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BASELINE DATA

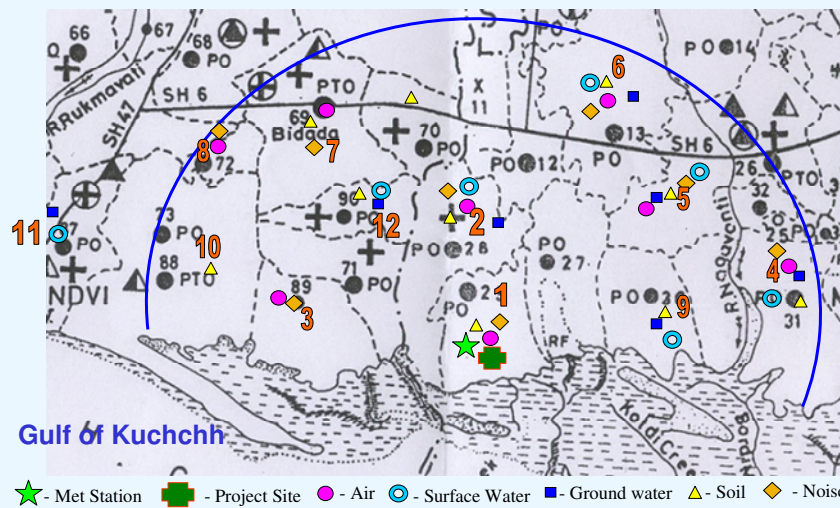


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MANDVI

ENVIRONMENTAL MONITORING LOCATIONS

MUNDRA

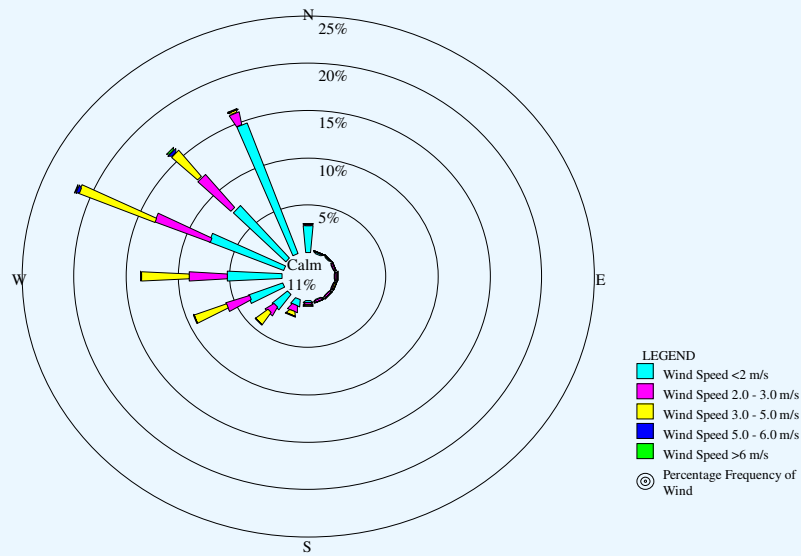


1. Tundawand 2. Kandagara 3. Tragadia 4. Jarapara 5. Bhujpur Mota 6. Desalpar
7. Bidada 8. Pipari 9. Navinal 10. Gundiya 11. Maska 12. Nana Bhadia



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WIND-ROSE DIAGRAM FOR SUMMER - 2006 (TUNDAWAND - SITE SPECIFIC)



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SUMMARISED METEOROLOGICAL DATA - SUMMER 2006

Sr. No.	Parameter		Summer 2006		
			Max. Value	Avg. Value	Min. Value
1	Wind speed, m/s		9.0	2.2	0.0
2	Temperature, °C		40.2	28	16.2
3	Humidity, %	Morning	85	74.5	30
		Evening	70	53.7	15



AAQ Monitoring Data

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Location		SPM ($\mu\text{g}/\text{m}^3$)	RPM ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	NOX ($\mu\text{g}/\text{m}^3$)	CO ($\mu\text{g}/\text{m}^3$)
Tunda village	Min	78	38	8.0	11.8	980
	Average	106.8	65	11.2	16.3	1543
	Max	138	96	16.2	23.4	2050
Jalpara	Min	82	38	7.0	10.9	1000
	Average	110.6	65.5	10.9	16.6	1576.8
	Max	138	94	15.4	22.4	2000
Desalpar	Min	84	42	8.4	13.5	900
	Average	113.11	71.4	11.2	18.4	1563.4
	Max	138	98	15.4	22.8	2010
Mota Bhojapur	Min	84	38	7.6	11.2	1000
	Average	112.9	68.8	11.2	16.7	1576.2
	Max	136	98	18.4	23.8	2000
Tragadi	Min	78	38.0	8.1	12.6	1000
	Average	108	66.3	10.6	17.0	1523.8
	Max	134	92	14.2	23.5	1900
Pipari	Min	78	38	7.8	12.4	900
	Average	105.1	66.6	10.0	15.6	1348.5
	Max	134	96.0	13.0	22.0	2000
Bidada	Min	82	34.0	8.9	14.9	1260.0
	Average	115.1	65.7	11.3	18.7	1700.8
	Max	142.0	98	15.9	22.8	1980.0
Kandagra	Min	84	38	7.6	14.2	900
	Average	109.4	66.8	10.6	18.3	1425.7
	Max	134	96	16.4	22.8	1980.0



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AAQ IN THE STUDY AREA

Summary of AAQ Data					
	SPM μm^3	RPM μm^3	SO ₂ μm^3	NOx μm^3	CO μm^3
Min	78	34	7.0	10.9	900
Avg.	110.1	67	10.8	17.2	1532.3
Max	142	98	18.4	23.8	2050

Monitored air quality parameters SPM, RPM, SO₂, & NOx, values are well within stipulated NAAQ standards for residential & rural areas.



SUMMARY OF WATER QUALITY

Sr. No.	Parameters	Results
1	Temperature , °C	22 - 27
2	pH Value	7.14 - 7.84
3	Total Alkalinity , mg/l	37.9 - 116.8
4	Fluoride (as F), mg/l	0.08 - 1.08
5	Iron (as Fe), mg/l	0.02 - 0.77
6	Copper (as Cu), mg/l	BDL - 0.04
7	Total Nitrogen, mg/l	0.26 - 1.21
8	Total Phosphorous, mg/l	0.3 - 2.1
9	Dissolved Oxygen ,mg/l	2.9 - 3.6
10	Chemical Oxygen Demand,mg/l	11.6 - 49.2
11	BOD ₃ , at 27 °C, mg/l	3.3 - 13.
13	Heavy metals	BDL

Water quality at above locations are well within the Drinking water [IS-10500] standard



EQUIVALENT NOISE LEVELS (LEQ) IN THE STUDY AREA (10km Radius)

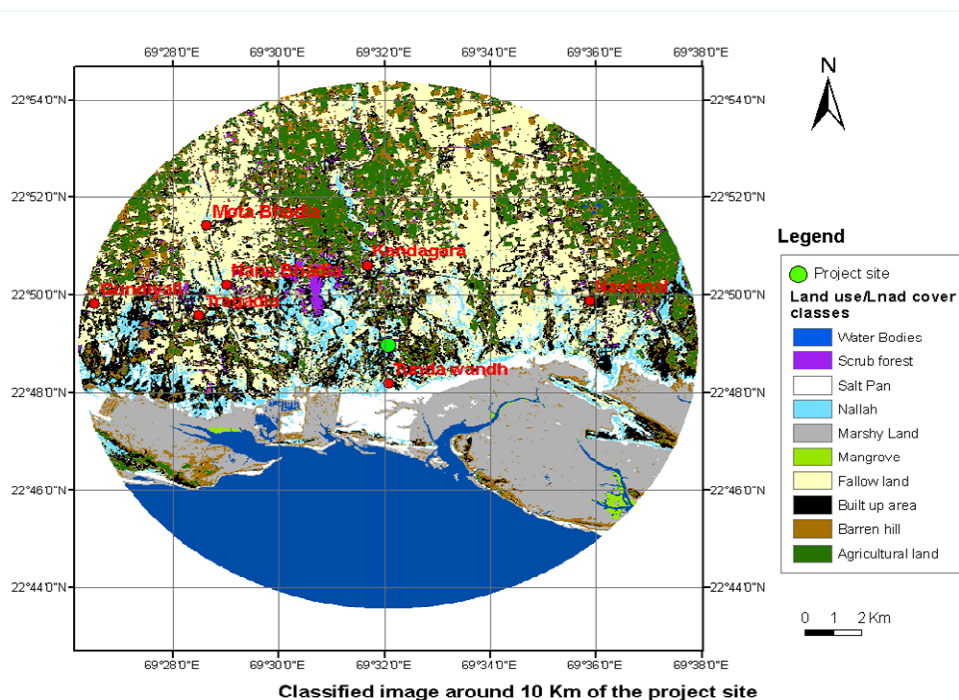
Sr. No.	Location	Results dB(A)		
		Day-Night (06.00 AM – 5.00 AM)	Day (06.00 AM – 10.00PM)	Night (10.00 PM – 6.00 AM)
1	Tunda village	50.8	50.9	50.6
2	Jarpara	59.2	61.2	45.7
3	Desalpar	54.8	53.5	55.9
4	Mota Bhojapur	54.7	54.8	54.5
5	Tragadi	54.6	53.8	55.9
6	Pipari	52.1	51.8	52.7
7	Bidada	53.7	53.1	54.4
8	Kandagara	54.2	52.1	56.4

Noise level in the plant area well within specified limits of NAAQS



PHYSICO-CHEMICAL PROPERTIES OF SOIL

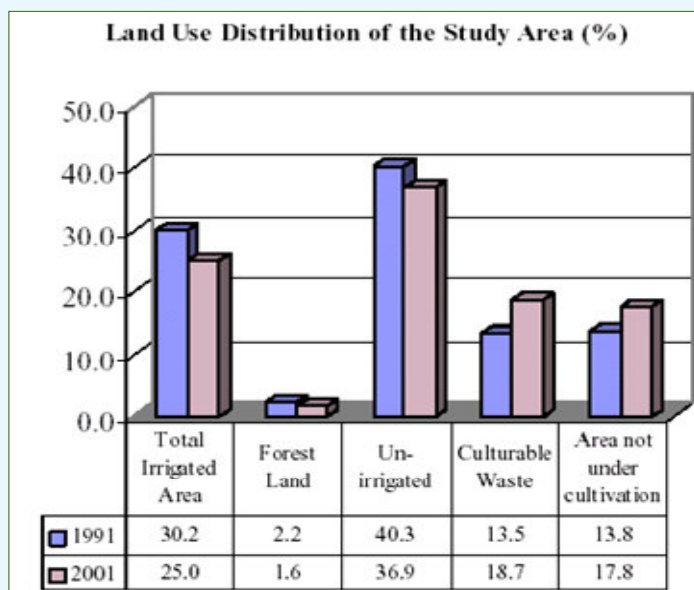
Sl. No.	Parameters, Units	Results
1	pH (1:10 suspension)	6.8 - 7.9
2	Electrical conductivity ms/cm	0.08 - 2.32
3	Organic Matter, %	0.17 - 1.03
4	Nitrogen, mg/gm	0.01 - 0.03
5	Phosphorus, mg/gm	0.29 - 0.60
6	Potassium, mg/gm	0.25 - 0.92
7	Sodium as Na, PPM	61.49 - 1677
8	Chlorides as Cl, mg/gm	0.04 - 4.61
9	Total Alkalinity, mg/gm	0.08 - 0.37
10	Iron as Fe, mg/gm	0.01 - 2.21
11	Zinc as Zn, mg/gm	0.004 - 0.596
12	Copper as Cu, mg/gm	0.006 - 0.867
13	Sand, %	14.6 - 33.3
14	Silt, %	27.6 - 58.6
15	Clay, %	26.8 - 40.5





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LAND USE PATTERN WITHIN 10 KM RADIUS



Source: Census 2001 & District Handbook 1991



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PREDICTION OF IMPACTS

STACK EMISSION DETAILS (Industrial Source Complex - Model)

Stack	Emission detail per stack
No. of Stacks	5
SO₂ Emission rate per stack, g/s	1750
NO_x Emission Rate per stack, g/s	616.9
SPM Emission Rate per stack, g/s	82.2
Exit Gas Velocity, m/s	25
Exit Gas Temperature, °C	140
Stack Height, m	275
Effective Exit Diameter of each stack , m (considering single-flue)	7.7



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PREDICTION OF IMPACTS

Predicted Background GLC's for SO₂, NO₂ & SPM at Monitoring Locations

Sr. No.	Location	Predicted Total GLC's (µg/m ³)		
		SO ₂	NO ₂	SPM
1	Tunda village	16.2	23.4	138.0
2	Jarpara	45.7	33.1	139.4
3	Desalpar	39.7	31.4	139.1
4	Mota Bhojapur	39.7	31.3	137.0
5	Tragadi	39.0	32.2	135.1
6	Pipari	27.6	27.1	134.6
7	Bidada	20.9	24.6	142.2
8	Kandagara	30.9	27.9	134.6
NAAQS Limit (Rural & Residential) area		80	80	200



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Overall Worst Case Scenario of the Study Area

24 Hourly Concentrations	SO ₂	NO _x	SPM
Baseline Maximum Monitored Concentration (µg/m ³)	18.4	23.8	142
Predicted Maximum Incremental GLC (µg/m ³)	56.1	19.8	2.6
Overall GLC's during Worst Case Scenario (µg/m ³)	74.5	43.6	144.6
NAAQS Limit (Rural & Residential) (µg/m ³)	80	80	200



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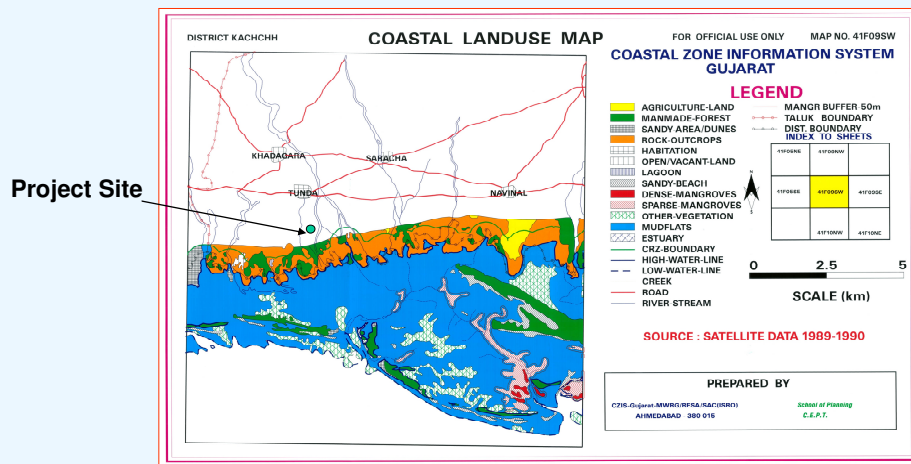
RAPID MARINE EIA STUDY (5 SLIDES FROM NIO)



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CRZ Clearance

- Main plant is beyond the CRZ line (Letter issued from State Dept. and Forest)
- CRZ map collected from Space Application Centre Ahmedabad
- Application for CRZ clearance for Intake and Outfall structure filed to State Department of Env. & forest





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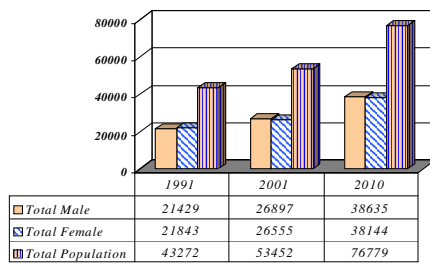
SOCIO ECONOMIC ASSESSMENT



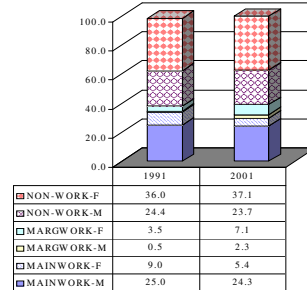
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SOCIO-ECONOMIC ASSESSMENT-10 KM RADIUS

Population Projection for the Study Area*



Workers Distribution in the Study Area (%)





Social Aspects

- **Primary data collection by circulating socio-economic survey questionnaire to Gram Panchayat officials of villages in Mundra & Mandvi**
- **Reconnaissance survey – villagers, agriculturists, traders, milkmen, Panchayat officials**
- **No villages or villagers are directly affected by this project.**
 - R & R issues bare minimum
- **There is little likelihood of any impact on agriculture & plantations during construction phase.**
- **Generation of primary & secondary employment opportunities**



SUMMARY OF IMPACT AND MITIGATION MEASURES DURING CONSTRUCTION

Activity	Likely Impact	Mitigation Measures
Transportation of Plant Machinery & construction material to site	Damage to Roads & dust in atmosphere	Good construction management practices will Improve local roads connecting plant, ash depot & residential colony. Construction of Railway line will help in reducing transportation problems.
Water required during construction of Power Plant, Ash Depot & Residential colony	Reduction of water table in the area	Thermal desalination plant / RO plant envisaged will have no impact on GW
Drinking water for construction workers	Reduction of water table in the area	Thermal desalination plant / RO plant envisaged, - no impact on ground water
Unskilled labor required for construction	May create some social problems like drinking	Employment of local labor would be less likely to fall prey to such activities
Movement of staff between site, ash depot, residential colony & nearby towns in vehicles	Damage to roads & obstruction to local traffic	Good construction management practices will Improve local roads connecting plant, ash depot and residential colony



SUMMARY OF IMPACT & MITIGATION MEASURES AFTER CONSTRUCTION

Activity	Likely Impact	Mitigation Measures
Movement of coal from port to power plant	No adverse impact if railway is used	No mitigation required if railway is used
Water required for Power Plant	No adverse impact if sea water is used	Sea water is used
Dust emission from Coal & ash from power plant	Adverse effect likely on health of humans, cattle, plantation & agricultural land	Proper dust suppression system & 100m wide green belt apart from plantation in ash disposal & within premises. Health check-up facilities for workers, cattle & villagers are necessary
Transportation of coal & ash from power plant to Ash depot	Dust pollution	Use of closed system & water as dust suppression at transfer point
Disposal of ash from ash depot to buyers	Air pollution	Use closed containers , dust suppression system and preferred railways instead of road for transportation
Water for residential colony	Water table in the area will go down	Use of sea water for desalinated water
Disposal of effluent into sea	Adverse impact on marine life (fish) & loss of livelihood of fishermen	Intake & outfall structures should be properly designed . If fisherman requires any help, loan should be arranged for betterment of their livelihood.



Environmental Aspects

Impacts	Remedial Actions	Nature of Impact
<u>Construction Phase</u>		
Dust Emissions	Water spraying, Maintenance of roads	Temporary (minor)
Noise	Use of pollution certified properly maintained vehicles	Temporary
Water Pollution	Good construction & engineering process, septic tank/soak pits	Minor
Socio-Economic	Increased Jobs, flow of money, low migration of workers (local)	Positive



Environmental Aspects

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Impacts	Remedial Actions	Nature of Impact
Operation Phase		
Air Pollution		
Dust - Coal & ash handling, Fly ash - stack, silos, ash disposal area	ESP (150mg/Nm ³)	Minor Negative
SO ₂	-Single flue, Total 3 chimneys. - Height 275m, Dia 7.7m. - Space provision for FGD	Minor Negative (low S content imported coal)
NO _x	• SG - advanced low NO_x burners • Over fire system equipment with air-ports in furnace	Minor Negative
Fly-ash	• Water sprinkling arrangement, • Utilisation by pvt entrepreneurs	Minor Negative



Environmental Aspects

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Impacts	Remedial Actions	Nature of Impact
Operation Phase		
Water Pollution		
Effluent - WTP, bottom ash handling, coal pile run offs, air pre-heater wash water , plant wash down , floor & equipment drainage, sewage	Acid neutralization pit, Guard Pond Disposal into sea (Within permissible discharge Stds)	Minor Negative
Thermal Pollution Water	Once through cooling Resultant water will meet MoEF Norms	Minor Impact/ Insignificant
Heat Flux	Ht of stack 275m- no impact	
Noise Pollution	Acoustic enclosures, silencers, Green belt (100m wide)	



Environmental Aspects

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Impacts	Remedial Actions	Nature of Impact
Operation Phase		
Socio-Economic		
Improved infrastructure facilities & amenities	Employment, No R & R Issues	Major Positive
Electricity/ power		Major positive
Ecological		
Remote area, barren , no wildlife sanctuary, defence installation	33% plantation-increase aesthetic look	Major Positive
Solid waste management	300 acre (ash disposal area) Plantation	Minor Negative
Fly ash Bottom ash	100% fly-ash utilisation (MoEF Notification), Potential users identified	Minor Negative



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ENVIRONMENT MANAGEMENT PLAN

- Environment Management Cell
- Ambient air & noise quality monitoring
- Water quality monitoring
- Meteorological data collection
- Post project monitoring of Marine Environment
- Fly ash utilisation plan
- Afforestation program
- Periodic preventive maintenance & Occupational safety & health



Environment Management Cell

- Comprise a **team** of environmental engineers, chemists, horticulturists, safety specialists & well-trained staff for operation & maintenance of pollution control equipment.
- Staff **training programmes** in areas of environment, ambient air, water quality monitoring, SWM, noise abatement, safety & health aspects would be conducted.
- **Pollution control equipment** would be provided with spares and maintenance facilities.
- Staff would be trained to operate ESP & other pollution control equipment at optimum efficiency.
- Develop Environmental Management Division (EMD) headed by a very senior manager. EMD will take up additional responsibility of environmental functions related to proposed UMPP.

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ENVIRONMENT MANAGEMENT PLAN

PROPOSED OPERATION PHASE PRACTICES

Ambient Air Quality (AAQ) Monitoring Schedule

<i>Parameters</i>	<i>Purpose</i>	<i>Frequency</i>	<i>Equipment</i>
SPM	Ambient Air quality monitoring	Twice in a week for 24 hours each at each station	Respirable dust Sampler (RDS)
SO ₂	Ambient Air quality monitoring	Twice in a week for 24 hours each at each station	Respirable dust Sampler (RDS)
NO _x	Ambient Air quality monitoring	Twice in a week for 24 hours each at each station	Respirable dust Sampler (RDS)
SPM, SO ₂ , NO _x	Stack emission	Continuous	In-situ continuous monitors
SPM, SO ₂ , NO _x	Occupational exposure	Once in a month	Portable spot detectors



ENVIRONMENT MANAGEMENT PLAN

PROPOSED OPERATION PHASE PRACTICES

Water Quality Monitoring Schedule

Waste Water Sources	Frequency of Analysis	Parameter of Examination
Boiler blow down	Weekly	Temperature suspended solids, oil & grease, dissolved solids, copper, iron etc.
Water treatment plant effluent	Daily	pH, suspended solids COD, BOD, dissolved solids
Ash pond effluent	Weekly	pH, suspended solids, oil & grease, dissolved solids, heavy metals like chromium, zinc, iron, manganese, aluminium, nickel, phosphate etc.



ENVIRONMENT MANAGEMENT PLAN

PROPOSED OPERATION PHASE PRACTICES

Ambient Noise Level Monitoring

- Noise level monitoring inside & outside the plant.

Parameters	Purpose	Frequency	Equipment
Noise level	Noise	Once in a week	Noise level meter

Meteorology

- A meteorological station at a suitable location in the plant to monitor

Parameters	Purpose	Frequency	Equipment
Wind speed & wind direction	Meteorological investigation	Continuous on hourly basis	Anemometer with data logger and printer facility
Relative humidity and temperature	Meteorological investigation	Continuous on hourly basis	Thermohygrograph
Rain fall	Meteorological investigation	Continuous on hourly basis	Rain gauge



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ENVIRONMENT MANAGEMENT PLAN

Post Project Monitoring of Marine Environment

- **Sampling Site**
 - sampling area should cover the discharge point as well as other locations affected by upcoming marine facilities.
 - The intertidal region should also be periodically sampled to know the beach fauna and beach profile
- **Frequency of Monitoring**

1st monitoring 2nd monitoring 3rd monitoring 4th monitoring Periodic monitoring	Before operation stage 1 month after operation 6 months after operation 12 months after operation Once or twice every year.
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- **Parameters to be monitored**
 - Shoreline
 - Seafloor changes along the pipeline route
 - Water quality
 - Sediment quality
 - Mangrove and seaweeds
 - Fishery resources and bioassay

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ASH HANDLING & MANAGEMENT

- Imported coal to be used contains up to about 10-15% of ash.
- Estimates quantity of Ash: **0.3MT (Bottom Ash) + 1.2MT (Fly Ash)**
- **Ash Disposal Area = 374 Ha for storage of ash for period of 25 years**
- Ash disposal area to be **lined with impervious lining** to prevent seepage of rainwater from the disposal area in to the ground
- Minimum height of ash bund about 5m



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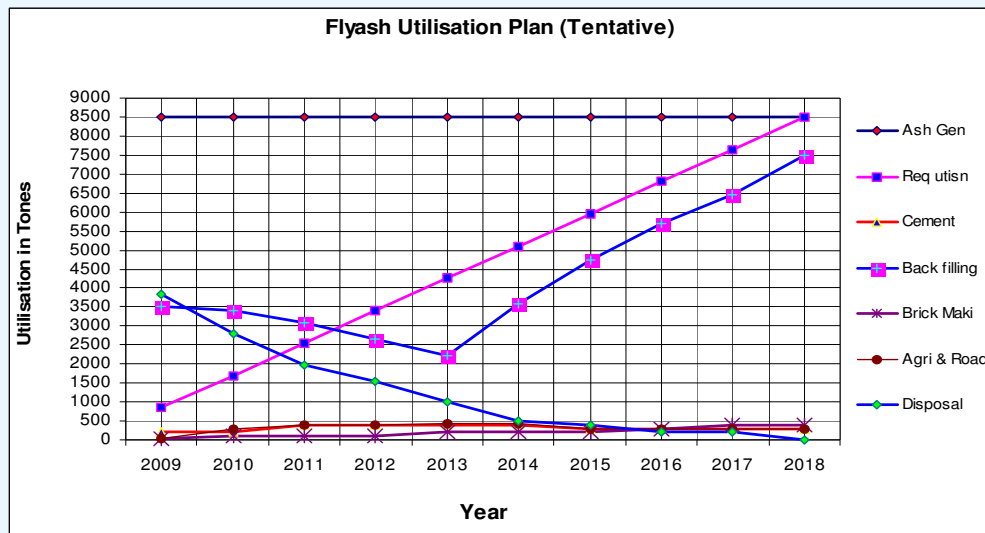
FLY ASH UTILISATION PLAN

- Dry form- can be used in construction industries, cement, etc
- Power plant developer to utilize 100% ash to the extent possible in following uses:
 - (a) Cement Industry
 - (b) Brick Industry
 - (c) Fly ash aggregate making Industry
 - (d) Road making / paving
 - (e) Agriculture, Back filling and filling of abandoned mines
 - (f) Construction of ash-pond dyke, reclamation of low lying areas, mine fills & for agricultural applications such as soil conditioner & fertilizer.
- A survey questionnaire circulated among various cement manufacturing & construction industries
- M/S. Sanghi Cement, Adani Industries, Adani SEZ have shown their interest for use of fly ash.



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ENVIRONMENT MANAGEMENT PLAN :





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ENVIRONMENT MANAGEMENT PLAN

Afforestation program for Greenbelts & Reclamation of Ash Dyke Areas

- Tree plant species native of area will be grown in area earmarked (~ 33% of the proposed area) for green belt plantation.
- Implemented plantation of trees & vegetation within & around the plant
- Selected tree species that are fast growing, pollution tolerant and better physiognomy will be selected for plantation.
- Reuse & recycle of treated wastewater will be envisaged for dust suppression & developing & maintaining green belt and plantation area.



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ENVIRONMENT MANAGEMENT PLAN

CONSTRUCTION PHASE PRACTICES

- Proper disposal of construction wastes.
- Adequate erosion control plan to minimise soil erosion.
- Minimise noise by using appropriate noise control measures.
- Spraying of dust suppressants at regular intervals.
- Sedimentation pond and peripheral drains for runoff water from construction site.

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ENVIRONMENT MANAGEMENT PLAN

PROPOSED OPERATION PHASE PRACTICES

Occupational safety and health

- All elevated platforms, walkways, stairways and ramps will be equipped with handrails, toe-boards and non-slip surfaces.
- Steam pipes will be provided with thermal insulation.
- Shield guards and guard railings will be provided where belts, pulleys, shafting, gears or other moving parts are located.
- Electrical equipment will be grounded and checked for defective insulation.
- Workers responsible for cleaning boilers will be provided with special footwear, masks and dust-proof clothing. The cleaning of boilers may require the use of corrosive acids such as sulphuric acid and hydrochloric acid as well as caustic chemicals. The workers using these chemicals will wear protective clothing and goggles. Emergency eyewash and showers will be available in the working area.
- Maintenance workers and cleaners, who enter enclosed areas for cleaning fuel, oil residues or coal ash dust will wear self-contained air respirators.
- A programme for fire safety will be regularly carried out. This is important to establish a safety programme and in case of fires due to flame out.
- Good housekeeping practices will include keeping all walkways clear of debris, cleaning up oil spots and excess water as soon as they are noticed, and regular inspecting and maintaining of all machinery.

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SOCIAL CORPORATE RESPONSIBILITY

DRINKING WATER & WATER SUPPLY:

- Installation of Desalination Plant for treating sea water
- To be supplied to local inhabitants as per the requirement

MEDICAL & HEALTH CARE

- Construction of Hospital & better medical facilities in the power plant colony
- facilities to be utilised by local inhabitants also

SCHOOL & EDUCATION

- Public schools (medium & higher secondary)
- Better opportunities for the power plant staff & for local inhabitants

ROAD & TRANSPORT

- The colony & villages will be well connected with state and national highway
- Existing road network will be strengthened
- Additional public transport facilities for movement of staff from power plant to colony and to city & near by areas



Contd..

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TRAINING FOR SELF EMPLOYMENT

- Establishment of welfare centres to educate & uplift local villagers
- Adult literacy programmes
- Better training opportunities for villagers

PLANTATION

- 33% of green belt in the area
- Development of parks

MARINE ECOLOGY

- Regular monitoring of the marine environment will be done to ensure protection of Marine ecosystem

FISHING

- Measures would be taken to ensure that livelihoods of fishermen are not affected



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SUMMARY AND CONCLUSIONS

- Power is wheel for socio-economic development of any country & project benefits
- **Emissions from proposed project will not degrade environmental quality of the surrounding area.**
- Impact on water, noise, soil and land use is expected to be minimal.
- **Impact on ecology, socio-economics, amenities & infrastructure of study area is expected to be positive.**
- Other benefits are:
 - Setting up of new industries and its allied ancillary units.
 - Generation of either direct or indirect employment to the locals.
 - Assured & reliable supply of power to upcoming industries & surrounding region would be a boon for development.



SUMMARY AND CONCLUSIONS

- **Employment opportunities** to all locals
- More **business opportunities** which will result in increase in employment for skilled and unskilled services
- Development of **infrastructure** facility, **transportation, water supply, education,** and other welfare schemes
- Availability of **reliable & secured power** improve number of industries which subsequently will improve status of both **primary & secondary employment generation**
- **Flow of money** (to the tune of Rs 30 Crores a month) & development of infrastructure facility will be helpful in improving the status of all the local villages

Therefore, setting up of proposed power plant will not only help in improving surrounding environment quality but also help in improving the socio-economic status of surrounding area

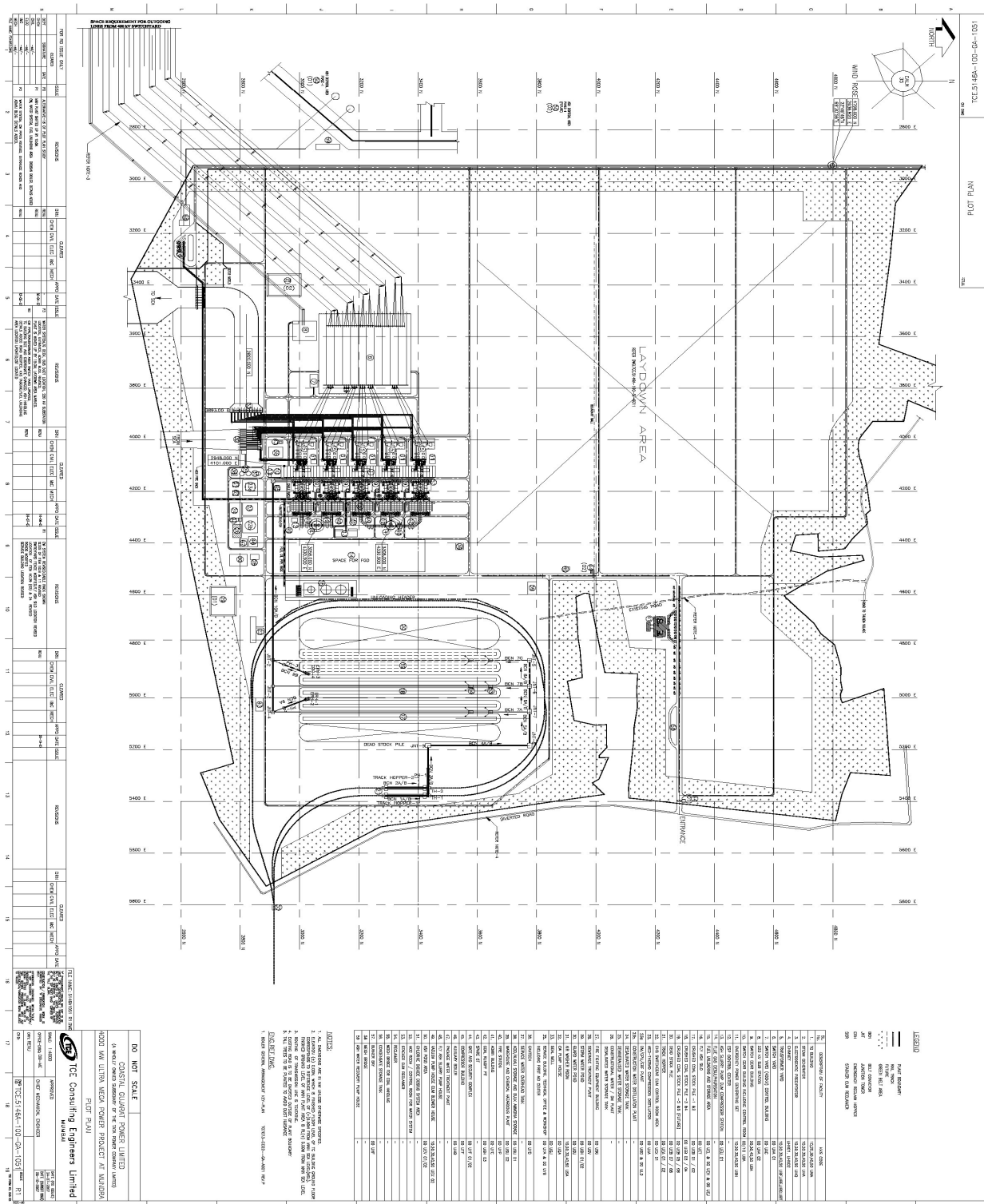
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THANK YOU.

ANNEXURE-6

SITE BOUNDARY & PLOT PLAN



ANNEXURE-7

MAP SHOWING SURVEY NUMBERS

