एनटीपीसी
NTPC
A MAHARATAN COMPANY

एन टी पी सी लिमिटेड
(भारत सरकार का उद्यम)
NTPC Limited
(A Govt. of India Enterprise)
(Formerly National Thermal Power Corporation Ltd.)
केन्द्रीय कार्यालय/Corporate Centre

CC: ESE: 9579:2016: GEN

Date: 05.08.2016

Director, IA- (Thermal)
Ministry of Environment, Forests and Climate Change
3rd Floor, Vayu Block,
Indria Paryavaran Bhawan,
Jor Bagh Road, Aliganj,
New Delhi – 110 003

Sub.: Application for Environmental Clearance for Barethi STPP, Stage-I (4 x 660) MW – Reg.

Ref.:- J-13012/59/2010– IA.II (T)

Dear Sir,

The subject project was appraised during the EAC meetings held on 19.05.2015 and 16.06.2016 wherein EAC of MOEF&CC has sought certain clarifications.

NTPC response to the clarifications is enclosed as **Annexure-A**.

It is requested to re-consider the proposal for accord of Environmental Clearance (EC) for Barethi STPP, Stage-I (4x660 MW) at the earliest.

Looking forward for kind consideration,

Thanking you,

Yours faithfully,
For and on behalf of NTPC Ltd.

(R.K. Baderia)
GM & HOD (Env.Engg)

Encls: As above.

अभियांत्रिका कार्यालय परिसर, प्लाट नं. ए–8ए, सैक्टर–24, पोस्ट बाक्स नं. 13, नोयडा (उ.प्र.) पिन–201301
ENGINEERING OFFICE COMPLEX, Plot No. A-8A, Sector-24, Post Box No. 13, NOIDA (U.P.) Pin-201301
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Regd. Office : NTPC Bhawan, SCOPE Complex, 7, Institutional Area, Lodhi Road, New Delhi-110003

ANNEXURE-A

Reply for Queries Raised by EAC of MOEF&CC for Barethi STPP Stage-I (4x660) MW

1. *Revised plant layout with 33% green belt of the project area, with focus towards Khajuraho, and Panna Tiger Reserve.*

NTPC RESPONSE:

The plant layout has been revised envisaging an area of about 500 acres for development of green belt in all available/vacant spaces as well as all along the periphery of project area.

Detailed write up on green belt development plan and revised GLP showing proposed green belt status is enclosed as **Annexure-I.**

An additional plantation/afforestation will be developed on the land made available by the forest department within the study area (10 Km). Madhya Pradesh Rajya Van Vikas Nigam Limited (MPRVVNL) has consented vide letter dated 06.07.2016 regarding plantation/afforestation of 5.30 lakhs trees and maintenance for a period of 5 years which covers an area of approximately 500 acres is enclosed as **Annexure-IA.**

2. *The plantation must be started immediately along the periphery areas, so that some cover will be available by the time the plant becomes operational.*

NTPC RESPONSE:

NTPC has prepared an action plan for the development of green belt in and along the periphery of the project area. Accordingly, the plantation activity will be initiated immediately after the accord of Environmental Clearance for the project ensuring sufficient green belt cover at the time the plant becomes operational.

3. *Detailed Storm water management system.*

NTPC RESPONSE:

A surface area drainage map for the entire project area showing the storm water drainage system is enclosed as **Annexure-II.**

A detailed Storm Water disposal for coal handling and fuel oil handling area is enclosed as **Annexure-II (A)**.

4. *MoUs for the entire 2.9 MTPA of fly ash proposed to be utilized for manufacture of cement.*

NTPC RESPONSE:

A revised Fly Ash Utilization Plan along with the comfort letters / Expression of Interests (EOI) obtained from various Cement Industries for lifting of fly ash from the project is enclosed as **Annexure-lll**.

5. *Low lying areas are not to be developed using fly ash.*

NTPC RESPONSE:

It is to confirm that no fly ash generated from the project will be used for the development of the low lying areas.

6. *Detailed sulphur balance. AAQ modelling for all the four seasons shall be carried out and submitted.*

NTPC RESPONSE:

A detailed Sulphur balance is enclosed as **Annexure-IV.**

The Air Quality modelling predictions of annual and all seasons are enclosed as **Annexure-V.**

7. *Impact of fugitive emissions.*

NTPC RESPONSE:

Details about the impacts assessment study and mitigation measures regarding the fugitive emissions from all the vulnerable point and non-point sources in the project area *i.e. transport, coal handling area, ash pond area etc* are enclosed as **Annexure-VI**.

8. *Impact on the aquatic flora and fauna*

NTPC RESPONSE:

Shyamri stream and Bada Nala stream are monsoon fed streams carrying sufficient rain water during monsoon season and are dry during non-monsoon season. At Present most of the agriculture in the proposed project area is rainfed having very low per unit yield and poor agriculture intensity. There is practically no flow in Shyamri stream and Bada Nala stream in lean season. The Government of Madhya

Pradesh has committed an annual evaporation and environmental release/ flow of 4.24 MCM in the Shyamri dam and 9.52 MCM in the Majhgaon dam for sustenance of the aquatic life of the lower streams area.

The creation of the reservoir with assured release of environmental flows in non-flowing period, will transform Shyamri stream and Bada Nala stream in to perennial one. This will lead to development of the fishes as well as promotion of aquatic flora and fauna. Also creation of water body will lead to the qualitative and quantitative improvement of the agriculture yield, eventually leading to sustainable family income.

Further, NTPC shall conduct a study on aquatic flora and fauna in lower streams area and recommendations of the study reports shall be communicated to the State Government for implementation.

9. *The details regarding water drawl, including reported plan that only excess water during monsoon will be stored in the dam and utilised for the plant and that there will be no change or diversion in non-monsoon flows, or in the downstream water withdrawal during non-monsoon period and impact of the same etc. In this connection, the EAC also pointed out that the PP's contention that there will be no impact on Ken river is not tenable, since both the dams that will cater to the project's water requirement are fed by the Ken river.*

NTPC RESPONSE:

Detailed write up along with schemes for drawl of make-up water from proposed Majhgaon & Shyamri dams and elaborating its all likely impacts are enclosed as **Annexure-VII**.

10. *Considering the scale of the project and proximity with the Panna Tiger Reserve and the contiguous forest, NBWL clearance/comments shall be obtained as already desired earlier by the EAC. The Ministry may also seek comments from its wildlife department.*

NTPC RESPONSE:

As per the letter dated 16.09.2015 is enclosed as **Annexure-VIII (A)** received from the Office of Field Director, Panna Tiger Reserve, Panna (M.P), it was communicated that;

- Distance of project site from the proposed Eco-Sensitive Zone of Panna Tiger Reserve is 12.234 Km

- Distance of project site from the Buffer Zone of Panna Tiger Reserve is 11.812 Km

- Distance of project site from the of Core Zone of Panna Tiger Reserve is 14.244 Km

In this regard, a map showing the Buffer Zone of Panna Tiger Reserve duly signed and stamped by Field Director of Panna Tiger Reserve is also enclosed as **Annexure-VIII (B)**.

It is also pertinent to mention that as per MOEF&CC Office Memorandum (O.M) dated 02.12.2009, NBWL Clearance is required if, the project falls within 10 km area of Wildlife Sanctuary.

Further, NTPC has written a letter to MOEF&CC on 12.07.2016 requesting that Clearance from NBWL may please not to be insisted upon copy of the letter is enclosed as **Annexure-VIII (C)**.

11. *Since the site is ecologically sensitive, the EAC recommended that no further expansion of the project may be permitted in future at the site*.

NTPC RESPONSE:

At current stage no future expansion is envisaged at the site. However, depending upon the situation if the country/state will have any power short fall & if Government of India recommends, then NTPC will approach MOEF&CC before expansion for necessary clearance.

12. *As already desired earlier by the EAC, all the required measures to protect the natural surface drainage pattern of the area shall be taken.*

NTPC RESPONSE:

A surface area drainage map for the entire project area showing the storm water drainage system is enclosed as **Annexure-II.**

13. *Hydro geological study needs to be elaborated.*

NTPC RESPONSE:

Hydro geological study of the area has been carried out by IIT Roorkee. The comprehensive Hydro geological report has already been submitted to MOEF&CC on 03.06.2016 and circulated to all the EAC members for their kind perusal.

14. *A detailed map of the area showing streams, tributaries, dams, Ken River etc.*

NTPC RESPONSE:

A map showing the details of the area indicating the streams, tributaries, dams and Ken River is enclosed as **Annexure-IX.**

ANNEXURE- I

Green Belt Development / Afforestation Plan

1.0 Green Belt Development

In any industrial project it is most important to chalk out a long-term approach to keep air clean. One such measure is using the plants for absorbing and trapping the air pollutants. Plants in general and trees in particular, function as sinks for gaseous pollutants and this is achieved through various physiological processes occurring within the plant system.

Green belt acts as bio filter for the air pollutants and play a major role in safeguarding the environment and controlling the increasing level of air and noise pollution. It can serve as buffer and shock absorber against transient and accidental release of pollutants from industrial complex.

The green belt has been recommended as one of the major components of the Environmental Management Plan (EMP) which will further enhance the environmental quality by:

1. Mitigation of air pollution
2. Attenuation of noise level
3. Maintaining the bio diversity of the area by restoring water balance, checking soil erosion
4. Improvement in the overall environment & aesthetics of the plant site

2.0 Areas for Green Belt Development

Greenbelt will be designed as per the Guidelines of CPCB. An area of 500 acres is envisaged for green belt development both in the plant and township. A green belt consisting of plantation of native/indigenous species and possibly leguminous species allround the main plant and township with a width of 50 m – 100 m will be developed in and all available spaces within the plant boundary except plant boundary. The proposed Greenbelt Plan shown in the General Layout Plan (GLP) is enclosed as **Exhibit-1**.

Plantation site would be cleared from all wild vegetation. Suitable soil and water conservation measures will be adopted, if required. Since plantation area is large, it would be divided into blocks inter-linked by paths laid out in such a way that every tree is accessible for all post plantation care. The planting arrangement and size

would be based on the optimum use of the available land and quantum of irrigation water.

A tree requires sufficient space below and above the ground to spread its roots and branches. However, spacing varies with the tree species, soil fertility, availability of moisture and purpose of plantation.

Plantation shall be developed in and around:

1. Avenue plantations along road sides in Main Plant and Township areas.
2. Shelterbelt Plantations along the vicinity of ash storage/ disposal sites/ water reservoirs and along boundary walls.
3. Plantations of recreational and socio-economical importance such as flowering/ fruiting/ medicinal species in selected places like habitations, shrubs and small trees under the power transmission lines.
4. Block and Strip plantations as well as solitary plants will be raised on possible locations.

The natural vegetation type in study area is predominantly Tropical Dry Deciduous Teak Forest followed by Tropical Dry Deciduous Mixed Forest. Project site is surrounded by protected forest namely Parariya (8 km), Barkuan (9 km), Basari (6.5 km), Ganj (6.5 km), Bedari (7 km). Teak is the dominant species. The other associated tree species includes Saja, Seja, Tendu, Mahua, Rohan, Jamun, Achar, Kusum, Bad and Khair. The list of the dominant tree species found in the study area are as follows:

List of dominant trees found in the Study Area

S N	Local Name	Hindi Name	Botanical Name
1	Achar	Achar	Buchanania Lanzan
2	Arjun	Arjun, Koha	Terminalia arjuna
3	Aam	Aam	Mangifera indica
4	Kardhai	Kardhai	Anogeissus accuminata
5	Kalla	Korkut	Dillenia
6	Kathgullar	Kathmoor	Ficus hispida
7	Amla	Amla	Emblica officinalis
8	Imali	Imali	Tamarindus indica
9	Kasie	Kasie, kasahi	Bridelia seuamosa
10	Kari	Kari damsal	Milusa tomentosa
11	Kala siras	Kala siras	Albizia lebbek
12	Kevlor	Kevlor	Bauhinia purpurea
13	Kumbhi	Bhai, kumbhi	Careya arborea
15	Kusum	Kusum	Schleichera oleosa

S N	Local Name	Hindi Name	Botanical Name
16	Kekad	Kekad	Garuga pinnata
17	Kaith	Kaitha	Feronia limonia
18	Kem (Mundi)	Mundi	Mitragyna parviflora
19	Khair	Khair	Acacia catechu
20	Garari	Garari	Cleistanthus collinus
21	Gamari	Khamhar	Gmelina arborea
22	Gullar	Dumar	Ficus glomerata
23	Gunja	Kekad	Gardenia pinnata
24	Chichwa	Chichwa	Albizzia odoratissima
25	Chirol	Chirhole	Holoptelea integrifolia
26	Jamun	Jamun	Syzygium cumini
27	Kankar	Kankar	Lannea coromandalica
28	Tinsa	Tinsa, tilawa	Ougenia oojeinensis
29	Tun	Tun	Cedrela toona
30	Tondari	Tondari	Casearia tomentosa
31	Dhahpalas	Dhahman	Cordia myxa
32	Dhaman	Dhaman	Grewia tillaefolia
33	Dhawada	Dhawa	Anogeissus latifolia
34	Dhobin	Dhobil	Dalbergia paniculata
35	Neelgiri	Neelgiri	Eucalyputs Spp
36	Neem	Neem	Azadirachta indica
37	Palas	Chwela	Butea monosperma
38	Pakhar	Pakar	Ficus infectoria
39	Padar	Padar	Stereospermum suaveolens
40	Pangara	Hadua	Erythrina suberosa
41	Peepal	Peepal	Ficus religiosa
42	Pula	Barnga	Kydia calycina
43	Bad	Bargad, bar	Ficus bengalensis
44	Bhera	Bheda	Terminalia belerica
45	Beejasal	Beeja	Pterocarpus marsumpium
46	Babool	Babool	Acacia nilotica
47	Bel	Bel	Aegle marmelos
48	Bhirra	Bhirra, bhirha	Chloroxylon excelsum
9	Bhornsal	Bhrkut	Hymenodictyon excelsum
50	Maharukh	Maharukh	Ailanthus excels
51	Mahuaa	Mahuaa	Madhuca indica
52	Mokha	Mokha, dhatha	Schrebera swietenioides
53	Riunja	Riunsa	Acacia leucophloea
54	Rohan	Rohan, rohina	Soymida febrifuga
55	Lsoda	Labher, lsuda	Cordia dichotoma
56	Seesam	Kala seesam	Delbergia latifolia

S N	Local Name	Hindi Name	Botanical Name
57	Gurara	Sefad siras	Albizzia procera
58	Saguan	Saguan	Tectona grandis
59	Saj	Saja	Terminalia tomentosa
60	Salie	Slie, salenh	Boswellia serrata
61	Seja	Senja, lendia	Legrertroemia parviflora
62	Semal	Samara	Bombax ceiba
63	Sonpakar	Kadbar	Ficus tomentosa
64	Sonpadar	Kotri	Radermachera xylocarpa
65	Haldu	Haldu, kalmi	Adina cardifolia

3.0 Selection of Tree Species

Plants possess a large surface area and their leaves exhibit an efficient pollutant trapping mechanism. The effectiveness of plants to control pollution depends upon the physiological, morphological traits such as leaf epidermis, size, leaf orientation, internal enzyme system, etc. For pollution abatement purposes tree species would be fast growing native species, wind firm, unpalatable to animals, hardy and pollutants tolerant/resistant.

Selection of species will based as mentioned below:

- Indigenous/Native tree species will be preferred for planting.
- Tall and broad leaves trees will be planted particularly near the ash storage sites so as to reduce ash spread in the surroundings. Special such as Azadirachta indica (Neem), Dalbergia sisoo (Shishum), Albizia lebbeck (Siris), Focus sp., Terminalia arjuna, Ailanthus excels, Slbizia Procera will be planted along boundaries, selected roads and ash dykes and water reservoir.
- Plants with dense foliage and flowers such as Pongamia pinnata (Karani), Casia siameo, Bahunia sps., Polyalthia longifolia, Astonia scholaris, Nerium sps., Nyctanthus arboriristis, Ashoka, Silver Oak, Bottle Brush, Amltas etc. will be preferred for avenue plantations along roads and in parks etc.
- Timber tree species will also be considered for block plantations in open spaces which are not likely to be used in near future for extension of the project activities.
- Fast growing and early maturing species will be planted in the locations which may come under future expansion programme of the project.
- Moderately growing plants which can provide raw material for house hold cottage activities (e.g. silk), fuel and fodder will be preferred in the areas near local rural habitations.

- Plants capable of efficient pollutant trapping capabilities, such as - . Alstonia scholaris, Azadirachta indica, Melia azadirachta, Grevillea robusta, Tamrindus indica, Terminalia arjuna, Ficus species., Cassia Seamea, Dalbergia Sisoo, Pongamia pinnata, Cassia fistula etc. will be preferred at the time the selections of the species. Fruit bearing and medicinal plant and the species having recreational value will be preferred in the housing colony.

4.0 Plan of Work for Plantation

- Detailed plantation work plan including name of the species and their numbers, location, density, raising of seedlings, plantation techniques, stages, period, maintenance/ monitoring schedule, replacement, costing etc. will be drawn in consultation with some local experts from the State Government agency/ institution.
- Species and location wise plan of the plantation will be depicted on a General layout plan and project site map before the actual plantation work begins.
- One or two year old seedlings/saplings will be procured from State Forest Department/Corporation and if it is not available with them then the private agencies were approached. Establishment of nursery will be undertaken in case the plantation material is not available from some other sources. Adequate arrangement for watering, particularly during early years, weeding and hoeing, replacing the casualties and fencing will be envisaged in the plan.
- Plantation work will, preferably, be entrusted to a government agency, such as Forest Department/Development Corporation.
- Also efforts will be done for undertaking long term MoU with State forest dept. for development and maintenance of green belt in the vacant land as identified by forest dept.

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: mprvvn@rediffmail.com

MADHYA PRADESH RAJYA VAN VIKAS NIGAM LIMITED

REGISTERED OFFICE : Panchanan 5th Floor, Malviya Nagar, Bhopal-462003 (M.P.)

क्रमांक/म.नि./पी.एस./2016/ 2451 भोपाल, दिनांक 06-07-16

प्रति,

श्री रजत कुमार वागची,
महाप्रबंधक (EMG),Cc,
एन.टी.पी.सी. लि.,
नोएडा

विषय :– Request for exploration – near Barethi Plant – NTPC.

संदर्भ :– आपका ई–मेल से प्राप्त पत्र दिनांक 22.06.2016

विषयांतर्गत संदर्भित पत्र से प्रेषित प्रस्ताव अनुसार एन.टी.पी.सी. के छतरपुर (म.प्र.) जिले के बरेठी प्लांट की 10 कि.मी. की परिधि के अंतर्गत आने वाले वन मण्डल छतरपुर के वन कक्ष कमांक पी 562 एवं 563 में चयनित वनक्षेत्र में 5.30 लाख पौधों का रोपण एवं 5 वर्ष तक रख–रखाव किये जाने हेतु म.प्र.राज्य वन विकास निगम की ओर से सहमति प्रदान की जाती है।

कृपया उक्त संबंध में शीघ्र आगामी कार्यवाही करने का कष्ट करें।

नि.म.प्र.राज्य वन विकास निगम लि.

(डॉ0 आर. पी. सिंह)
प्रबंध संचालक

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MADHYA PRADESH RAJYA VAN VIKAS NIGAM LIMITED

REGISTERED OFFICE : Panchanan 5th Floor, Malviya Nagar, Bhopal-462003 (M.P.)

क्रमांक/म.नि./पी.एस./2016/ 2451 भोपाल, दिनांक 06-07-16

Ref.: Slno. / P.Ni./P.S/2016/2451 **Dated:** 06.07.2016

Copy To,

Sh. Rajat Kumar Bagchi
General Manager (EMG),CC
NTPC Ltd.
Noida

Subject: Request for exploration-near Barethi Plant-NTPC.

Reference: Your letter received vides e-mail dated 22.06.2016.

In reference to subject proposal submitted vide aforesaid letter/mail for plantation within 10 km radius of Barethi Plant in Chhatarpur district (M.P), M.P. Rajaya Van Vikas Nigam Ltd. hereby accords its consent for undertaking plantation/afforestation of 5.30 lakhs plants and its maintenance for 5 years in the selected forest block of P-562 & P-563 under Chhatarpur forest division

(Dr. R. P. Singh)
Managing Director

WIND ROSE

BERNE NALLAH

KARRITIR NALLAH

B2 OUT FALL DRAIN

APPROACH ROAD

ASH DYKE

T4-T5 (2.5M WIDE RCC DRAIN WITH SLOPE 1:1000, STARTING DEPTH 1.75M)

T3-T4 (2.5M WIDE RCC DRAIN WITH SLOPE 1:1000 (WITH STARTING DEPTH OF 1.75M)

T2-T3 (4.5M WIDE RCC DRAIN WITH SLOPE 1:1000)

T1-T2 (3M WIDE RCC DRAIN WITH SLOPE 1:1000, STARTING DEPTH 2M)

T7-T2 (4M WIDE RCC DRAIN WITH SLOPE 1:1000; STARTING DEPTH 3M)

T6-T7 (2.0M WIDE RCC DRAIN WITH SLOPE 1:1000; STARTING DEPTH 2M)

T8-T9 (2.2M WIDE RCC DRAIN WITH SLOPE 1:1200 (WITH STARTING DEPTH OF 1.00M)

RESERVOIR PART-II (AREA = 40 ACRE)
EMBANKMENT TOP LEVEL RL+281.5M
RESERVOIR BED LEVEL RL+276.0M (APPROX.)

RESERVOIR PART-I (AREA = 40 ACRE)
EMBANKMENT TOP LEVEL RL+281.5M
RESERVOIR BED LEVEL RL+276.0M (APPROX.)

SPACE FOR FUTURE EXPANSION

TOWNSHIP 150 ACRE

B1 TO BERNE NALLAH OUT FALL DRAIN

NOTES

1. ALL DIMENSIONS ARE IN MM AND LEVELS ARE IN METRES UNLESS NOTED OTHERWISE.
2. CONCRETE SHALL BE OF GRADE M25 FOR DRAINS AND CULVERTS AS PER IS: 456-2000.
3. MINIMUM CLEAR COVER TO MAIN REINFORCEMENT OF TOP SLAB, WALL AND BASE SLAB SHALL BE 40 MM.
5. ALL CIVIL AND STRUCTURAL WORKS SHALL BE CARRIED OUT IN CONJUNCTION WITH THE CONTRACT TERMS AND CONDITIONS, TECHNICAL SPECIFICATION & SCHEDULE OF QUANTITIES.
6. DEPTH OF DRAIN SHALL MEAN HEIGHT FROM INVERT LEVEL(IL) TO FINISH GROUND LEVEL.
7. PCC BELOW FOUNDATIONS SHALL BE LAID IMMEDIATELY AFTER EXCAVATIONS. IN CASE OF ANY LOOSE MATERIAL BELOW FOUNDING LEVEL THE SAME SHALL BE REMOVED AND FILLED BY PCC. WATER TABLE SHALL BE MAINTAINED AT 0.5M BELOW FOUNDING LEVEL.
8. REINFORCEMENT STEEL SHALL BE HIGH YIELD DEFORMED TMT BARS OF GRADE FE-500 CONFIRMING TO IS:1786 (LATEST)
9. WEEP HOLES AT EVERY ONE METRE DISTANCE SHAL BE PROVIDED FOR DEPTH OF DRAIN MORE THAN 1M.
10. SLOPE OF THE DRAIN SHALL BE 1 VERTICAL : 1000 HORIZONTAL UNLESS OTHERWISE NOTED.
11. DRAINS ARE TO BE PROVIDED ON BOTH SIDES OF THE ROAD AND ON ONE SIDE OF PETROL ROAD ALL ALONG THE BOUNDARY WALL.
12. ADDITIONAL CULVERTS/DRAINS NOT SHOWN IN THE DRAWING BUT REQUIRED TO MEET THE FUNCTIONAL REQUIREMENT SHALL ALSO BE PROVIDED BY THE BIDDER.
13. EARTHWORK EXCAVATION FOR TRUNK DRAIN FORM T1 TO T2 AND FROM T2 TO T3 UPTO SECTION 3M x 3M IS NOT IN THE SCOPE OF BIDDER. BE PROVIDED BY THE BIDDER.
14. CONNECTION OF DRAINS FROM POINTS T3 AND T10 UPTO THE NATURAL DRAIN IS IN BIDDER SCOPE. FOR CONNECTION RCC DRAINS ARE TO BE PROVIDED. FORM T3, NATURAL DRAIN IS ABOUT 2000M AND FROM T10 NATURAL DRAIN IS ABOUT 200M. FOR CONNECTION UPTO NATURAL DRAIN "AREA DRAINAGE STUDY" CAN BE REFEREED.
15. WHEREVER STARTING DEPTH OF DRAIN IS NOT MENTIONED OR SOME ADDITIONAL DRAIN IS TO BE PROVIDED, STARTING DEPTH SHOULD BE MIN. 600MM. WIDTH OF THE DRAIN WHEREVERE NOT MENTIONED OR FOR ADDITIONAL DRAIN SHOULD BE MIN 500MM.

LEGEND:

1. LAND ACQUISITION LINE
2. DRAINS IN OTHER SCOPE
3. DRAINS IN BOP PACKAGE SCOPE

FOR TENDER PURPOSE

NTPC Limited
(A GOVERNMENT OF INDIA ENTERPRISE)
ENGINEERING DIVISION

BARETHI SUPER THERMAL POWER PROJECT
STAGE-I (4X660MW)

TITLE: STROM WATER DRAINAGE LAYOUT

REV.NO.	DESCRIPTION	DRAWN	DESIGN	CHKD.	M	E	C	C&I	ES	APPD	DATE
A	FOR TENDER PURPOSE	RAJ K.	AP		--	--	RB	--	--		23.02.15

CLEARED BY

SIZE	SCALE	DRG. NO.	REV. NO.
A0	1:4000	9579-001C-PVC-C-A-007	A

CAD FILE: 9579-001C-PVC-C-A-007

ANNEXURE-II (B)

STORM WATER DISPOSAL FOR COAL AND OIL HANDLING AREA FOR BARETHI STAGE-I(4X660 MW)

To minimize contamination of plant effluent with storm water, the drains for plant effluent and that for the storm water have been segregated. Plant process effluents collected through separate area wise pits and then continuously pumped from different areas to Effluent Treatment Plant and after treatment the same is reused/recycled to achieve zero liquid discharge from process. Storm water will be disposed from the plant and will not require any treatment. The areas in which contamination of rain water is likely to occur, will be treated separately and the same will be reused in various process e.g. CW make-up, Service Water etc. The rain water collected in the Storm /rain water drains in other catchment areas within plant where contaminations will not occur (other than Coal Stockyard, F.O. Unloading area & DM Plant acid/alkali Neutralization Pit area), the rain water will go out of plant boundaries as it is. The treatments or measures taken for drains in three specific contamination areas are as follows

Coal Stockyard Area:

The coal stockyard drain shall be directed to Coal slurry settling ponds and the entire water shall be collected in Coal Decanted Water Sump under all conditions. The cumulative capacity of the identified settling ponds (3 nos) is 3000M^3

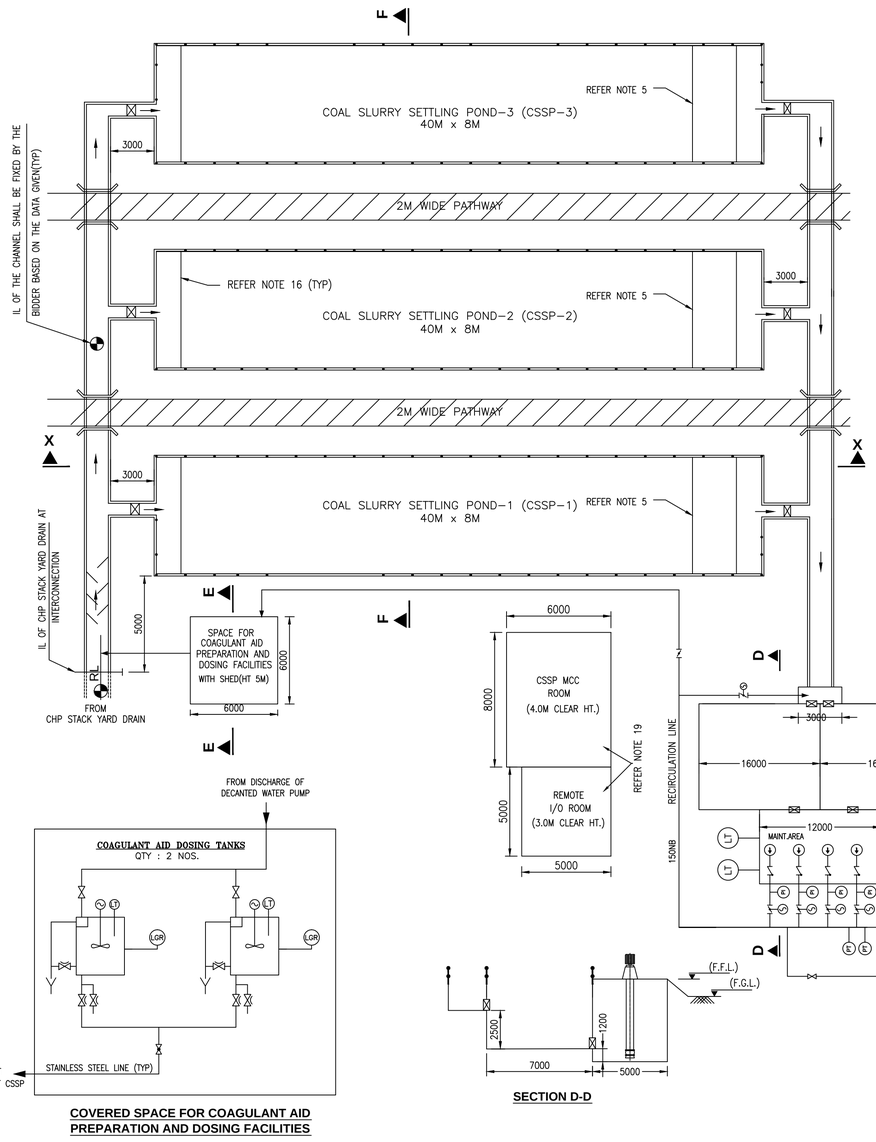
Under Normal Condition only one (01) Settling pond will be operating and under heavy rain condition all three (3) ponds will be operating through opening of gates. The decanted coal water pumps shall pump water to CHP dust suppression tank in Coal Handling Plant. In storm and heavy rain water condition, the valve to CHP Tank shall be closed and the decanted water from settling pond shall be pumped to a stilling chamber as shown in the P&ID. This water shall be clarified in an additional clarifier (Cap = 2000m^3/h) and put back to CW channel for CW make-up. For the storm condition, 2x500m^3/h pumps shall be running additionally in the existing coal decanted water sump. The maximum water expected to be handled by the system in storm water condition is assumed to be 1630m^3/h. The coagulant dosing in the proposed clarifier shall be from the existing chemical house only.

Fuel Oil unloading area:

The contaminated storm/rain water, if any, from the FO unloading catchment area will be collected in a pit and will be pumped by 2x30M^3/hr capacity pumps to waste service water sump (two sections) of cumulative volumetric capacity 500 m^3 (refer the attached P&ID for liquid Effluent Treatment system). The waste service water mixed with oil will be clarified in Lamella Clarifiers (2 nos) and treated water will be collected in treated water pit for further pumping to CMB/ETP and shall be reused as service water in plant. The maximum water expected to be handled by the system in storm water condition is assumed to be 20 m^3/h based on average rain fall data.

DM water neutralization Pit:

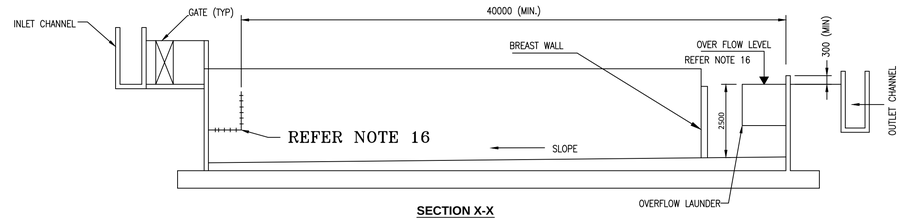
The DM Water neutralization Pit shall be covered and will not get full during rain/Storm.



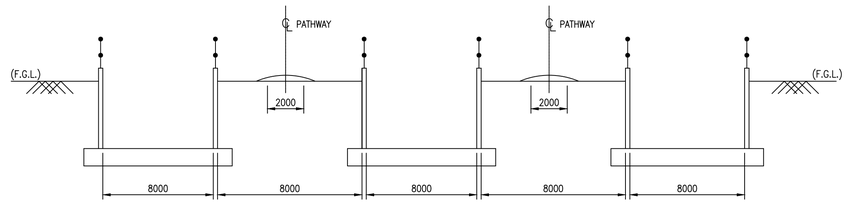
COVERED SPACE FOR COAGULANT AID PREPARATION AND DOSING FACILITIES

SECTION E-E

SECTION D-D



SECTION X-X



SECTION F-F

NOTES:

1. ALL DIMENSIONS ARE IN mm AND ELEVATIONS ARE IN METRES.
2. DIMENSIONS INDICATED ARE MINIMUM CLEAR INSIDE DIMENSIONS EXCLUDING THICKNESS OF WALL/COLUMN/SLABS/BEAMS ETC.
3. DIMENSIONS & ELEVATIONS OF ALL BUILDINGS/STRUCTURES/FACILITIES SHOWN HERE REPRESENT A SYSTEM REQUIREMENT. BIDDER SHALL CHECK THE SAME FOR EFFICIENT AND SAFE WORKING OF THE PLANT. BIDDER SHALL FURTHER DEVELOP THE SAME DURING DETAILED ENGINEERING AND GET IT APPROVED FROM OWNER BEFORE EXECUTION.
4. DRAINS, OVERFLOWS ETC. OF VARIOUS UNITS SHALL BE IN BIDDER'S SCOPE UPTO THE TERMINAL POINT. THIS SHALL INCLUDE ALL PIPINGS, VALVES, MANHOLES, INTERCONNECTING CHAMBERS ETC. TO THE EXISTING OWNER'S DRAINAGE SYSTEM AS INDICATED BY OWNER AT THE TIME OF DETAIL ENGINEERING.
5. A BREAST WALL SHALL BE CONSTRUCTED AT 5M BEFORE THE POND OUTLET TO EFFICIENTLY UTILISE THE POND VOLUME.
6. HAND RAILING, RUNGS ETC. SHALL BE PROVIDED ON ALL THE WATER SUMPS AND INLET CHAMBERS AND IN CSSP.
7. INLET AND OUTLET CHANNELS OF CSSP SHALL BE DESIGNED SUITABLY TO TAKE BOTH NORMAL (400M/HR PER POND) FLOW AND STORM WATER FLOW CONDITIONS (1000M/HR PER POND).
8. STAIRS(MINIMUM 2 FOR EACH SECTION) SHALL BE PROVIDED TO FACILITATE FOR TAKING OUT THE SETTLED COAL SLURRY MANUALLY FROM THE CSSP.
9. POND SIZES INDICATED HERE ARE THE MINIMUM DIMENSIONS. FURTHER I.L. OF POND (MIN. 2.5M FROM THE POND OVERFLOW LEVEL) SHALL BE FINALISED BY THE BIDDER. NECESSARY CALCULATIONS FOR JUSTIFYING THE LEVELS, POND SIZE ETC. SHALL BE FURNISHED ALONGWITH THE OFFER INCLUDING SAFETY AGAINST UPLIFT.
10. DESIGN SETTLING VELOCITY OF THE COAL PARTICLES = 5M/HR (MAX).
11. COAGULANT AID DOSING SHALL BE USED TO AID THE SETTLING OF COAL PARTICLES DURING THE STORM WATER FLOW CONDITIONS.
12. MAXIMUM WATER LEVEL IN CSSP-1, 2 & 3 SHALL BE EQUL TO RL IN M
13. TOTAL SUSPENDED SOLIDS AT THE INLET TO CSSP SHALL BE CONSIDERED AS 1800 PPM.
14. NECESSARY CROSS-OVERS SHALL BE PROVIDED BY THE BIDDER FOR EASY APPROACH TO THE VARIOUS AREAS OF THE CSSP.
15. OVERFLOW LEVEL OF CSP SHOULD BE LESS THAN OR EQUAL TO INVERT LEVEL OF INLET CHANNEL TO COAL SLURRY SETTLING PONDS.
16. FOR PROPPER DISTRIBUTION OF COAL SLURRY WATER INLET DISTRIBUTION CHAMBER OF 8Mx1.2M SHALL BE PROVIDED.

LEGENDS:

BIDDER'S SCOPE

------ NOT IN BIDDER'S SCOPE

FGL:- FINISHED GROUND LEVEL TO BE PROVIDED BY THE OWNER.

FFGL:- FINAL FINISHED GROUND LEVEL TO BE ACHIEVED BY THE BIDDER.

FFL:- FINISHED FLOOR LEVEL.

FOR TENDER PURPOSE ONLY

REV.	DESCRIPTION	DRAWN	DESIGN	CHKD.	CLEARED BY C	M	E	C&I	APPD	DATE
A	RELEASED FOR TENDER	TARUN								

NTPC Limited
(A GOVT. OF INDIA INTERPRISE)
ENGINEERING DIVISION

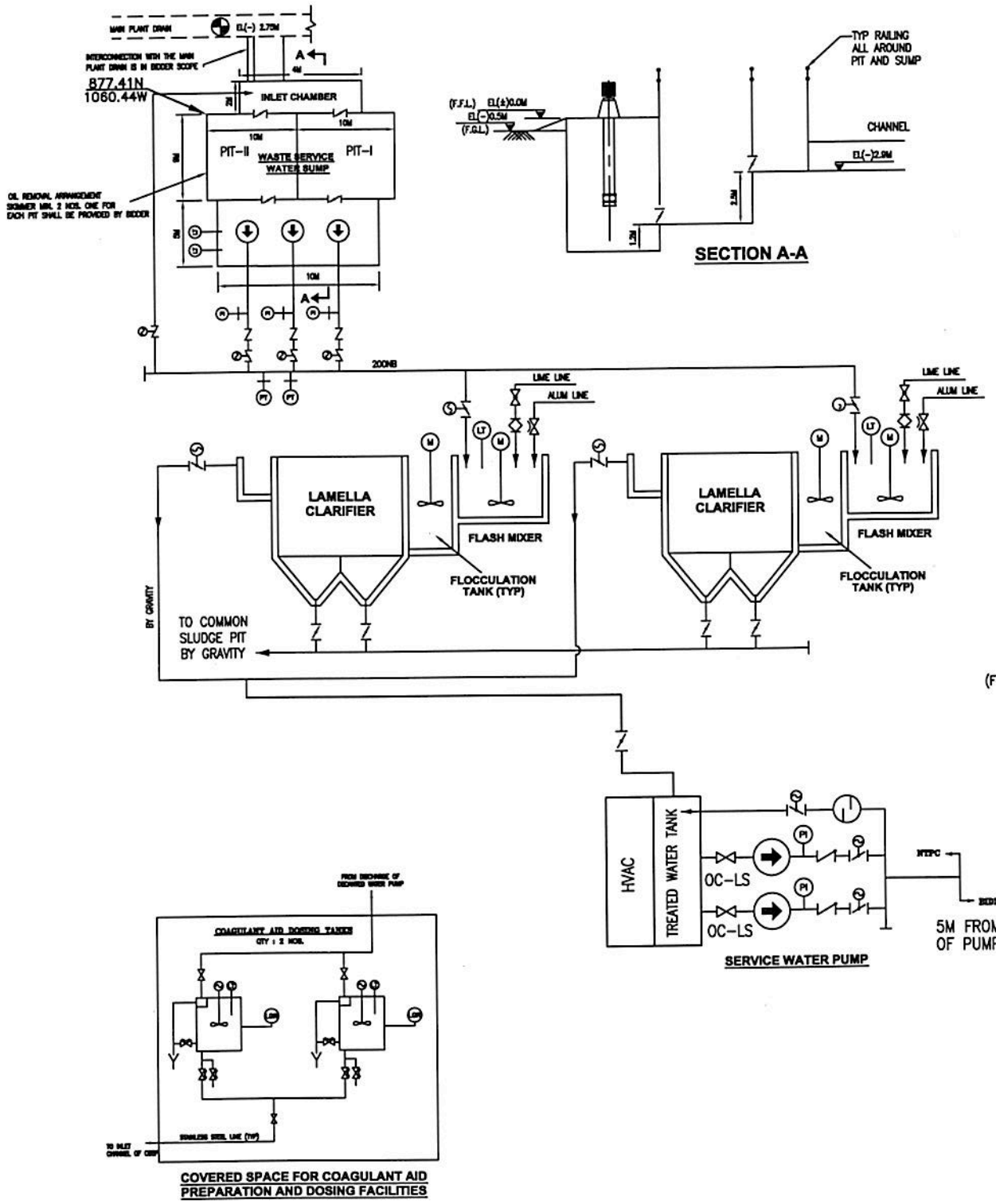
PROJECT: BARETHI SUPER THERMAL POWER PROJECT STAGE-I (4X660MW)

TITLE: P & ID & LAYOUT OF COAL SLURRY SETTLING POND & TREATMENT SYSTEM

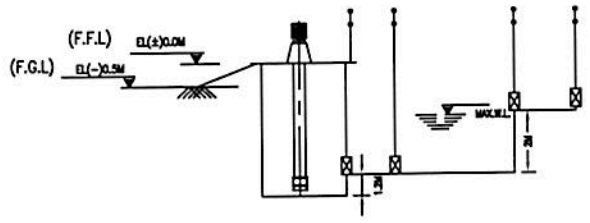
SIZE	SCALE	DRG.NO.	REV.
A1	NTS	9579-001C-POM-A-003	A

CAD FILE NAME : 9579-001C-POM-A-003

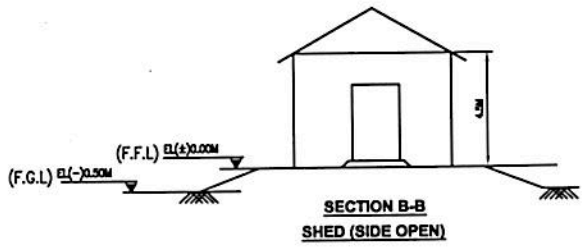
PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT



SECTION A-A



SECTION E-E



SECTION B-B
SHED (SIDE OPEN)

SERVICE WATER PUMP

COVERED SPACE FOR COAGULANT AID PREPARATION AND DOSING FACILITIES

NOTES:

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. DIMENSIONS INDICATED ARE CLEAR INSIDE DIMENSIONS MINIMUM EXCLUDING THICKNESS OF WALL/COLUMN/SLABS/BEAMS ETC.
3. DIMENSIONS & ELEVATIONS OF ALL BUILDINGS SHOWN HERE REPRESENT A MINIMUM REQUIREMENT. BIDDER SHALL CHECK THE SAME FOR EFFICIENT AND SAFE WORKING OF THE PLANT. BIDDER SHALL FURTHER DEVELOP THE SAME DURING DETAILED ENGINEERING AND GET IT APPROVED FROM OWNER BEFORE EXECUTION.
4. DRAINS, OVERFLOWS ETC. OF VARIOUS UNITS SHALL BE IN BIDDER'S SCOPE UPTO THE TERMINAL POINT. THIS SHALL INCLUDE ALL PIPINGS, VALVES, MANHOLES, INTERCONNECTING CHAMBERS ETC. TO THE EXISTING OWNER'S DRAINAGE SYSTEM AS INDICATED BY OWNER AT THE TIME OF DETAIL ENGINEERING.
5. ALL AREAS ARE TO BE PROPERLY VENTILATED.MINIMUM AREA REQUIREMENT FOR WINDOWS VENTILATORS,GLAZING ETC. TO BE PROVIDED AS PER TECHNICAL SPECIFICATION.
6. LOCATION OF DOORS SHALL BE DECIDED DURING DETAIL ENGINEERING.

LEGEND:-

BIDDER'S SCOPE OF WORK

FOR TENDER PURPOSE ONLY

REV.	DESCRIPTION	DRAWN	DESIGN	CHKD.	CLEARED BY C	M	E	C&I	APPD	DATE
A	RELEASED FOR TENDER	TARUN								

एन टी पी सी NTPC **NTPC Limited**
(A GOVT. OF INDIA ENTERPRISE)
ENGINEERING DIVISION

PROJECT: **BERATHI SUPER THERMAL POWER PROJECT**
STAGE-I (4 X 660MW)

TITLE: **P & I D & LAYOUT OF LIQUID EFFLUENT TREATMENT SYSTEM**

SIZE	SCALE	DRG.NO.	REV.
A1	NTS	9579-001C-POM-A-002	B

ANNEXURE- III

Ash Utilization Plan

Barethi Super Thermal Power Project

Stage-I (4x660 MW)

Corporate Ash Management Group

NTPC Limited, Noida

June 2016

1.0. Introduction

For gainful utilization of fly ash in various applications, Ministry of Environment, Forests and Climate Change has issued a Gazette Notification dated 03-11-2009 which is an amendment to its earlier notifications dated 14-09-1999 and amendment dated 27-08-2003. The new notification stipulates that all coal based power stations/ units commissioned after the date of issue of notification have to utilize at least 50% of ash generated within 1 year, 70% within 2 years, 90% within 3 years and 100% within 4 years respectively from the commissioning of the units. The notification dated 03-11-2009 further amended on 25-01-2016 also calls for utilization of 100% ash generated.

The amendment dated 25-01-2016 stipulates that the cost of transportation of ash for road construction projects or for manufacturing of ash based products or use as soil conditioner in agriculture activity (i) up to radius of 100 km shall be borne by TPP (ii) beyond 100 km and up to 300 km shall be shared equally between the user and TPP (iii) TPPs shall bear entire cost of transportation of ash within a radius of 300 km in the road construction projects under Pradhan Mantri Gramin Sadak Yojna and asset creation programs of the Government involving construction of buildings, road, dams and embankments.

The unutilized fly ash with respect to the target during a year, if any, shall be utilized within next two years in addition to the targets stipulated for those years and the balance unutilized ash accumulated during the first 4 years shall have to be utilized progressively over next 5 years in addition to 100% utilization of current generation of ash.

2.0. Ash Utilization Plan

NTPC- a socially conscious power utility considers utilization of ash as a thrust area of its activities. Barethi Super Thermal Power Project Stage-I (4x660 MW) is planned to be set up in District-Chhatarpur, Madhya Pradesh (M.P.). Barethi STPP, Stage-I (4X660 MW) is expected to use coal having ash content not exceeding 34% & average GCV 4200 KCal/Kg. It is estimated that the power plant shall produce about 11,500 ton of ash per day i.e. about 3.8 million ton per annum. In order to assess ash utilization potential in the vicinity of proposed expansion project, a market survey /study has been undertaken through a Consultant. The survey covered cement plants located within 100/ 300/ 500 km, RMC plants, brick manufacturing plants and major construction activities within the 100 km, mines within the 50 km radius of Barethi projects. The

sector wise ash utilization potential indicated in the study is presented as follows.

2.1 Cement and Concrete Sector

Cement plants provide a potential for Ash Utilization on sustainable basis. There is large number of cement plants such as Diamond Cement-Damoh, Prism Cement-Satna, Jaypee Cement-Rewa, Satna Cement-Satna etc. of total installed capacity of 26.46 million ton per annum, located within 300 km from the proposed power plant. It is expected that these plants will take fly ash from proposed Barethi project. Further, there are about 14 new/ expansion cement plants of capacity about 35 million ton which are upcoming within 150-200 km of proposed project. The total requirement by all above cement units is estimated to be about 9 MTPA. It is estimated that 30% of the total fly ash requirement of these Cement plants shall be met from Barethi STPP, Stage-I (4X660 MW) due to location advantage. Thus, about 2.9 million ton fly ash per annum from Barethi would be utilized in this sector.

In this context, comfort letters/expression of interest (EOI) have been obtained from the various Cement Industries and are enclosed as **Annexure-A**. Details EOI from different cement industries having potential/demand for utilization of fly ash of about 3.684 are as follows;

EOI from Cement Industry for Fly Ash Utilization from Barethi STPP

Sl. No.	**Name of Cement Plant**	**Expression of Interest for Ash Utilization (MTPA)** As on 26.06.2016
1.	Birla Corporation Ltd. (Satna Cement Works, Satna)	0.7
2.	Prism Cement, Satna	1.8
3.	Diamond Cements, Damoh	0.7
4.	Maihar Cement, Satna	0.002
5.	Reliance Cement, satna	0.002
6.	KIS Cement, Maihar	0.48
Total		**3.684**

2.2 Fly Ash Bricks & other fly ash based building products

Presently there are 4 fly ash brick making plants located in the vicinity of proposed project. NTPC shall also set up pilot cum demonstration fly ash brick making plants at the project to meet in-house requirement and to build up confidence of other potential users. It is expected that through awareness programs, many more brick manufacturers will come forward and utilize fly ash in fly ash bricks & other fly ash based building products manufacturing. The estimated ash utilization potential in this segment is about 0.1 million ton per annum.

2.3 Road and Highway Construction Activity:

As per National Highway Development Program vision 2025, most of the National Highways are going to be upgraded from two lanes to four lanes and from four lanes to six or eight lanes. Hence it is assumed that some of these projects would also fall in the specified zone of NTPC- Barethi as a number of developmental packages are being declared by Central Government as well as State Government of Uttar Pradesh (U. P.) & Madhya Pradesh (M. P.) for the infrastructural development of the Bundelkhand region. It is expected that bottom ash will be used in road project works. The estimated bottom ash utilization would be about 0.8 million ton per annum.

2.4 Overall Market Prospective Potential of Fly Ash Utilization

Sl. No.	Ash Utilization Area	Potential for Ash Utilization (million TPA)
1	Cement & Concrete sector	2.9
2	Fly ash Bricks	0.1
3	Roads and Highway Embankment	0.8
Total Ash Utilization Potential		**3.8**

3.0. Infrastructural Facilities for Ash Utilization

A tentative ash utilization plan proposed for Barethi STPP, Stage-I (4X660 MW) is presented at above table for which support of regulatory authorities will be required. The plan would be revised from time to time based on the actual consumption pattern as well as emerging trends in ash utilization. In order to have maximum ash utilization in various areas and also to comply the stipulations of

MoEF&CC's Gazette Notification on fly ash dated 03-11-2009 & 25-01-2016 following actions are proposed to be taken up by NTPC

i. NTPC shall provide a system for 100% extraction of dry fly ash along with dedicated dry ash silos having separate access roads so as to ease the delivery of fly ash. Provision shall also be kept for segregation of coarse and fine ash, loading this ash to closed/ open trucks and also for loading fly ash into rail wagons. This will ensure availability of dry fly ash required for manufacture of Fly Ash based Portland Pozzolana Cement (FAPPC) for cement plants and Ready Mix Concrete plants.

ii. NTPC shall also promote, adopt and set up the ash based product manufacturing facilities within its premises & fly ash brick thus produced shall be utilized in in-house construction works as well as for supply in the market on price.

iii. NTPC shall make efforts to motivate and encourage entrepreneurs to set up ash based building products such as fly ash bricks, blocks tiles etc in the vicinity of proposed power plant.

iv. All government/ private agencies responsible for construction/ design of buildings, road embankment, flyover bridges and reclamation within 100 km of the plant areas shall be persuaded to use ash and ash based products in compliance of MoEF&CC's Gazette Notification on fly ash.

4.0. Monitoring & reporting mechanism

The project shall be having Ash Management Group (AMG) to promote and coordinate the activities related to ash utilization. In compliance to the provisions of MoEF&CC notification, Annual Ash Utilization Implementation Report shall be submitted by the 30th day of April, every year to the Central Pollution Control Board (CPCB), concerned State Pollution Control Board (SPCB) or Committee and the concerned Regional Office of the Ministry of Environment & Forests and Climate Change (MOEF&CC).

BIRLA CORPORATION LIMITED

Unit : SATNA CEMENT WORKS, SATNA

P.O. Birla Vikas, Satna - 485 005, Madhya Pradesh, Phone : 07672 - 412000 - 01
Fax : (07672) 257456 / 257576, Gram : CEMENT, E-mail: admin@satnacement.com

1. Location details of proposed ash utilization Unit:-

(I) Name of Unit :	Birla Corporation Limited Unit: Satna Cement Works,
(II) Complete Mailing Address With PIN No.	Birla Corporation Limited Unit: Satna Cement Works PO. Birla Vikas, Satna – 485005 Madhya Pradesh
(III) Distance from Chhatarpur	App. 145 Kms (App 140 Km from Basari)
(IV) Contact Person Name	Mr. P C Jaryal, GM (Store & Purchase) Mr. Anirudh Bhardwaj, Dy. Manager (RM)
(V) Cell No. / Phone No.	07672-412439, 412310, 412667
(VI) Fax No.	07672 – 257456, 257576, 257513
(VII) E Mail ID	pcj@satnacement.com rawmaterial@satnacement.com
2. Total Requirement of Fly Ash	Our Total Plant Requirement is 7.20 Lacs Tns / per Annum and we will be lift ash app 1200-1800 Tons Per day from your plant
3. Proposed end use of fly ash	Cement Manufacturing
4. Year of experience	More than 50 Years in Cement Manufacturing
5. Average annual turnover	750 Crores (2014-15)

Dated - 04.06.2015

Place - Satna

P. C Jaryal
GM (Store & Purchase)

Address - Birla Corporation Limited
Unit: Satna Cement Works
PO Birla Vikas, Satna (M.P.)

PRISM CEMENT UNIT - II
(A Unit of Prism Cement Ltd.)
Works : Vill. Mankahari, P.O. Bathia, Dist. Satna - 485111 (M.P.) India
Tel. : (07672) 275301-2, 275621-22, Fax : 275303
Corres. Add. : 'Rajdeep', Rewa Road, Satna - 485 001 (M.P.) India
Tel. : (07672) 402726, Fax : 402710

18.06.15

Requirement of Fly Ash

1. Location details of proposed ash utilization unit :-

(I) **Name of Unit** : Prism Cement Unit-II

(II) **Address** : Village- Mankahari, Teh- Rampur , Satna(PO-485111)

(III) **Contact Person Name** : Sanjay Bhambri

(IV) **Cell No.** : +9584464997

(V) **Fax No.** : +91-7672-275303

(VI) **Email ID** : sbhambri@prismcement.com

2. Total requirement of fly ash : 18 Lacs/Annum

3. Proposed end use of fly ash : Cement

4. Year of experience in the business : Since 1997

5. Average annual Turnover : 2189.00 Crore

Place: Satna

18/6/15

Sanjay Bhambri

Sr. Manager

Prism Cement Limited

Satna

PRISM CEMENT UNIT-II SATNA (M.P.)

By Courier Service

HEIDELBERGCEMENT

Diamond Cements
Prop: HeidelbergCement India Limited
CIN: L26942HR1958FLC042301
Village and P. O. Narsingarh
District Damoh, M.P. 470 675, India
Phone +91-07601-241301, 02 & 05
Fax +91-07601-241235
Website: www.mycemco.com

Ref : HCIL/Ngh/FA/ 982

18th June 15

To,
Dy. Manager (C&I/IT)
M/s. NTPC Limited
Barethi Super thermal Power Project
Green Avenue Satai Road
CHHATARPUR, MP 481 001

Sub : Supply of fly ash from upcoming Barethi Thermal Power Station

Dear Sir,

We are in receipt of your letter no. Barethi/P&S/01 dated 04th June 15 regarding upcoming of 4 * 660 MW Thermal Power Project located at Barethi near Chhatarpur and 1st phase 660 MW likely to commission by Nov 2019.

As desired by you we are pleased to provide the following information :

1) Location details of proposed ash utilization unit
   - i) Name of Unit : Diamond Cements, Prop. Heidelberg Cement India Ltd.
   - ii) Address : Post : Imlai, Dist : Damoh, MP Pin 470 661
   - iii) Distance from Chhatarpur your plant location : Approx. 180 Kms
   - iv) Contact Person Name : K.V.N. Raju, DGM Purchase
   - v) Cell No. : 91655 10927
   - vi) E-mail ID : kvn.raju@heidelbergcement.in
2) Total Requirement of fly ash 7.00 lakhs tons/annum, however the sourcing will be confirmed based on suitability of logistic and other terms & condition.
3) Proposed end use of fly ash manufacturing 2 million tons Cement at above grinding unit
4) Year of experience in the business 8 years in India
5) Average annual Turnover approx.. 2000 Crores

Thanking you,

Yours faithfully,
For Diamond Cements
Prop. Heidelberg Cement India Ltd.

(D.P. Tiwari)
Vice President Purchase

15/6

Format

Requirement of fly ash to be furnished on letterhead of the company

1- Location details of proposed ash utilization unit:-

(i) Name of Unit — Maihar Cement - Maihar

(ii) Complete mailing address with Pin No. — Sartanagar Maihar Satna (MP) 485001

(iii) Distance from Chhatapur" — 200 KM

(iv) Contact person Name: — Shailendra Jain

(v) Cell No : — 09425154021

(vi) Fax No :

(vii) E mail ID:

2- Total Requirement of fly ash — 2000 Tonne/annum

3- Proposed endues of Fly ash — Cement/RMC/Bricks

4- Years of experiencr in Business — 3 years

5- Average annual Turnover:

Date: 22/06/16

Place: Maihar, Satna

Signature

Name of Person Shailendra Jain

Designation Sr. Manager

Name of the Company Maihar Cement, Maihar

Address Sartanagar Maihar

Company Seal — MAIHAR CEMENT, MAIHAR SATNA

Format

Requirement of fly ash to be furnished on letterhead of the company

1- Location details of proposed ash utilization unit:- Reliance Cement, Maihar

(i) Name of unit

(ii) Complete mailing address with PIN no Birla Road, Satna (M.P) 485001

(iii) Distance from Chhatarpur: 200 KM

(iv) Contact person Name: Devendra Chauraiya.

(v) Cell No : 09111020401.

(vi) Fax No :

(vii) E mail ID: Devendra.chouraisiya@reliance.adgroup

2- Total Requirement of fly ash 2000 Tonne/annum

3- proposed endues of Fly ash Cement/RMC/~~Bricks~~

4- Years of experiencr in Business 3 years.

5- Average annual Turnover:

Date: Satna.

Place: 12/06/2016.

Signature

Name of Person Devendra Chauraisia

Designation Sr. Manager

Name of the Company Reliance Cement Co. Pvt Ltd

Address Birla Road . Satna.

Company seal

For : Reliance Cement Co. Pvt. Ltd.

Authorised Signatory

KJS CEMENT

1. LOCATION DETAILS OF PROPOSED ASH UTILIZATION

S.No	DETAILS REQUIRED	Particulars
(i)	Name of unit	KJS CEMENT LTD
(ii)	Complete mailing address with PIN no	purchase@kjscement.com 485771
(iii)	Distance from Chhatarpur:	175 KM
(iv)	Contact person Name	N M Gangwal
(v)	Cell No	7389945362
(vi)	Fax No	07674-292024
(vii)	E mail ID	nm.gangwal@kjscement.com

2- Total Requirement of fly ash **4,80,000** Tonne/annum

3- Proposed endues of Fly ash: **For Making of Cement**

4- Years of experiencr in Business: **4 Years**

5- Average annual Turnover: **585 Lacs**

Date: 24.06.2016

Place: MAIHAR

KJS CEMENT LTD. RAJNAGAR MAIHAR

Signature :

Name of Person: N.M. GANGWAL

Designation : GM (Material)

Name of Company: KJS CEMENT LTD

KJS CEMENT LTD. RAJNAGAR MAIHAR

ANNEXURE-IV

Details of Sulphur Balance equation for Barethi STPP

BACKGROUND:

The total coal requirement for Barethi STPP, Stage-I (4x660 MW) is estimated as 11.0 MTPA. In pursuance to expedite the process of project implementation, Ministry of Coal (MoC) framed a policy guideline in reference to which Coal India Limited (CIL) vide its Office Memorandum (OM) dated 09.05.2016 has accorded in-principle approval for grant of bridge linkage for Barethi STPP, Stage-I (4x660 MW) from coal mines of South Eastern Coalfield Ltd. [80% allocation from projects Korba / Raigarh field of SECL while remaining 20% from Korea Rewa field of SECL.]

Further, the coal quality parameters of SECL coal mine block proximate analysis as received basis are as given below:

- Ash : max. 34%
- Total Moisture : 10 % to 12 %
- Sulphur : 0.26% to 0.4%
- GCV (kcal/kg) : 3800 to 4200

SULPHUR BALANCE CALCULATION:

SULPHUR BALANCE FOR 660 MW PER UNIT	
RATE OF COAL COMBUSTION	352 T/HR
VOLUMETRIC FLOW RATE OF FLUE GAS	672 NM^3 /sec
SULPHUR FEED (0.4 % IN COAL) T/HR	1.408 T/Hr
	1408 Kg/Hr
TOTAL SO2 EMISSION FROM COAL	2.816 T/ HR
	2816 Kg/Hr
SO2 DESIGN VALUE AS PER LATEST TPP STANDARDS OF 100 mg/Nm^3	67.2 gm/Sec
	0.24132 T/Hr 241.32 Kg/Hr

**** Note:** Considering emission rate as per new TPP emission standard for SO_2 - 100 mg/Nm^3

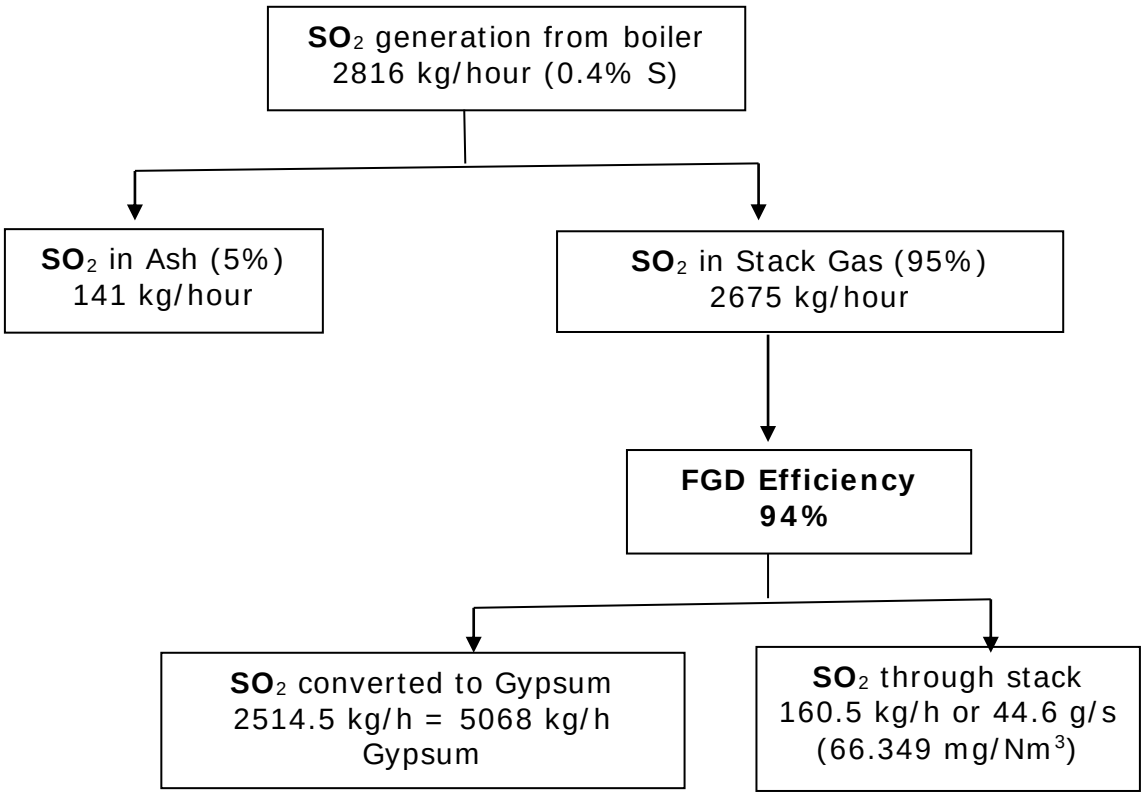
Equations:

$Ca(OH)_2 + SO_2$ ------- $CaSO_3.½H_2O + ½ H_2O$
74 + 64 = 138 120 + 9 + 9 = 138

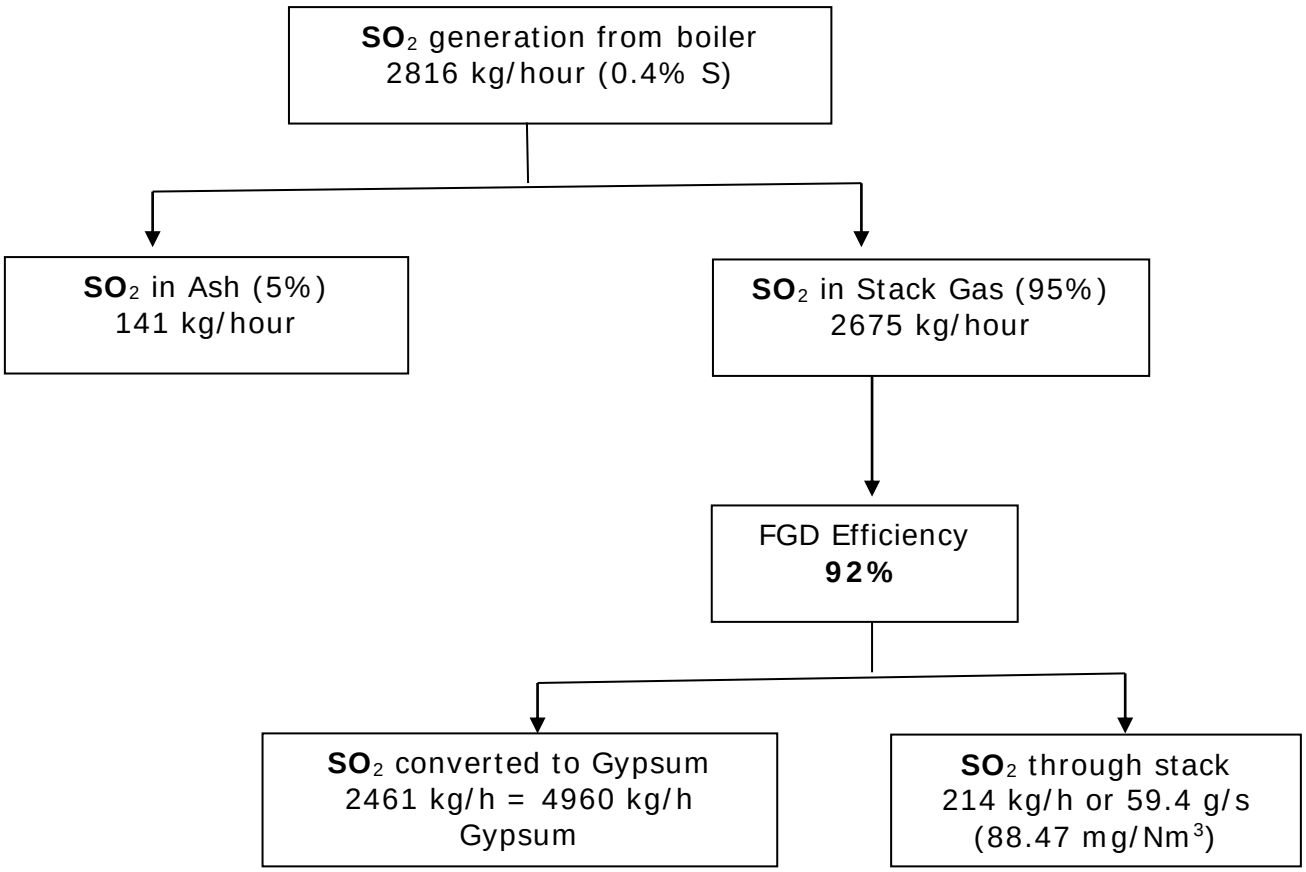
Note: 64 kg SO_2 will produce 129 kg gypsum. Therefore, 1 Kg of SO_2 is equivalent to 2.016 kg gypsum.

The sulphur balance diagram estimated considering different scenario of FGD efficiency **94% & 92% respectively** of is presented below:

Scenario I: With FGD efficiency of 94%



Scenario II : With FGD efficiency of 92%



OBSERVATION:

Coal having sulphur percentage of 0.4% (max.) will be combusted at rate of 352 t/hr/unit which may result in SO_2 emission of 2.675 t/hr assuming that 95% of the sulphur fed is emitted through stack. The remaining 5% is assumed to be a part of bottom ash and fly ash etc.

However, proposed plant will be designed to install suitable Flue Gas Desulphurization (FGD) system with efficiency ranging from 92% to 94% for controlling and limiting SO_2 emission level within 67.2 gm/sec which is equivalent to 99.75 mg/NM^3 to meet the new regulatory norm of 100 mg/NM^3 under all design conditions.

ANNEXURE-V

AIR QUALITY DISPERSION MODELLING REPORT

(For all the four Season)

of

BARETHI SUPER THERMAL POWER PROJECT STAGE-I (4 x 660) MW

At Barethi Village, Tehsil Rajnagar,
District Chhatarpur
(Madhya Pradesh)

Prepared by:

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1.0 Background Information

M/s NTPC Limited intends to set up Barethi Super Thermal Power Project Stage-I (4x660) MW capacity near village Barethi in Rajnagar Tehsil of Chhatarpur district of Madhya Pradesh. Fresh Terms of Reference (TOR) was accorded by MOEF&CC vide letter No. J-13012/59/2010/-IA.II (T) dated 25th July 2014. Final Environmental Impact Assessment Report was submitted for appraisal by the Expert Appraisal Committee of MOEF&CC for grant of Environmental Clearance (EC). The EAC meeting was held on 16th June 2016, and the EAC members sought that NTPC shall carryout the Ambient Air Quality Modelling exercise for all the four seasons and submit the report.

The EIA Consultant appointed by NTPC carried out the modelling study and the findings are described in subsequent sections.

Upon discharge to atmosphere, the air emissions from stationary point sources are subjected to following physical and chemical processes:

1. An initial vertical rise, called plume rise, due to initial buoyancy and momentum of discharge,
2. Transport by wind in its direction,
3. Diffusion by turbulence, and
4. Gravitational settling, chemical transformations, deposition, washout and other complex reactions.

The impact on ambient air quality during the operation of the proposed Barethi STPP, Stage-I (4 x 660 MW) has been predicted using mathematical modelling by following the guidelines developed by CPCB. Modelling was carried out using the USEPA's ISCST3 software. ISCST3 meets the requirement of CPCB guidelines and calculates 24-hour average values.

The impact of stack emission on the ground level concentration (GLCs) of SPM, SO_2 and NOx in the ambient air has been predicted through Industrial Source Complex – Short Term Model (Version 99155). The assumptions made for short-term computations are as follows:

1. The ISC short-term model for stacks uses the steady state Gaussian plume equation for a continuous elevated source
2. Polar coordinate system has been used for computations, and

3. The model computations have been done for distance up to 10.0 km.

The options used for short-term computations are:

- The plume rise is estimated using Briggs formulae, but the final rise is always limited to the height of the mixing layer;
- Stack tip down-wash is not considered;
- Buoyancy Induced Dispersion is used to describe the increase in Plume dispersion during the ascension phase;
- Calms processing routine is used by default;
- Wind profile exponents is used by default, 'Irwin';
- Flat terrain is used for computations;
- It is assumed that the pollutants do not undergo any physicochemical transformation and that there is no pollutant removal by dry deposition; and
- Washout by rain is not considered;

2.0 Required Data for Source Emission Modelling

- **Emission Inventory:** Emission inventory of PM, SO_2 and NOx was prepared using data provided by NTPC. Unit-wise stack diameter, exit velocity, gas temperature, sulphur 0.4 % and pollution load is given in **Table-1** taking into consideration of worst coal emission details (as per new TPP standards-December 2015).

Table-1

Stack Emission Inventory *(As per New TPP Emission Standard-Dec 2015)*

	Name of Unit	Stack height (m)	Stack top dia (m)	Stack temp, (K)	Stack velocity (m/s)	Volume flow rate (Nm^3/s)	Stack Emission Rate (g/s)		
							PM	SO_2	NOx
1	Stack 1 Flue 1	275	8	328	16-18	672	20.2	67.2	67.2
2	Stack 1 Flue 2	275	8	328	16-18	672	20.2	67.2	67.2
3	Stack 2 Flue 3	275	8	328	16-18	672	20.2	67.2	67.2
4.	Stack 2 Flue 4	275	8	328	16-18	672	20.2	67.2	67.2
Total							**80.8**	**268.8**	**268.8**

Emission Rate: *PM - 30 mg/Nm^3, NOx - 100 mg/Nm^3, SO_2 - 100 mg/Nm^3*

- **Meteorological Data:** Surface meteorological data for wind speed, wind direction and ambient temperature that has been generated near the project site has been used. Stability class and mixing height data were obtained from CPCB / IMD Publication and used in the modelling study.

- **Mixing Height:** As the site-specific mixing heights are not available, in the present study the hourly daytime mixing depth has been derived on the basis of the data presented in a CPCB publication *"Spatial Distribution of Hourly Mixing Depth over Indian Region"* for pre-monsoon season.

- **Stack & Receptor Locations**: The stack locations were assigned with reference to one absolute reference point (ARP). Flat terrain was considered for modelling. Cartesian Grid of dimensions 10 km x 10 km area around ARP was considered for modelling.

- **Default Values:** The ISCST model by default does the extrapolation of wind speed to the effective height of release. It calculates final plume rise as per Briggs equation. Since 50% of land inside a circle of 3 km radius around the site does not have considerable build-up area, rural dispersion coefficient is considered for modelling. Dry depletion and wet depletion of pollutants, exponential decay of pollutants during the travel time from source to receptor was not considered, hence the predicted results are over estimates. ISCST3 uses regulatory default options for stack tip downwash, buoyancy induced dispersion, and uses calm processing routines, default wind processing exponents, vertical potential temperature gradients.

3.0 Results & Discussion of Source Emission Modelling

In the present study, simulations have been done for the monitoring period using the hourly Triple Joint Frequency data viz., stability, and wind speed and wind direction. Short-term simulations were done to estimate concentrations at the receptors to obtain an optimum description of variations in concentrations over the site in 10 km. radius covering 16 directions. ISCST3 model was setup for calculating 24-hour average values. The ground level concentrations (GLC) of results obtained by using emission rates mentioned in Table 1 *(as per MOEF&CCs new emission standards for TPP)* were plotted as isopleths (iso-concentration plots) on the topo map showing the locations and directions affected by the air emissions of Barethi STPP.

The isopleths drawn for the four different seasons are shown in **Figures 1 to 12**. The seasonal wind roses are also given along with the isopleths.

The Maximum Ground Level Concentrations (MGLC) obtained by using emission rates given in Table-1 is superimposed over the baseline ambient air quality values of PM_{10} **(**PM_{10} includes $PM_{2.5}$), SO_2 and NOx (maximum value) and shown in **Table 2 to 5**.

Table-2

Prediction of Impact during Winter Season (24-h avg in ug/m^3)

Parameter	Incremental GLC (Max)	Baseline (Max value)	Resultant Concentration	Distance and direction of MGLC	National Ambient Air Quality Standard 2009
SO_2	9.50	5.6	15.1	4 km SSE	80
NO_X	9.50	14.2	23.7	4 km SSE	80
PM_{10}	2.85	56.0	58.85	4 km SSE	100

Table-3

Prediction of Impact during Summer Season (24-h avg in ug/m^3)

Parameter	Incremental GLC (Max)	Baseline (Max in d/w side)	Resultant Concentration	Distance & Direction of MGLC	National Ambient Air Quality Standard 2009
SO_2	9.96	5.6	15.56	4 km NNE	80
NO_X	9.96	14.2	24.16	4 km NNE	80
PM_{10}	2.99	56.0	58.99	4 km NNE	100

Table-4

Prediction of Impact during Monsoon Season (24-h avg in ug/m^3)

Parameter	Incremental GLC (Max)	Baseline (Max)	Resultant Concentration	Distance and direction of MGLC	National Ambient Air Quality Standard 2009
SO_2	6.29	5.6	11.89	4 km E	80
NO_X	6.29	14.2	20.49	4 km E	80
PM_{10}	1.89	56.0	57.89	4 km E	100

Note: Rainfall events not considered for modelling

Table-5

Prediction of Impact during Post Monsoon Season (24-h avg in ug/m^3)

Parameter	Incremental GLC (Max)	Baseline (Max in d/w side)	Resultant Concentration	Distance and direction of MGLC	National Ambient Air Quality Standard 2009
SO_2	6.34	5.6	11.94	3 km E	80
NO_X	6.34	14.2	20.54	3 km E	80
PM_{10}	1.90	56.0	57.9	3 km E	100

4.0 Conclusion:

It can be inferred from Table-2 to Table-5 that prediction of impact under the worst case scenario (worst coal parameter) & based on the emission rates mentioned in Table-1 *(new emission standards stipulated for Thermal Power Plants dated 07.12.2015)* reveals that the maximum incremental ground level concentration (GLCs) value of PM, SO_2 and NO_2 from the proposed Barethi STPP, Stage-I (4x660 MW) when superimposed over the existing baseline concentrations, the resultant concentrations (baseline + incremental) observed to be well within the permissible limit of the National Ambient Air Quality Standards (November 2009) during all the four seasons. However, in normal condition the actual concentration may be much less than the predicted the value. Hence, it can be validated that during the plant operation the ambient air quality would remain well within the prescribed NAAQS for residential, rural and other areas.

5.0 Mitigation Measures

To minimize the impact on ambient air quality due to Barethi STPP Stage-I, the following air pollution control measure have been envisaged;

i. Two twin flue stacks of 275 m height for reducing ground level concentration (GLCs) of air pollutants and to facilitate wider dispersion of pollutants.
ii. Installation of High efficiency ElectroStatic Precipitators (ESPs) to keep PM emission within 30 mg/Nm^3.
iii. Installation/Use of appropriate low NO_x burners and appropriate De-NOx system such as Selective Catalytic Reduction (SCR) system in boiler for controlling and limiting NO_x emission within 100 mg/Nm^3 under all design conditions.
iv. Water spraying at all dust generation areas viz., the coal and ash handling areas for control of fugitive dust emissions.

v. Installation of Flue Gas Desulphurization (FGD) system for controlling and limiting SO_2 emission within 100 mg/Nm^3 under all design conditions
vi. Installation of adequate no. of dust extraction / suppression systems at coal handling plant, coal / stockyard and all other dust prone areas in order to control fugitive dust emissions. In addition water sprinklers also to be installed at CHP area.
vii. Online monitoring instruments for stack emissions, ambient air quality shall be installed.
viii. Developing of Greenbelt (100 m wide) around the plant to arrest the fugitive emissions; and
ix. Asphalting of the roads within the plant area;

ANNEXURE-VI

FUGITIVE DUST MODELLING REPORT
(FROM COAL HANDLING & ASH POND)

BARETHI SUPER THERMAL POWER PROJECT
STAGE-I (4 X 660) MW

At Barethi Village, Tehsil Rajnagar,
District Chhatarpur
(Madhya Pradesh)

Prepared by:

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1.0 Background Information

M/s NTPC Limited intends to set up Barethi Super Thermal Power Project, Stage-I (4 x 660 MW) capacity near village Barethi in Rajnagar Tehsil of Chhatarpur district of Madhya Pradesh. Fresh TOR was accorded by MOEF&CC vide letter No. J-13012/59/2010/-IA.II (T) dated 25th July 2014. Final Environmental Impact Assessment Report has been submitted for appraisal by the Expert Appraisal Committee of MOEF&CC for grant of Environmental Clearance (EC). In the EAC meeting of MOEF&CC held on 16th June 2016, the EAC members sought NTPC to submit the impact prediction from major fugitive dust emission sources like the coal handling and ash pond. The EIA Consultant appointed by NTPC carried out the modelling study and the findings are described in subsequent sections.

2.0 Source of Fugitive Emission

Regulations governing air pollution concentrate on point source emissions, however, emissions from non-point sources, i.e. emissions during raw material storage, transportation and handling are equally important to monitor and control. In fact, often, fugitive emissions can be more harmful than particulate emissions.

The fugitive dust emissions expected may be from coal storage yards, coal conveyor belt area, ash disposal areas, transportation of fuel and solid waste. The fugitive emissions may be divided based on generation i.e. i) During Construction Phase and ii) During Operation Phase.

i. <u>Fugitive Emission During Construction Phase:</u>

The fugitive emission during construction phase may be due to site preparing activities, road transportation, loading & unloading of construction material, operation of construction machineries etc.

In order to mitigate the impacts of the above mentioned activities regular sprinkling of water at site, transportation routes, loading and unloading facilities etc. may be implemented. Regular maintenance of the construction equipment and vehicles shall also be carried out.

ii. Fugitive Emission During Operation Phase:

The major sources of fugitive emissions at Barethi STPP during operation may be due to coal transportation, CHP, ash generation and disposal. In order to mitigate the coal dust emission during transportation water sprinkling shall be implemented. Dust extraction and suppression system is planned at CHP and coal conveyors. Regular water fogging/ spraying is being carried out coal storage yards at most of the NTPC plants and the same shall be followed at Barethi STPP.

3.0 Methodology of Fugitive Dust Modelling

The impact during the coal handling and ash pond on the ambient air quality of the surrounding area has been predicted using mathematical modelling by following the guidelines developed by CPCB ("Assessment of Impact to Air Environment : Guidelines for Conducting Air Quality Modelling" Probes/70/1997-98). Atmospheric dispersion models are mathematical expressions, which attempt to describe the process in the order of emission release rate to atmospheric concentrations. Gaussian Plume Model has been followed for the study. Modelling was carried out using the software ISCST3 developed by the US Environment Protection Agency. The software meets the requirement of CPCB and calculates worst-case 24-hour average values (Short Term).

The Industrial Source Complex Short Term (Version 3) dispersion model provides option to model emissions from a wide range of sources. The model uses a virtual point source algorithm to model the effects of volume sources. Therefore, the basic equation is also used to calculate concentration produced by volume source emission. If the volume source is elevated the user assign the effective emission height. The user also assigns initial lateral and vertical dimensions for the volume source, which are actually added to the downwind distance for the calculation of dispersion coefficients. There are two types of volume sources; surface based sources which can be modelled as area sources, and elevated sources.

The area source model is based on the equation for a finite crosswind line source. Individual area source have the normal east-west and north-south dimensions. The effect of an area source with an irregular shape can be simulated by dividing the area source into multiple squares that approximate the area of the area source. The only requirement is that each grid must be square.

Volume and Area Source Emissions: The volume and area sources options of the ISCST3 model were used to simulate the effects of fugitive dust emissions.

4.0 Required Data for Fugitive Dust Modelling

Emission Inventory: Emission Factors for coal handling and ash pond in thermal power plants operating under Indian conditions are not available. Therefore, inventory of PM emission rate from ash pond and coal handling area of Barethi Super Thermal Power Project was prepared using emission factors given in AP42 (USEPA). The calculations are given below:

PM emission factor for Ash Pond– 250 g/ton
(2300 tons/day ash corresponds to 6.7 g/s)
PM emission factor for Coal Handling – 24.42 g/ton
(1408 tons/hour corresponds to 9.6 g/s)

Meteorological Data: Surface meteorological data for wind speed, wind direction and ambient temperature that has been generated near the project site during winter season has been used. It is presumed that winter season is the most critical season because of more calm periods and high ground based inversions, when worst GLC are seen.

Default Values: The ISCST model by default does the extrapolation of wind speed to the effective height of release. It calculates final plume rise as per Briggs equation. Since 50% of land inside a circle of 3 km radius around the site does not have considerable build-up area, rural dispersion coefficient is considered for modelling. Dry depletion and wet depletion of pollutants, exponential decay of pollutants during the travel time from source to receptor was and attenuation due to dense greenbelt not considered, hence the predicted results are over estimates.

5.0 Results & Discussion of Fugitive Dust Modelling

The ground level concentrations (GLC) obtained by using emission factors mentioned above were plotted as isopleth (iso-concentration plot) on the topo map showing the locations and directions affected by the uncontrolled fugitive dust emissions from coal handling and ash pond of NTPC Barethi. The wind rose along with the isopleth is also shown in **Figure 1**.

The Maximum Ground Level Concentration (MGLC) of PM_{10} is superimposed over the maximum baseline ambient air quality values of PM_{10} and shown in **Table 1.** The top 25 highest GLC values of winter season is given in **Table 2.**

It is observed from the modelling result that maximum fugitive dust will be at 1.5 – 2.0 km from the project in S to SW direction of ash pond location. It is proposed to develop thick three tier greenbelt plantation of 50-100 m width in order to trap and reduce the fugitive dust emissions by almost 70%. It will be ensured that ash disposal will be under moist condition and water sprinkling will be done in the coal handling area.

Further, 100% fly ash utilization plan for the project has been proposed in compliance to the fly ash notification dated 03.11.2009. Also in order to mitigate the fugitive emissions due to ash generation, fly ash will be conveyed through closed silos and remaining unutilized fly ash shall be disposed off through HCSD system in the ash disposal area for which around 660 acres of land has also been earmarked within Barethi STPP.

Table 1: Prediction of Impact during Winter Season (24-h avg in ug/m^3)

Parameter	Incremental GLC (Maximum)	Baseline (Maximum value)	Superimposed value	Distance and direction of MGLC	National Ambient Air Quality Standard 2009
PM_{10}	10.9	56.0	66.9	1.5 -2.0 km S – SW direction of ash pond location	100

Table 2 Top 25 GLC values due to Fugitive Dust from Coal Handling and Ash Pond

RANK	CONC (YYMMDDHH) AT RECEPTOR (XR,YR) OF TYPE
1.	10.85787 (14121024) AT (-1500.00, -2000.00) GC
2.	10.60355 (14121024) AT (-2000.00, -2000.00) GC
3.	10.32870 (14121024) AT (-2000.00, -1500.00) GC
4.	10.26211 (15010324) AT (1000.00, -2500.00) GC
5.	10.09941 (14121024) AT (-2000.00, -2500.00) GC
6.	9.95962 (15010324) AT (1500.00, -2500.00) GC
7.	9.84965 (14121024) AT (-2500.00, -2500.00) GC
8.	9.75892 (15010324) AT (1500.00, -2000.00) GC
9.	9.52419 (14121024) AT (-2500.00, -2000.00) GC
10.	9.50572 (14121024) AT (-2500.00, -3000.00) GC
11.	9.48144 (15010324) AT (1500.00, -3000.00) GC
12.	9.46483 (14121024) AT (-1500.00, -2500.00) GC

13.	9.33685 (15010324) AT (500.00, -2500.00) GC
14.	9.23590 (14121024) AT (-3000.00, -3000.00) GC
15.	9.21935 (15011224) AT (-1000.00, -2500.00) GC
16.	9.20478 (15010324) AT (1000.00, -3000.00) GC
17.	9.01858 (14121024) AT (-2000.00, -3000.00) GC
18.	8.99980 (14121024) AT (-3000.00, -3500.00) GC
19.	8.89945 (14121024) AT (-3000.00, -2500.00) GC
20.	8.81027 (15010324) AT (2000.00, -3000.00) GC
21.	8.80401 (15010324) AT (1500.00, -3500.00) GC
22.	8.73877 (15011224) AT (-1500.00, -2000.00) GC
23.	8.70902 (14121024) AT (-3500.00, -3500.00) GC
24.	8.67014 (15010324) AT (2000.00, -2500.00) GC
25.	8.64282 (14121024) AT (-2500.00, -3500.00) GC

6.0 Mitigation Measures

i. Installation of adequate nos. of water sprinklers at CHP area.

ii. Regular sprinkling of water at all dust generation areas viz., the coal and ash handling areas, transportation routes, loading and unloading facilities etc for control of fugitive dust emissions.

iii. Installation of adequate no. of dust extraction / suppression systems at coal handling plant including coal stockyard, ash handling points, transfer areas and all other dust prone areas in order to control fugitive dust emissions.

iv. Developing of Greenbelt (50-100 m width) around the plant to arrest the fugitive emissions; and

v. Asphalting of the roads within the plant area;

ANNEXURE- VII

NTPC LIMITED
(A Government of India Enterprise)

BARETHI SUPER THERMAL POWER PROJECT

STAGE - I (4 x 660 MW)

SCHEMES FOR DRAWL OF MAKE-UP WATER FROM PROPOSED MAJHGAON & SHYAMRI RESERVOIRS

JUNE 2016

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1.0 Introduction

Barethi Super Thermal Power Project has been conceived as a coal based power plant of 3960MW ultimate capacity near village Barethi & Sandni in Rajnagar Tehsil of Chhatarpur district in Bundelkhand region, Madhya Pradesh. Present capacity of the project Barethi STPP Stage-I (4x660MW). GoMP has allotted 40MCM of water from Majhgaon reservoir & 40MCM water from Shyamri reservoir thereby making total allotment of 80MCM. In lieu of allowing drawal of water for the plant, Govt. of MP has asked NTPC to bear 50% cost of Majhgaon project & 100% cost of Shyamri project. The location of Barethi plant w.r.t. the sites of proposed Majhgaon & Shyamri projects along with tentative pipe corridor routes is placed at **Annexure-I.** Since water is to be drawn from two different sources which are in different directions from the plant, two independent water drawl schemes have been envisaged. The water shall be conveyed through a closed conduit and there shall be no evaporation loss & pilferage shall also be avoided.

The proposed "**Schemes for Drawal of Make-Up Water from proposed Majhgaon & Shyamri Reservoirs**" is being put up for the perusal of Water Resource Department, Govt. of Madhya Pradesh.

2.0 Salient features of Majhgaon & Shyamri Reservoirs

B. <u>Majhgaon Reservoir</u>	
River	Bada Nala
T.B.L.	RL. 187.00 m
M.W.L	RL. 182.50 m
F.R.L.	RL. 182.50 m
Dead Storage Level/ MDDL	RL. 172.00 m
River Bed Level	RL. 154.88 m
Gross storage at FRL	112.62 MCM
Live Storage	105.23 MCM
Dead Storage	7.39 MCM

WATER AVAILABILITY AND PROPOSED UTILIZATION IN MAJHGAON DAM

WATER AVAILABILITY AND PROPOSED UTILIZATION IN MAJHGAON DAM (UNIT: MCM)		
Sl. No.	**Particular**	**75% dependability**
1	Flow in Bada Nala	13.36
2	Flow at Bariyapur PUW for diversion to Majhjaon dam	92.44
3	Total (Sum of 1 & 2)	105.8
4	Live storage Capacity (as per project report)	105.23
5	Water available in storage (Smaller of the available	105.23
	flow and live storage capacity)	
Proposed water utilization		
6	Irrigation	53.71
7	Drinking water	2.00
8	Annual evaporation and environmental release	9.52
9	Total for irrigation, drinking water and	65.23
	environmental release	
10	**Available for Barethi STPP = (5-9)**	**40.00**

The Salient features of the scheme from **Majhgaon reservoir** are as below:-

- The Majhgaon dam will store flow of Bada Nala with net catchment of 51.653 sq km and also water diverted from Ken River at Barirpur pickup weir. It needs mention that only the excess water of KEN River during monsoons is diverted. The proposed Ken-Betwa link project does not cover the command area of Bariyapur PUW. So it is proposed to divert the flow available from catchment of 466 Km2 between downstream of Daudhan Dam and upstream of Bariyarpur PUW.

- An Intake well shall be constructed at about 430m upstream of dam axis approximately at North-2754085 m & East-416424 m on the right

bank of Bada Nala. Invert level of Intake shall be kept at El. 167 m, which is 5m below the minimum draw down level (MDDL) Ground Level at the location of Intake Well is about 162.5 m.

- The Pump house shall be constructed at top of Intake well with level of pump floor at El. 187 m.
- Water shall be conveyed, to Plant area through make up water pipelines.
- The Facility area shall be constructed at dam toe at about 270m downstream of dam axis approximately at North-2754800 m, East-416540 m & El.-163 m on the right bank of Bada Nala.
- An approach bridge of about 156m length from bank to pump house shall be constructed on the right bank of Bada Nala.
- Approach road from dam top to the location of Approach Bridge & from dam top to facility area shall be constructed on the existing hill in right bank of Bada Nala.
- Road proposed by WRD at top of Majhgaon dam shall be used by NTPC for reaching the pump house and its facility area.
- An intermediate in-line booster pump house shall also be constructed near Bamitha.

General Layout plan of this area is shown in **Annexure -II** The tentative location of Intake well, pump house, facility area & approach roads w.r.t. Majhgaon Dam is shown in **Annexure-III.**

B. Shyamri Reservoir	
River	Shyamri
T.B.L.	RL. 341.60 m
M.W.L	RL. 340.00 m
F.R.L.	RL. 338.10 m
Dead Storage Level/ MDDL	RL. 330.90 m
River Bed Level	RL. 322.19 m
Gross storage at FRL	57.130 MCM
Live Storage	51.332 MCM
Dead Storage	5.798 MCM

WATER AVAILABILITY AND PROPOSED UTILIZATION IN SHYAMRI DAM

Water availability and proposed utilization in Shyamri dam (unit: MCM)		
Sl.No.	Particulars	**75 % Dependability**
1	Flow in Shyamri river	57.13
2	Live storage Capacity	51.33
3	Water available for storage (Smaller of the available flow and live storage capacity)	51.33
	Proposed water utilization	
4	Irrigation (as per CSR activity)	7.09
5	Annual evaporation and environmental release	4.24
6	Total for irrigation and D/S release	11.33
7	Available for Barethi STPP = (3-6)	40.00

The Salient features of the scheme from **Shyamri reservoir** are as below:-

- Shyamri dam shall be constructed across stream Shyamri, a tributary of Ken River having a catchment of 212.23 Sq Km.

- A dedicated rectangular sluice of size 1mX1m shall be provided by WRD in the body of Shyamri dam upto sufficient distance away from the dam body for dove-tailing the same with make-up water pipes by NTPC. The sluice shall have hydraulically designed bell mouth intake to avoid entry of air along with provision of trash rack (opening size of 50mm), gate, gate operating platform & approach arrangement for platform from dam top.

- Water shall be conveyed to Make up water Pump house located in the downstream of Shymari dam , from where it shall be conveyed to Plant area through make up water pipelines

General Layout plan of Shyamri dam is shown as **Annexure IV**

3.0 Water Drawal Schedule

The month wise water drawal schedule for drawing 80 MCM of water for Barethi STPP Stage-I (4X660) MW shall be as below:-

Sl. No.	Months	Water drawal per month in MCM	
		From Majhgaon	From Shyamri
1	January	3.397	3.397
2	February	3.068	3.068
3	March	3.397	3.397
4	April	3.288	3.288
5	May	3.397	3.397
6	June	3.288	3.288
7	July	3.397	3.397
8	August	3.397	3.397
9	September	3.288	3.288
10	October	3.397	3.397
11	November	3.288	3.288
12	December	3.397	3.397
Total		**40 MCM**	**40 MCM**

Grand Total	80 MCM

4.0 Dependable flows at Shyamri Dam site

Table below shows computation of dependable flow at the site of Shyamri Dam. The annual dependable flow is 57.13 MCM for 75% dependability.

TABLE 1.1

DEPENDABLE YEILD OF SHYAMRI MEDIUM TANK PROJECT

YEAR	Annual Runoff (MCM)	Annual Runoff in Descending order (NCM)	Frequency	Rank	% of Dependability = m*100/(n+1)
1976-77	106.89	191.84	1	1	2.78
1977-78	59.71	188.24	1	2	5.56
1978-79	159.41	164.22	1	3	8.33
1979-80	37.92	159.41	1	4	11.11
1980-81	191.84	158.53	1	5	13.89
1981-82	61.94	140.44	1	6	16.67
1982-83	188.24	139.01	1	7	19.44
1983-84	139.01	113.98	1	8	22.22
1984-85	57.13	111.41	1	9	25.00
1985-86	80.81	106.89	1	10	27.78
1986-87	53.10	104.14	1	11	30.56
1987-88	65.91	97.97	1	12	33.33
1988-89	51.48	97.57	1	13	36.11
1989-90	33.87	86.30	1	14	38.89
1990-91	97.57	80.81	1	15	41.67
1991-92	158.53	72.20	1	16	44.44
1992-93	164.22	68.99	1	17	47.22
1993-94	66.14	67.64	1	18	50.00
1994-95	104.14	66.14	1	19	52.78
1995-96	51.43	65.91	1	20	55.56
1996-97	86.30	61.94	1	21	58.33
1997-98	113.98	61.84	1	22	61.11
1998-99	111.41	61.32	1	23	63.89

1999-00	97.97	61.06	1	24	66.67
2000-01	49.07	59.71	1	25	69.44
2001-02	72.20	58.37	1	26	72.22
2002-03	67.64	57.13	1	27	75.00
2003-04	140.44	53.63	1	28	77.78
2004-05	61.06	53.10	1	29	80.56
2005-06	68.99	51.48	1	30	83.33
2006-07	47.74	51.43	1	31	86.11
2007-08	53.63	49.07	1	32	88.89
2008-09	61.84	47.74	1	33	91.67
2009-10	58.37	37.92	1	34	94.44
2010-11	61.32	33.87	1	35	97.22
Catchment Area = 212.230 Sq. km					
75% dependable year = 57.13 MCM		Yield rate = 57.13/212.23 = 0.27 MCM/Sq. km			

5.0 Dependable flows at Majhgaon Dam site

The Majhjaon Dam will store flow of Bada Nala and the water diverted from Ken River at Bariyarpur PUW. The 75% dependable flow in Bada Nala is 13.36 MCM. The water availability at Bariyarpur PUW (for diverting to Majhgaon dam) has been worked out on catchment area proportion basis (i.e. 466 km2/22069 km2) of the Ken River flows at Daudhan village. The 75% dependable flows at (for diversion) are 92.44 MCM.

Thus, water availability at Majhgaon Dam is 13.36 + 92.44 = 105.80 MCM at 75% dependability basis

Table1.2

Dependable yield of Bada Nala

Year	Annual Runoff (MCM)	Annual Runoff in desc. Order (MCM)	Frequency	Rank	% of Dependability = m*100/(n+1)
1964	23.03	64.93	1	1	2.04
1965	11.32	63.45	1	2	4.08
1966	8.64	61.88	1	3	6.12
1967	32.84	58.11	1	4	8.16
1968	19.50	44.26	1	5	10.20
1969	19.05	41.96	1	6	12.24
1970	16.66	35.56	1	7	14.29
1971	61.88	34.23	1	8	16.33
1972	64.93	33.80	1	9	18.37
1973	21.26	33.38	1	10	20.41
1974	14.59	32.84	1	11	22.45
1975	44.26	32.27	1	12	24.49
1976	32.27	31.07	1	13	26.53
1977	27.77	28.15	1	14	28.57
1978	28.15	28.02	1	15	30.61
1979	5.69	27.77	1	16	32.65
1980	63.45	27.76	1	17	34.69
1981	12.87	26.56	1	18	36.73
1982	35.56	25.80	1	19	38.78
1983	16.28	25.72	1	20	40.82
1984	33.38	25.71	1	21	42.86
1985	24.56	24.56	1	22	44.90
1986	9.11	23.23	1	23	46.94
1987	13.49	23.03	1	24	48.98
1988	21.26	22.62	1	25	51.02
1989	10.53	21.26	1	26	53.06
1990	26.56	21.26	1	27	55.10
1991	27.76	19.50	1	28	57.14
1992	31.07	19.26	1	29	59.18
1993	23.23	19.08	1	30	61.22
1994	25.80	19.05	1	31	63.27
1995	19.26	16.66	1	32	65.31

1996	28.02	16.28	1	33	67.35
1997	33.80	15.14	1	34	69.39
1998	15.14	14.59	1	35	71.43
1999	41.96	13.49	1	36	73.47
2000	13.32	13.32	1	37	75.51
2001	25.71	13.00	1	38	77.55
2002	22.62	12.87	1	39	79.59
2003	58.11	11.32	1	40	81.63
2004	25.72	10.53	1	41	83.67
2005	34.23	9.87	1	42	85.71
2006	5.42	9.11	1	43	87.76
2007	1.58	8.64	1	44	89.80
2008	5.04	5.69	1	45	91.84
2009	13.00	5.42	1	46	93.88
2010	9.87	5.04	1	47	95.92
2011	19.08	1.58	1	48	97.96
Catchment Area = 51.653 sq km					
75% dependable yield = 13.36 MCM			Yield rate = 13.36/51.653 = 0.26 MCM/sq km		

6.0 PROVISION OF ENVIRONMENTAL RELEASES

Shyamri stream and Bada nala stream are monsoon fed streams carrying sufficient rain water during monsoon season (July to October) and are dry during non-monsoon season. At present water utilization in these two streams is negligible.

The water demand of the Barethi STPP in lean season is proposed to be met by storing surplus water of Ken River and its tributaries i.e Shyamri and Badanala in monsoon season.

There is practically no flow in Shyamri and Badanala in lean season. Furthur, after the dam is constructed,an annual environmental flow of 4.24 MCM in the Shyamri dam and of 9.52 MCM in the Majhgaon dam shall be released respectively to take care of downstream environmental releases and evaporation loss from the reservoirs.

In addition with proposed irrigation in the command area of 9700 ha of Majhgaon dam, return flow from irrigated area would augment the base flow in the Badanala stream which shall be beneficial in the context of environmental flow. Similarly, with proposed irrigation in the command area of 780 ha of Shyamri dam, return flow from irrigated area would augment the base flow in the stream which shall be beneficial in the context of environmental flow.

Govt.of MadhyaPradesh
मध्य प्रदेश शासन

OFFICE OF THE FIELD DIRECTOR
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E-mail: fdptr82@gmail.com Website: www.pannatigerreserve.in

Panna Tiger Reserve
पन्ना टाइगर रिजर्व

क्रमांक / मा0चि0 / 2015 / 1639 / पन्ना, दिनांक 16/9/2015

प्रति,

महा प्रबंधक,
एनटीपीसी लिमिटेड
बरेठी सुपर थर्मल पावर परियोजना
बरेठी जिला छतरपुर (म0प्र0)

विषय :– **Radial Distance Between BSTPP and Eco-Sensitive zone of Panna Tiger Reserve.**

संदर्भ :– आपका पत्र क्रमांक NTPC/Barethi/03 दिनांक 22.07.2015,
एवं NTPC/Barethi/05 दिनांक 08.09.2015

——00——

उपरोक्त विषयांकित संदर्भित पत्र द्वारा एनटीपीसी बरेठी सुपर थर्मल पावर द्वारा संरक्षित क्षेत्र से संबंधित जानकारी चाही गई है जो आपके द्वारा दी गई जीपीएस कोर्डिनेट के अनुसार है :–

क्रमांक	एनटीपीसी परियोजना का विवरण	जी0पी0एस0 कोर्डिनेट	रिमार्क
1	2	3	4
1–	चिमनी	24° 46' 22.65" N 79° 41' 49.35" E	Stack Point
2–	एनटीपीसी बरेठी परियोजना	24° 45' 56.00" N 79° 41' 45.00" E	न्यूनतम दूरी बिन्दु
		24° 47' 50.00" N 79° 44' 08.00" E	अधिकतम दूरी बिन्दु

उपरोक्त कोर्डिनेट के आधार पर परियोजना की न्यूनतम दूरी बिन्दु से मापन अनुसार संरक्षित क्षेत्रों की सीमा से दूरी की स्थिति निम्नानुसार है :–

1– प्रस्तावित ईको सेंसिटव जोन की दूरी–12.234 किमी0।
2– पन्ना टाईगर रिजर्व पन्ना कोर की दूरी–14.244 किमी0।
3– पन्ना टाईगर रिजर्व पन्ना बफरजोन की दूरी–11.812 किमी0।

संलग्न :– कोर्डिनेट अंकित मानचित्र।

उप संचालक,
पन्ना टाइगर रिजर्व,
पन्ना (म.प्र.)

ENGLISH TRANSLATION

OFFICE OF THE FIELD DIRECTOR

Panna Tiger Reserve
Panna, Madhya Pradesh (India)
PHONE NO. +917732-252135 (O), FAX, +917732-252120
E-Mail:fdptr82@gmail.com, Website: www.pannatigerreserve.in

Ref.: Slno. /Layout/2015/1639/Panna, **Dated:** 16/09/2015

Copy To,

General Manager,
NTPC Ltd.
Barethi Super Thermal Power Project,
Barethi, Dist. – Chattarpur (M.P.)

Subject: Radial Distance between BSTPP and Eco- Sensitive Zone of Panna Tiger Reserve.

Reference: Your Letter ref no. NTPC/Barethi/03 dated 22.07.2015 &
NTPC/Barethi/05 dated 08.09.2015.

This is in reference to above subject and corresponding cited letters by NTPC Barethi Super Thermal Power Project seeking information in context to the aforesaid protected area with respect to the GPS co-ordinates as provided are as follows;

Slno.	Description of NTPC Project	GPS Co-ordinates	Remarks
1	2	3	4
1	Chimney	24°46'22.65''N 79°41'49.35''E	Stack Point
2	NTPC Barethi STPP Project	24°45'56.00''N 79°41'45.00''E	Minimum Distance
		24°47'50.00''N 79°44'08.00''E	Maximum Distance

Based on the details of above mentioned GPS co-ordinates, the measured distance between the lowest point of plant boundary and boundaries of protected areas are as follows;

1. Distance of proposed Eco-sensitive zone -12.234 Km
2. Distance of core zone of Panna Tiger Reserve- 14.244 Km
3. Distance of buffer zone Panna Tiger Reserve- 11.812 Km

Encl.:- Map marked with Co-ordinates

Dy. Director
Panna Tiger Reserve
Panna (M.P.)

एनटीपीसी
NTPC
A MAHARATAN COMPANY

एन टी पी सी लिमिटेड
(भारत सरकार का उद्यम)
NTPC Limited
(A Govt. of India Enterprise)
(Formerly National Thermal Power Corporation Ltd.)
केन्द्रीय कार्यालय/Corporate Centre

CC: ESE: 9579:2016: GEN

Date: 12.07.2016

Director, IA- (Thermal)
Ministry of Environment, Forests and Climate Change
3rd Floor, Vayu Block,
Indria Paryavaran Bhawan,
Jor Bagh Road, Aliganj,
New Delhi – 110 003

Sub.: Barethi STPP, Stage-I (4 x 660) MW

Ref.:- J-13012/59/2010– IA.II (T)

Dear Sir,

The application of Environmental Clearance for Barethi Super Thermal Power Project, Stage-I (4x660 MW) at Barethi in Chhattapur District of Madhya Pradesh was submitted to MOEF&CC on 07.05.2015. The project was appraised during EAC meetings held on 19.05.2015 and 16.06.2016 wherein EAC of MOEF&CC has sought certain clarifications.

EAC's comments as per Minutes of Meeting held on 16.06.2016 w.r.t NBWL Clearance/ Comments is reproduced below:

"Considering the scale of the project and proximity with the Panna Tiger Reserve and the contiguous forest, NBWL clearance/comments shall be obtained as already desired earlier by the EAC. The Ministry may also seek comments from its wildlife department"

It is pertinent to mention that as per MOEF&CC Office Memorandum (O.M) dated 02.12.2009, NBWL clearance is required if, the project falls within 10 km area of Wildlife Sanctuary (copy enclosed as **Annexure-I**) for ready reference.

In view of above, it is kindly requested that Clearance from NBWL may please not to be insisted upon, however, it is re-assured that NTPC being a responsible corporate citizen shall take all necessary measures to work for environmental protection at its best.

Looking forward for kind consideration,

Thanking you,

Yours faithfully,
For and on behalf of NTPC Ltd.

(R.K. Baderia)
GM & HOD (Env.Engg)

For Kind Information
Shri. Gyanesh Bharti
JS(MOEF&CC)

12/7/16

अभियांत्रिका कार्यालय परिसर, प्लाट नं. ए–8ए, सैक्टर–24, पोस्ट बाक्स नं. 13, नोयडा (उ.प्र.) पिन–201301
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Regd. Office : NTPC Bhawan, SCOPE Complex, 7, Institutional Area, Lodhi Road, New Delhi-110003

79°36'0"E
79°48'0"E
80°0'0"E
80°12'0"E
25°0'0"N
24°50'0"N
24°40'0"N
24°30'0"N
N
Chhatarpur
Rajnagar
Majhgaon dam site
Bada Nala
Connecting Canal
Khajuraho
Airport
Ganj
Bamitha
Barethi
STPP site
Ken River
Shyamri dam site
Shyamri River
Ken River
Ken River
0 2 4 8 12 16
Kilometers
Legend
Waterbody
Ken River
Drainage Network
Dam sites
Barethi STPP site
Contour