaining, preparing and maintaining waste permits for transporting and disposing of waste generated by the Contractor. All permits must meet with Sembcorp's approval.
- Prevention of environmental contamination from work activities.
- Implementation of written response procedures for spills and accidental releases where relevant.

6.5.15 Emergency Response

The Contractor shall establish an emergency response plan and conduct or participate in emergency response drills to test the effectiveness of the plan. Specific requirements include:

- Contractor shall maintain a workmen manifest on site and appoint fire warden to facilitate on site evacuation and head count at assembly area.
- Contractor shall participate in any drills / exercise conducted by Sembcorp.
- Emergency contact and organization chart shall be made available to Sembcorp
- Contractor shall ensure their workmen know and are familiar with the project site's alarm alert system.
- Emergency response plan must be regularly tested to assure the consequences of any incident are controlled and limited, for both major and less serious events.

6.5.16 Fire Fighting

The Contractor shall prominently published in all relevant language for areas of work under its control, the procedures to be carried out in the event of fire and ensure all workmen receive regular instruction on basic fire fighting techniques. The Contractor shall also ensure that adequate approved firefighting equipment is available at its work sites.

The Contractor shall also comply with requirements for hot work as outlined in the site HSE Plan.

6.5.17 First Aid Facilities

The Contractor shall provide and maintain sufficient first aid boxes for use in the project site. Where there are more than 500 persons at work in the project site, the Contractor shall also provide a room with first aid facilities.

When more than 25 persons are employed, the Contractor shall appoint in the project site sufficient numbers of first aiders who shall be readily available during working hours.

Where the eyes or body of any person in the site may come into contact with toxic or corrosive substances, the Contractor shall ensure that suitable facilities for quick drenching or flushing of the eyes or body are provided and properly maintained within the work area for emergency use.

6.6 Audits

Sembcorp shall have the right to conduct inspections/audits for the Contractor's operations, equipment and emergency procedures at any time. Prior notice shall be given in advance of these audits. The Contractor shall fully cooperate with Sembcorp during such audits / inspections.

Contractors shall have a formalized process for undertaking its formal and informal routine inspections, audits and reviews. Specific requirements include:

- Planned inspection / audits shall be conducted to ensure all facilities and conditions of work site are well maintained, in good order, and that the Contractor's site HSE Plan is working effectively.
- Contractor HSE representative shall be responsible for conducting and possess an execution schedule of planned inspections / audits.
- Records of such inspections, audits and reviews shall be maintained. Corrective actions shall be identified, implemented and tracked to completion.
- A joint internal audit program may be carried out between Sembcorp and the Contractor.

6.7 Review

The Contractor shall have a formal process to regularly (at least annually) assess contract HSE performance against objectives. Where deficiencies are identified, corrective actions shall be developed and implemented.

7. APPENDIX

1. Group HSE Policy
2. Definition of Dangerous Occurrences Cases

8. REVISION HISTORY

REV NO	REVISION SUMMARY	EFFECTIVE DATE
0	This is a new procedure.	**xxx**

Appendix 1: Group HSE Policy

sembcorp

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SEMBCORP
HEALTH, SAFETY & ENVIRONMENTAL POLICY

Sembcorp manages health, safety and environment responsibilities as its first priority. Sembcorp is committed to continuously improving its HSE performance and managing HSE risks associated with its activities, products and services.

Sembcorp has established and will maintain a health, safety and environment (HSE) management system, and integrate HSE considerations into all aspects of its business operations by implementing the following policy which aims to prevent accidents, injuries, occupational illnesses and pollution as well as conserve natural resources:

Stress to all employees and contractors their responsibility and accountability for safe performance and set appropriate objectives and targets to continually improve HSE performance.

Educate employees to be aware of and understand the safety risks and health hazards associated with their job and the potential impact on the environment.

Make available this policy to all interested parties upon request.

Build, design, operate and maintain facilities and conduct operations in a manner that safeguards people, property and the environment, and minimises waste.

Comply with all HSE laws and regulations and other HSE requirements applicable to Sembcorp's activities, products and services.

Offer assistance to and influence suppliers, contractors and other interested parties to improve their HSE performance where necessary.

Review and evaluate operations to measure progress and ensure compliance with this policy via periodic system audits and management reviews.

Prepare for, and respond quickly to, accidents or other emergency situations to mitigate adverse impact on people, property and the environment.

Mr Tang Kin Fei
Group President and CEO, Sembcorp Industries Ltd

Appendix 2: Types of Dangerous Occurrences Cases

The following dangerous occurrences must be reported:

1. Bursting of a revolving vessel, wheel, grindstone or grinding wheel moved by mechanical power
2. Collapse or failure of lifting equipment:
    1. Lifting equipment refers to a crane, derrick, winch, hoist, piling frame or any appliance used to raise/lower persons or goods
    2. The collapse or failure of any lifting equipment's load-bearing part(s), other than the breakage of the chain or rope slings, is also deemed a dangerous occurrence
    3. In addition to the above, any instance of a crane overturning will also be deemed a dangerous occurrence
3. Explosion or fire in a room/place in which persons are at work, resulting in damage to, the structure of the room/place; or any machine or plant in the room/place. The explosion or fire must have been caused by the ignition of dust, gas, vapour or any substance that is/contains celluloid. The incident must also have resulted in the complete suspension of normal work in the room/place or stoppage of machinery/plant for at least five hours
4. Electrical short circuit or failure of electrical machinery, plant or apparatus, resulting in explosion, fire or structural damage and causing its stoppage for at least five hours
5. Explosion or fire in a room in which persons are at work, resulting in the complete suspension of normal work in the room for at least 24 hours
6. Explosion or failure of the structure of a steam boiler, receiver or container used to store (At greater than atmospheric pressure):
    - Any gas(es) including air; or
    - Any liquid/solid resulting from the compression of gas(es)
    - Failure/collapse of formwork or its supports
7. Partial or complete collapse of:
    - A scaffold exceeding 15 metres in height
    - A suspended or hanging scaffold from which a person may fall more than two metres
9. Accidental seepage or entry of seawater into a dry / floating dock, causing flooding.

Annex S

Environmental Due Diligence of Existing Facilities in Saidabad Power Generation Complex

1.1 INTRODUCTION

The Saidabad Power Generation Complex is already a developed area for power generation, with an operational power plant of NWPGCL and associated infrastructure for gas supply, HSD supply and power evacuation. As required by the ADB SPS (2009), the conduct of environmental audits for projects involving existing activities or facilities is needed to determine existence of any areas which may cause or is causing environmental risks or impacts. Considering that the proposed ADB-funded project will be located within the same compound of existing Saidabad Power Generation Complex, an environmental audit was undertaken at site.

1.2 OBJECTIVE

The main objectives of the environmental due diligence is:

- To determine existence of any areas where the existing substations may cause or is causing environmental impacts or risks;
- To assess compliance with environmental requirements of the Government of Bangladesh;
- To evaluate adequacy of mitigation measures, monitoring plan, and institutional arrangements to manage environmental impacts;
- To propose corrective action and recommendations consistent with the GOB and SPS.

1.3 AUDIT AND SITE INVESTIGATION PROCEDURES

This environmental due diligence focused on the existing Sirajganj 1 project, RMS area of S1, existing gas pipeline and HSD pipeline of S1 project, HSD pumping station at Bangabandhu Bridge West Railway Station and GTCL valve station at Saidabad Union in Sirajganj District of Bangladesh. The audit was conducted through site visit and inspection of these facilities, interview with the concerned staff of these facilities and limited monitoring records provided by the NWPGCL for S1 Project. No reports related to environmental management and emergency preparedness was made available during the audit. The site visits were conducted on June 1 and 2, 2015. The following staffs were interviewed during this environmental audit: (i) Mr. Upanand Kumar Biswas, Superintendent Engineer, NWPGCL; (ii) Mr. Kamal Chandra Paul, Assistant Engineer and Incharge of PGCL RMS facility; and (iii) Mr. Sakhawat Hussain, Sub Divisional Engineer, PGCB. A description of the facilities is already provided in Section 3.7 of the Main ESIA report.

1.4 AUDIT FINDINGS

The following are the observations at each facility based on the discussions with the staff and visual inspection:

1.4.1 Sirajganj 1 (S1) Power Plant

Emergency Response System and Fire Fighting System

- Hydrant system is in place as per the Fire Safety norms of Bangladesh
- Potable extinguishers and sand buckets are provided as per the plan
- Fire and Gas detection systems are provided at specific plant locations, which are connected with the control room.
- One fire water storage tank of about 750 m3 capacity is provided.
- 2 Jockey water pumps and 1 motor driven water pump are provided for the hydrant system. The power supply is also connected with an emergency DG.
- The hydrant system and pumps are reportedly tested every week.
- A foam and CO2 based extinguishing system is also provided in the GT area.
- Mock drills are reportedly being conducted by the Site Fire and Safety Department as well as the District Fire Department at regular intervals.
- No documented emergency response and communication plan is currently prepared for the site.
- No dedicated emergency response team is currently formed at site.
- The overall approach for emergency management is reportedly to address the emergency first and communicate to the control room. The control room is then assigned the responsibility to communicate with others. However, this communication procedure has not been documented.
- A Public Address system is in place and assembly points are identified at site.
- Hazards other than fire, such as natural hazards (e.g. flooding), are currently not anticipated. No rescue team is currently in place however there is a plan to develop one. Sufficient manpower is available and responsibilities can be assigned. The Site Fire and Safety Department reportedly has about 10 people, however roles and responsibilities are not clearly defined.

HSD Storage and Pipeline

- Flow meters are provided at the HSD unloading area.
- A few potable fire extinguishers and sand buckets are provided in the HSD storage area, however, as the facility is currently not used, no regular checks of these are being carried out. It was observed during the previous visit to this area that fire extinguishers had expired.
- No fire hydrant system is currently in place for this area. However, if required, same can be provided at this area as well by NWPGCL.
- Underground pipeline from unloading area to the site does not have any fire protection system.
- Header isolation valves are also provided.
- Cathodic protection is provided to check any corrosion of pipe material, which needs to be monitored every month. However, this

facility is currently non-operational and hence no monitoring is being carried out.

- To date, ~2.5 million litre of HSD has been transported through this pipeline.
- As per the procedure for HSD pumping, after completion of the fuel transfer the pipeline need to be cleaned by injecting water, which leaves no HSD inside the pipeline while it is not in use.
- HSD storage area is bunded in order to contain any oil spillage during transfer/ leakage.
- Three storage tanks with 5 million litre, 5 million litre and 1 million litre capacity are provided in this area.
- In case of any spillage/ leakage, HSD can be transferred to another tank.
- Foam based and hydrant system is provided in the HSD storage area.
- No oil spill management system for the HSD unloading and/or receiving area as well as for plant is currently in place.

Water Monitoring and Discharge

- Regular monitoring of water quality for the process is being carried out by the chemical department.
- No raw water testing is being carried out.
- Weekly monitoring of process water and effluent is being done by in-house lab. However, no monitoring of outfall temperature is being done.
- Quarterly monitoring by third party is being done for the outfall.
- Recent outfall monitoring (April 2015) of the discharge indicated discharge containing 40 to 80 mg/l of oil and grease, which is about 4 to 8 times higher than the permissible levels. It was reported that this was due to non-operation of oil-water separator, which was under maintenance at that time. Some froth was visible on the stagnant water near the discharge point; however there was no evidence of prolonged discharge of oil and grease in that area.

Environmental monitoring

- Quarterly environmental monitoring is being carried out by NWPGCL and the monitoring reports are being submitted to the DoE. This environmental monitoring includes ambient air quality monitoring, ambient noise monitoring and stack emission monitoring and reported with monthly frequency.
- The results of these monitoring (August 2014 to January 2015) indicate that the levels are observed well within the respective applicable standards.

1.4.2 RMS Area and Gas Pipeline

- RMS area and natural gas pipeline from valve station to RMS is being maintained by GTCL/ PGCL.
- Gas leak and fire hazards are identified by the GTCL.

- Portable Fire Extinguishers of type A,B, C and E are placed inside the control room. Only one fire extinguisher was found at the RMS area.
- A hydrant system is in place for the building. However, it was reported that no regular inspection of the same is being carried out. The hydrant system just outside the building was had a damaged hose reel. It was reported that the hydrant system is not capable of covering the entire RMS area. No power back-up supply is available for the hydrant system.
- No automatic gas leak detection system is in place. However, portable gas detection equipment is available in the control room. It was further reported that no periodic monitoring of gas leakage is being carried out.
- During the rainy season, visual inspection is being carried out to check any gas leakage.
- Twice daily inspection of the area is being carried out by the staff of GTCL.
- 4 people (2 Assistant Engineers and 2 Technicians) are deputed for monitoring and maintenance of the RMS.
- As per the procedure, monthly maintenance is being carried out if required.
- For Gas pipeline cathodic protection is being provided.
- Cathodic Protections (CPs) are installed at every 500 to 600 m length of pipeline.
- Monthly monitoring at CPs is being carried out by PGCL.
- No documented procedure for emergency preparedness and response is present.
- No official training is being imparted to the staff for emergency preparedness and response.
- However, the GTCL staffs do participate in the mock drills being conducted by NWPGCL and/or Fire Department.
- Valve station at the main pipeline is fenced and has a full time security person at site.

1.4.3 PGCB Substation

- The substation has 7 bays, out of which 6 are for the transmission line and 1 for the generation line.
- 2 reserved bays are currently available, which can handle up to 450 MW power and same will be used by S4 as per the draft agreement.
- The two other power plants (S2 and S3) will require additional bays to be constructed for which area is available.
- No transformers are in the substation area, as these will be available at the respective power plant.
- SF6 based circuit breakers are provided.
- In addition to the above, the substation has an office building and control room.
- No hydrant system is available for building or substation area.
- A total of 17 portable fire extinguishers (dry type) are available in this area.

- No transformer oil generation, as the transformers will be located at the respective power plants.
- However, transformer oil is being used in CT and CVT, which are approximately 270 kg and 140 kg, respectively.
- Changing of oil in CT and CVT is being done when the dielectric strength is less than 40 kV.
- No system of proper disposal of this oil currently in place.
- As reported due to low quantity of this oil, it can't be auctioned and hence this is being kept within site in a storage tank, which has a possibility of soil contamination, due to improper disposal.

1.5 AREAS OF CONCERN AND CORRECTIVE ACTION PLAN

Sirajganj 1 project, RMS and Sub-station are owned and operated by the NWPGCL, PGCL and PGCB, respectively, which are government entities. The following are the recommended improvements in the existing facilities that need to be considered in the design and operation of the proposed ADB-funded project:

Management of Hazardous Waste and Effluent

The management of hazardous wastes such as used oil need to be incorporated in the operation of the Sirajganj 1 and PGCB substation. While there is a current system for changing of oil, the proper disposal of used oil remains uncertain since no clear information was available with respect to the disposal of these. Used oil generated from sub-station was reportedly disposed within the site and hence it is recommended to ensure that all hazardous waste are being disposed of in an environmentally safe manner.

Cooling water blow down and other treated effluent from the S1 plant should be monitored at periodic intervals in order to ensure that the discharge meet the applicable standards of the GOB for discharge on land/ surface water. Regular inspection of oil water separators should be carried out by the project.

Emergency Preparedness and Response

The site management should ensure that adequate systems for fire-fighting and on-site emergency response are installed. This preparation should include the identification of areas where accidents and emergency situations may occur, communities and individuals that may be impacted, response procedures, provision of equipment and resources, designation of responsibilities, communication, including that with potentially affected Communities and periodic training to ensure effective response. The emergency preparedness and response activities should be periodically reviewed and revised, as necessary, to reflect changing conditions. Offsite emergency preparedness plan should be developed for HSD and gas pipeline, in particular.

Fire-fighting system (with portable extinguishers and fire hydrants) should be strengthened in the RMS area and HSD pumping station as well.

Emergency preparedness and response plan should be documented and training shall be provided to every staff member of the concerned agency.

Occupation Health and Safety

Safety signages were observed in all the areas in particular for use of PPEs. Safety training is being conducted by NWPGCL, however, same is not being provided by PGCL and PGCB. Though, it was reported that PGCL staff do take part in emergency preparedness drills.

Figure 1 ***Photo-Documentation***

PPE Usage Signage at RMS Area Entrance

Portable Fire Extinguisher at RMS Control Room

View of RMS Area

Only Fire Extinguisher placed inside RMS Area

Damaged Hose of Hydrant System in RMS Building

View of PGCB Substation

View of PGCB Substation

Veiw of PGCB Sub-station

Water outfall from Sirajganj 1 Project

Stagnent Water near the Discharge Point of Sirajganj 1 project

Dedicated Railway Siding and HSD Unloading System at Bangabandhu Bridge West Railway Station

HSD Pumping Station of NWPGCL at Bangabandhu Bridge West Railway Station

Annex T

Climate Risk Assessment of Sirajganj 4 Project

CONTENTS

1 INTRODUCTION

ERM has been contracted to provide a brief overview of the critical future climate risks related to the Sirajganj combined cycle gas turbine (CCGT) project in Bangladesh.

The study reviews the climate change context within which the Sirajganj CCGT Plant will operate in relation to existing extreme weather and climate change related risks based on publically available data and information from the existing environmental and social impact assessment (ESIA) particularly in relation to project design and water.

The study provides a high level assessment of the physical risks facing the development such as water availability, floods, storms etc referring specifically to the potential impacts on a gas fired power plant development on the site in question. It identifies high level mitigation measures which could be implemented in order to reduce the risk or take advantage of opportunities facing the Sirajganj Gas Power Plant in Bangladesh.

The remainder of this report is structured as follows:

- *Section 2* provides a brief overview of the project to provide context for the remainder of the report
- *Section 3* gives details of the geographical context in which the project is being developed in relation to the Jamuna River and the regional climate in the past.
- *Section 4* analyses how climate change might impact the region and identifies the particular risks (at a high level) facing the Sirajganj CCGT plant
- *Section 5* summarises the key risks identified.

Sembcorp is planning to develop a 414MW combined cycle gas power plant within the Saidabad Power Generation Complex. The site is approximately 10km south of Sirajganj, located on the banks of the Jamuna River 2 km south of Bangabandhu Bridge as illustrated in *Figure 2.1*.

The Jamuna River will be the primary source of water although consideration is being given to the use of ground water (subject to local authority approval). Recognising the risk of flooding, the Bangladesh Power Development Board (BPDB) raised the level of the entire Complex site during site preparation and an embankment of 4-5 m high has been constructed around the site.

The main power block of the Plant will consist of one dual fuel gas turbine (GT), one steam turbine (ST), one heat recovery steam generator (HRSG) and bypass and exhaust stacks. Black start and emergency diesel generators will be provided to provide black start and safe shutdown capabilities. A 230 kV switchyard/sub-station will be constructed to distribute power from the site.

An agreement has been made with the Pashchimanchal Gas Company Ltd (PGCL) for the delivery of natural gas (NG) and a 22 year Power Purchase Agreement (PPA) with the BPDB will regulate the sale of electricity. Assuming construction is completed within a 2.5 year period, and an operating lifetime of 30 years, this provides an approximate decommissioning date of 2048.

The plant has been designed to operate at maximum efficiency at a temperature of 32˚C and humidity of 85% as indicated in *Table 2.1.*

Table 2.1 Sirajganj CCGT temperature and humidity design specification

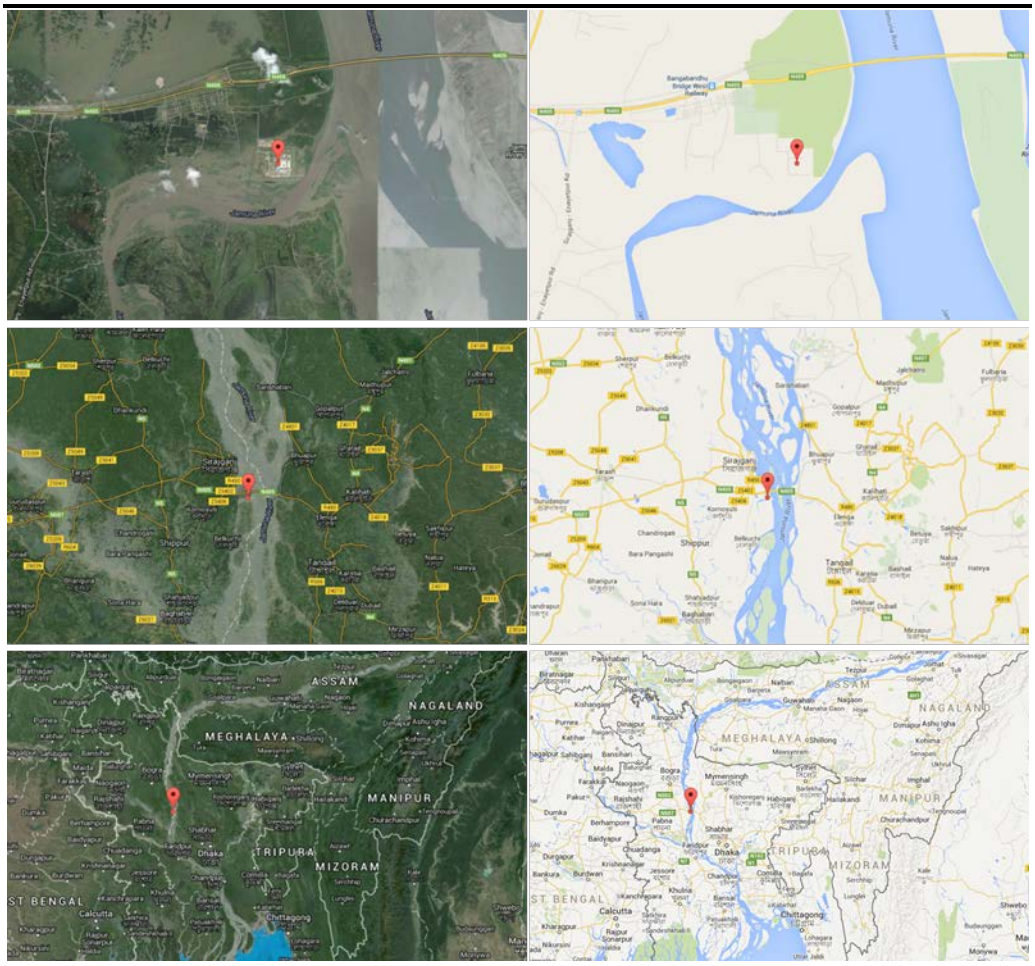
Variable	*Design specification*
Maximum Ambient Temperature	40.5 °C
Reference Ambient Temperature	**32 °C**
Minimum Ambient Temperature	5.3°C
Maximum Relative Humidity	100%
Reference Relative Humidity	**85%**
Minimum Relative Humidity	8%

Source: ESIA documentation

The project has a water demand of 554m^3/hr. This is 0.007% of the minimum water discharge reported upstream. The demand on the respective river channel will be 0.24% of the total hourly flow (1) .

Figure 2.1 Overview of site location

(1) Data sourced from ESIA documentation



Source: Google Maps

3 GEOGRAPHICAL CONTEXT

3.1 SIGNIFICANT GEOGRAPHICAL FEATURES

3.1.1 The Jamuna River

The site lies on the banks of the Jamuna River which is a tributary of the Brahmaputra. It originates in the Tibetan plateau as the Tsangpo River, before turning south through the Eastern States of India in the Assam Valley, and then into Bangladesh where it confluences with the Teesta, becoming the Jamuna. Eventually the river reaches the Ganges in central Bangladesh as can be seen in *Figure 2.1.*

The Jamuna is a very dynamic braided river, with channel development and abandonment a commonly observed phenomenon. The main river channel runs 1.5 km to the east of the project site, however a connecting channel runs 0.5 km to the south east. This channel is understood to not currently be connected with the main channel due to siltation.

Himalayan snow melt and deglaciation provide ~25% of the runoff to the Brahmaputra River, although this varies considerably depending on seasonal variation during the year(1).

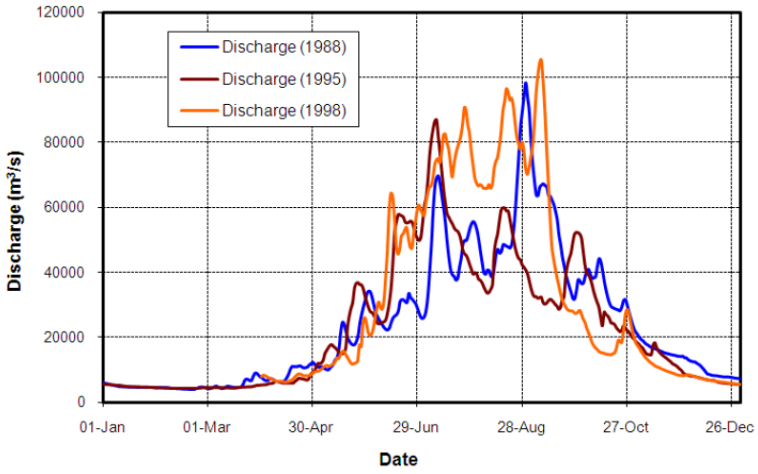
The lowest level of discharge is typically during the December to April period (as illustrated in *Figure 3.1)* with the lowest water level of 6.2m. Peak discharge is typically towards the end of the monsoon season in August and September when the highest water level is around 15m [above mean sea level].

River water temperature varies from 24 – 24.5˚C on the surface to 22.5 - 23˚C at depth of 2 metres(2) .

Figure 3.1 Discharge of the Jamuna River at Bahadurabad Ghat (near Saghata)

(1) Lutz and Immerzeel, 2013.

(2) Data sourced from ESIA documentation



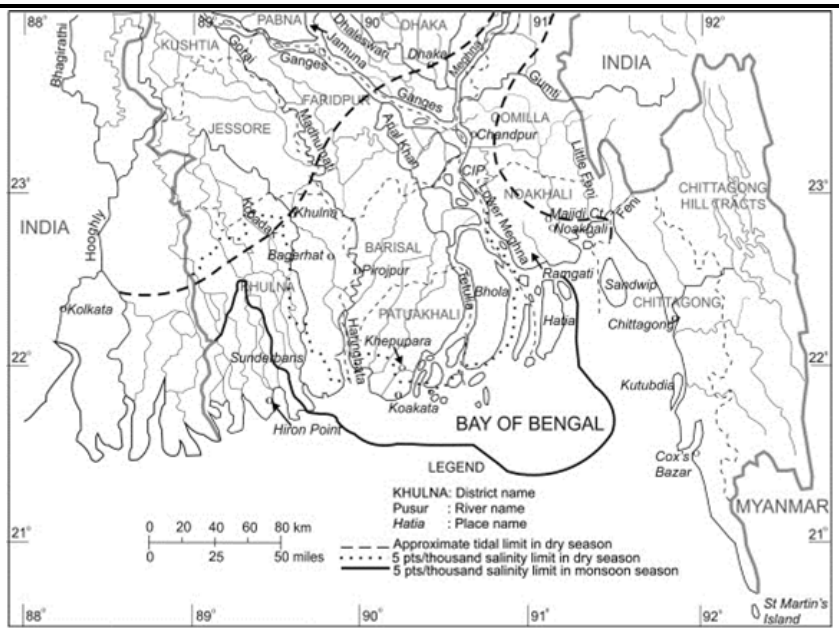
Source: Kamal et al, 2015

3.1.2 *Tidal influences*

The Brahmaputra is a tidal river, with the lower portion receiving the direct effects of tidal conditions. It is one of the world's few 'tidal bore' rivers, meaning it is susceptible to leading waves, produced from extreme weather conditions (e.g. cyclone related storm surges) or tsunami, heading inland from the Bay of Bengal against the current of the river through the country's low lying delta.

The tidal and salinity limits of the Brahmaputra, during the dry season, reach approximately as far inland as the confluence between the Padma and the Jamuna rivers as illustrated at the top of *Figure 3.2.*

Figure 3.2 ***Tidal and Salinity Limits in the Lower Brahmaputra***



The Jamuna River branch does not typically experience the effects of these tidal bore events, being beyond the river's tidal limit during the dry season. No information has been identified as to if, and how often, particularly high

tides combined with storm surges or tsunamis might result in shift of the tidal limit upstream of Sirajganj in the past or in the future.

3.2 CURRENT NATIONAL AND LOCAL CLIMATE

3.2.1 Overview

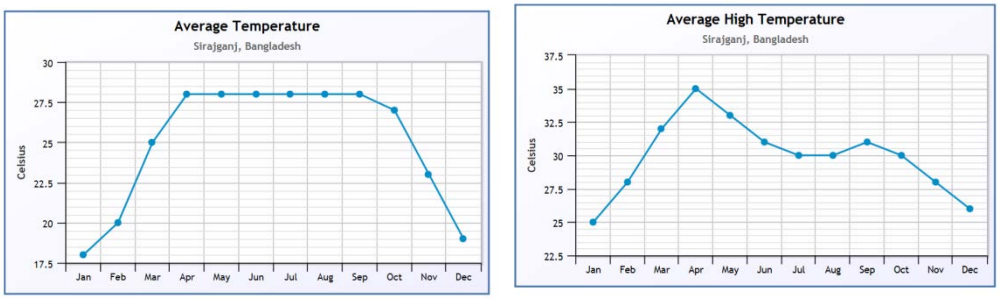
Bangladesh has a subtropical monsoon climate characterised by wide seasonal variations in rainfall, high temperatures and humidity. The country has three clearly identifiable seasons: a hot, humid summer from March to June, a cool, rainy monsoon season from June to October and a cool, dry winter from October to March. Sirajganj has a typical profile for the country.

The country's climate is notable for its intense cyclones, which develop over the Bay of Bengal. These typically occur during April and May and between September and November.

3.2.2 Temperature

Bangladesh has generally warm weather throughout the year. At Sirajganj, the coolest average month is January with an average maximum temperature of 25 ˚C and the warmest months are around April and May with an average maximum temperature of 33 - 35 ˚C as illustrated in *Figure 3.3*.

Figure 3.3 Average Temperatures by Month – Sirajganj

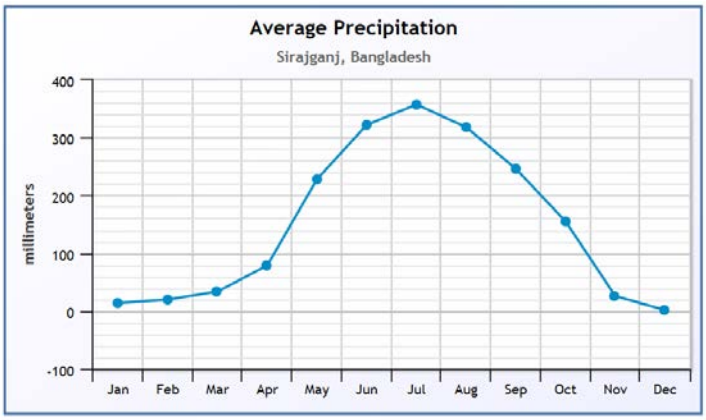


Source: AccuWeather

3.2.3 Precipitation

Bangladesh receives the majority of its rainfall during the monsoon period and most parts of the country receive over 2,000 mm of rain per year. At Sirajganj, around 70% of the annual rainfall is received during the monsoon in June, July and August as illustrated in *Figure 3.4*. Mean rainfall across the country has decreased by 1.1mm per month per decade between 1960 and 2003, although there has been an increase in rainfall during the monsoon periods.

Figure 3.4 Average precipitation by Month - Sirajganj



Source: AccuWeather

3.2.1 *Tropical Cyclones*

There is a significant risk of cyclones across much of Bangladesh, with the greatest severity and frequency experienced in the south of the country. ***Error! Reference source not found.*** *Figure 3.5* illustrates the path of cyclones across the country over the period 1969-2008, displaying a general direction of travel from south west to east.

There is a far greater concentration in the south of the country compared to the centre and north.

Nine cyclones have moved within 200km of Sirajganj (located near the centre of *Figure 3.5*) in the past 40 years and the inland location means that their intensity has reduced to that of a tropical storm with the maximum recorded at a wind speed of 74 km/h [(1)] .

Figure 3.5 Cyclone Pathways Across Bangladesh - 1969-2008

(1) UNEP-GRID (Global Resource Information Database) Global Risk Data Platform

3.2.2 Flooding

Large parts of Bangladesh are low lying and flood regularly. Flooding due to unmanageable flow of the river is a major risk along the banks of the Jamuna. The site upon which the Sirajganj plant will be developed sits within the flood plain and has been raised by 4 – 5m in order for ground level to be around one metre above the 200-year high water level return period. The project specification indicates that this is in addition to concrete placed at the perimeter of the site to prevent water ingress.

4 CLIMATE CHANGE IMPACT ASSESSMENT

4.1 OVERVIEW

The investigation of future climate change involves assessment of a range of different indicators modelled as part of the Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report published in 2013. The assessment looks at projected change for the year 2050 for two future emission scenarios, RCP 4.5 and RCP 8.5. These consider variations on the same factors, including different emissions pathways, adaptation approaches and projected patterns of climate.

- RCP 4.5 is consistent with a future with relatively ambitious emissions reductions.
- RCP 8.5 is a high emissions scenario, consistent with a future with no policy changes to reduce emissions, and characterised by increasing greenhouse gas emissions that lead to high greenhouse gas concentrations over time.

Emissions scenarios describe future releases of greenhouse gases, aerosols, and other pollutants into the atmosphere and provide inputs to climate models. Representative Concentration Pathways (RCP) are consistent sets of projections of components of radiative forcing, i.e. the change in the balance between incoming and outgoing radiation to the atmosphere caused primarily by changes in atmospheric composition, that are meant to serve as input for climate modelling.

In addition, for this study ERM has used information from the United Nations Development Programme (UNDP) on extreme events, including coverage for major features over the period 1969-2008. Further sources have included reports from the International Centre for Integrated Mountain Development and the Asian Development Bank (ADB).

The remainder of this section looks at how the climate is projected to change under future scenarios and the potential impact this may have on the Sirajganj CCGT plant.

It should be noted that this is a very high level study of publically available information and has not included any detailed site specific modelling. Recommendations have however been provided for further work for those impacts identified as potentially significant risks to the project.

4.2 TEMPERATURE

4.2.1 Air temperatures

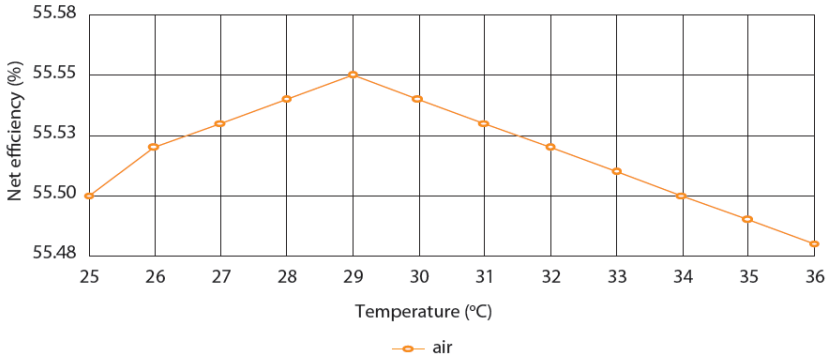
The mean surface ambient air temperature in Bangladesh has increased by approximately 0.4˚C since 1960, with the number of hot days per year (1) increasing by 26 between 1960 and 2003(2)

According to UNDP data, mean annual temperatures at the site are projected to increase between 0.9 and 2.6 ˚C by the 2060s. (3) Projections demonstrate that the average annual rise in temperature is expected to be fairly consistent throughout the year, suggesting that temperatures might hit an average annual mean of between 35.9 and 37.6 ˚C during April – the month with the warmest annual high temperatures.

The efficiency of gas power plants is affected by temperature as it affects the density of gas feeding into the turbines and therefore the efficiency of power generation. Higher temperatures lead to lower densities and reduced efficiencies as illustrated in *Figure 4.1*.

Figure 4.1 demonstrates that CCGT plants typically operate at the highest efficiency levels at a temperature of 29 ˚C. The research undertaken by the ADB in Vietnam suggests that each degree above this level results in around 0.1-0.15% reduction in efficiency.

Figure 4.1 Change in Plant Net Efficiency with Air Temperature (Case Study of a Vietnamese CCGT)



Source: Asian Development Bank, 2012

The reference ambient air temperature for the Sirajganj plant is 32 ˚C. The average maximum temperature at Sirajganj is above this for at least three months of the year and with an increase in temperatures, the number of hot days will increase. This will reduce the efficiency of production and increase cooling requirements. In addition there are possible impacts related to the health and safety of the staff on site and the increased risk of exposure to very high temperatures, including for prolonged periods of time.

(1) Hot days are defined as the annual count of days with at least 6 consecutive days when the temperature was above the 90th percentile for that day of the year. The 90th percentile values come from the statistics of the base period (1961-1990).
(2) Karmalkar et al, 2010.
(3) Ibid.

The increase in temperature and the number of hot and very hot days in the region is likely to result in:

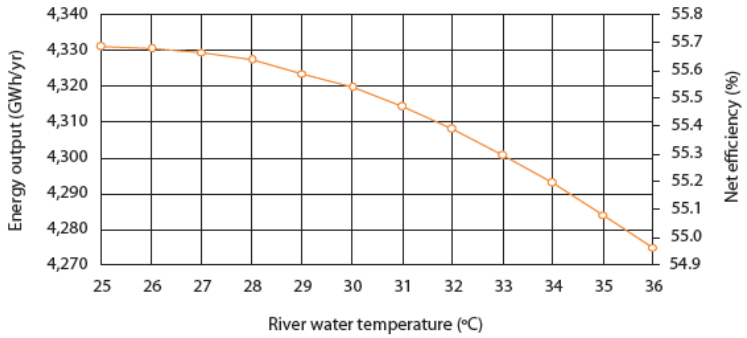
- A reduction in the efficiency of power generation at the Sirajganj plant;
- Health and safety impacts on staff such as increased risk of heat stress.

4.2.2 *Water temperatures*

Cooling water temperature influences the efficiency of CCGT plants with higher temperatures reducing the net efficiency by 0.1% for each degree temperature increase above 27 ˚C as illustrated in *Figure 4.2*.

The Jamuna River water temperature varies from 24 – 24.5˚C on the surface to 22.5 - 23˚C at depth of 2m [(1)]. Given the influence of glacial melt on discharge, it is unlikely that water temperatures will rise significantly above 26 ˚C in the medium term which is the point at which plant efficiency is affected as illustrated in *Figure 4.2*.

Figure 4.2 Efficiency and Energy Output as a Function of River Water Temperature



Source: Asian Development Bank, 2012

4.3 *PRECIPITATION AND WATER AVAILABILITY*

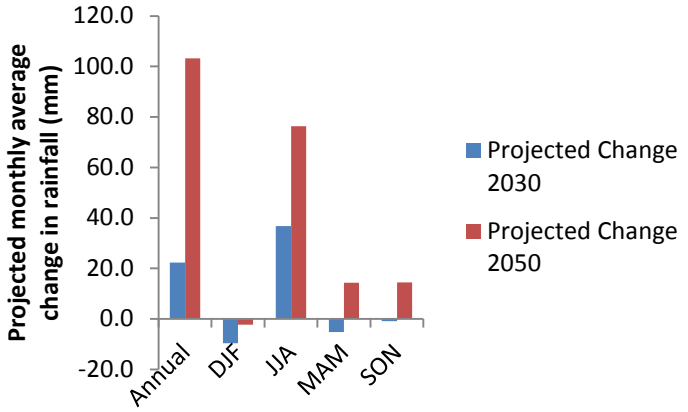
4.3.1 *Rainfall*

Average rainfall is projected to increase most significantly during the summer monsoon months and to decrease slightly during the dry winter months as illustrated in *Figure 4.3*. The overall impact of this on streamflow is expected to be minimal, as discussed in *Section 4.3.3* below.

Under RCP 8.5, extreme precipitation events are projected to become more intense with an increase in the quantity of rain falling over a 24 hour period and over five consecutive days. In addition, the intensity of the most extreme events (i.e. 1:20 and 1:100 year return periods) is projected to increase[(2)]. This suggests that the level of a 1:100 year flood could increase or that events of the current magnitude will occur more frequently. The same would be true for 1:200 year events.

Figure 4.3 Projected change in precipitation under RCP8.5 for 2030 and 2050

(1) Data from ESIA documentation
(2) IPCC AR5, 2013



Source: IPCC AR5, 2013

The overall implication of the projected change in precipitation is an increase in flood risk during the summer monsoon and cyclone seasons. In addition to affecting the plant, flooding could impact local communities, staff housing and transport/supply chain.

Further work is required to investigate the potential impact on river flow and changes in flood return periods to determine the nature of the risk to the Sirajganj facility and the likelihood of existing flood prevention measures being overtopped. The existing risk will be amplified and could have a significant impact on operations in the future.

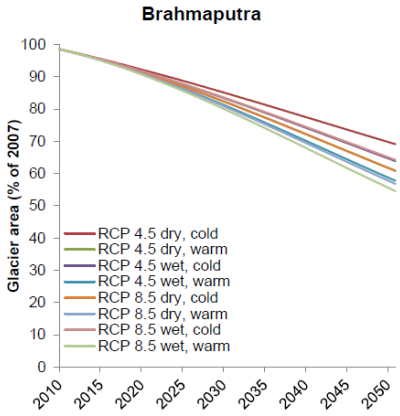
4.3.2 *Stream flow*

Projections of how climate change may impact both the proportion of overall river runoff and the total quantity in the Brahmaputra river basin are uncertain.

Figure 4.4 shows projected changes in glacier area for the Brahmaputra basin, displaying an expected decrease in the overall quantity of runoff from glaciers under any future scenario (with a reference of 2007, looking out to 2050).

However, the IPCC generally projects the conditions in Bangladesh will be warmer and wetter suggesting that the reduction in glacial area could be around 60% from 2007 to 2050.

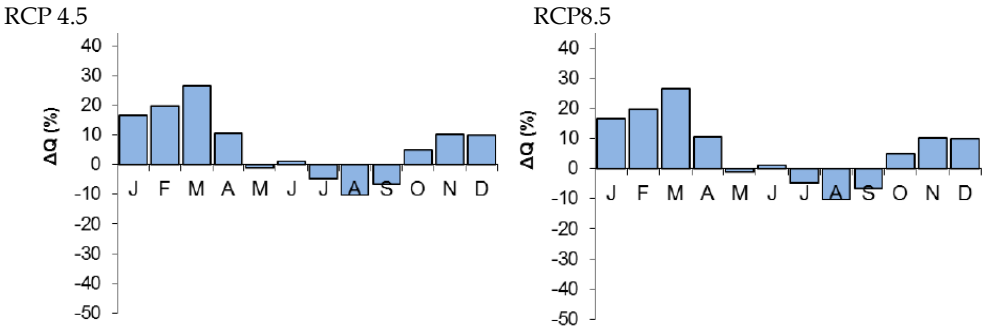
Figure 4.4 Projected Changes in Glacier Area for the Brahmaputra Basin



Source: Lutz and Immerzeel, 2013

Figure 4.5 illustrates changes in discharge for the Brahmaputra from Himalayan sources under RCP 4.5 and 8.5 for 2041-2050 with respect to 1998-2007. It indicates that the contribution to streamflow is highest during the cooler dryer periods likely as a result of warmer temperatures increasing snow melt and deglaciation.

Figure 4.5 Changes in discharge for Brahmaputra from Himalayan sources

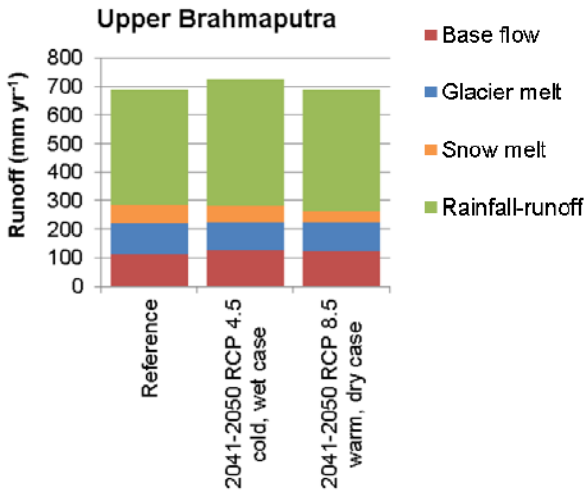


Source: Lutz and Immerzeel, 2013

Figure 4.6 illustrates the changing hydrological characteristics for the Brahmaputra basin for 2041-2050 (from a 2007 reference period) for RCP 4.5 Cold, Wet Case and RCP 8.5 Warm, Dry Case (as presented in *Figure 4.4)*.

It is apparent that the overall trend for all forms of runoff is towards a similar or slightly higher level of runoff in the period up to 2050 – in part due to projected increased rainfall during the monsoon period. *Figure 4.6* indicates that a greater proportion of rainfall in the overall runoff, similar or reduced levels of glacier and snow melt, as well as a slightly increased base flow.

Figure 4.6 Projected hydrological characteristics for Brahmaputra Basin in 2041 - 2050



Source: Lutz and Immerzeel, 2013

The project has a water demand of 554m³/hr or 0.24% of the total hourly flow in the river channel from which it will be abstracted (1) . It is unlikely that future changes in stream flow will have a significant impact on water availability.

The projected patterns of precipitation change and mountain runoff discussed above suggest an intensification of the extremes in the patterns of discharge. These patterns could significantly affect the flow rates in the Jamuna River during different seasons with an amplification of flood risk during the wet season and a potential inland shift of the tidal/salinity limit in the dry season.

There is a potential risk of reduced rainfall in dry winter months leading to the tidal/salinity limit moving inland. It is unclear given the information at hand whether there may be a risk of the plant's water supply being affected but it is noted as something to be aware of at this stage.

4.3.3 Drought

The World Resources Institute Aqueduct tool rates Bangladesh as low risk from water stress and drought risk(2). However, there may be competition for water if the Sirajganj area becomes more industrialised in the future and/or if the population increases in which case, the availability of clean, potable water may be an issue.

4.4 CYCLONES

It is expected that, as a result of climate change, the frequency of cyclones is likely to either decrease or remain essentially unchanged globally, but that cyclone intensity (measured by windspeed and rain rates) will likely increase(3). The exact influence of climate change will vary by region.

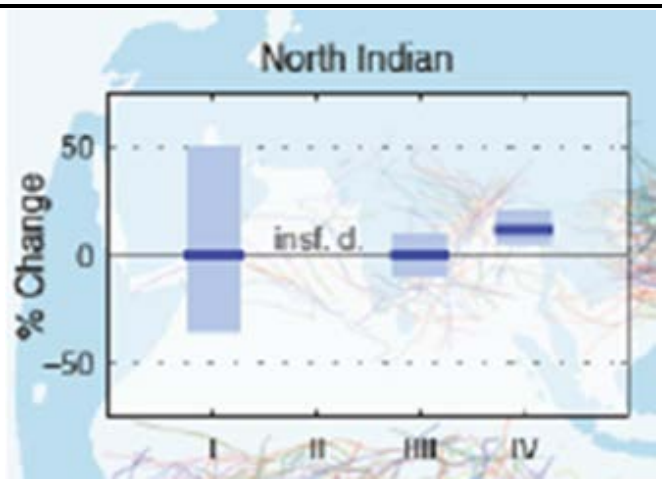
(1) Data from ESIA documentation

(2) Aqueduct http://www.wri.org/our-work/project/aqueduct

(3) IPCC AR5, 2013

Figure 4.7 illustrates the IPCC's projected change in cyclone activity in the North Indian Ocean [(1)] . The (I) overall number of storms per year is likely to remain unchanged by 2081 - 2100 relative to the baseline of 2000 – 2009 although there is considerable uncertainty in this projection. The (II) frequency of category 4 and 5 storms and (III) the mean lifetime maximum intensity of the storms are expected to remain the same at present. There could be (IV) ~10% more extreme precipitation associated with cyclones making landfall.

Figure 4.7 ***Projected change in cyclone intensity and frequency***



Source: IPCC AR5, 2013

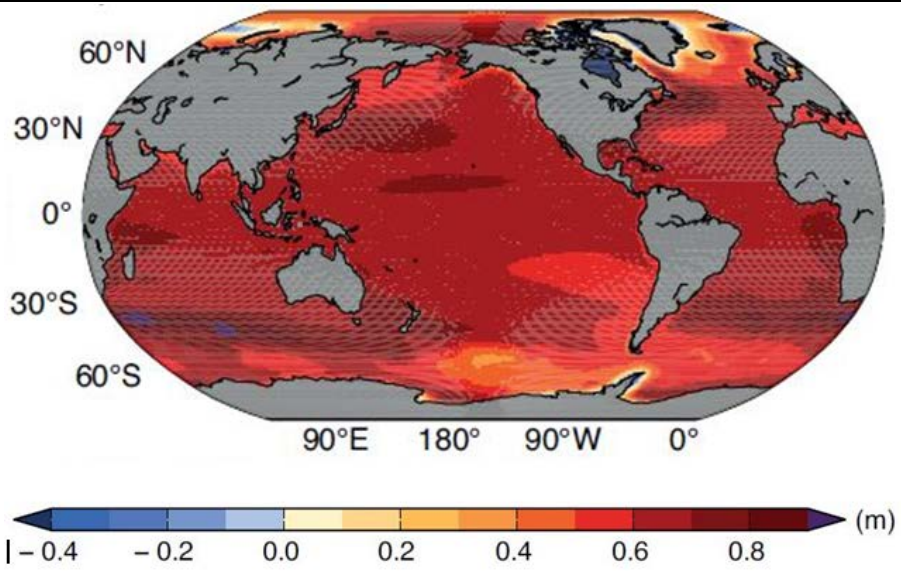
The projected increase in the precipitation rate within 200k of cyclone storm centres could result in an increased risk of flooding although this is likely to affect areas closer to the coast more than inland locations.

4.5 *SEA LEVEL RISE*

Under the RCP 8.5 scenario, sea level rise of between 0.6 - 0.7m is projected by 2081 – 2100 as illustrated in *Figure 4.8*.

Figure 4.8 ***Projected sea level risk under RCP8.5 by 2081 – 2100***

(1) IPCC AR5, 2013



Source: IPCC AR5, 2013

An increase in sea level will result in an increase in the reach and impact of storm surges given the Bruun Rule, which describes the cross-shore response of a shore/beach to sea level rise(1). According to Bruun's Rule, one unit of sea level rise results in 50 – 100 units of water movement landwards. For example, a rise in sea level of as little as 5 cm can mimic the effects of a 1 m rise in sea level following storm activity or tidal surges.

Given this, it could be expected that, as a consequence of climate change, the tidal/salinity limit illustrated in *Figure 3.2* could move further upstream.

An increase in sea level could increase the risk of occasional salination of cooling water abstracted from the Jamuna River during storm surges, tsunami or periods of particularly high tides during the dry season. It is unclear given the information at hand what the likelihood of this impact occurring is but it is noted as something to be aware of at this stage.

(1) The Bruun rule has several limitations. Firstly, the rule does not account for longshore interactions, and secondly, the rule assumes the wave climate is steady and hence the equilibrium profile remains the same - simply translated landwards and upwards with the rise in mean sea level. http://www.cmar.csiro.au/sealevel/sl_drives_short.html

5 SUMMARY

Climate change could have a variety of impacts on operation of the Sirajganj CCGT plant in Bangladesh, particularly with regards to increased flood risk. *Table 5.1* summarises the risks identified from the impacts discussed in *Section 4* and provides a relative indication of the level of threat in the future on a scale of low, medium and high. It is recommended that risks identified as high be investigated in further detail to fully understand the implications for operation of the plant in the future. Given that these both relate to the increased risk of flooding in the future, which will also apply to the Saidabad Power Generation Complex as a whole and its surrounding communities, options to work closely with local authorities and the North West Power Generation Company (NWPFCL) on this issue should be investigated as a combined response is likely to be more cost-effective.

Table 5.1 Summary of climate change impacts at Sirajganj

Impact	Cause	Level of threat
Flooding of CCGT facility causing business interruption and damage to infrastructure	Higher monsoon rainfall, higher cyclone related rainfall, storm surges linked to sea level rise	High
Flooding of local communities and impacts on staff housing and transport/supply chain	Higher monsoon rainfall, higher cyclone related rainfall, storm surges linked to sea level rise	High
Salination of cooling water impacting operations	Sea level rise causing extent of storm surge/tsunami impact to move further inland	Low
Higher cooling water temperatures reducing cooling efficiency	Increased temperatures	Low
Higher ambient air temperatures leading to reduced operational efficiency/production	Increased temperatures	Medium
Higher ambient air temperatures leading to health and safety impacts (e.g. heat stress) for staff	Increased temperatures	Medium

Annex U

Commitment Register

Table 1 Commitment Register

S. No.	Aspect	Commitment	Reference	Outcome Plan/Protocol	Responsibility
	Site preparation and Construction Phase				
1.	Soil Compaction and Erosion	Demarcate routes for movement of heavy vehicles;	ESMP	Traffic management plan	EPC Contractor
		Restrict the height of topsoil stockpiles to minimize erosion and compaction during gas pipeline RoW excavations	ESMP		
		Strip and place soils when dry, and not when wet	ESMP		EPC Contractor
		Build small bunds in areas with slope to prevent soil erosion.	ESMP		EPC Contractor
		All areas of excavation will be closed and compacted before monsoon season	Specification manual		EPC Contractor
		Storm water channelized to settling tanks	Specification manual		EPC Contractor
2.	Soil and Sediment contamination (spills and leaks)	Prepare loading and unloading protocols for temporary jetty	Specification manual and ESMP	Loading and unloading protocol	EPC Contractor
		Prepare guidelines and procedures for immediate clean-up actions following any spillages of oils, fuels or chemicals	Specification manual and ESMP	• Chemical storage and handling Protocols • Site specific Emergency Response Plan for immediate soil clean up and decontamination/Spill management Plan	EPC Contractor
		Storage and handling of chemicals and fuels on impervious areas only and storage areas with bunds or other containment device	Specification manual and ESMP	Chemical storage and handling Protocols	EPC Contractor
3.	Soil Contamination from waste	Design processes to prevent/minimise quantities of wastes generated and hazards associated with the waste generated	Specification manual	Waste Management Plan	EPC Contractor
		Implementation of construction	Specification	Inventory of construction material	EPC Contractor

S. No.	Aspect	Commitment	Reference	Outcome Plan/Protocol	Responsibility
		materials inventory management system	manual and ESMP		
		Inventorization and storage of waste in designated areas/containers.	Specification manual and ESMP	Waste Management Plan	EPC Contractor
		Bitumen or any hazardous wastes will be disposed off to licensed contractors	Specification manual and ESMP	Waste Management Plan	EPC Contractor
		Storage areas will impermeable floors and containment, of capacity to accommodate 110% of the volume of the largest waste container	Specification manual and ESMP	Waste Management Plan	EPC Contractor
4.	Spill management and soil quality conservation	Trainings of workers related to handling and responding to spills and soil management	ESMP	Training Plan	EPC Contractor
5.	Waste management	Trainings of workers	ESMP	Training Plan	EPC Contractor
6.	Wastewater Discharge	Ensure that wastewater discharged from washing of machinery equipment meets the standards stipulated in Schedule 10 of ECR, 1997 and the applicable World Bank/ IFC General EHS Guidelines prior to discharge	Specification manual	Wastewater Management Plan	EPC Contractor
		Sanitary facilities for workforce with septic tanks	Specification manual and ESMP	Wastewater Management Plan	EPC Contractor
		Ensure that any wastewater discharges from sanitary facilities meet the standards stipulated in Schedule 9 of ECR, 1997 and the applicable World Bank/ IFC General EHS Guidelines	Specification manual and ESMP	Wastewater Management Plan	EPC Contractor
		Vehicle servicing areas and wash bays will be located within roofed and cemented areas. The drainage in these covered areas will be connected to oil/water separator and channelized properly to the land/inland waters ;	ESMP	Wastewater Management Plan	EPC Contractor
		Oil and grease separator shall be used for wastewater generated from cleaning activities;	ESMP	Wastewater Management Plan	EPC Contractor
		Any surplus wastewater from the concrete batching will be treated to comply with discharge standards	ESMP	Wastewater Management Plan	EPC Contractor

S. No.	Aspect	Commitment	Reference	Outcome Plan/Protocol	Responsibility
		before it is discharged			
7.	Exhaust Emissions	Implementation of the good site practices such as the regular maintenance of vehicles and equipment, using cleaner fuels and switching off vehicles when not in use.	ESMP	Traffic/Equipment Management Plan	EPC Contractor
		All diesel-powered equipment will be regularly maintained and idling time reduced to minimise emissions;	ESMP	Traffic/Equipment Management Plan	EPC Contractor
		Low sulphur diesel (S<0.5%) will be used in diesel powered equipment in collaboration with best management practices	ESMP	Traffic/Equipment Management Plan	EPC Contractor
		Vehicle / equipment exhausts observed emitting significant black smoke in their exhausts will be serviced/ replaced.	ESMP	Traffic/Equipment Management Plan	EPC Contractor
	Dust Generation	Implementation of a regular watering and sprinkling dust suppression regime, during the dry season;	ESMP	Dust Management Plan	EPC Contractor
		Concrete batching plant will be located within the power generation complex to keep it away from sensitive receptor/s;	ESMP	Dust Management Plan	EPC Contractor
		Material transport will be totally enclosed with impervious sheeting and wheel washing will be carried out at site ;	ESMP	Dust and Traffic Management Plan	EPC Contractor
		• Stockpiles will be maintained at site only, which is a fenced area. No stockpiles will maintained outside, and maximum possible distance between the stockpiles and receptors will be maintained; • Covering and/or watering of all stockpiles of dusty materials such as excavated spoils to avoid fugitive dust emissions;	ESMP	Dust Management Plan	EPC Contractor
		Approach road will be kept clean, free from mud and slurry.	ESMP	Dust Management Plan	EPC Contractor

S. No.	Aspect	Commitment	Reference	Outcome Plan/Protocol	Responsibility
8.	Air Quality	Waste from construction will not be burned.	ESMP	Waste Management Plan	EPC Contractor
9.	Noise	Only those vehicles meeting the standards stipulated in Schedule 5 of the Environmental Conservation Rules, 1997 will be used	Specification manual	Traffic Management Plan	EPC Contractor
		Normal working hours of the contractor will be between 06:00 and 21:00 hours from Monday to Sunday. If work needs to be undertaken outside these hours, it should be limited to activities that do not exceed the noise criteria at nearby noise sensitive receptors;	Specification manual and ESMP		EPC Contractor
		Only well-maintained equipment will be operated on-site;	ESMP	Equipment management Plan	EPC Contractor
		Regular maintenance of equipment such as lubricating moving parts, tightening loose parts and replacing worn out components should be conducted;	ESMP	Equipment management Plan	EPC Contractor
		Machinery and construction plant that may be in intermittent use (e.g. trucks) shall be shut down or throttled down during non-work periods	ESMP	Equipment management Plan	EPC Contractor
		Low noise equipment shall be used as far as practicable	ESMP and Specification Manual	Equipment management Plan	EPC Contractor
		The number of equipment operating simultaneously shall be reduced as far as practicable	ESMP and Specification Manual	Equipment management Plan	EPC Contractor
		Equipment known to emit noise strongly in one direction should be orientated so that the noise is directed away from nearby NSRs as far as practicable;	ESMP		EPC Contractor
		Noisy plant (such as breakers and rollers) shall be located as far away from receptors as practicable	ESMP		EPC Contractor
10.	Terrestrial Flora and	Pre-construction surveys to be	ESMP	Biodiversity management Plan	EPC Contractor and

S. No.	Aspect	Commitment	Reference	Outcome Plan/Protocol	Responsibility
	Fauna	conducted by qualified ecologist hired by project developer to identify the floral and faunal species of conservational significance. The location of CR/EN species (if chance found) shall be marked in advance and the area will be avoided;			Project Developer
		If tree removal cannot be avoided, adequate compensatory afforestation including conservation of EN species in consultation with Forest Department shall be undertaken;	ESMP	Biodiversity management Plan	EPC Contractor and Project Developer
		Efforts to be taken to replant the species nearby where no disturbance due to project activity is envisaged;	ESMP	Biodiversity management Plan	EPC Contractor and Project Developer
		Vegetation clearing will be kept to the minimum extent practicable for the project site, temporary jetty, transportation route through Jamuna eco park, water and gas pipeline;	ESMP	Biodiversity management Plan	EPC Contractor
		Construction schedule to be managed such that the foundation work is not done during monsoon season;	ESMP		EPC Contractor
		Strict instruction shall be given to the construction workers not to cut trees from the nearby areas for their kitchen fuel and timber use;	ESMP		EPC Contractor
		Use of LPG/ Kerosene for cooking need to be provided/ encouraged in order to reduce the impacts on vegetation from the vicinity of the Project site;	ESMP		EPC Contractor
		Construction workers shall be given conservation and awareness training to promote sustainable resource use;	ESMP	Training Plan	EPC Contractor
		Improved management of eco-park needs to be supported by the project to reduce impacts during the construction phase of the project.	ESMP	Biodiversity management Plan	EPC Contractor and Project Developer
		There is a likelihood of introduction of invasive species due to movement of Vehicles in the Jamuna Eco Park. All vehicles tyres should be properly	ESMP	Traffic Management Plan and Biodiversity management Plan	EPC Contractor

S. No.	Aspect	Commitment	Reference	Outcome Plan/Protocol	Responsibility
		washed before entering Jamuna Eco Park.			
		• Identification of any trees where vultures nest on in the AOI and protection of these trees with a surrounding buffer area. • Exclusion of cattle from project area by site security to reduce risks of carcasses contaminated by diclofenac being consumed by vultures.	ESMP	Biodiversity management Plan	EPC Contractor and Project Developer
11.	Aquatic Flora and Fauna	Herpetofaunal experts will be appointed to understand the usage of the proposed temporary jetty area by turtle and terrapin of conservational significance prior to start of construction activities for identification of egg laying sites of aquatic reptiles at the equipment loading sites for avoidance.	ESMP	Biodiversity management Plan	EPC Contractor and Project Developer
		Conservation training will be given and a ban on capture of species or its eggs with any contractor/subcontractor/construction worker working on water pipeline, jetty area including logistics contractor not complying being immediately removed from the project;	ESMP	Biodiversity management Plan	EPC Contractor
		During transportation of equipment's the vessel speed will be regulated and observer for the Dolphin movement should be appointed to guide the vessel to the temporary jetty area.; and	ESMP	Traffic Management Plan	EPC Contractor with vessel operating company
		Ballast discharge will be regulated near the AOI	ESMP	Traffic Management Plan	EPC Contractor with vessel operating company
		Engage trawlers/barges with valid requisite licenses and emergency handling capacity or tie-ups	ESMP	Traffic Management Plan	EPC Contractor with vessel operating company
		All vessels plying the river are to be properly maintained with oil seals. All	ESMP	Traffic Management Plan	EPC Contractor with vessel operating

S. No.	Aspect	Commitment	Reference	Outcome Plan/Protocol	Responsibility
		containers used for hydrocarbons storage (vessels and jetty area) tobe sealed tightly and secured to prevent accidental spillage or leaks into the river.			company
		Vessels plying the river and on shore facilities to be routinely inspected by the site security to ensure compliance to these principles.			
		Any turtle or terrapin habitat identified during pre-construction surveys should be protected or if impacts cannot be avoided, restored to near natural conditions.	ESMP	Biodiversity management Plan	EPC Contractor
		Water Intake areas and Temporary Jetty areas will be extensively surveyed prior to the construction activities and during unloading of machinery. Awareness of the need for protection of species and actions required in case of" chance encounters" with any such species is to be provided to construction workers.	ESMP	Biodiversity Management Plan Training Plan Loading and unloading Protocol	EPC Contractor
12.	Transportation	Avoiding peak hours for heavy vehicles movement where possible;	ESMP	Traffic Management Plan	EPC Contractor
		During transportation of heavy equipment from the temporary jetty inside the ecopark to the main road a speed limit of 10 km/hr will be maintained by all heavy vehicles;	ESMP	Traffic Management Plan	EPC Contractor
		Regular maintenance of vehicles to avoid break downs leading to congestions;	ESMP	Traffic Management Plan	EPC Contractor
		Training and awareness amongst driver's to encourage systematic parking, following traffic rules, preventing unnecessary stoppages and overtaking.	ESMP	Traffic Management Plan and Training Plan	EPC Contractor
		Collaboration with local communities	ESMP	Traffic Management Plan and	EPC Contractor

S. No.	Aspect	Commitment	Reference	Outcome Plan/Protocol	Responsibility
		and responsible authorities to improve signage (eg pedestrian crossings, speed limits etc), visibility and awareness of traffic and pedestrian safety; and		Training Plan	
		Coordination with emergency responders to ensure that appropriate first aid is provided in the event of accidents.	ESMP	Emergency response Plan and Traffic Management Plan	EPC Contractor
13.	Community Health and Safety	Barriers will be provided to prevent ingress of persons into the construction site and also to protect public exposure to hazards associated with construction activities;	ESMP		EPC Contractor
		Screening, surveillance and treatment of workers, through the provision of medical facilities and, where required, immunization programmes;	ESMP		EPC Contractor
		Undertaking health awareness and education initiatives among workers;	ESMP		EPC Contractor
		Implementation of a vector control programme in labour camps and surrounding areas; and	ESMP	Vector Control Management Plan	EPC Contractor
14.	Social Scenario	Providing labour related infrastructure such as camps, sanitation facility, drinking water facility, etc. in accordance with local regulations as well as IFC handbook for labour accommodation;	ESMP	Construction Management Plan covering labour accommodation and related aspects	EPC Contractor
		Consulting with the local community prior to finalization of location of labour camp to get their consent	ESMP		EPC Contractor and Project developer
		Preparation of a detailed plan, in keeping with lender requirements, for the construction of the labour camp and the mitigation measures to be put in place	ESMP	Construction Management Plan covering labour accommodation and related aspects	EPC Contractor
		Ensure proper administrative channel to manage labour related statutory compliance, such as payment of wages, provident fund, insurance etc. as well as labour issues arising during	ESMP		EPC Contractor

S. No.	Aspect	Commitment	Reference	Outcome Plan/Protocol	Responsibility
		the construction phase activities;			
		Prevent illegal labour practices such as child labour, bounded labour or forced labour through internal vigilance mechanisms and surveillance; and	ESMP		EPC Contractor
		Awareness shall be generated amongst migrant labourers in maintaining congenial relations with local labourers as well as community.	ESMP	Training Plan	EPC Contractor
		Consultations with the fishing households before dredging and other site improvement activities are carried out at the Jetty location. Alternative anchorage areas should be identified and safe anchorage of their boats to be facilitated.	ESMP	Construction Management Plan	EPC Contractor
		The reduction in fish catch for these fishing households should be compensated through cash payment during the period for which jetty is used.	ESMP		Project developer
		Engaging closely with local NGOs to understand the key collective requirements of the surrounding community and identify one or more of the highlighted concerns to support	ESMP	CSR Management Plan	Project developer with EPC Contractor
		Enhance employment opportunities by maximizing utilization of the local population, as far as possible.	ESMP	CSR Management Plan	Project developer with EPC Contractor
		Communication of a clear plan of action to improve the welfare of the neighbouring community, before commencing construction works on site.	ESMP	CSR Management Plan	Project developer with EPC Contractor
	Operations Phase				
15.	Soil and Sediment Quality	Proper Storage and labelling of wastes	ESMP	Waste Management Plan	Project O & M
		Special care shall be taken in the storage areas to prevent any spillage of hazardous wastes and restrict access (except for trained staff) to such areas;	ESMP	Waste Management Plan	Project O & M

Annex V

Framework Management Plans

- Pollution Prevention Management Plan
- Waste Management Plan
- Traffic Management Plan
- Emergency Response Plan
- Stakeholder Engagement Plan and Grievance Redressal Mechanism

1 POLLUTION PREVENTION MANAGEMENT PLAN (PPMP)

1.1 INTRODUCTION

A Framework Pollution Prevention Management Plan (PPMP) has been prepared for the proposed project in order to guide the development of detailed management plan. The PPMP is developed to assist the operation to meet the objectives of prevention of pollution which would result due to the construction related activities of the project and its associated facilities. The PPMP is based on the assessment of impacts on air quality, ambient noise levels, and water quality, which would occur during the site preparation and construction phase of the Project.

This PPMP builds on the conceptual information presented in the Project documents and applies to all of the activities conducted during the site preparation and construction. The PPMP is to be read in conjunction with the other environmental management plans.

1.2 SCOPE

Site preparation and Construction Phase: The responsibility to frame the detailed PPMP and its implementation will be with the EPC Contractor selected by SCU for the phase.
Areas: Project site and associated facility areas where any preparation/ construction activity will be carried out related to the Project.
Define: Project site, Jetty area, water pipeline, Labour accommodation, roads, lay down areas, batching plant, etc.

Note: This is a guidance framework for pollution prevention and it is expected that this framework will be developed into specific plans by the EPC Contractor for maintaining ambient air quality, water quality, noise levels within the project and surrounding areas during the construction phase. Each plan developed under the pollution prevention management plan framework is expected to follow the framework content and requirements.

1.3 OBJECTIVES

The PPMP aims to ensure that discharges and emissions from the project during the construction phase do not result in unacceptable impacts on the environment and surrounding community. It focuses on the strategies to be used to monitor the air quality (particulate levels, in particular), ambient noise levels, water quality, mitigation of emissions and discharges at sources, monitoring and reporting and reviewing of monitoring results in terms of ESIA requirements.

The objectives of pollution prevention management plan for the Project are as follows:

- To develop inventory of emission and discharge sources;
- To maximise pollution control at source;
- To analyse alternate emission and disposal control strategies and technologies;
- To identify critical issues after implementation of mitigation measures; and
- To address pollution issues by adopting additional mitigation measures and regular monitoring.

1.4 APPLICABLE LEGISLATIONS AND REGULATORY STANDARDS

The following acts, regulations and guidelines have been reviewed and are applicable to PPMP fully or partly in the Project:

Table 1.1 Applicable Legislations

S.N	Applicable Legislation	Agency Responsible	Applicability
1	Environmental Conservation Rules, 1997 and subsequent amendments in 2002 and 2003	Department of Environment	Applicable Projects falls under Red Category and require environmental clearance and to follow standards prescribed in ECR
2	Water Pollution Control Ordinance, 1970	DoE	Applicable and has to take measures for the prevention, control and abatement of existing or potential pollution of any waters, including construction, modification, extension or alteration of disposal systems
3	The Ground Water Management Ordinance, 1985	Upazilla Parishad	Proposed Project will use surface water source however, should groundwater also be required then licenses will need to be obtained prior to installation of any tube-wells, and ground seepage
5	Ozone Depleting Substances (Control) Rules, 2004	Ministry of Environment and Forests	Applicable
6	Noise Pollution (Control) Rules 2006	Ministry of Environment and Forests	Applicable, follow standards for noise levels.

1.5 IMPACT AVOIDANCE AND IMPACT MITIGATION

1.5.1 Pollution Prevention - Policies and Principles

Pollution prevention within the context of this Management Plan (MP) and the Project refers to:

- Air emissions due to various Project activities including excavation of soil to create building and equipment foundations; pile driving for the equipment foundation; exhaust emission from movement of heavy

equipment by barge, heavy loaders, trucks; loading and unloading of materials, installation of gas pipeline; concreting works, including operation of concrete batching plant, which will be located away from sensitive receptors and additional net fencing on section of boundary wall facing the residential receptors to reduce dust transport; operation of diesel generators and other diesel based construction machineries, dust generated from stockpiles of materials, waste, loose earth, handling and moving excavated material and transporting wastes on vehicles,

- Water pollution both on surface and ground water media due to release or discharge of effluents and wastewater, polluted storm water runoff, inappropriate storage of waste leading to water quality impacts from runoff entering the adjoining channel to the Project site or seepage to ground water
- Noise and vibration generation due to various Project activities such as usage of heavy equipment during the construction activities, piling and concrete foundations works for major plant and buildings transport, people movement, etc.; and
- Soil pollution due to civil work activities; transportation of construction material, equipment and personnel; storage of construction materials including hazardous material; storage, handling and disposal of wastes generated from site clearance, site excavation and formation, civil works and activities of construction workers (general waste and sewage),erection of Power Plant Building

The pollution issues relating to waste management, traffic and transport have been dealt in detail in the corresponding MPs which should be referred. This MP is supplementing to the above referred issue-specific MPs and should not be construed as contradictory.

1.5.2 Approach

The overall approach for avoiding and mitigating impacts comprises the following elements:

- EPC Contractor will adopt a Best Practicable Environmental Option (BPEO) approach to each discharge/emissions issue.
- Pollution prevention measures will adopt life-cycle assessment principles wherein residual impacts, if any will be avoided to the extent possible;
- The approach of impact avoidance, minimisation and mitigation will be adopted in pollution prevention and management; and
- The Duty of Care principle will be followed - whereby the polluter will ensure that each of the pollution issue is properly managed.

1.6 POLLUTION PREVENTION & MANAGEMENT

The pollution prevention will have following management elements, out of which the notable ones are explained in the subsequent sub-sections:

- Inventory of discharge and emission sources
- Conduct pre-Project surveys
- Analysis of alternate disposal and emission control strategies and technologies

1.6.1 Inventory of Pollution & Emission Sources

Preparing an inventory of all pollution and emission sources from the Project activities is essentially the first step towards managing the impacts. The Management Plan will involve preparation of an up to date inventory of all emission and discharge sources based on the latest Project activity related information. A preliminary list of emission and discharge sources at Project footprint area is presented below.

- Air emission sources
    - Site preparation and levelling including protection for lay down areas, plant areas, site roads and drainage within plant boundary;
    - Excavation of soil to create building and equipment foundations;
    - Pile driving for the equipment foundation;
    - Exhaust emission from movement of heavy equipment by barge, heavy loaders, trucks;
    - Loading and unloading of materials,
    - Installation of gas pipeline;
    - Concreting works, including operation of concrete batching plant, which will be located away from sensitive receptors and additional net fencing on section of boundary wall facing the residential receptors to reduce dust transport;
    - Operation of diesel generators and other diesel based construction machineries;
    - Dust generated from stockpiles of materials, waste, loose earth, handling and moving excavated material and transporting wastes on vehicles.
- Discharge sources
    - Workshop and washing effluent (due to washing of equipment and machinery);
    - Sewage and sanitary waste;
    - Storm water runoff;
    - Soil contamination at waste dumps, chemical storage, vehicle parking, oil and fuel spills and leaks
- Noise and Vibration sources
    - usage of heavy equipment during the construction activities
    - piling and concrete foundations works for major plant and buildings
    - transport,
    - people movement,

An inventory of pollution and emission sources at all Project footprint area shall be prepared as part of this management element. Inventory of pollution and emission sources helps in formulating the following management approaches:

- Avoidance of discharge or emission, if feasible
- Source reduction
- Resource recovery options
- Recycle options

- Optimal treatment strategies and technologies
- Post-treatment, resource recovery and recycle options
- Ultimate disposal considering the local environmental sensitivities

The inventory database of discharge and emission sources along with standard requirements shall be kept as a living document and updated as and when any new sources are cited at any point in time of the Project period. Any intermittent discharge and emission sources shall also be identified and included in the inventory.

1.6.2 Conduct Pre-Project Survey

The EPC Contractor will conduct the pre-Project survey at various environmental receptors identified in earlier stage specifically and in overall ambient environment generally.

The pre-Project survey will serve as the benchmark levels throughout the Project construction phase and during reinstatement of the footprint areas.

1.6.3 Assess Discharge & Emissions Impact Using Modelling Approaches & Other Assessment Tools

Based on the complete details that will be available at the time of management plan preparation, modelling or other appropriate objective assessment tools to assess the impacts due to discharge and emission from the well sites and other Project footprint areas will be undertaken for following scenarios:

- No mitigation measure
- Alternative mitigation options (for example Best Practicable Environment Options (BPEO).
- Cumulative scenario, if prevailing at the Project site
- Worst-case scenario

The outcome of this exercise will be to select appropriate methods of treatment for specific discharge and emissions. The Project will adopt a level of treatment/control to achieve regulatory prescribed standards.

1.7 MONITORING, REPORTING AND REVIEW

Mitigation measures have been developed to minimise the likelihood, extent or duration of occurrence, and any associated adverse effects of the construction related activities as part of the ESIA, which needs to be implemented to mitigate the adverse impacts identified due to the Project in the construction phase.

1.8 ACCOUNTABILITIES

The EPC Contractor will be responsible for day to day implementation of management plan and SCU HSE and project management team will be monitoring of the implementation of this management plan.

All employees and sub-contractors of the EPC Contractor will be provided with environmental awareness training through a site induction process. All employees and contractors of EPC Contractor will have a responsibility to manage operations in an environmentally responsible manner and report any visible emission/ discharge/ accidental spillage. All pollution related environmental incidents will be reported to the Environmental Coordinator / HSE Manager/ Project Manager.

The EPC Contractor will define detailed responsibilities for activities required as per the PPMP.

1.9 REPORTING AND REVIEW

The EPC Contractor team will present to the SCU management on a monthly basis the following:

- What is the overall environmental performance of the Project against the national standards and set targets
- How is the pollution prevention at source is being managed and what is the progress against the set targets
- Any environmental issues that have come up in pollution prevention that has triggered a fine or a complaint by the government authorities, the root cause and actions taken;
- Any complaints or grievance from the local community of pollution issues and action taken. Time line for closing of the action.
- Any major issue emerging that will need SCU management inputs as well as budget for pollution prevention -e.g. need for additional water treatment/ capacity augmentation, etc.

2 WASTE MANAGEMENT PLAN (WMP)

2.1 INTRODUCTION

The Project Company recognises that unplanned storage and disposal of waste have the potential to directly impact land and water environment. These impacts have been recognised during the ESIA study and thus a framework Waste Management Plan (WMP) has been prepared in recognition of the impact.

This WMP builds on the conceptual information presented in the Project documents and applied to all of the activities conducted during the site preparation and construction till the handover to the Project Company.

2.2 SCOPE

Site preparation and Construction Phase: The responsibility to frame the detailed WMP and its implement will be with the EPC Contractor selected by SCU for the phase.
Areas: Project site and associated facility areas where any preparation/ construction activity is going on related to the Project.
Define: Project site, Jetty area, water pipeline, Labour accommodation, roads, lay down areas, batching plant, etc.

Note: *This is a guidance framework for waste management and it is expected that this framework will be developed into specific plan/s by the EPC Contractor for managing waste generated due to various site preparation and construction activities within the project and surrounding areas during the construction phase. The WMP is to be read in conjunction with the other environmental management plans.*

2.3 OBJECTIVES

The objectives of waste management in the Project are as follows:

- To identify waste types and quantities on site and inventorize them;
- To ensure the disposal of wastes conform applicable guidelines or standards;
- To ensure areas where fuels, oils or other potential contaminants are stored are appropriately bunded;
- To prevent any reactions between waste due to incompatibility in nature
- To ensure sewage disposal does not degrade the environment;
- To investigate methods to minimise waste generated and implement reasonable and feasible measures to minimise waste
- To identify potential re-use or recycling opportunities and ensure appropriate handling and collection procedures are in place; and
- To have procedures in place for appropriately handling of relevant wastes.

2.4 APPLICABLE LEGISLATIONS AND REGULATORY STANDARDS

The following acts, regulations and guidelines have been reviewed and are applicable to WMP fully or partly in the Project:

Table 2.1 Applicable Legislations (1)

S.N	Issues	Applicable Legislation	Agency Responsible	Applicability
1	Industrial Solid Waste	Bangladesh National Environmental Policy	DOE	• To phase-in corrective measures in polluting industries; • To conduct EIAs for all new public and private industrial developments; • To ban, or find environmentally sound alternatives for, the production of goods that cause environmental pollution; and • To minimize waste and ensure sustainable use of resources by industry
2	Hazardous Wastes Management	The National Conservation Strategy, 1992 provides recommendations for sustainable development of the industrial sector.	GoB	▪ Hazardous or toxic materials/wastes shall not be imported as raw materials for industry; ▪ Import of appropriate and environmentally-sound technology shall be ensured; and ▪ Dependence on imported technology and machinery should gradually be reduced in favour of sustainable local skills and resources.
3	Protection of water quality, including strengthening regulations concerning agrochemicals and industrial effluent	The National Water Policy, 1999	DoE	▪ Applicable, as water for cooling is to be drawn from the Jamuna river with discharge of treated water on land and the river course will also be used for transport of heavy equipment.
4	Basel Convention on Transboundary Movement of Hazardous Waste, 1989		GoB	▪ Preventing any transboundary movement of hazardous waste from the project and d environmentally sound management of such waste as close as possible to the source of generation

(1) Bangladesh does not have any legislation related to Solid and Hazardous Waste Management. However, reference wherever found has been included. SCU/the EPC Contractor is encouraged always to seek the guidance and advice of Department of Environment, Bangladesh in this case – on any clarifications, new legislations.

2.5 IMPACT AVOIDANCE AND IMPACT MITIGATION

2.5.1 *Approach*

The overall approach for avoiding and mitigating impacts comprises the following elements:

- The EPC Contractor will adopt a Best Practicable Environmental Option (BPEO) approach to each waste stream;
- All wastes should be moved to an acceptable permanent grave as soon as practicable. Storage is viewed as a temporary requirement and should be used for as short a time as possible; and
- The Duty of Care principle will be followed - whereby the waste producer will ensure that a waste is properly managed even after that waste has been transferred to a third party.

Treatment of waste simply transfers the pollutant to a different medium; therefore, treatment is less preferable than reuse or recycling as a waste management option. Following the waste management principles outlined above, where the generation of waste is unavoidable, waste minimisation techniques will be followed which may include a) a focus on reducing waste at the source, wherever possible, and b) waste reuse and recycling.

A pre-requisite to the adoption of this approach is the development of a detailed inventory of waste generated by during different project activities. Details on the inventory and the sequence of activities that follow from this information are outlined below and described in the following sub-sections on waste management and final disposal.

2.5.2 *Waste Management*

Waste Inventory

A summary of main waste streams that will be generated during the construction phase activities as identified in ESIA. The waste inventory database will be updated once more accurate information about the activities to be carried out by the EPC contractor within site and construction activity areas.

Waste Classification

All wastes will be classified at the point of production to determine appropriate segregation procedures, storage and ultimate treatment/disposal. Initial classification will result in the waste being assigned as liquid or solid waste. Then the classification will further categorise the waste within one of the following categories:

- Inert;
- Non-hazardous; and
- Hazardous.

The classification process will initially involve reference to the waste inventory and, in particular, the details relating to segregation, labelling, storing and treatment of each waste item. In the event that the waste is not included in the inventory or unrecognisable, samples will be taken and analysed to allow classification according to the above waste classes. The inventory will then be updated. If a waste is unrecognisable and sampling is not deemed appropriate or practical, the waste will be deemed hazardous and disposed of in a manner consistent with hazardous waste management procedures set out in this plan. This will be further detailed in site waste management procedures.

The waste classification process will generate information that will be used to determine safe exposure levels for employees, as appropriate, for hazardous substances used or handled onsite, thereby protecting the health of workers. In particular, the following will be determined:

- The hazardous substances that are to be used or generated during different project activities and the associated risks these substances may pose to people's health;
- The precautions required before handling hazardous substances;
- The procedures required to prevent people being exposed to hazardous substances; where this is not reasonably practicable, procedures for controlling exposure levels will be developed;
- Training requirements with respect to handling hazardous materials to ensure that employees/workers are properly informed, trained and supervised.

In addition, the information will assist in the development of plans and procedures to deal with accidents, incidents and emergencies involving hazardous materials. Material Safety Data Sheets (MSDS) will be obtained for all hazardous substances and held at sites generating or handling the respective wastes. The MSDSs will be readily accessible to all employees/ workers in local languages.

Waste Handling

All personnel who are involved in the handling of hazardous and non-hazardous waste will undergo specific training in:

- The procedures to be followed to ensure adequate segregation of wastes;
- The duty of care system and how to complete the documentation correctly;
- Waste handling;
- Waste treatment; and
- Waste storage.

Waste Container Labelling

The relevant team will ensure that all waste containers are clearly identifiable and accurately describe the type of waste contained therein. Full descriptions of the waste are required to assist site and external personnel to handle the material safely and to ensure that non-compatible materials are not stored or

transported together. Any unidentified wastes will be treated initially as hazardous and will be subject to the classification process outlined above.

All waste containers on-site (bins, skips, drums etc) will be clearly labelled to show which wastes can be disposed into them and which wastes they contain. Any previous labelling will be removed or covered to avoid confusion.

Waste Storage and Segregation

The following general storage and segregation procedures will be observed:

- Different types of wastes require segregation. This will typically require separate storage areas or physical separation for hazardous and non-hazardous wastes and/or the segregation of different types of hazardous wastes;
- Voluminous waste as some construction waste will be stored in earmarked areas only;
- Wastes require covered storage, away from direct sunlight, wind and rain. In the case of non-hazardous wastes this requirement may be satisfied by the use of sealed containers such as 'wheeled bins'.
- Hazardous wastes, depending upon their form, may be stored either in similar containers or in tanks, drums or other smaller containers. In such cases storage under cover is important to protect the integrity of the container. Solid waste will be stored in such a way as to prevent it blowing away in high winds.
- Hazardous liquid wastes will be stored in bunded area with provision of spill collection, if any;
- Storage of non-hazardous general waste (except food waste), will be done in a manner to reduce health, safety and environment risks associated with the storage of this materials. The waste will be stored using either shipping containers or temporary earth bunding and will be designed in such a way to minimise leachate, odour and biogas generation;
- As far as practicable, the storage of waste will be kept to a minimum. This is both good housekeeping and, in the case of hazardous wastes, reduces the risks associated with the storage of large quantities of hazardous materials;
- Storage areas for waste will be secure from the general public, in particular children, and clearly marked so as to indicate the hazards of the stored material.
- Waste will be stored in a way to prevent, as far as possible, access by stray dogs and vermin. Waste will only be stored for as long as necessary before transferred off-site for appropriate treatment and disposal;
- Waste storage containers used will be appropriate in terms of volume, composition, shape, and opening for the material that is being stored. Only containers in a good condition will be used. Bungs and lids will be securely fastened or other forms of covering shall be provided;
- Containers that are susceptible to reaction with the wastes, which may lead to the release of harmful substances, must not be used;
- Only one category of hazardous waste may be placed in any one container. Solid and liquid wastes must not be mixed; and

- If a hazardous waste is mixed with other wastes the entire consignment will be considered as hazardous for disposal purposes.

Site Waste Collection Points

Waste Collection Points (WCPs) will operate at various activities areas. Here the waste will be segregated and stored temporarily prior to transfer to the Waste Storage Area (WSA) and final disposal sites.

The WCPs will typically comprise of a dedicated area, storage containers, and secondary containment for hazardous liquid wastes (oils etc.). Separate storage containers will be provided for prime recyclables (paper, cardboard, scrap metal), domestic waste, and hazardous waste requiring segregation including oils, oily solids, chemicals and batteries. Care will be taken to ensure that chemicals are kept in separate containers in order to avoid a chemical reaction.

Waste Storage Area (WSA)

WSAs will be created at appropriate locations. WSAs are secure compounds and comprise the following:

- Waste reception area for weighing or estimating waste volumes and masses, by weighing unit or volume-mass conversion chart (per waste type);
- Waste Segregation Area;
- Hazardous waste storage area, including secondary containment and roofing;
- Laydown areas (e.g., for skip laydown/storage);
- Absorbents for dealing with leaks/spillages from containers;
- Returnable (to original supplier) storage area (if possible);
- Reusable and recyclables storage area;
- Separate drainage, spillage control kerbs and sump;
- PPE store;
- Eyewash and emergency shower; and
- Emergency equipment including fire-extinguisher.

Secure storage will be provided for the interim storage of selected wastes for which there is a realistic expectation of future reuse or recycling. The facility will also be used for the temporary storage of wastes requiring special handling. Any unknown wastes that require repackaging prior to disposal would be handled in this area. Wastes may also be stored in this area should they require short-term, well-ventilated storage out of direct sunlight.

Transportation of Wastes

Strict measures will apply to the transportation of wastes. Contractors will be required, at a minimum, to cover the following issues:

- Disposal of hazardous waste will be done by engaging DOE approved waste management agencies or alternatively through appropriate agencies post background verification.
- Ensure that the nature, integrity and protection provided by packaging and containers used for transport are appropriate for the kind and quantity of material involved;
- Ensure adequate transport vehicle specifications, including enclosed compartments or incorporating cloth tarpaulins to facilitate odour control and ensure waste is not lost en-route;
- Consider routes used to minimise disturbance to local communities;
- Follow loading and unloading procedures to facilitate safe operations and avoid loss of wastes;
- Inform employees involved in transporting wastes of how to respond to accidents and emergencies;
- Provide the necessary means for emergency response.

Vehicles (including third party vehicles) will be checked for their suitability and maintenance and driver training will be in line with the Project driving requirements. Waste transportation contractors will be contractually required to comply with Project requirements and local legislation for vehicle maintenance and safety as these specific requirements will be included in their contractual agreements.

Drivers of vehicles used to transport hazardous wastes will have been trained to use spill clean-up materials. Vehicles will be provided with spill clean-up materials and, as appropriate, carry a MSDS, and hazardous warning signs in accordance with international standards.

Transfer Procedures

Transfer of waste from a WCP to a WSAs and/or to a third party facility will be fully documented on a Waste Transfer Note.

At a minimum, the following will be recorded:
- Waste originator;
- Waste description and type(s);
- Consignment reference number;
- Form (e.g. solid, liquid, sludge);
- Quantity(ies) (weight) and units (e.g. number of containers, drums);
- Name and signature of originator;
- Name and signature of waste transporter plus receiving party and
- Verification details of the waste disposal/treatment/recycling agency;

Only authorized personnel (i.e. those that have received the appropriate training) will be able to complete the Waste Transfer Notes. Waste received at the WSAs will undergo any further sorting and segregation as required, prior to being transferred from the WSAs to final treatment and disposal facility or further interim storage site. The tracking steps listed above may be modified as appropriate to enhance the waste tracking process.

The EPC Contractor will maintain a register recording the details of all wastes generated, and the quantity of wastes sent to and received by the WSAs or final disposal/treatment facility. Wastes both received at the WSAs and despatched by the WSAs for disposal or interim storage will be recorded in a register held by the WSAs Site Supervisor (or delegate).

The register will record details of:

- Wastes received by the WSAs; and
- Wastes despatched by the WSAs for disposal or interim storage.

The following information should be held in the register:

- Waste originator;
- Waste type(s) collected and delivered (hazardous/non-hazardous), including a general description of waste;
- Waste Transfer Note reference number (in and out);
- Form (e.g., solid, liquid, sludge);
- Quantity(ies) and units (e.g. number of containers or skips) collected and delivered;
- Transporter (e.g. truck) number and type;
- Date delivered to WSAs;
- Date despatched;
- Name of WSAs Site Supervisor (or delegate); and
- Waste receiver site (once despatched) and confirmation of receipt.

2.5.3 Final Disposal

An assessment of the Best Practicable Environmental Options (BPEO) for identification of best possible waste management solutions will be undertaken considering each waste stream and balancing such aspects as environmental impact, accident potential, technical standards, financial costs and local availability.

In line with the waste management hierarchy approach, the EPC Contractor and Project Company will investigate and implement, where practicable reuse, recycle and other options in preference to sending waste to landfill and/or incineration, if required. Only those waste treatment companies that are approved by DOE for use by the Project will be utilised.

The following subsections detail waste management disposal options to be considered by the Project.

Reuse / Recycle

The EPC Contractor will identify different wastes which can be utilized for recycle/reuse. The following measures will be considered to minimise waste generation, and to promote reuse and recycling:

- Reduce material consumption (e.g. extending the useful life of consumables);

- Inventory control and management (e.g. reduce losses of materials due to expired shelf-life and improper storage conditions);
- Favour suppliers who use less packaging or practice 'take-back' schemes;
- Material substitution (e.g. where practicable, select non-hazardous replacements for hazardous materials to reduce the amount of hazardous wastes requiring disposal, recognising that this may not result in an actual reduction in the quantity of waste produced);
- Volume reduction (e.g., through material substitution and filtration);
- Reuse chemical containers; and
- Review establishment of food composting.

General Site Waste Management

The following actions/strategies will be put into practice to minimise the accumulation/generation of waste on site:

- All personnel working on the project are to undergo a site induction. The site induction will include the waste management practices on the Project.
- All waste areas are to be clearly identified as waste storage areas. This includes bins and other receptacles for domestic waste, and which would be marked according to the type of waste accepted, e.g. scrap metal, oil filters and oily rags, other recyclables, general waste, etc.
- Clear written instructions are to be erected at appropriate locations detailing recycling and waste separation information.

2.6 *MONITORING, REPORTING AND REVIEW*

Waste management data will be documented and reported to Project Company/ SCU. The information will include the quantities and type of waste removed off site for recycling or disposal, the contractor engaged to remove the wastes and the final destination for all waste products. Details will be provided on the implementation success of the WMP implemented and any areas that require improvement will be highlighted.

2.7 *ACCOUNTABILITIES*

All employees/ workers/ sub-contractors that are engaged by the EPC Contractor directly or indirectly to work in the Project will be responsible for:

- Ensuring the effective implementation of this Plan with respect to their work areas;
- Ensuring any potential or actual waste management issues, including environmental incidents, are reported to the HSE manager/supervisors;
- Ensuring that all wastes are placed into the appropriate storage areas or receptacles;
- Ensuring they comply with all on-site requirements;
- Ensuring they engage in safe work practices; and
- Undertaking work practices that comply with this WMP.

The EPC Contractor will define detailed responsibilities for activities required as per the WMP.

2.8 REPORTING AND REVIEW

The EPC Contractor team will present to the SCU management on a monthly basis the following:

- Inventories of waste, its disposal and management records;
- How is the waste being reused and recycled and what is the progress against the targets if any defined by SCU.
- Any issues that have come up in waste management, the root cause and actions taken;
- Any complaints or grievance from the local community of waste management issues and action taken. Time line for closing of the action.
- Any major issue emerging that will need SCU management inputs as well as budget for waste management.

3 TRAFFIC MANGEMENT PLAN (TMP)

3.1 INTRODUCTION

This Framework Traffic Management Plan (TMP) has been prepared to address the environmental, health and safety impacts associated with the transportation of large quantity of construction material and equipment to the Project site by road including man and material transportation between the Project Site and construction laydown area/s.

This TMP builds on the conceptual information presented in the Project documents and applied to all transportation activities to be conducted during the site preparation and construction by the EPC Contractor.

3.2 SCOPE

Site preparation and Construction Phase: The responsibility to frame the detailed TMP and its implementation will be with the EPC Contractor selected by SCU for the phase.
Areas: Project site and associated facility areas, roads where any transportation activity will take place related to the Project.
Define: Roads connecting Project site, Jetty area, Labour accommodation, roads, lay down areas, material transport routes, batching plant, etc.

The TMP is to be read in conjunction with the other environmental management plans.

3.3 OBJECTIVES

The objectives of this framework management plan relates specifically to the following traffic and transport management issues:

- Traffic management,
- Driver training,
- Strengthening/ improvement of road infrastructure,
- Vehicle management and maintenance,
- Community liaison and safety and
- Emergency response.

3.4 APPLICABLE LEGISLATIONS AND REGULATORY STANDARDS

The following national regulations apply fully or partly on transport vehicle management and maintenance issues in the Project:

- The Vehicle Act,1927
- The Motor Vehicle Ordinance , 1983

- The Bengal Motor Vehicle
- The Environment Conservation Act ,1995

The EPC Contractor/SCU would be encouraged always to seek the guidance and advice of local Road Transport Authority or Bangladesh Road Transport authority , Sirajganj division, which is responsible for maintenance and strengthening of the road infrastructure, on any clarifications, new legislation and latest amendments, especially on vehicular emission norms and maintenance, strengthening/widening of roads.

3.5 IMPACT AVOIDANCE AND IMPACT MITIGATION

The framework avoidance and mitigation measures will involve a combination of following management elements:

- Transport management planning,
- Route selection and management,
- Pre-condition survey,
- Traffic management implementation,
- Driver training,
- Road maintenance,
- Vehicle management and maintenance, and
- Community liaison and safety.

The essential features of each element are outlined below.

3.5.1 *Traffic Management Planning*

Movement of all heavy equipment and vehicles from Jetty to project site needs to be coordinated with the logistics team of SCU. Considering the laydown area on the other side of highway and heavy traffic movement on the national highway (Dhaka – Bogra Highway), specific traffic management planning will be carried out by the EPC Contractor. The Traffic Management Plan aims to maximise optimum use of road based vehicles and reduced congestion as well as impact on community.

The Traffic Management Plan would cover arrangements for the following aspects:

- Sourcing or recruitment for drivers and number of qualified drivers needed,
- Driver training and approval,
- Hours of driving and rest periods,
- Driver, vehicle and load security arrangements,
- Driver communication with control point and vehicle equipment,
- Language/communication,
- Source of suitable vehicles,
- Vehicle quality and specification,
- Number of vehicles required,
- Vehicle preventative maintenance programme,
- Vehicle database relating to emission control and noise
- Vehicle routes, route planning and alternative routes,

- Placement of traffic stewards for smooth traffic movement
- Overall vehicle movements,
- Emergency recovery of vehicle,
- Community safety, and
- Spot checks and audit of the transport system.

3.5.2 Route Selection and Management

Route for transportation of construction material will be through the National Highway to the Project site. The Traffic Management Plan will detail procedures to be adopted to ensure appropriate Project speed limits. The Project vehicles will not traverse through routes other than approved route/s. In the event of changing the route from the identified route, appropriate permit procedures will be followed to have a control on such events. In addition, all the vehicles engaged (owned/ contracted) will comply with all statutory vehicle limits (width, height, weight, loading, etc.).

3.5.3 Pre-condition Survey

The EPC Contractor will undertake a pre-condition survey to assess the existing road conditions, loading/ unloading and parking facilities. Photographs will be taken as a record of condition. Local authorities will also be consulted during the pre-condition survey.

3.5.4 Traffic Management Implementation

In order to minimise the disruption due to the heavy traffic movement, The EPC Contractor will adopt the following measures:

- Traffic flows will be timed and Project related traffic at peak traffic hours will be avoided to the extent possible;
- Clear signs, traffic stewards and signal posts will be set up as necessary;
- Appropriate supervision will be provided to control the flow of traffic while entering the national highway;
- Ensure that traffic activities requiring 'Heavy Vehicle Transport' will be in accordance with the regulatory requirements. The Road Transport Authority or Traffic Police shall be consulted on the procedures required to be followed;
- The Project traffic or any Project activity will not obstruct the access to neighbouring properties;
- Vehicles speed will be minimised during the periods children are travelling to and from school;
- In the unlikely event of a road closure, diversions will be planned and communicated to the authorities and affected communities in advance. All diversion will be constructed to the specifications of the applicable road authority and will be maintained in good drivable conditions until the completion of the re-instatement work;
- The enforcement of speed controls, and the implementation of further pollution control measures, such as damping down the key access roads that have suspended particulate matter levels going above NAAQS;
- Appropriate speed limits for HMVs will be determined as part of the management plan based on type of road available for the construction material transportation; and

- Avoidance of passage through and near settled areas during night time hours.

Where there is the potential for cumulative impacts from congestion and related impacts from Project traffic to settlements near or en-route to Project location, transport phasing will be carefully considered in order to minimise disturbance impacts.

3.5.5 Parking

Signposted parking facilities will be provided at Project Site. The parking of Project vehicles on footways, along single lane roads and double parking shall be avoided.

Temporary hard-standing areas will be provided on the Project site for the parking of emergency service vehicles. These areas will be kept free of other vehicles and will be appropriately signed.

Another potential impact in vehicles and construction equipment is the oil and fuel spillage/leakage. The vehicle maintenance procedures will address the oil and fuel spills due to leakage etc. Oil and fuel spill during parking or whenever the vehicle is idling will be addressed by providing readily available oil and fuel adsorbent materials or drip trays. Vehicles will not be allowed to park outside of dedicated areas. Project personnel will report any spillage and leakage for immediate rectification.

3.5.6 Driver Training

The EPC Contractor is required to ensure that all drivers and driver trainers are suitably trained in accordance with driver training requirements. Driver qualifications, skills of drivers and contractor's driving assessors will be checked by the EPC Contractor in accordance with the approved training requirements. The EPC Contractor shall issue a specific permission to each driver and for each vehicle type after assessment and approval of driver's competency. Unauthorised passengers in Project vehicles are strictly prohibited.

The following issues and documents are to be addressed during driver training and in a language mostly appropriate to individual drivers:

- Journey Management Plan;
- Road to Better Driving Manual;
- Health and Safety Standards and Practices;
- National and local legal requirements to drive a vehicle; and
- Any additional requirements for Project drivers.

3.5.7 Road Maintenance

Throughout the construction period, The EPC Contractor will be responsible for monitoring the condition of roads used by Project traffic and for ensuring that they are maintained in a condition that is at least as good as the condition

they were in before the start of the Project and to the satisfaction of the Project and road maintenance authorities. The EPC Contractor also need to liaison with the Road and Bridge (R&B) Department, Local Government Engineering Department (LGED) and the Bangladesh Bridge Authority (BBA) for strengthening and maintenance of roads (within the key project activity areas), which would be used for heavy vehicles movement for construction materials to the project site and return.

The EPC Contractor will aim to keep road free from debris by covering of all the construction transport vehicles carrying construction materials and rejects.

3.5.8 Vehicle Management and Maintenance

In order to ensure that accident rates and the overall transport fuel consumption are minimised, the Project shall ensure that the vehicle fleet working on the Project (whether directly for the contractor or for the contractor's subcontractors) is maintained according to the manufacturers' specifications, as well as mechanically maintaining vehicles to manufacturer specifications so as to minimise fuel consumption.

The following in respect of vehicle maintenance, noise and emission standards will be required:

- All vehicles shall be maintained so that their noise and emissions do not cause nuisance to workers or local people;
- An up to date database of all Project vehicles will be maintained and supplied on demand or for audit inspections. The database will contain details about the periodical maintenance, schedule of maintenance, vehicular emission and noise emission testing done as per regulatory requirements;
- New vehicles: vehicles/equipment purchased 'as new' after contract award shall comply with regulation noise and air quality emission standards in force on the purchase date;
- Method statements shall be produced to cover vehicle/equipment emission measurement and routine maintenance. Method statements shall require regular maintenance of diesel engines to ensure that emissions are compliant.
- Routine maintenance shall be to a high standard to ensure that vehicles are safe and that emissions and noise are compliant.
- Oil and fuel leaks must be addressed within specified time duration, from the time of observation or reporting.
- Vehicle maintenance and management parameters will form a critical component of reporting under this plan.

3.5.9 Community Liaison and Community Safety

Traffic safety in local communities must be a high priority for the Project. The Traffic Management Plan will have procedures that will minimise traffic impacts on communities.

The EPC Contractor along with SCU will ensure communities are advised in advance of Project progress where transport issues have the potential to

impact local communities. The Project Stakeholder Engagement Plan will be utilised to communicate with the communities in this regard. The communications to the community will discuss the timing (*start, duration and finish of Project activities in their vicinity*) of traffic and transportation activities.

Traffic Management will include a programme of traffic safety awareness for inhabitants of villages affected by significant increases in Project related road traffic. The EPC Contractor will provide these communities with sufficient information on safety measures related to road traffic prior to commencement of work and continue to provide sufficient opportunity for community members to air and resolve traffic related complaints during Project period.

Efforts will be made to brief women particularly on safety measures. As the primary caretakers, women are well positioned to pass on safety information to their children. The CSR Team will carry out the traffic safety awareness programme as part of or separate to the comprehensive safety awareness programme. Any grievances will be recorded as per GRC framework specified in the ESIA Report or as further updated for the Project by the Project Company.

3.6 MONITORING, REPORTING AND REVIEW

Traffic management data will be documented and reported monthly to SCU. The information will include the traffic congestion, nuisances, incidents and accidents, training records, awareness programmes etc. Details will be provided on the implementation success of the TMP implemented and any areas that require improvement will be highlighted.

3.7 ACCOUNTABILITIES

All employees/workers/ sub-contractors that are engaged by the EPC Contractor for the transportation requirement will be responsible for:

- Comply with the road safety rules and regulations; and
- Ensure any potential or actual traffic management issues are reported to the Project Manager, Supervisor or Task Coordinator.

The EPC Contractor will be responsible for the following activities as described in the TMP:

- Approve appropriate resources for the implementation of this Plan;
- Ensure the effective implementation of strategies designed to reduce traffic induced impacts;
- Authorise internal and external reporting requirements of this Plan;
- Fortnightly/ monthly review of internal reports and incidents;

The EPC Contractor will define detailed responsibilities for activities required as per the TMP.

3.8 REPORTING AND REVIEW

The EPC Contractor team will present to SCU management on a monthly basis the following:

- Actions taken against the mitigation measures adopted for road safety and control of pollution due to use of heavy equipment within the site and transportation of raw materials
- Any issues that have come up in traffic management that has triggered a fine or a complaint by the government authorities, the root cause and actions taken;
- Any complaints or grievance from the local community on health and safety, pollution or noise and action taken. Time line for closing of the action.
- Any major issue emerging that will need management inputs as well as budget for traffic management-e.g. additional parking area/s, signage, noise barriers, etc.

4 EMERGENCY RESPONSE PLAN (ERP)

4.1 INTRODUCTION

This Framework Emergency Response Plan (ERP) has been prepared to address the emergency situations, which could arise during the construction phase of the Project as per the contractual requirements and effectively manages emergencies on site and off site by the EPC Contractor.

This ERP builds on the conceptual information presented in the Project documents and applied to all project activities to be conducted during the site preparation and construction by the EPC Contractor.

4.2 SCOPE

Site preparation and Construction Phase: The responsibility to frame the detailed ERP and its implementation will be with the EPC Contractor selected by SCU.
Areas: Project site and associated facility areas where any preparation/ construction activity is going on related to the Project.
Define: Project site, Jetty area, water pipeline, Labour accommodation, roads, lay down areas, batching plant, etc.
Activities: construction, transportation, etc. can be defined in detail to capture the coverage of ERP.

4.3 OBJECTIVES:

The ERP aims to ensure:

- Emergency Response Team (ERT) of the EPC Contractor as initial responder in case of any on-site and/or off-site emergency situation caused due to the project related activities;
- Provide mutual aid in case of any emergency situation arising due to other construction/ operations within the Saidabad Power Generation Complex as well as any off-site facility;
- Coordination with the local fire, police and district administration, emergency medical services, the public health authorities, collectively referred to as the External Emergency Response Team (EERT).

The EPC Contractor will provide and sustain the required technical, human and financial resources for quick response during the construction phase of the project.

4.4 EMERGENCY RESPONSE

4.4.1 Approach

Emergencies can be categorised into three broad levels on the basis of seriousness and response requirements, namely:

a) **Level 1:** This is an emergency or an accident, which:
   - can be effectively and safely managed, and contained within the site, location or installation by the available resources; and
   - has no impact outside the site, location or installation.

b) **Level 2:** This is an emergency or an accident, which:
   - cannot be effectively and safely managed or contained at the location or installation by available resource and additional support is alerted or required;
   - is having or has the potential to have an effect beyond the site, location or installation and where external support of mutual aid partner may be involved; and
   - is likely to be danger to life, the environment or to industrial assets or reputation.

c) **Level 3:** This is an emergency or an incident with off-site impact which could be catastrophic and is likely to affect the population, property and environment inside and outside the installation, and management and control is done by district administration. Although the Level-III emergency falls under the purview of District Authority but till they step in, it should be responsibility of the unit to manage the emergency.

Level 1 and Level 2 shall normally be grouped as on-site emergency and Level 3 as off-site emergency. In order to address any level of emergency situation,

The EPC Contractor will identify emergency situations and categorise them under Levels for planning response and training people accordingly.

4.4.2 Roles and Responsibilities

Roles and responsibilities in case of any emergency incident response are presented in ***Table 4.1.***

Table 4.1 Roles and Responsibilities in Emergency Incident Response

S. No.	Entity	Responsibility
1.	Emergency Response Team (ERT)	• Immediate response to the emergency situation • Prepare the emergency site to facilitate the response action, e.g. vacating, clearing, restricting, etc. • Communicate/ alert the EERT • When necessary and requested by the EERT, lends support/ provides assistance during the EERT's response operations. • Provide mutual aid in case of any emergency situation arises in the surrounding plant/s or construction site.

S. No.	Entity	Responsibility
2.	Resources	• Provide and sustain the people, equipment, tools and funds necessary to ensure Subproject's quick response to emergency situations. • Maintain good communication lines with the EERT to ensure prompt help response and adequate protection, by keeping them informed of Subproject progress.
3.	External Emergency Response Team (EERT)	• Provide support to the ERT based on communication received from ERT for Level 1 and Level 2 type emergencies. • Immediate action in case of Level 3 type emergency situation/ accident. • Co-ordination with different agencies.

The ERT will be led by the senior EPC Contractor Engineer (designated ERT-Lead) on-site with a suitably trained site supervisor or junior engineer as deputy. Trained first-aiders and security personnel will be the core members of the ERT. The EPC contractor will ensure that ERT members are physically, technically and psychologically fit for their emergency response roles and responsibilities.

4.4.3 Pre-Start Up

Prior to the mobilization of civil works, the EPC Contractor through its Construction Manager, ERT-Lead, will meet with the ultimate response institutions to discuss the overall construction process, including, but not limited to:

- Project site, laydown areas, construction workers camp areas, temporary areas to be used for transportation of heavy lifts, etc., located within the project site and outside;
- construction time frame and phasing;
- any special construction techniques and equipment that will be used;
- any hazardous materials that will be brought to and stored in the construction premise and details on their applications and handling/management system;
- the Contractor's Emergency Management Plan; and
- names and contact details of the ERT members

The objective of this meeting is to provide the ultimate response institutions the context for:

- their comments on the adequacy of the respective Emergency Management Plans;
- their own assessment of what types, likely magnitude and likely incidence rate of potential hazards are anticipated; and
- the arrangements for coordination and collaboration with district administration and external agencies working on emergency response and disaster management.

To ensure effective emergency response, prior to mobilization of civil works, the EPC Contractor will:

- set up the ERT;
- set up all support equipment and facilities in working condition;

- made arrangements with the EERT;
- conducted proper training of ERT members, and encouraged and trained volunteers from the work force;
- conducted orientation to all construction workers on the emergency response procedures and facilities, particularly evacuation procedures, evacuation routes, evacuation assembly points, and self-first response, among others; and
- conducted drills for different possible situations.

To sustain effective emergency response throughout the construction Phase implementation an adequate budget shall be provided to sustain the capabilities and efficiency of the emergency response mechanism, the emergency response equipment, tools, facilities and supplies. Drills and reminders will take place regularly, the former at least every two months and the latter at least every month.

4.4.4 Alert Procedures

Means of communicating, reporting and alerting an emergency situation may be any combination of the following:

- audible alarm (siren, bell or gong);
- visual alarm (blinking/rotating red light or orange safety flag);
- telephone (landline);
- mobile phone;
- two-way radio; and
- public address system/loud speakers.

Some rules relative to communicating/alerting will be:

i. Whoever detects an emergency situation first shall immediately :
   - call the attention of other people in the emergency site,
   - sound the nearest alarm, and/or
   - report/communicate the emergency situation to the ERT.

ii. Only the ERT-Lead and, if ERT-Lead is not available, the Deputy ERT-Lead are authorized to communicate with the EERT. Exceptional cases to this rule may be necessary and should be defined in the Emergency Management Plans.

iii. When communicating/alerting an emergency to the EERT, it is important to provide them with at least:
   - the type of emergency situation;
   - correct location of the emergency;
   - estimated magnitude of the situation;
   - time it happened;
   - in case of a spill, which hazardous substance spilled; and
   - in case of fire and explosion, what caused it.

Such details would allow the EERT to prepare for the appropriate response actions. For an effective reporting/alerting of an emergency situation:

i. The names and contact details of the relevant persons and institutions should be readily available in, or near to, all forms of communication equipment, and strategically posted (at legible size) in all Subproject sites and vehicles:
    - Most relevant construction/operations staffs namely, the ERTL, Deputy ERTL, first-aiders, supervising engineers, foremen
    - EERT institutions/organisations
    - Concerned Union authority/ies.

ii. Project site and activity areas outside (such as laydown area, construction workers camp, temporary jetty, water intake structure area, etc.) should have good access to any combination of audible and visual alarms, landline phones, mobile phones and two-way radio communication at all times.

iii. Contractor's construction vehicles should also be equipped with the appropriate communication facilities.

4.4.5 Emergency Response Situations

The following tables suggest general procedures that will be described in more detail in the Emergency Management Plans prepared by the EPC Contractor.

Table 4.2 Evacuation Procedures

S. No.	Procedure	Remarks
1.	Move out as quickly as possible as a group, but avoid panic.	All workers/staff, sub-contractors, site visitors to move out, guided by the ERT.
2.	Evacuate through the directed evacuation route.	The safe evacuation shall have been determined fast by the ERT-Lead/Deputy ERT-Lead and immediately communicated to ERT members.
3.	Keep moving until everyone is safely away from the emergency site and its influence area.	A restricted area must be established outside the emergency site, all to stay beyond the restricted area.
4.	Once outside, conduct head counts.	Foremen to do head counts of their sub-groups; ERT-Lead/Deputy ERT-Lead of the ERT.
5.	Report missing persons to EERT immediately.	ERT-Lead/Deputy ERT-Lead to communicate with the EERT.
6.	Assist the injured in evacuation and hand them over to the ERT first-aiders or EERT medical group	ERT to manage injured persons to ensure proper handling.
7.	If injury warrants special care, DO NOT MOVE them, unless necessary and instructed/directed by the EERT.	ERT-Lead/Deputy ERT-Lead communicates with EERT to get instructions/directions in handling the injured.

Table 4.3 Response Procedure during Medical Emergency

S. No.	Procedure	Remarks

S. No.	Procedure	Remarks
1.	Administer First Aid regardless of severity immediately.	Fundamentals when giving First Aid: • Safety first of both the rescuer and the victim. • Do not move an injured person unless: • victim is exposed to more danger when left where they are, e.g., during fire, chemical spill • it would be impossible for EERT to aid victims in their locations, e.g., under a collapsed structure • instructed or directed by the EERT. First AID to be conducted only by a person who has been properly trained in giving First Aid.
2.	Call the EERT emergency medical services and/or nearest hospital.	ERT-Lead/Deputy ERT-Lead or authorized on-site emergency communicator
3.	Facilitate leading the EERT to the emergency site.	ERTL/Deputy ERTL to instruct: • an ERT member on- site to meet EERT in access road/strategic location. He/she shall hold orange safety flag to get their attention and lead them to site. • Other ERT members to clear access road for smooth passage of the EERT.
4.	If applicable, vacate site and influence area at once, restrict site, suspend work until further notice.	Follow evacuation procedure.

Table 4.4 ***Response Procedure in Case of Fire***

S. No.	Procedure	Remarks
1.	Alert a fire situation	Whoever detects the fire shall immediately: • call the attention of other people in the site, • sound the nearest alarm, and/or • Foreman or any ERT member among the construction sub-group contacts the fire department (in this case it should be agreed on that it is alright for any ERT member in the sub-group to alert the fire department) • report/ communicate the emergency situation to the ERTL/Deputy ERTL.
2.	Stop all activities/operations and evacuate.	All (non-ERT) workers/staff sub-contractors, site visitors and concerned public to move out to safe grounds following the evacuation procedure.
3.	Activate ERT to contain fire/control fire from spreading.	Guided by the training they undertook, ERT members assigned to mitigate the fire shall assess their own safety situation first before attempting to control fire spread.
4.	Call the nearest fire and police stations and, if applicable, emergency medical services.	When alerting the EERT, ERTL will give the location, cause of fire, estimated fire alarm rating, any injuries.
5.	Facilitate leading the EERT to the emergency site.	ERT-Lead/Deputy ERT-Lead to instruct: • an ERT member to meet the EERT in the access road or strategic location and lead them to the site. He/she shall hold the orange safety flag to get their attention and lead them to the site.

S. No.	Procedure	Remarks
		• some ERT members to stop traffic in, and clear, the access road to facilitate passage of the EERT.
6.	ERT to vacate the site as soon as their safety is assessed as in danger.	Follow appropriate evacuation procedure.

Other situation to be identified and details included by the EPC Contractor.

4.5 MONITORING, REPORTING AND REVIEW

Emergency situations will be identified, documented and reported to SCU. The information will include details of trainings, mock drills and the response. Any areas that require improvement will be highlighted. Any incidents will be immediately reported to SCU and further root cause analysis and preventive action taken to be intimated.

4.6 ACCOUNTABILITIES

All employees/ workers/ sub-contractors that are engaged by the EPC Contractor directly or indirectly to work in the Project will be responsible for:

- Ensuring the effective implementation of this Plan;
- Trained to respond as per requirements of the ERP;

The EPC Contractor will define detailed responsibilities for activities required as per the ERP.

4.7 REPORTING AND REVIEW

The EPC Contractor team will present to the SCU management on a monthly basis the following:

- Any emergency incidents on site and/ off site;
- Root cause analysis and prevention action taken;
- Timeline and responsibility for closing of the action.
- Any major issue emerging that will need SCU management inputs as well as budget for ERP.

5 STAKEHOLDER ENGAGEMENT PLAN (SEP)

5.1 INTRODUCTION

This Stakeholder Engagement Plan (SEP) has been prepared for the proposed project in order to guide the development of detailed management plan as per the contractual requirements for managing the internal and external engagement process.

Note: This is a guidance framework and it is expected that this framework will be developed into specific plan by the EPC Contractor for stakeholder engagement and grievance redressal.

5.2 SCOPE

This SEP covers our engagement in the project as EPC contractor in Site Preparation and Construction Phase. All stakeholders will would be directly or indirectly impacted or has power or ability to influence our operations are covered. This SEP includes all stakeholders involved in on-site (Project site and associated facilities where any preparation/construction activity related to the Project takes place) and off-site locations (Transportation route and work sites of primary supply chain locations if significant environment and social impacts are predicted) as defined below:

- The geographic coverage;
- applicability to any off-site location;
- applicability to primary supply chain.

5.3 OBJECTIVES

The objectives of the SEP are as follows:

- Identification of stakeholders with a special emphasis on the vulnerable communities;
- Understanding the profiles (interest, authority, vulnerability, special characteristics, and their intra and inter-relationship with each other) of identified stakeholders;
- Identification of the material issues of each stakeholder; and
- Defining approaches for engagements for specific stakeholder or any stakeholder group; and
- Ensuring that the required systems are in place to report and record/document any decisions, queries, complaint, grievance or incident raised by the stakeholders.

5.4 METHODOLOGY FOR SEP PREPARATION

This section shall give a brief overview of the meetings, consultations held with major stakeholders covered in this SEP. It should also mention sources of information used for understanding and preparation of stakeholder profiles.

5.5 STRUCTURE OF SEP

This SEP framework is divided in six sections as follows:

Introduction

(This section outlines the project background, scope, objective, methodology etc)

Stakeholder Identification and Analysis

(This section deals with mapping the interest/influence/impacts of the project activities on a possible range of stakeholders. The chapter provides a brief profile and rate the level of influence or impact for all stakeholders identified.)

Stakeholder Engagement Activities

(This section elaborates the stakeholder engagement strategy and activities determined in consideration of the stakeholder profile, influence/impacts discussed in previous section)

Grievance Redress Mechanism

(This section deals with grievance handling mechanism linked to the stakeholder engagement activities proposed under this plan)

Monitoring and Documentation

(This section describes the internal and external monitoring system and a documentation plan for recording the stakeholder engagement process and any significant milestones or outcomes)

Roles, Responsibilities & Resources

(This section describes the requirements of man-power and budgetary requirement to implement this SEP and specify the roles and responsibilities of key personnel.)

5.6 STAKEHOLDER IDENTIFICATION AND ANALYSIS

5.6.1 Stakeholder identification

Stakeholder Definition

A stakeholder is defined as "a person, group, or organization that has direct or indirect stake in a Project/organization because it can affect or be affected by the Project or its Proponent's actions, objectives, and policies". Stakeholders vary in terms of degree of interest, influence and control they have over the Project or the proponent.

Stakeholder Categorization

In the present study, all the stakeholders have been primarily categorized into two categories that have been identified as:

- ***Primary Stakeholders:*** include people, groups, institutions that either have a direct influence on the Project or are directly impacted (positively or adversely) by the Project and its activities; and
- ***Secondary stakeholders:*** are those that have a bearing on the Project and its activities by the virtue of their being closely linked or associated with the primary stakeholders and due to the influence they have on the primary stakeholder groups.

Apart from categorization, stakeholders have also been classified in accordance with the level of influence they have over the Project as well as their priority to the Project proponent in terms of importance.

5.6.2 Stakeholder Profiling & Analysis

"Stakeholder Analysis" is the process of understanding the profile of the individuals or groups that are likely to affect or be affected by a proposed project, and sorting them according to their impact on the project and the impact the project will have on them.

Understanding Stakeholder Profiles

Understanding of the stakeholders identified is achieved by using information and knowledge on key characteristics of the stakeholders identified. The interest and perceptions of key stakeholders are profiled based on initial interaction or consultations with these groups. Some of the indicative characteristics of the stakeholders considered while profiling them includes: social status, literacy, knowledge and awareness of concerned issues, economic status, political linkages, social networks, access to civil society, media and other power centres, strengths and weakness, etc. This information is used to assess the manner in which the interests of the stakeholders should be addressed in the project plan, policy, program, or other action. A systematic profiling helps in understanding of the socio-political environment surrounding the project. It allows for the:

- Identification of social networks of key stakeholders, their primary groupings and sub groupings;
- Identification of the interests, concerns and potential risks surrounding the stakeholders, as well as conflicts of interests (if any);
- Identification of relations between stakeholders that may enable "coalitions" of project sponsorship, ownership and co-operation as well as the mechanisms which may have a role in influencing other stakeholders;
- Identifying stakeholders (those who are likely to have an adverse impact on the project) and taking appropriate measures to combat their influence;
- Identification of the impact and influence of the project on the stakeholders and of the stakeholders on the project;
- Development of a framework for participatory planning and implementation of stakeholder engagement activities.

Analysis and Levelling of Stakeholder Influence/Priority

Apart from categorization, stakeholders have also been classified in accordance with the level of influence they have over the Project as well as their priority to the Project proponent in terms of importance.

The influence and priority have both been primarily rates as:

- ***High Influence/Priority:*** Which implies a high degree of influence of the stakeholder on the Project in terms of participation and decision making or a high priority for the Project proponent to engage that stakeholder
- ***Medium Influence/Priority:*** Which implies a moderate level of influence and participation of the stakeholder in the Project as well as a priority level for the Project proponent to engage the stakeholder who are neither highly critical nor are insignificant in terms of influence.
- ***Low Influence/Priority:*** Which implies a low degree of influence of the stakeholder on the Project in terms of participation and decision making or a low priority for the Project proponent to engage that stakeholder

The following table provides the stakeholder analysis for the construction phase of the project.

Table 5.1 Stakeholder Profile and Rating of the Level of Influence/Impact/Interest

Stakeholders	Category of Stakeholder	Brief Profile	Overall Influence on the Project	Basis of Influence Rating
Project Management				
Sembcorp Utilities Pte Ltd (SCU)	Primary	• SCU is a 100% subsidiary of Sembcorp Industries Limited, which is a leading energy, water and marine group operating across six continents worldwide. • SCU is the primary Project proponent owning a controlling stake of 71% in the Project	Highest	• Are the primary Project proponents • Responsible for establishment and operation of this Project • Primary financial beneficiaries • Responsible for all the Project related risks and impact liabilities
North West Power Generation Company Limited (NWPGCL)	Primary	• NWPGCL is an enterprise of BPDB. This company was created in order to meet the prevailing demand of electricity and to solve the low-voltage problem the in the North-West region of the country. • NWPGCL is the co-sponsor of the Project with a stake of 29%.	High	• Influence in day to day activities of the Project including managing construction activities, engaging sub-contractors, procuring material etc. may be limited and mostly be carried out by SCU • Participation will increase during operation phase as BPDB is the primary authority for overseeing continual functioning of the power assets in Bangladesh
Project Financiers to include the International Finance Corporation, the CDC Group plc and Clifford Capital	Primary	•	High	• Engagement is limited at the corporate management level • Key participants in the decision making process which may have direct or indirect implications for the Project • Compliance to funding agencies safeguard and other policies such as governance, transparency and accounting standard
External Stakeholders				
Bangladesh Power Development Board	Primary	• The BPDB is responsible for major portion of generation and distribution of electricity mainly in urban areas except Dhaka and West Zone of the country.	High	• The land lease agreement (LLA) and power purchase agreement will be executed between the Project Company (yet to be formed) and BPDB. • In the event of gas supply failure to the

Stakeholders	Category of Stakeholder	Brief Profile	Overall Influence on the Project	Basis of Influence Rating
		• The Board is under the Power Division of the Ministry of power, Energy and Mineral Resources, Government of Bangladesh.		project, BPDB need to instruct the Project Company to switch to HSD.
Pashchimanchal Gas Company Limited (PGCL)	Primary	• Wholly owned subsidiary of state controlled Petrobangla • The main objective of this company is to distribute natural gas as a fuel through its Gas Distribution Pipeline to Household, Commercial, Industrial, and Power Plant etc. of Rajshahi Division.	High	• The gas supply agreement will be executed between the Project Company (yet to be formed) and PGCL. • Will provide gas supply for the Project • Will assist the Project Company only in obtaining of necessary governmental licenses and permits • The responsibility of design, construction, commissioning and transfer of the gas pipeline from the plant to PGCL's connection point is that of the Project Company • However, due to an existing pipeline route, the pipeline for the gas supply would be channelled through the existing route. Only Right of Way in parallel to existing line of NWPGCL will be required
Bangladesh Petroleum Corporation (BPC)	Primary	• Bangladesh Petroleum Corporation (BPC) is a government-owned monopoly in Bangladesh dealing in importation of crude oil and refined oil, lubricant, refining of crude oil, and distribution and marketing of fuel oils, lubricants and other petroleum products in the country. • BPC imports up to 29 million barrels of petroleum products a year, including 9 million barrels of crude oil, to meet the country's demand, mainly from Kuwait, Saudi Arabia, India and United Arab Emirates.	High	• The fuel supply agreement will be executed between the Project Company and BPC • Under the supply agreement, HSD will have a content of 10,280 Kcal/kg, HSD price is determined by the GOB and will be a pass-through cost for the Project Company • The responsibility for the construction, installation and maintenance of the receipt and storage facilities would be that of the Project Company while BPC would be responsible for installation of the facilities to transport fuel to the receiving point.
Power Grid Corporation of Bangladesh (PGCB)	Secondary	• Power Grid Company of Bangladesh Ltd. or PGCB has the primary objective of managing, operating and	Low	• Transmission line corridor has already been established for the existing 225MW

Stakeholders	Category of Stakeholder	Brief Profile	Overall Influence on the Project	Basis of Influence Rating
		expanding the national power grid of Bangladesh • Provides connectivity and power evacuation support for power Projects in order to connect them to the national power grid • Is the central authority on providing permits and clearances for power evacuation and supply		NWPGCL power plant. The same corridor is to be used for the upcoming power plant... • Engagement level during operation phase for obtaining requisite permits and clearances
Community				
Local Community	Primary	• The local community primarily comprises of the peripheral villages to the site boundary which are *Barashimul Panchasona* and *Khas Barashimul* • It also includes specific community groups in close interaction with Project site and related activities anywhere within the 5km Area of Influence	Low	• No major restrictions around the Project site especially with respect to access to grazing land, cultivation on Char land or uptake of water from the Jamuna River • Project will bring development to the area • Increase in employment opportunities and preference for local employment, where possible
Fishing Households		• The fishing households at Khas Chtragachha, Purba Radhunipur, Jagtala, Belutia and Paschim Mohanpur.	High	• Some of the households who use the temporary jetty location to anchor their boats during the dry season, when water levels recede, will face inconvenience and have to use other locations. • The dredging and increase navigation around the jetty location may reduce their fish catch. As reported during the consultations undertaken, past dredging activities were responsible for the declining fish catch in the area. • The fishing community, especially those with access to motor boats, fish in the main channel as well. The dredging activities and the use of the Jetty may result in temporary hardship on them.
Regulatory/Administrative				

Stakeholders	Category of Stakeholder	Brief Profile	Overall Influence on the Project	Basis of Influence Rating
Authorities & Agencies				
Department of Environment (DoE) Ministry of Environment and Forest, Bangladesh	Primary	• The Department of Environment is the primary government regulatory authority for Environmental protection in Bangladesh. • The closest office is located in Bogra District	High	• Government Regulatory agency to provide Environmental Clearance (EC) to the Project based on evaluation and approval of Environmental Impact Assessment (EIA) study • Responsible for monitoring the Project's Environmental compliance throughout the Project lifecycle
Forest Department, Ministry of Environment and Forest, Bangladesh	Primary	• The forest department under the Ministry of Environment and Forest is responsible for management of forests and ecological assets of national or international importance within Bangladesh	Medium	• Permission for construction of temporary jetty close to the ecological park (maintained by Forest Department) located about 4 km from the Project site.
District Commissioners Office (DCO), Sirajganj	Primary	• The District commissioners office is the most senior administrative authority within the district	Low	• The participation of the district commissioners office is restricted to permitting and clearances • Is the primary agency for overseeing the Project's compliances to local administrative rules and regulations
Local Government Engineering Department (LGED), Sirajganj	Secondary	• Local Government Engineering Department (LGED) is one of the largest public sector organizations in Bangladesh entrusted with planning and implementation of local level infrastructure development programs.	Low	• Is responsible for maintenance of the approach road to the Project site over the lifecycle of the Project
Directorate of Labour, Ministry of Labour and Employment	Primary	• Primary nodal agency for creating employment opportunities, implementation for labour laws, fix minimum wages of labour, and ensuring addressal of labour related grievances though labour courts	Medium	• All labour related permits and licences have to be procured by both the Project Company as the principal employer as well as the contractors and sub-contractors working in the Project • Responsible for undertaking periodic audits and compliance check at the site in order to ensure proper implementation of

Stakeholders	Category of Stakeholder	Brief Profile	Overall Influence on the Project	Basis of Influence Rating
				the local labour regulations
Dept. of Social Welfare (DSW)	Secondary	• Local governmental agency responsible for implementation of governmental social welfare schemes and activities in Sirajganj District.	Low	• No major influence on Project related activities • However participation level and influence may increase in case community welfare activities proposed by the Project proponent are implemented in coordination with this agency
Dept. of Public Health and Engineering	Secondary	• Primary department responsible for managing the overall healthcare facilities in the district • Local community healthcare centres and hospitals functioning under this department are responsible for providing medication and healthcare facilities to the community	Low	• No major influence on Project related activities • Key agency responsible for managing healthcare facilities around the Project area • Controlling out-break of any major disease and monitoring the disease pattern
Other Regulatory & Permitting Authorities	Primary	• Bangladesh Railways for obtaining railways related clearances for transportation of HSD • Bangladesh Water Development Board (BWDB) for transportation of material and resources through the Jamuna River	Medium	• Agencies required for obtaining permits and licenses for establishment and operation of the Project • Primary involvement during pre-construction and operation phases
Contractor & Sub-Contractors				
Contractors (local and foreign)	Primary	• Contractors include OEM (Original Equipment Manufacturers), part suppliers, mechanical installers and maintenance service providers who would be engaged during the Project lifecycle	Medium	• Construction phase will require almost 1500 people (for both civil and mechanical work), during peak construction stage, including both local and migrant workers over a span of almost 2 and a half years • Engagement levels would be mostly during construction, and decommissioning phases
Migrant Workers and Labourers	Primary	• Labourers and workers arriving from outside of Sirajganj for participating in construction activities	Medium	• Responsible for undertaking mostly skill based work during construction phase • Engagement level during both civil and mechanical phases of work
Local Workers and	Primary	• Labourers and workers recruited		• Responsible for undertaking mostly un-skill

Stakeholders	Category of Stakeholder	Brief Profile	Overall Influence on the Project	Basis of Influence Rating
Labourers		from the Area of Influence mostly during the construction phase of the Project		based work during construction phase and housekeeping related work during operation phase of the Project • Engagement level primarily in civil construction part of the work
Political Administration				
Upazilla (sub District Level) Political Administration Union leaders & local representatives	Secondary	• Elected representative of people at sub-district level for a fixed tenure • Elected representative at union level i.e. village level for a fixed tenure	Medium	• Key linkage between the community and the Project proponent • Plays important role in providing public opinion and sentiment on the Project • Empowered to provide consent and authorization for establishment of Project on behalf of the community
Other Institutional Stakeholders Groups				
Local NGOs and Community & Social Welfare Groups (CSWG)	Secondary	• Microfinance agencies, social welfare groups and charitable organizations working in the area	Low	• No major involvement in the Project as per today • Possible inclusion during future stages of the Project with respect to Project related community welfare activities
Media	Secondary		Medium	• Public watchdog on the Project related activities • No major influence on the Project as of today

5.7 STAKEHOLDER ENGAGEMENT ACTIVITIES

The process of Stakeholder engagement refers to the exchange of information, as well as regular communication with the stakeholders. The primary focus of such an engagement process is to develop a relationship based on mutual understanding and trust on issues of common interest. Some of the key principles suggested by international practices for effective stakeholder engagement include:

- Conducting meaningful consultation with affected people and other concerned stakeholders, including civil society, and facilitate their informed participation;
- Providing meaningful information in a format and language that is readily understandable and tailored to the needs of the target stakeholder group(s);
- Starting consultation early in the Project preparation stage and is carried out on an ongoing basis throughout the Project cycle;
- Providing information in advance of consultation activities and decision-making;
- Providing information in ways and locations that make it easy for stakeholders to access it and that are culturally appropriate;
- Respect for local traditions, languages, timeframes, and decision-making processes;
- Two-way dialogue that gives both sides the opportunity to exchange views and information, to listen, and to have their issues heard and addressed;
- Conducting consultation in an atmosphere free of intimidation or coercion;
- Developing clear mechanisms for responding to people's concerns, suggestions, and grievances;
- Being Gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and
- Incorporating, where appropriate and feasible, feedback into Project or program design, and reporting back to stakeholders.

For the construction phase, engagement methods that are a mix of information disclosure and consultation are identified. These engagement methods are identified in keeping with the profile of the stakeholders and the level of engagement required. The primary methods identified include:

- Individual level consultation/discussion;
- Information disclosure;
- Focus group discussion; and
- Community meetings

These serve the purpose of allowing the project proponents to gain an understanding of the viewpoint of the other stakeholders involved in a project in regards to the functioning of the project, the implementation of various provisions in the project. These modes of engagement also provides the stakeholder with an opportunity to be involved in the formulation and

implementation of the various strategies and plans while allowing them to voice their concerns or suggestions pertaining to the project. The following table provides the engagement plan according to the stakeholder groups identified for the construction phase.

Table 5.2 Methods of Engagement for Stakeholder Groups

Stakeholder Group	Method of Engagement	Frequency	Responsible Department[1]	Monitoring Indicators
North West Power Generation Company Limited (NWPGCL)	• Information disclosure	• Periodically, need based	• XXXX	• Reports and/or Minutes of Meetings
Project Financiers to include the International Finance Corporation, the CDC Group plc and Clifford Capital	• Information disclosure	• Periodically, need based	• XXXX	• Reports and/or Minutes of Meetings
Bangladesh Power Development Board	• Information disclosure	• Periodically, need based	• XXXX	• Reports and/or Minutes of Meetings
Pashchimanchal Gas Company Limited (PGCL	• Information disclosure	• Periodically, need based	• XXXX	• Reports and/or Minutes of Meetings
Bangladesh Petroleum Corporation (BPC)	• Information disclosure	• Periodically, need based	• XXXX	• Reports and/or Minutes of Meetings
Power Grid Corporation of Bangladesh (PGCB)	• Information disclosure	• Periodically, need based	• XXXX	• Reports and/or Minutes of Meetings
Local Community	• Individual level consultation /discussion; • Information disclosure; • Focus group discussion; and • Community meetings	• Monthly or quarterly	• XXXXX	• Minutes of Meetings

[1] Need to be updated by the EPC Contractor

Stakeholder Group	Method of Engagement	Frequency	Responsible Department[1]	Monitoring Indicators
Fishing Households	• Individual level consultation /discussion; • Information disclosure; • Focus group discussion;	• Monthly or quarterly	• XXXXX	• Minutes of Meetings
Department of Environment (DoE) Ministry of Environment and Forest, Bangladesh	• Information disclosure	• Periodically, need based	• XXXX	• Reports and/or Minutes of Meetings
Forest Department, Ministry of Environment and Forest, Bangladesh	• Information disclosure	• Periodically, need based	• XXXX	• Reports and/or Minutes of Meetings
District Commissioners Office (DCO), Sirajganj	• Information disclosure	• Periodically, need based	• XXXX	• Reports and/or Minutes of Meetings
Local Government Engineering Department (LGED), Sirajganj	• Information disclosure	• Periodically, need based	• XXXX	• Reports and/or Minutes of Meetings
Directorate of Labour, Ministry of Labour and Employment	• Information disclosure	• Periodically, need based	• XXXX	• Reports and/or Minutes of Meetings
Dept. of Social Welfare (DSW)	• Information disclosure	• Periodically, need based	• XXXX	• Reports and/or Minutes of Meetings
Dept. of Public Health and Engineering	• Information disclosure	• Periodically, need based	• XXXX	• Reports and/or Minutes of Meetings
Other Regulatory & Permitting Authorities	• Information disclosure	• Periodically, need based	• XXXX	• Reports and/or Minutes of Meetings
Migrant Workers and Labourers	• Focus group discussion;	• Monthly	• XXXX	• Minutes of Meetings
Local Workers and Labourers	• Focus group discussion;	• Monthly	• XXXX	• Minutes of Meetings
Upazilla (sub District Level) Political Administration	• Information disclosure	• Periodically, need based	• XXXX	• Reports and/or Minutes of Meetings
Union leaders & local representatives	• Information disclosure	• Periodically, need based	• XXXX	• Reports and/or Minutes of Meetings

Stakeholder Group	Method of Engagement	Frequency	Responsible Department[1]	Monitoring Indicators
Local NGOs and Community & Social Welfare Groups (CSWG)	• Information disclosure	• Periodically, need based	• XXXX	• Minutes of Meetings
Media	• Information disclosure	• Periodically, need based	• XXXX	• Minutes of Meetings

Note: It should be noted that the stakeholder analysis and framework plan thus formed are based on the present understanding of the project and its activities. The stakeholder identification and analysis process and engagement plan shall be regularly reviewed and updated as required.

This engagement will also include those done as part of the IEE or EIA for regulatory environmental clearance certificate from DOE and the additional meetings and disclosure sessions with stakeholders organized by SCU and NWPGCL.

5.8 *GRIEVANCE REDRESS MECHANISM*

The grievance redress mechanism under this SEP provides a formal forum to the aggrieved or interested stakeholders to deal with issues arising out of environmental and social related issues linked to the project. The proposed Grievance Redress Mechanism (GRM) has been developed for the Project to promote amicable dispute settlement through mediation to reduce/avoid the escalation of such issues to litigation.

5.8.1 *Structure of Grievance Redress Mechanism*

There will be a Grievance Redress Cell (GRC), an officially body that will seek to resolve disputes arising out of various matters related to the implementation of the stakeholder engagement activities. The GRC meetings will be held in the Project Company's site office and the same will be widely publicised in project area for the knowledge of general public.

Responsibility of GRC

The key responsibilities of GRC are as follows:

- Review, consider and resolve grievances related to social and environmental aspects received by the Project Company Field Office having the GRC;
- Entertain grievances of indirectly affected persons and/or persons affected during project implementation;
- Resolve grievances within a period of two weeks at the GRC level and communication of the resolution to the aggrieved party;
- The GRC shall not engage in any review of the legal standing of an "awardee" nor shall deal with any matters pending in the court of law;

- Arrive at decisions through consensus, failing which resolution will be based on majority vote. Any decision made by the GRC must be within the purview of Environmental Management Plan, Corporate EHS and Social Policies or any such documents of relevance of that matter;
- In case the grievance relates to environmental monitoring results or engineering matters, the GRC will validate the information available to it, as provided by the Project Company's Project management team/ environmental monitoring team. However, GRC will not be in a position to question the validity of the data provided to it. The GRC team shall meet at least twice a month for review of grievances registered and the resolution vetted out to the concerned parties. The frequency of meeting may increase or decrease depending on the number grievances received.
- If needed, may undertake field visits to verify and review the issues, dispute or other relevant matters.

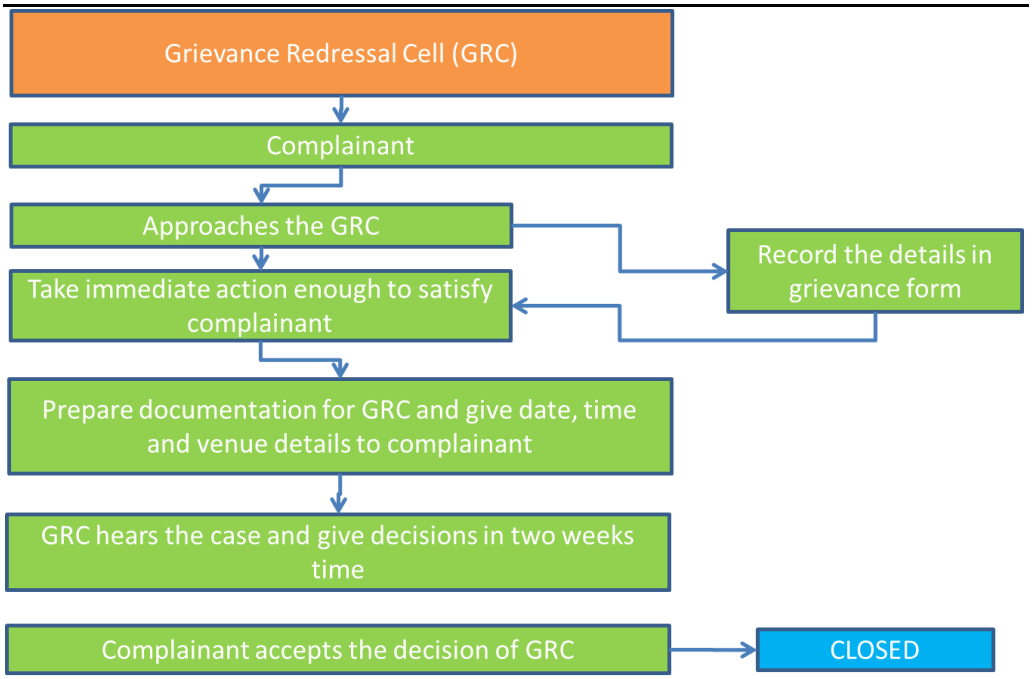
Grievance Reporting Procedure

An aggrieved person, a group of persons or a community will be able to file grievances without any fear and intimidation. The grievances can be submitted in either in writing or may be submitted orally/ telephonically to the GRC; the whole purpose is to make the GRM easily accessible to the affected population. Once the complaint is received, acknowledgement of the same will be made to the complainant, and tentative date of hearing may be communicated to him/her in advance. The complainant may be represented by him/her or appointed agent for hearing of grievance. The decision made by GRC will be communicated to the concerned person/group/community in writing. If dissatisfied, with the decision of the GRC, the person/ group/ community may register the grievance at the administrative level in case there are necessary channels for the same.

5.8.2 Process of GRC for handling Complaints

The grievance redress procedure will include the stepwise procedure, to deal with any grievance that comes for redress before the GRC. A schematic representation of the grievance redress procedure to be followed by the Project Company is being shown below in Figure 5.1.

Figure 5.1 Grievance Handling Process by GRC



Grievances primarily related to any serious event such as accidents involving the community, labour related major disputes such as non-payment of wages or work related injuries or fatalities, major intrusion of project on any community resource, and other issues for which the aggrieved party in his or her free will wants to register a grievance or complaint.

The process followed will follow the following steps:

- On receipt of complaint the GRC shall give an acknowledgement to the complainant with date, time and venue of hearing of his/her grievance.
- The GRC shall prepare a brief note on the grievance for discussion on scheduled date. On the given date, the GRC shall hear the complainant and give its decision. A written copy of decision shall be provided to the complainant. If the complainant is satisfied with the decision, an acknowledgement of same shall be obtained from him on the decision copy and the case shall be closed.
- While every effort shall be made to resolve the complaint amicably, if the complainant is not satisfied with the outcome of GRC's decision, he or she can opt for any grievance redress forum available at the administrative level or any other arbitration mechanism with mutual agreement. If these alternative mechanisms of resolution of conflict fails, then the aggrieved person may take legal recourse However, every effort shall be made to resolve the case amicably without resorting to legal course of action. While the process continues, a proper documentation of the records shall be maintained by the project company, pertaining to each of the grievance in a proper grievance register or record.

5.8.3 Disclosure of the Grievance Redress Mechanism

GRM procedures and operational rules will be publicized widely through community meetings and pamphlets in the local language so that people are aware of their rights and obligations, and procedure of grievance redress.

5.9 *MONITORING AND DOCUMENTATION*

Like the other project components, the SEP and GRM shall be monitored to ensure that the stakeholders are being adequately engaged and they are having no or limited issues with the project and in case there are concerns, they are being adequately addressed as per the mandate. In order to keep track on the effectiveness of the plans, it shall be the responsibility of the EPC Contractor to compile and maintain a database on engagement activities and grievances received for periodic review. The mechanism shall be based on two components, internal monitoring and reporting and external monitoring and reporting which shall run simultaneously. Mostly this shall be aligned with simultaneous process monitoring rather than doing it separately all the time.

5.10 *ROLES, RESPONSIBILITIES & RESOURCES*

In order to meet the objectives of the SEP and GRM, the EPC Contractor will ensure the engagement and grievance redressal process is given as much importance as the other project activities as well as guarantee the availability of certain resources. The EPC Contractor will provide for and dedicated staff as well as ensure the budgetary requirements are met at every stage of the project.

Box 5.1 Sample Grievance Form

Reference No.		**Date**	
Full Name			
Address			
Phone no.			
Date, time & venue of GRC meeting			
Description of Incident or Grievance (What happened? Where did it happen? Who did it happen to? What is the result of the problem?)			
Date if Incident or grievance (provide details such as **One time incident/grievance (date _____)** **Happened more than once (how many times? _____)** **On-going (currently experiencing problem) _____)**			
What would you like to see happen to resolve the problem?			
Signature of complainant /thump impression of complainant		**Signature of person filling the form (SCU Representative)**	

5.10.1 Manpower

In order to ensure the proper implementation of the SEP and GRM, the EPC Contractor will make available human resources in the form of internal resources existent and external resources such as NGOs or other third party organizations. The internal manpower will include:

- Site personnel serving as the EHS/Community Relations officer, who shall serve as the Grievance Officer and lead the stakeholder engagement process
- Senior Representative on behalf of the Project Company and part of the site level project management team. In most cases, this individual shall be of an authority not lower than the "***Site Manager***". However in cases where the site manager is not available, this role may be deputed to his immediate deputy or any individual with that level of authority;
- Representatives of departments including HR, Environment; Health and Safety and Commercial etc.
- Any other concerned person with decision making authority in relevance to the stakeholders identified, grievances received or aggrieved party
- There would be an external member nominated by the local District Administration to be part of the GRC. The nominated member may be an elected member from the Union Parishad or a senior administrative officer of the district.

The GRC and stakeholder engagement cell shall be empowered to takes decisions which are to be considered final and binding on the Project Company. However, the decision of the GRC is not binding on the aggrieved person and he or she may take the grievance to the administrative setup in case any grievance channel is available at that level or take a legal course, in case not satisfied with the outcome of GRC decision.

5.10.2 *Budget*

The Project Company's administration shall ensure adequate budgeting and resource allocation for implementing the stakeholder engagement plan and grievance redress mechanism

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