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APSEZL/EnvCell/2017-18/009

Date: 23.05.2017

To,

Additional Principal Chief Conservator of Forests (C),
Ministry of Environment, Forest and Climate Change,
Regional Office (WZ),
E-5, Kendriya Paryavaran Bhawan, Arera Colony,
Link Road No. – 3, Bhopal – 462 016.
E-mail: rowz.bpl-mef@nic.in

Sub : Half yearly Compliance report for Environment and CRZ Clearance for the "Multi Product SEZ, Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited"

Ref : Environment and CRZ clearance granted to M/s Adani Ports and SEZ Limited vide letter dated 15th July, 2014 bearing MoEF letter No. 10-138/2008-IA.III.

Dear Sir,

Please refer to the above cited reference for the said subject matter. In connection to the same, it is to state that copy of the compliance report for the Environmental / CRZ Clearance for the period of October – 2016 to March – 2017 is enclosed here for your records. The stated information is also provided in form of a CD (soft copy).

Thank you,
Yours Faithfully,
For, **M/s Adani Ports and Special Economic Zone Limited**

Ennarasu Karunesan
Chief Executive Officer
Mundra & Tuna Port

Enclosure: As above

Copy to:

1) The Director (IA Division), Ministry of Environment, Forests & Climate Change, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi-110003
2) Zonal Officer, Regional Office, CPCB – Western Region, Parivesh Bhawan, Opp. Ward Office No. 10, Subhanpura, Vadodara – 390 023
3) Member Secretary, GPCB – Head Office, Paryavaran Bhavan, Sector 10 A, Gandhi Nagar – 382 010
4) Deputy Secretary, Forests & Environment Department, Block – 14, 8th floor, Sachivalaya, Gandhi Nagar – 382 010
5) Regional Officer, Regional Office GPCB (Kutch-East), Gandhidham, 370201

पर्यावरण एवं वन मंत्रालय (केन्द्रीय)
Ministry of Environment & Forests (C)
क्षेत्रीय कार्यालय (पश्चिम क्षेत्र)
Regional Office (Western Region)
भोपाल (म.प्र.)–462016

Adani Ports and Special Economic Zone Ltd
Adani House
PO Box No 1
Mundra, Kutch 370 421
Gujarat, India

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adani

Environmental Clearance Compliance Report

Multi Product SEZ, Mundra, Dist. Kutch, Gujarat

Adani Ports and SEZ Limited

For the period of

October-2016 to March-2017

Index

F. No. 10-138/2008-IA.III
Government of India
Ministry of Environment & Forests

Paryavaran Bhawan,
CGO Complex, Lodhi Road,
New Delhi - 110 003.

Dated: July 15, 2014

To
M/s Adani Port and SEZ Ltd
Adani House, Near Mithakhali Six Roads,
Navarangpura, Ahmedabad,
Gujarat- 380 009.

Subject: EC for proposed Multi- Product SEZ and CRZ clearance for Desalination, sea water intake, outfall facility and pipeline, at Mundra by M/s Adani Port and SEZ Ltd. – Reg.

This has reference to letter No. ENV-10-2010-1601-E dated 27.03.2012 of the Director (Environment) & Additional Secretary, Govt. of Gujarat and your subsequent letters dated 10.05.2012, 14.05.2012, 26.05.2012 and 29.04.2013 seeking prior Environmental and CRZ Clearance for the above project under the EIA Notification, 2006 and Coastal Regulation Zone Notification, 2011. The proposal has been appraised as per prescribed procedure in the light of provisions under the EIA Notification, 2006 and the Coastal Regulation Zone Notification, 2011 on the basis of the mandatory documents enclosed with the application viz., the Questionnaire, EIA, EMP, recommendations of the State Coastal Zone Management Authority and the additional clarifications furnished in response to the observations of the Expert Appraisal Committee constituted by the competent authority in its meetings held on 16th –17th April, 2012, 4th –5th June, 2012 and 9th -10th July, 2012.

2. It is, interalia, noted that the project involves development of multi product SEZ on a plot area of 18,000 ha. of which 6641.2784 ha. is presently notified under Special Economic Zone (SEZ). As per the proponent, the Multi product SEZ at Mundra comprising of various processing zones, non-processing zones, warehousing zones, Road Network (trunk as well as internal), Bridges or culverts over natural drains, Rail Network, IT-Telecommunication network, Electrical Network, Water supply, conservation & drainage Network, Effluent collection network, Desalination Plant with proposed intake & outfall locations, Common Effluent Treatment Plants & Sewage Treatment Plants, Natural Gas line network, Social Infrastructure, Existing Airstrip, Municipal Solid Waste Disposal site, utilities & supporting infrastructure etc. For the first phase of development total water requirement will be 150 MLD. Power requirement will be approx. 360 MW. Desalination plant of 150 MLD output capacity is proposed. 11 MLD water will be sourced through Narmada water pipeline. Two CETP each of capacity 50 MLD and 17 MLD as well as STP of 62 MLD is proposed. This will require 375 MLD of seawater intake and 241 MLD of treated waste water outfall into the sea. For final phase of development total water requirement will be 450 MLD and power requirement will be approx. 1000 MW.

3. A suitable seawater intake point has been identified on the eastern end of the approved East Port Basin at Latitude 22°48'30.76"N; Longitude 69°46'34.06"E where a depth of 6 m below CD would be available after the port development. As per modelling study the combined discharge of 241MLD which includes 16MLD from CETP and 225 MLD from desalination plant as RO reject is expected having 57.57ppt of salinity, 14.41 mg / l of BOD and 94.39 mg/l of COD. After careful consideration of many aspects a suitable outfall location is identified on the west of the Eastern basin at Latitude 22°46'44.04"N; Longitude 69°45'5.51"E taking advantage of the expected 7.5m below CD basin depth. The outfall pipe line length is approximately 5.7 km and diffuser designed to attain a minimum dilution of 40-50 times.

4. The Centre for Earth Science Studies demarcated HTL, LTL and CRZ area. As per the CESS report and GCZMA, out of 6641.2784 ha of SEZ area, 1473.39 ha area falls within CRZ area. No SEZ industrial activity is proposed in the CRZ area. Only the Desalination plant pipeline for intake and outfall is proposed in CRZ areas. The Gujarat SCZMA in their 14th meeting held on 27-02-2012 considered the proposal of intake, outfall facilities, Desalination plant and laying pipeline and recommended the same vide their letter no.ENV-10-2010-1601-E dated 27th March 2012. Gujarat Pollution Control Board has granted Consent to Establishment of Marine outfall (NOC) vide letter dated 10.11.2011. The length of the intake will be approximately 5 Kms. As the sea water intake demand is 15000m3/h, drawal by pipe system is suitable by incorporating a wet well structure at the location. The intake point proposed is within the proposed East Port basin with a depth of 6 m below CD. The projected quantity of water can be transported through a single pipe of 1.3 m dia with a flow velocity of 3 m/ s or with a 1.6 m pipe with flow velocity of 2m/s.

5. The Expert Appraisal Committee, after due consideration of the relevant documents submitted by the project proponent and additional clarifications furnished in response to its observations, have recommended for the grant of Environment and CRZ Clearance for the SEZ in an area of 8481.2784 ha. However, SEZ for 1840 ha has been approved in principle by Ministry of Commerce and Industries.

6. Hon'ble High Court of Gujarat in WP No. 21 of 2013 vide order dated 13.01.2014 has directed that the Ministry to take a decision of its own so far as the issue of grant of environmental clearance is concerned considering the position prevailing as on date and also the aspects which have been highlighted by us in this judgment, within a period of thirty days from the date of this judgment without fail. Further, vide order dated 27.01.2014 Hon'ble Supreme Court in SLP No. 1526 of 2014 which was filed against the Order of High Court by the Respondent-1 has passed order that in case, the MOEF is unable to complete the process within the time stipulated by the High Court, it will be open for them to approach this Court for extension of time. Accordingly, Ministry has filed a petition before the Hon'ble Supreme Court seeking extension of two months time.

7. It is noted from the Judgement dated 13.01.2014 of Hon'ble High Court of Gujarat in PIL 21 of 2013 the Hon'ble Court has construed the grant of lease to units prior to

obtaining EC by M/s APSEZL as violation of EIA, Notification, 2006. Therefore, according to the OMs dated 12.12.2012 and 27.06.2013, PP was addressed for Board Resolution and the State Government was addressed to take credible action against the PP for the violation. Direction under Section 5 of E(P)Act, 1986 was also issued to APSEZ not to take up and allow any further construction activity within SEZ till the grant of clearance.

8. Further, Hon'ble Supreme Court video order dated 02.05.2014 in SLP 1526 of 2013 had ordered for stay of Ministry's letter dated 3.04.2014 addressed to Government of Gujarat to initiate legal action for the violation, also directed that the Ministry to complete the process of EC within eight weeks.

9. M/s APSEZ Ltd. has stated that the Board resolved that since the matter is sub-judice before the Hon'ble Supreme Court of India, will fully abide by the out come of the decision of the Hon'ble Supreme Court.

10. In view of the above and to comply with the orders of Hon'ble Courts, Ministry hereby accords necessary Environment Clearance for proposed Multi- Product SEZ in an area of 6641.2784 ha and CRZ clearance for desalination, seawater intake, outfall facility and pipeline for as per the provisions of Environmental Impact Assessment Notification – 2006 and its subsequent amendments and Coastal Regulation Zone Notification, 2011, subject to strict compliance of the terms and conditions as follows:

11. PART A - SPECIFIC CONDITIONS

(i) *PP shall abide by the final order/decision of Hon'ble Supreme Court in SLP (Civil) no. 1526/2014 and connected matters.*

(ii) *Properly conserve the creeks, river and the mangroves area in the area.*

(iii) *Ensure that mouths of all the creeks are kept open to ensure flushing of the creeks.*

(iv) *Bring the creeks to the condition as was seen in the satellite map of 2005 which will be a "reference" satellite map and a copy of which shall be sent to you separately.*

(v) *Submit once in a year latest satellite map which can be compared with the reference satellite map of 2005 to ensure that no modification in the creeks, rivers, mangroves and mouth of creeks have taken place.*

(vi) *Any direction issued by the MoEF with respect to the report submitted by Ms Sunita Narain Committee shall be complied with by the Proponent as applicable.*

(vii) *At its cost get Inspection study done once in a year by the organizations like NEERI or any organization approved by this Ministry to - (i) ensure compliance of all the EC conditions (ii) development of SEZ meeting of the environment norms, and (iii) advise any mid-term correction that can be introduced depending on the recommendation of the independent Third Party.*

(viii) *"Consent for Establishment" for the SEZ shall be obtained from Gujarat Pollution Control Board under Air and Water Act and a copy shall be submitted to the Ministry before start of any construction work at the site.*

(ix) *PP shall get detailed bathymetry done for all the creeks and rivers within Port and SEZ areas along with mapping of co-ordinates, running length, HTL, CRZ boundary, mangrove areas including buffer zone through NCSCM / NIOT. PP shall also get prepared a detailed action plan for conservation and protection of creeks/ mangrove area etc through NCSCM / NIOT and submit the same to GCZMA for their examination and recommendation. GCZMA will submit its recommendations to MoEF for approval.*

(x) *PP shall demarcate the CRZ area on land with GPS coordinates in consultation with GCZMA/ the agency which has done the HTL/LTL demarcation for the area. There shall be no allotment of plot/s in CRZ area to industries. No industrial activity within CRZ area except the port and harbor & the foreshore facilities shall be allowed as committed*

(xi) *Till the approval of action plan for conservation and protection of creeks/ mangrove area, the CRZ area within SEZ shall be demarcated as "No Development Zone". PP shall not allow/ undertake any development in CRZ area of SEZ.*

(xii) *The implementation of action plan approved by the MoEF shall be monitored by the NCSCM/ NIOT. Compliance with action plan shall be submitted to GCZMA and to MoEF, RO. at Bhopal along with six monthly monitoring report.*

(xiii) *PP shall earmark separate budget for the implementation of the above action plan. The details of the expenditure shall be submitted to GCZMA and to MoEF, RO. at Bhopal along with six monthly monitoring report.*

(xiv) *All the industry in SEZ shall be connected through impervious drainage lines to the STP/ CETP for the discharge of their sewage or industrial effluent. There shall not be any discharge to creeks / rivers. PP shall be accountable for implementing this condition and necessary clause shall be incorporated in the MoU while allotting the plot to the individual industries*

(xv) *PP shall not carry out any river course modification.*

(xvi) *The individual industrial units shall obtain prior EC under EIA Notification, 2006 as applicable.*

(xvii) *Proponent shall identify 200 ha of land for mangrove plantation as per the condition laid by SEAC.*

(xviii) *50 meter buffer from the existing mangrove area should be provided for any developmental activity,*

(xix) *Proponent shell develop the green belt with 3 layers of canopy all along the periphery.*

(xx) *All the recommendation of the EMP shall be complied with in letter and spirit. All the mitigation measures submitted in the EIA report shall be prepared in a matrix format and the compliance for each mitigation plan shall be submitted to MoEF along with half yearly compliance report to MoEF-RO.*

(xxi) *There shall be no disturbance to the sand dunes. The pipelines shall be laid using advanced method viz. Horizontal Directional Drilling (HDD) so as to avoid disturbance to the sand dunes/ creeks/ mangroves.*

PART – B. GENERAL CONDITIONS

Construction Phase.

(i) *Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.*

(ii) *A First Aid Room will be provided in the project both during construction and operation of the project.*

(iii) *All the topsoil excavated during construction activities should be stored for use in horticulture/landscape development within the project site.*

(iv) *Disposal of muck during construction phase should not create any adverse effect on the neighbouring communities and be disposed, taking the necessary precautions for general safety and health aspects of people, only in approved sites with the approval of competent authority.*

(v) *Soil and ground water samples will be tested to ascertain that there is no threat to ground water quality by leaching of heavy metals and other toxic contaminants.*

(vi) *Construction spoils, including bituminous material and other hazardous materials, must not be allowed to contaminate watercourses and the dump sites for such material must be secured so that they should not leach into the ground water.*

(vii) *Any hazardous waste generated during construction phase should be disposed off as per applicable rules and norms with necessary approvals of the Gujarat Pollution Control Board.*

(viii) *The diesel generator sets to be used during construction phase should be low sulphur diesel type and should conform to Environment (Protection) Rules prescribed for air and noise emission standards.*

(ix) *The diesel required for operating DG sets shall be stored in underground tanks and if required, clearance from Chief Controller of Explosives shall be taken.*

(x) *Vehicles hired for bringing construction material to the site should be in good condition and should have a pollution check certificate and should conform to applicable air and noise emission standards and should be operated only during non-peak hours.*

(xi) *Ambient noise levels should conform to residential standards both during day and night. Incremental pollution loads on the ambient air and noise quality should be closely monitored during construction phase. Adequate measures should be made to reduce ambient air and noise level during construction phase, so as to conform to the stipulated standards by CPCB/GPCB.*

(xii) *Fly ash should be used as building material in the construction as per the provisions of Fly Ash Notification of September, 1999 and amended as on 27th August, 2003. (The above condition is applicable only if the project site is located within 100 Kms of Thermal Power Stations).*

(xiii) *Ready mixed concrete must be used in building construction.*

(xiv) *Storm water control and its re-use should be regulated as per CGWB and BIS standards for various applications.*

(xv) *Water demand during construction should be reduced by use of pre-mixed concrete, curing agents and other referred best practices.*

(xvi) *Permission to draw ground water shall be obtained from the competent Authority prior to construction/operation of the project.*

(xvii) *Separation of grey and black water should be done by the use of dual plumbing line for separation of grey and black water.*

(xviii) *Fixtures for showers, toilet flushing and drinking should be of low flow either by use of aerators or pressure reducing devices or sensor based control.*

(xix) *Use of glass may be reduced by upto 40% to reduce the electricity consumption and load on air-conditioning. If necessary, use high quality double glass with special reflective coating in windows.*

(xx) *Roof should meet prescriptive requirements as per Energy Conservation Building Code by using appropriate thermal insulation material to fulfill requirements.*

(xxi) *Opaque wall should meet prescriptive requirement as per Energy Conservation Building Code which is proposed to be mandatory for all airconditioned spaces while it is aspirational for non-airconditioned spaces by use of appropriate thermal insulation material to fulfil these requirement.*

(xxii) *The approval of the competent authority shall be obtained for structural safety of the buildings due to earthquake, adequacy of fire fighting equipments, etc. as per National Building Code including protection measures from lightning etc.*

(xxiii) *Regular supervision of the above and other measures for monitoring should be in place all through the construction phase, so as to avoid disturbance to the surroundings.*

(xxiv) *Under the provisions of Environment (Protection) Act, 1986, legal action shall be initiated against the project proponent if it is found that construction of the project has been started without obtaining environmental clearance.*

Operation Phase

(i) *The PP while issuing the allotment letter to individual member units shall specifically mention the allowable maximum quantity of water usage and effluent generated by each member unit.*

(ii) *The PP shall establish an environmental monitoring cell with all the potential polluting units as members to review the environmental monitoring data and suggest improvements.*

(iii) *Treated affluent emanating from STP shall be recycled/reused to the maximum extent possible. Treatment of 100% grey water by decentralised treatment should be done. Discharge of unused treated affluent shall conform to the norms and standards of the Pollution Control Board. Necessary measures should be made to mitigate the odour problem from STP.*

(iv) *The solid waste generated should be properly collected and segregated. Wet garbage should be composted and dry / inert solid waste should be disposed off to the approved sites for land filling after recovering recyclable material.*

(v) *Diesel power generating sets proposed as source of back up power for elevators and common area illumination during operational phase should be of enclosed type and conform to rules made under the Environment (Protection) Act, 1986. The height of stack of DG sets should be equal to the height needed for the combined capacity of all proposed DG sets. Low sulphur diesel should be used. The location of the DG sets may be decided in consultation with the Gujarat Pollution Control Board.*

(vi) *Noise should be controlled to ensure that it does not exceed the prescribed standards. During night time the noise levels measured at the boundary of the building shall be restricted to the permissible levels to comply with the prevalent regulations.*

(vii) *Green belt of adequate width and density preferably with local species along the periphery of the plot shall be raised so as to provide protection against particulates and noise.*

(viii) *Weep holes in the compound walls shall be provided to ensure natural drainage of rain water in the catchment area during the monsoon period.*

(ix) *Rain water harvesting for roof run- off and surface run- off, as plan submitted should be implemented.*

(x) *The ground water level and its quality should be monitored regularly in consultation with Central Ground Water Authority.*

(xi) *Traffic congestion near the entry and exit points from the roads adjoining the proposed project site must be avoided. Parking should be fully internalized and no public space should be utilized.*

(xii) *A Report on the energy conservation measures conforming to energy conservation norms finalised by Bureau of Energy Efficiency should be prepared incorporating details about building materials & technology, R & D Factors etc and submitted to the Ministry along with six monthly monitoring report.*

(xiii) *Energy conservation measures like installation of CFLs/TFLs for the lighting the areas outside the building should be an integral part of the project design and should be in place before project commissioning. Used CFLs and TFLs should be properly collected and disposed off/sent for recycling as per the prevailing guidelines/ rules of the regulatory authority to avoid mercury contamination. Solar panels may be used to the extent possible.*

(xiv) *Adequate measures should be taken to prevent odour problems from solid waste processing plant and STP.*

(xv) *The buildings should have adequate distance between them to allow movement of fresh air and passage of natural light, air and ventilation.*

(xvi) *The environmental safeguards contained in the EIA Report should be implemented in letter and spirit.*

(xvii) *Adequate drinking water facility be provided.*

(xviii) *Incremental pollution loads on the ambient air quality, noise and water quality should be periodically monitored after commissioning of the project.*

(xix) *Application of solar energy should be incorporated for illumination of common areas, lighting for gardens and street lighting in addition to provision for solar water heating. A hybrid system or fully solar system for portion of the apartments should be provided.*

(xx) *Ozone depleting substance (Regulation & Control) Rules should be followed while designing the air conditioning system of the project.*

12. Officials from the Regional Office of MOEF, Bhopal who would be monitoring the implementation of environmental safeguards should be given full cooperation, facilities and documents / data by the project proponents during their inspection. A complete set of all the

documents submitted to MoEF should be forwarded to the CCF, Regional office of MOEF, Bhopal

13. In the case of any change(s) in the scope of the project, the project would require a fresh appraisal by this Ministry.

14. The Ministry reserves the right to add additional safeguard measures subsequently, if found necessary, and to take action including revoking of the environment clearance under the provisions of the Environmental (Protection) Act, 1986, to ensure effective implementation of the suggested safeguard measures in a time bound and satisfactory manner.

15. All other statutory clearances such as the approvals for storage of diesel from Chief Controller of Explosives, Fire Department, Civil Aviation Department, Forest Conservation Act, 1980 and Wildlife (Protection) Act, 1972 etc. shall be obtained, as applicable by project proponents from the respective competent authorities.

16. These stipulations would be enforced among others under the provisions of Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and control of Pollution) act 1981, the Environment (Protection) Act, 1986, the Public Liability (Insurance) Act, 1991 and EIA Notification, 2006.

17. The project proponent should advertise in at least two local Newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the project has been accorded Clearance and copies of clearance letters are available with the Gujarat Pollution Control Board and may also be seen on the website of the Ministry of Environment and Forests at http://www.envfor.nic.in. The advertisement should be made within 10 days from the date of receipt of the Clearance letter and a copy of the same should be forwarded to the Regional office of this Ministry at Bhopal.

18. Clearance is subject to final order of the Hon'ble Supreme Court of India in the matter of Goa Foundation Vs. Union of India in Writ Petition (Civil) No.460 of 2004 as may be applicable to this project.

19. "Any appeal against this clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010".

20. A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zilla Parisad/Municipal Corporation, Urban Local Body and the Local NGO, if any, from whom suggestions/ representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the company by the proponent.

21. The proponent shall upload the status of compliance of the stipulated EC conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB.

22. The project proponent shall also submit six monthly reports on the status of compliance of the stipulated EC conditions including results of monitored data (both in hard copies as well as by e-mail) to the respective Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB.

23. The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of EC conditions and shall also be sent to the respective Regional Offices of MoEF by e-mail.

(Lalit Kapur)
Director (IA-III)

Copy to:

1. The Principal Secretary, Forest and Environment Department, Block no. 14/ 8 floor Sachivalaya, Gandhinagar – 382 010 Gujarat.
2. The Chairman, Central Pollution Control Board, Parivesh Bhavan, CBD-cum-Office Complex, East Arjun Nagar, Delhi – 110 032.
3. The Member Secretary, Gujarat Coastal Zone Management Authority & Director,(Environment) Forests & Environment Department, Block No. 14, 8th Floor, Sachivalaya, GandhiNagar-382.
4. The Chief Conservator of Forests, Ministry of Environment and Forests, Regional Office, Western Region, Kendriya Paryavaran Bhavan, Link Road No. 3, Ravishankar Nagar, Bhopal – 462016 (M.P.)
5. The Member Secretary, Gujarat State Pollution Control Board, Paryavaran Bhawan , Sector 10-A, Gandhi Nagar 382043, Gujarat
6. Director (EI), Ministry of Environment and Forests.
7. Guard File.
8. Monitoring File.

(Lalit Kapur)
Director (IA-III)

Copy of Environmental / CRZ Clearance

Compliance Report of Environmental / CRZ Clearance

M/s. APSEZL has been granted Environmental / CRZ clearance vide letter no. 10-138/2008-IA.III, dated 15th July, 2014 for development of "Multi Product SEZ, Desalination, Sea Water Intake, Outfall Facility and Pipeline".

Activities / Facilities approved are as below:

Facilities / Components Approved	Capacity	Status as on 31.03.2017
Desalination Plant	150 MLD	Construction has not been started.
Sea water Intake & Outfall Facility	375 MLD: Intake 241 MLD: Outfall	Construction has not been started.
Common Effluent Treatment Plant	17 MLD	MPSEZ Utilities Pvt. Ltd. (MUPL) has been granted environmental clearance for CETP having 17.0 MLD capacity. Out of which at present one module of CETP having 2.5 MLD capacity has been constructed and is in operation.
	50 MLD	Construction has not been started.
Social Infrastructure Projects	--	Adani Mundra SEZ Infrastructure Pvt. Ltd. (AMSIPL) has granted environmental clearance for township and area development project in 255 Ha.
Sewage Treatment Plant	62 MLD	Construction has not been started.
Airstrip	--	Airstrip has been developed within SEZ area after obtaining requisite permissions.
Municipal Solid Waste Site	--	Material Recovery site is provided for the management of Municipal Solid Waste.
Free Trade & Ware House Zone (FTWZ)	--	Construction work is under progress.

List of Industrial Units within SEZ area

Sr. No.	Name of Unit	Nature of Business	Status
1	SKAPS INDUSTRIES	Textile	Operation
2	TERRAM EOSYNTHETICS	Textile	Operation
3	AHLSTROM	Textile	Operation
4	ASHAPURA GARMENTS	Textile	Operation
5	THERMAX	Textile	Operation
6	OWS	Ware House	Operation
7	DORF KETAL	Chemical	Operation
8	OCCL	Chemical	Operation
9	AADI OIL	Oil	Operation
10	GARG TUBES LLP	Steel	Operation
11	EMPEZAR LOGISTICS	Ware House	Operation
12	SEABIRD CFS	CFS	Operation
13	HONEYCOMB CFS	CFS	Operation
14	ALL CARGO CFS	CFS	Operation
15	MUNDHRA CFS	CFS	Operation
16	SAURASHTRA CFS	CFS	Operation
17	FORBES CFS	CFS	Operation
18	TRANSWORLD CFS	CFS	Operation
19	MICT CFS	CFS	Operation
New Industries added in 2016-17			
20	MSTPL (Mundra Solar Technopark Pvt. Ltd.)	Electronics Manufacturing Cluster	Under construction
21	STEINWEIGE	FTWZ	Operation
22	INDEV LOGISTIC	FTWZ	Construction work completed
23	BRITANNIA INDUSTRIES LIMITED	Food Products	Under construction

Note:

Environmental / CRZ clearance has been granted for additional facilities like Processing Zones, Non-processing Zones, Warehousing Zones, Road Network (Trunk as well as Internal), Bridges or Culverts over natural drain, Rail Network, IT-Telecommunication Network, Electric Network, Water Supply, Conservation & Drainage Network, Effluent Collection Network and Utilities & Supporting Infrastructure within SEZ area.

Boundary wall is constructed along the project periphery. In some of areas level raising and area development of SEZ area, wherever required is also under progress.

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

Sr. No.	Conditions	Compliance Status as on 31-03-2017
Part – A: Specific Conditions		
i.	PP shall abide by the final order/decision of Hon'ble Supreme Court in SLP (Civil) no. 1526/2014 and connected matters.	Point noted and will be complied.
ii.	Properly conserve the creeks, river and the mangroves area in the area.	Complied. At locations where the road/rail passes through creeks/river, we have constructed bridges/culverts to allow free flow of water. APSEZL has so far constructed 19 culverts having total length of approx. 1100 m with total cost of INR 20 Crores. Three RCC Bridges have been constructed over Kotdi creek with total length of 230 m and cost of INR 10 Crores. 1254 ha area identified as potential mangrove conservation is being conserved and there is no disturbance to the mangroves in this area. A monitoring report prepared by GUIDE for the same is attached as **Annexure –** 3
iii.	Ensure that mouths of all the creeks are kept open to ensure flushing of the creeks.	Complied. As per Marine EIA of WFDP in 2008 carried out by NIO, prominent creek system (main creeks and small branches of creeks) in the study region are: (1) Kotdi (2) Baradimata (3) Navinal (4) Bocha (5) Mundra (Oldest port (Juna Bandar) leading to Bhukhi river) All above creeks are in existence allowing free flow of water and there is no filling or reclamation of any creek area. All the creek mouths present in our area are open having no obstruction that allows flushing of sea water in to the creeks. Please refer specific condition no. ii above for further details.
iv.	Bring the creeks to the condition as was seen in the satellite map of 2005 which will be a "reference" satellite map and a copy of which shall be sent to you separately.	Complied Based on the final direction issued by MoEF&CC vide their letter dated 18th Sept.2015, APSEZL has submitted a letter vide our letter dated 23.05.16.

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

Sr. No.	Conditions	Compliance Status as on 31-03-2017
v.	Submit once in a year latest satellite map which can be compared with the reference satellite map of 2005 to ensure that no modifications in the creeks, rivers, mangroves and mouth of creeks have taken place.	As per the directions of MoEF&CC these conditions stand null & void. Copy of the directions letter is attached as **Annexure -15.** Copy of our letter submitted to MoEF&CC is attached as **Annexure -16.**
vi.	Any direction issued by the MoEF with respect to the report submitted by Ms Sunita Narain Committee shall be complied with by the Proponent as applicable.	Complied. Based on the report submitted by Sunita Narain committee, MoEF&CC issued a Show Cause Notice (SCN) to APSEZ vide their letter dated 30.09.2013. APSEZ replied to the SCN vide letter dated 14.10.2013. Further, an order (containing 10 directions) was issued by MoEF&CC vide their letter dated 18.09.2015 and thereby disposed-off the show cause. Compliance to these 10 directions is enclosed as **Annexure – 1.**
vii.	At its cost get Inspection study done once in a year by the organizations like NEERI or any organization approved by this Ministry to - (i) ensure compliance of all the EC conditions (ii) development of SEZ meeting of the environment norms, and (iii) advise any mid-term correction that can be introduced depending on the recommendation of the independent Third Party.	Complied. APSEZ has engaged NEERI. Compliance report of the period from April'15 to Sept'15 was submitted to senior official of NEERI. Based on the site visit as well as the said compliance report NEERI has given their feedback. Details submitted to the MoEF & CC along with half yearly compliance report Oct – 2015 to March – 2016.
viii.	" Consent for Establishment" " for the SEZ shall be obtained from Gujarat Pollution Control Board under Air and Water Act and a copy shall be submitted to the Ministry before start of any construction work at the site.	Complied. Consent to Establish (CtE) is obtained and renewed/amended from time to time as per the progress of the project activity. The present in-force consent is obtained from Gujarat Pollution Control Board vide their letter no. GPCB/CCA-KUTCH-1044/ GPCB ID 31463/109800 dated 16.04,2012. Details submitted to the MoEF & CC along with half yearly compliance report Oct – 2015 to March – 2016.

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

Sr. No.	Conditions	Compliance Status as on 31-03-2017
ix.	PP shall get detailed bathymetry done for all the creeks and rivers within Port and SEZ areas along with mapping of co-ordinates, running length, HTL, CRZ boundary, mangrove area including buffer zone through NCSCM/NIOT. PP shall also get prepared a detailed action plan for conservation and protection of creeks/mangrove area etc through NCSCM/NIOT and submit the same to GCZMA for their examination and recommendation. GCZMA will submit its recommendations to MoEF for approval.	Complied MoEF&CC has issued an order vide letter dated 18.09.2015 with certain directions. This condition is part of the directions of the said letter. APSEZL approached NCSCM to carry out the said study. The work is under progress under supervision of the Sr. Scientists of NCSCM. First progress Report is received. Copy of the same is enclosed as **Annexure-17.** A point wise compliance for each direction of the MoEF&CC order is enclosed as **Annexure – 1.**
x.	PP shall demarcate the CRZ area on land with GPS coordinates in consultation with GCZMA/ the agency which has done the HTL/LTL demarcation for the area. There shall be no allotment of plot/s in CRZ area to industries. No industrial activity within CRZ area except the port and harbor & the foreshore facilities shall be allowed as committed.	Complied. MoEF&CC has issued an order vide letter dated 18.09.2015 with certain directions. This condition is part of the directions of the said letter. APSEZL approached NCSCM to carry out the said study. The work is under progress under supervision of the Sr. Scientists of NCSCM. A point wise compliance for each direction of the MoEF&CC order is enclosed as **Annexure – 1.** No industrial activity other than those permitted in the CRZ area will be carried out / permitted to the industrial units coming up in future. Only the activities related to port and harbor and those requiring foreshore facilities will be carried out in this area.
xi.	Till the approval of action plan for conservation and protection of creeks/mangrove area, the CRZ area within SEZ shall be demarcated as "No Development Zone". PP shall not allow/undertake any development in CRZ area of SEZ.	

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

Sr. No.	Conditions	Compliance Status as on 31-03-2017
xii.	The implementation of action plan approved by the MoEF shall be monitored by the NCSCM/NIOT. Compliance with action plan shall be submitted to GCZMA and to MoEF, RO at Bhopal along with six monthly monitoring report.	Point noted. Work of Bathymetry survey, topography survey by NCSCM is under progress. Based on the same action plan for conservation and protection of creeks/mangrove will be prepared.
xiii.	PP shall earmark separate budget for the implementation of the above action plan. The details of the expenditure shall be submitted to GCZMA and to MoEF, RO at Bhopal along with six monthly monitoring report.	Complied. Cost of the proposal by NCSCM is Rs. 3.15 Cr. The said amount is allocated separately in the budget. Contract is awarded to NCSCM and 90% of payment is already made. Details of the same were submitted to GCZMA and to MoEF, RO at Bhopal along with six monthly compliance report of Oct'15 to Mar'16
xiv.	All the industry in SEZ shall be connected through impervious drainage lines to the STP/CETP for the discharge of their sewage or industrial effluent. There shall not be any discharge to creeks / rivers. PP shall be accountable for implementing this condition and necessary clause shall be incorporated in the MoU while allotting the plot to the individual industries.	Complied. Industries are well connected with impervious pipeline to the CETP. Common Effluent Treatment Plant (CETP) is provided in SEZ to handle and treat effluent & sewage of various industries. As per agreement all the industries can/are discharging their wastewater to CETP. Also STP provided by different industries for treatment of domestic sewage. 100% treated waste water from CETP is being utilized for horticulture purpose in SEZ area. For existing units same practice is being followed. No discharge is allowed in to creeks / rivers.
xv.	PP shall not carry out any river course modification.	Complied No river course modification is carried out.
xvi.	The individual industrial units shall obtain prior EC under EIA Notification, 2006 as applicable.	Point Noted. During the compliance period of Oct'16 to Mar'17, no new industry has been established at SEZ which requires EC under EIA Notification, 2006. The condition is being followed on case to case basis as applicable.

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

Sr. No.	Conditions	Compliance Status as on 31-03-2017
xvii.	Proponent shall identify 200 ha of land for mangrove plantation as per the condition laid by SEAC.	Complied. 100 Ha. Mangrove plantation is carried out by SAVE at Tala Tadav village of Khambhat Taluka of Anand district. With respect to the proposed 100 Ha. of mangrove plantation, the same is partially completed by GEC at Vadagam village of Khambhat Taluka of Anand district.
xviii.	50 meter buffer from the existing mangrove area should be provided for any developmental activity.	Point noted and complied.
xix.	Proponent shall develop the green belt with 3 layers of canopy all along the periphery.	Complied. Development of greenbeltat various locations within the SEZ is an ongoing activity. Green belt of 3 layer canopy will be developed as part of the development of SEZ. The species as Ficus Infectoria, Ficus religiosa, Terminalia arjuna,Cocos nucifera,Washingtonia fillifera,Casurina spp., Azadirachta Indica, Eucalyptus spp., Jatropha curacus, Ficus bengalensis, Subabool spp., Casia fistula, Date Palm and Delonix regia were grown in SEZ area. Width of the green belt varies from 2 m to 8 m and density from 2000 to 3000 trees per hectare. Total 94 hectares of land with 158335 trees is developed under SEZ area till date. So, far APSEZL have developed total 397 ha area as green belt with plantation of 6,96,918 saplings. Total expenditures of the horticulture dept. for the period F.Y. 2016-17 are INR 555 lakh. Detailed break-up of green belt development along with photographs of the same are attached as **Annexure – 4**.

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

Sr. No.	Conditions	Compliance Status as on 31-03-2017
xx.	All the recommendation of the EMP shall be complied with in letter and spirit. All the mitigation measures submitted in the EIA report shall be prepared in a matrix format and the compliance for each mitigation plan shall be submitted to MoEF along with half yearly compliance report to MoEF-RO.	Complied. Compliance report of environmental management plan and mitigation measures proposed during meeting with expert appraisal committee is attached as **Annexure – 2.**
xxi.	There shall be no disturbance to the sand dunes. The pipelines shall be laid using advanced method viz. Horizontal Directional Drilling (HDD) so as to avoid disturbance to the sand dunes/creeks/ mangroves.	There is no sand dune in the SEZ area. Point noted. No pipelines for intake and outfall are laid till now and feasibility will be studied as and when required.
Part – B: General Conditions		
	Construction Phase	
i.	Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, creche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.	Complied. Most of the construction labours reside in the nearby villages where all basic facilities are easily available. However, for those residing near the construction site, infrastructure facilities such as water supply, drinking water, toilets, STP, sanitation, first aid, ambulance etc. is made available by APSEZL.
ii.	A first aid room will be provided in the project both during construction and operation of the project.	Complied. APSEZL has already available Occupational Health Center & First Aid facility, which will be utilized during entire construction as well as operation phase of SEZ project. Whereas in case of emergency situation requiring treatment at hospital facility, same will be provided at Adani Hospital located with SEZ area.

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

Sr. No.	Conditions	Compliance Status as on 31-03-2017
iii.	All the topsoil excavated during construction phase should be stored for use in horticulture/landscape development within the project site.	Complied. Excavated topsoil is used for the horticulture/landscape development within the project site.
iv.	Disposal of muck during construction phase should not create any adverse effect on the neighboring communities and be disposed, taking the necessary precautions for general safety and health aspects of people, only in approved sites with the approval of competent authority.	Complied. APSEZL adopt 5R concept for environmentally sound management of different types of solid & liquid waste. Liquid Effluent & Sewage - It is being treated at ETP/STP plants, treated water from ETP/STP is being used for horticulture purposes in compliance with GPCB standards. Municipal Solid Waste A well-established system for segregation of dry & wet waste is in place, by which all wet waste (Organic waste) is being segregated & utilized for compost manufacturing; compost is further used by in house horticulture team for green belt development. Whereas Dry Recyclable Waste - is being sorted out in various categories & finally being sent for recycling. Below given hazardous waste generated during operations of the individual units are being disposed as per applicable laws. E- Waste & Used Batteries - is being sold to registered recycler. Solid Hazardous Waste - is being disposed through common facility i.e. CHWIF and / or co-processing at cement industries. Used/Waste Oil - It is being sold to authorized recycler/reprocesser.
		Sewage generated at different location is properly collected and sent for treatment in respective treatment plants and after treatment it is being utilized on land for horticulture purpose within APSEZ premises.

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

<table>
<tr><th>Sr. No.</th><th>Conditions</th><th>Compliance Status as on
31-03-2017</th></tr>
<tr><td>v.</td><td>Soil and ground water samples will be tested to ascertain that there is no threat to ground water quality by leaching of heavy metals and other toxic contaminants.</td><td>Complied.
Environment Monitoring is being carried out on regular basis in Port & SEZ area through NABL and MoEF accredited agency.

Third party analysis of the ground water is being carried out at at every three monthby NABL accredited & MoEF&CC approved M/s. Pollucon Laboratory. Summary of the same for duration from Oct-16 to Mar-17 is mentioned below.
<table>
<tr><th>Parameter</th><th>Unit</th><th>Min.</th><th>Max.</th></tr>
<tr><td>pH</td><td>-</td><td>7.57</td><td>8.41</td></tr>
<tr><td>Salinity</td><td>mg/L</td><td>2.98</td><td>22.2</td></tr>
<tr><td>Oil & Grease</td><td>mg/L</td><td>BDL*</td><td>BDL*</td></tr>
<tr><td>Hydrocarbon</td><td>mg/L</td><td>BDL*</td><td>BDL*</td></tr>
<tr><td>Lead as Pb</td><td>mg/L</td><td>0.011</td><td>0.012</td></tr>
<tr><td>Arsenic as As</td><td>mg/L</td><td>BDL*</td><td>BDL*</td></tr>
<tr><td>Nickel as Ni</td><td>mg/L</td><td>BDL*</td><td>BDL*</td></tr>
<tr><td>Total Chromium as Cr</td><td>mg/L</td><td>0.017</td><td>0.022</td></tr>
<tr><td>Cadmium as Cd</td><td>mg/L</td><td>BDL*</td><td>BDL*</td></tr>
<tr><td>Mercury as Hg</td><td>mg/L</td><td>BDL*</td><td>BDL*</td></tr>
<tr><td>Zinc as Zn</td><td>mg/L</td><td>0.029</td><td>0.93</td></tr>
<tr><td>Copper as Cu</td><td>mg/L</td><td>BDL*</td><td>BDL*</td></tr>
<tr><td>Iron as Fe</td><td>mg/L</td><td>0.041</td><td>0.48</td></tr>
<tr><td>Insecticides/Pesticides</td><td>mg/L</td><td>BDL*</td><td>BDL*</td></tr>
</table>
*BDL = Below Detectable Limit

Soil analysis was carried out by NABL accredited & MoEF&CC approved laboratory M/s. Chennai Laboratory from Navinal area which indicates no threat to ground water quality by leaching of heavy metals and other toxic contaminants. The test report for the same is attached as Annexure – 5

Please refer Annexure – 5 for detailed analysis reports. Approx. INR 27.95 Lakh is spent for all environmental monitoring activities during the F.Y. 2016-17 period.</td></tr>
<tr><td>v.</td><td>Construction spoils, including bituminous material and other hazardous materials, must not be allowed to contaminate watercourses and the dump sites for such material must be secured so that they should not leach into the ground water.</td><td>Complied.
Construction spoils including bituminous material is being stored in identified temporary storage area outside CRZ area and is being utilized for filling / level raising purpose.

Hazardous material is being stored and is being disposed as per Hazardous and Other Wastes (Management and Transboundary Movement) Rules.</td></tr>
</table>

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

Sr. No.	Conditions	Compliance Status as on 31-03-2017
vi.	Any hazardous waste generated during construction phase should be disposed off as per applicable rules and norms with necessary approvals of the Gujarat Pollution Control Board.	Complied. Hazardous material is being stored and is being disposed as per Hazardous and other applicable wastes management rules by individual industries under SEZ area. Consent to operate is taken by different industries from GPCB for the said hazardous waste.
vii.	The diesel generator sets to be used during construction phase should be low sulphur diesel type and should conform to Environment (Protection) Rules prescribed for air and noise emission standards.	Complied. DG sets are being used as power back up source in case of power failure. Certificate showing Sulphur content in diesel was submitted along with the compliance submission for the period of Apr'16 to Sep'16. DG sets used are being confirming to the EPA norms.
viii.	The diesel required for operating DG sets shall be stored in underground tanks if required; clearance from Chief Controller of Explosives shall be taken.	Complied. Diesel is stored in the underground tank located in existing port area and approval of the same from Chief Controller of Explosives is obtained from PESO with License no. P/WC/GJ/14/4671(P291058) dated 18.12.15 and is valid till 31.12.18. Copy of Certificate from CCE was provided in last compliance submission for the period of April'16 to Sep'16 and there is no further change.
ix.	Vehicles hired for bringing construction material to the site should be in good condition and should have a pollution check certificate and should conform to applicable air and noise emission standards and should operated only during non-peak hours.	Complied. Respective industry necessary construction as per permissions and being SEZ transportation, material transportation will be as per requirement. The vehicles of on-going construction work enter with all the applicable formalities required for SEZ gate operations.

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

<table>
<tr><th>Sr. No.</th><th>Conditions</th><th>Compliance Status as on 31-03-2017</th></tr>
<tr><td>x.</td><td>Ambient noise levels should conform to residential standards both during day and night. Incremental pollution loads on the ambient air and noise quality should be closely monitored during construction phase. Adequate measures should be made to reduce ambient air and noise level during construction phase, so as to conform to the stipulated standards by CPCB/GPCB.</td><td>Complied.

Ambient Air Quality (twice in a week) and Noise (once in a month) monitoring are being carried out by NABL and MoEF&CC accredited agency namely M/s. Pollucon Laboratories Pvt. Ltd. Summary of the same for duration from Oct-16 to Mar-17 is mentioned below.
Total Sampling Locations: 5 Nos.
<table>
<tr><th>Parameter</th><th>Unit</th><th>Max</th><th>Min</th><th>Perm. Limit$</th></tr>
<tr><td>PM_{10}</td><td>µg/m^3</td><td>98.58</td><td>41.58</td><td>100</td></tr>
<tr><td>$PM_{2.5}$</td><td>µg/m^3</td><td>57.41</td><td>16.63</td><td>60</td></tr>
<tr><td>SO_2</td><td>µg/m^3</td><td>28.97</td><td>5.22</td><td>80</td></tr>
<tr><td>NO_2</td><td>µg/m^3</td><td>45.56</td><td>15.25</td><td>80</td></tr>
<tr><th>Noise</th><th>Unit</th><th colspan="2">Avg. Value</th><th>Perm. Limit</th></tr>
<tr><td>Day Time</td><td>dB(A)</td><td colspan="2">64.4</td><td>75</td></tr>
<tr><td>Night Time</td><td>dB(A)</td><td colspan="2">60.1</td><td>70</td></tr>
</table>
$ as per NAAQ standards, 2009
Values recorded confirms to the stipulated standards.
Please refer Annexure – 5 for detailed analysis reports. Approx. INR 27.95 Lakh is spent for all environmental monitoring activities during the F.Y. 2016-17.

Measures for mitigating air and noise pollution mentioned in EMP are being implemented regularly.</td></tr>
</table>

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

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xi.	Fly ash should be used as building material in the construction as per the provisions of Fly Ash Notification of September, 1999 and amended as on 27th August, 2003. (The above condition is applicable only if the project site is located within 100 Kms of Thermal Power Stations).	Complied. Part of fly ash generated from Adani Power Limited, Mundra is being utilized by Adani Group to manufacture paver blocks and the same is used in back up area, footpath, colonies area, parking area, approach road etc. APSEZ has utilized more than 1500 MT of fly ash to manufacture paver block during the period Oct'16 to March'17. For development in SEZ, 128 MT of Fly Ash was utilized generated from APL for ROB project. Fly ash based PPC cement is used for construction activity. Mundra Solar Park (a new industry under construction) utilized fly ash in construction of its infrastructure. Also Britannia (an upcoming new industry) is encouraged for use of fly ash in paver block.
xii.	Ready mixed concrete must be used in building construction.	Complied. Only RMC is used for construction activity. Mundra Solar Park (a new industry under construction) utilized RMC. Also an agreement is made with Britannia to use the same.
xiii.	Storm water control and its re-use should be regulated as per CGWB and BIS standards for various applications.	Complied. The Central Public Health and Environmental Engineering Organization (CPHEEO) manual is followed CAPEEHO.
xiv.	Water demand during construction should be reduced by use of pre-mixed concrete, curing agents and other referred best practices.	Complied. New Industries are conveyed the message for use of RMC during construction.
xv.	Permission to draw ground water shall be obtained from the competent Authority prior to construction/operation of the project.	Complied. Source of Water: Narmada water through GWIL and desalination plant of APSEZ. No ground water is used during construction & operation stage of the project.

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

Sr. No.	Conditions	Compliance Status as on 31-03-2017
xvi.	Separation of grey and black water should be done by the use of dual plumbing line for separation of grey and black water.	Point noted and will be complied
xvii.	Fixtures for shower, toilet flushing and drinking should be of low flow either by use of aerators or pressure reducing devices or sensor based control.	Complied. Tap water Saver devices are installed at various locations of SEZ & Port to reduce the flow by one third. Water Free urinals are installed at Adani House for water conservation.
xviii.	Use of glass may be reduced by up to 40% to reduce the electricity consumption and load on air-conditioning. If necessary, use high quality double glass with special reflective coating in windows.	Complied. Industries are conveyed reduced the use of glass up to 40% to reduce the electricity consumption and load on air-conditioning. If necessary, use high quality double glass with special reflective coating in windows. They will comply based on feasibility of implementation.
xix.	Roof should meet prescriptive requirements as per Energy Conservation Building Code by using appropriate thermal insulation material to fulfill requirements.	Complied. Industries are conveyed to meet prescriptive requirements as per Energy Conservation Building Code for roof by using appropriate thermal insulation material to fulfill requirements. They will comply based on feasibility of implementation.
xx.	Opaque wall should meet prescriptive requirement as per Energy Conservation Building Code which is proposed to be mandatory for all air-conditioned spaces while it is aspirational for non-air-conditioned spaces by use of appropriate thermal insulation material to fulfil these requirement.	Complied. Industries are conveyed to meet prescriptive requirement as per Energy Conservation Building Code for opaque wall, which is proposed to be mandatory for all air-conditioned spaces while it is aspirational for non-air-conditioned spaces by use of appropriate thermal insulation material to fulfil these requirement. They will comply based on feasibility of implementation.

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014		
Sr. No.	**Conditions**	**Compliance Status as on 31-03-2017**
xxi.	The approval of the competent authority shall be obtained for structural safety of the buildings due to earthquake, adequacy of firefighting equipments, etc. as per National Building Code including protection measures from lightning etc.	Complied. Industries are conveyed to avail approval of the competent authority for structural safety of the buildings due to earthquake, adequacy of firefighting equipment etc. as per National Building Code including protection measures from lightning etc.
xxii.	Regular supervision of the above and other measures for monitoring should be in place all through the construction phase, so as to avoid disturbance to the surroundings.	Complied.
xxiii.	Under the provisions of Environment (Protection) Act 1986, legal action shall be initiated against the project proponent if it is found that construction of the project has been started without obtaining environmental clearance.	Point noted. Wherever applicable, construction activities have started only after obtaining environmental clearance.
	Operation Phase	
i.	The PP while issuing the allotment letter to individual member units shall specifically mention the allowable maximum quantity of water usage and effluent generated by each member unit.	Point noted and will be complied. Provisions are made while issuing the allotment letter to individual member units for specifically mentioning the allowable maximum quantity of water usage and effluent generated by each member unit. Sample copy of one of such letter is enclosed as **Annexure-18**
ii.	The PP shall establish an environmental monitoring cell with all the potential polluting units as members to review the environmental monitoring data and suggest improvements.	Complied. APSEZL has a well structured Environment Management Cell, staffed with qualified manpower for reviewing the environmental monitoring data and suggest improvements. Environment Management Cell organogram is attached as **Annexure – 7**.

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

Sr. No.	Conditions	Compliance Status as on 31-03-2017
iii.	Treated effluent emanating from STP shall be recycled / reused to the maximum extent possible. Treatment of 100% grey water by decentralized treatment should be done. Discharge of unused treated effluent shall conform to the norms and standards of the Pollution Control Board. Necessary measures should be made to mitigate the odour problem from STP.	Complied. Sewage generated from individual industry is treated by individual industry itself. A common effluent treatment plant of 2.5 MLD capacities is already constructed in SEZ area (having an independent environmental clearance) which takes care of effluent generated from member units. The treated effluent from CETP confirms to the GPCB norms. Treated water is used for gardening / horticulture purpose within CETP and SEZ premises. Online monitoring system at the discharge point is provided to ensure meeting norms as per Environmental Clearance and GPCB norms. Regular supervision is done to ensure no bad odour problem.
iv.	The solid waste generated should be properly collected and segregated. Wet garbage should be composted and dry/inert solid waste should be disposed off to the approved sites for land filling after recovering recyclable material.	Complied. A well-established system for segregation of dry & wet waste is in place, by which all wet waste (Organic waste) is being segregated & utilized for compost manufacturing; compost is further used by in house horticulture team for green belt development. Whereas Dry Recyclable Waste is being sorted out in various categories & finally being sent for recycling. The following table summarizes the waste management practice (for Oct'16 to Mar'17) for different types of wastes at Mundra:

Type of Waste	Quantity	Method of Disposal
Dry Waste	62.77	After recovery sent for recycling
Wet Waste	25.78	Converted to Manure for Horticulture use

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

Sr. No.	Conditions	Compliance Status as on 31-03-2017
v.	Diesel power generating sets proposed as source of backup power for elevators and common area illumination during operational phase should be of enclosed type and conform to rules made under the Environment (Protection) Act, 1986. The height of stack of DG sets should be equal to the height needed for the combined capacity of all proposed DG sets. Low sulphur diesel should be used. The location of the DG sets may be decided in consultation with the Gujarat Pollution Control Board.	Complied. DG sets are used as power back up source only in case of power failure & DG sets are confirming to the Environment Protection Act 1986. Height of stacks are maintained as needed for the combined capacity of all attached DG Sets by different member units. Low sulphur diesel Certificate Details submitted to the MoEF & CC along with half yearly compliance report April – 2016 to Sep – 2016 and there is no further change.
vi.	Noise should be controlled to ensure that it it does not exceed the prescribed standards, During night time the noise levels measured at the boundary of the building shall be restricted to the permissible levels to comply with the prevalent regulations.	Complied. Noise Monitoring is being carried out on regular basis SEZ area through M/s. Pollucon laboratory accredited by NABL and approved by MoEF. **Noise** / **Unit** / **Avg. Value** / **Perm. Limit** Day Time / dB(A) / 64.4 / 75 Night Time / dB(A) / 60.1 / 70 The noise level is well within the permissible limits. Monitoring report for the period from Oct.'16 to March'17 is attached as **Annexure – 5**

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

Sr. No.	Conditions	Compliance Status as on 31-03-2017
vii.	Green belt of adequate width and density preferably with local species along the periphery of the plot shall be raised so as to provide protection against particulates and noise.	Complied. Development of greenbelt at various locations within the SEZ is an ongoing activity. Width and density varies depending upon the location of plantation. The species as Ficus Infectoria, Ficus religiosa, Terminalia arjuna,Cocos nucifera,Washingtonia fillifera,Casurina spp., Azadirachta Indica, Eucalyptus spp., Jatropha curacus, Ficus bengalensis, Subabool spp., Casia fistula, Date Palm and Delonix regia were grown in SEZ area. Width of the green belt varies from 2 m to 8 m and density from 2000 to 3000 trees per hectare. Total 94 hectares of land with 158335 trees is developed under SEZ area. So, far APSEZL have developed total 397 ha area as green belt with plantation of 6,96,918 saplings. Total expenditures of the horticulture dept. for the period F.Y. 2016-17 are INR 555 lakh. Detailed break-up of green belt development along with photographs of the same are attached as **Annexure – 4**.
viii.	Weep holes in the compound walls shall be provided to ensure natural drainage of rain water in the catchment area during the monsoon period.	Complied. Boundary walls are constructed in such a way by keeping opening for define river path to facilitate free flow of water and it is ensured that water is not stagnant at any given point during rainy season.
ix.	Rain water harvesting for roof run-off and surface run-off, as plan submitted should be implemented.	Complied. Operational units will be encouraged for rainwater harvesting within their premises.

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

<table>
<tr><th>Sr. No.</th><th>Conditions</th><th>Compliance Status as on
31-03-2017</th></tr>
<tr><td>x.</td><td>The ground water level and its quality should be monitored regularly in consultation with Central Ground Water Authority.</td><td>Complied.

To monitor the ground water quality, four bore wells are provided. Third party analysis of the ground water is being carried out quarterly by NABL and MoEF&CC accredited agency namely M/s. Pollucon Laboratories Pvt. Ltd. Summary of the same for duration from Oct'16 to Mar'17 is mentioned below.

<table>
<tr><th>Parameter</th><th>Unit</th><th>Minimum</th><th>Maximum</th></tr>
<tr><td>pH</td><td>-</td><td>7.57</td><td>8.41</td></tr>
<tr><td>Salinity</td><td>mg/L</td><td>2.98</td><td>22.2</td></tr>
<tr><td>Oil & Grease</td><td>mg/L</td><td>BDL*</td><td>BDL*</td></tr>
<tr><td>Hydrocarbon</td><td>mg/L</td><td>BDL*</td><td>BDL*</td></tr>
<tr><td>Lead as Pb</td><td>mg/L</td><td>0.011</td><td>0.012</td></tr>
<tr><td>Arsenic as As</td><td>mg/L</td><td>BDL*</td><td>BDL*</td></tr>
<tr><td>Nickel as Ni</td><td>mg/L</td><td>BDL*</td><td>BDL*</td></tr>
<tr><td>Total Cromium as Cr</td><td>mg/L</td><td>0.017</td><td>0.022</td></tr>
<tr><td>Cadmium as Cd</td><td>mg/L</td><td>BDL*</td><td>BDL*</td></tr>
<tr><td>Mercury as Hg</td><td>mg/L</td><td>BDL*</td><td>BDL*</td></tr>
<tr><td>Zinc as Zn</td><td>mg/L</td><td>0.029</td><td>0.93</td></tr>
<tr><td>Copper as Cu</td><td>mg/L</td><td>BDL*</td><td>BDL*</td></tr>
<tr><td>Iron as Fe</td><td>mg/L</td><td>0.041</td><td>0.48</td></tr>
<tr><td>Insecticides/Pesticides</td><td>mg/L</td><td>BDL*</td><td>BDL*</td></tr>
</table>
*BDL = Below Detectable Limit
Test Reports are attached as **Annexure - 5**</td></tr>
<tr><td>xi.</td><td>Traffic congestion near the entry and exit points from the roads adjoining the proposed project site must be avoided. Parking should be fully internalized and no public space should be utilized.</td><td>Complied.
The entry and exit gates of SEZ and port are provided with ample parking area near the gate. The entry / exit complex is fully equipped with traffic control equipments and round the clock security is provided for seamless support.
No public space is utilized for parking of the vehicle.</td></tr>
</table>

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

Sr. No.	Conditions	Compliance Status as on 31-03-2017
xii.	A report on the energy conservation measures conforming to energy conservation norms finalized by Bureau of Energy Efficiency should be prepared incorporating details about building materials & technology, R & D Factors etc and submitted to the Ministry along with six monthly monitoring report.	Point noted and will be complied Few of the buildings in MSTPL are designed as green building. Motion sensors are provided at different buildings. Energy Conservation through Installation of Motion Sensor (Occu switch) & AC Temp. Controls in buildings are provided.
xiii.	Energy conservation measures like installation of CFLs/TFLs for the lighting the areas outside the building should be an integral part of the project design and should be in place before project commissioning. Used CFLs and TFLs should be properly collected and disposed off/sent for recycling as per the prevailing guidelines/rules of the regulatory authority to avoid mercury contamination. Solar panels may be used to the extent possible.	Complied. CFL / LED lighting are being used at various common areas of SEZ. Used CFL are collected and sent for recycling through authorized e-waste collection agency. APSEZL Installed & Commissioned **1.5 MW** roof top solar plant at residential township. Details submitted to the MoEF & CC along with half yearly compliance report Apr – 2016 to Sep – 2016.
xiv.	Adequate measures should be taken to prevent odour problems from solid waste processing plant and STP.	Complied All organic waste is converted to compost for utilization by Horticulture dept. Other solid waste is being segregated and sent for recycling. These measures ensure that odor problem is not created in the surrounding area.
xv.	The buildings should have adequate distance between them to allow movement of fresh air and passage of natural light, air and ventilation.	Complied.
xvi.	The environmental safeguards contained in the EIA Report should be implemented in letter and spirit.	Complied. Compliance report of environmental management plan and mitigation measures proposed during meeting with expert appraisal committee is attached as **Annexure – 2.**

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

Sr. No.	Conditions	Compliance Status as on 31-03-2017
xvii.	Adequate drinking water facility be provided.	Point noted and being complied. As a part of dignity of labour adequate provision of drinking water is being provided.
xviii.	Incremental pollution loads on the ambient air quality, noise and water quality should be periodically monitored after commissioning of the project.	Environment. Complied. Work to carry out Cumulative Impact Assessment study of Mundra region (including SEZ area as well as other industries in the surroundings) is awarded to NABET accredited consultant namely M/s. Cholamandalam MS Risk Services Ltd. The study includes Incremental pollution load's impacts. Necessary studies have already commenced from March, 2016 and are expected to be completed by July, 2017. Baseline monitoring is conducted for the period Mar – May 2016. Secondary data collection is also completed. A progress report on the same was submitted to MoEF&CC vide our letter dated 10.09.2016 (please refer **Annexure – 6**). After completion of study the final report will also be submitted to concern authorities. Recommendations / suggestions given in the report will be discussed and implemented as agreed.
xix.	Application of solar energy should be incorporated for illumination of common areas, lighting for gardens and street lighting in addition to provision for solar water heating. A hybrid system or fully solar system for portion of the apartments should be provided.	Complied. APSEZL Installed & Commissioned **1.5 MW** roof top solar plant at residential township. Details submitted to the MoEF & CC along with half yearly compliance report Apr – 2016 to Sep – 2016 and there is no further change.
xx.	Ozone depleting substance (Regulation & Control) Rules should be followed while designing the air conditioning system of the project.	Complied. Industries are conveyed to follow Ozone depleting substance (Regulation & Control) Rules while designing the air conditioning system of the project. The same will be implemented by individual unit as per project suitability.

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

Sr. No.	Conditions	Compliance Status as on 31-03-2017
12	Officials from the Regional Office of MOEF, Bhopal who would be monitoring the implementation of environmental safeguards should be given full cooperation, facilities and documents/data by the project proponents during their inspection. A complete set of all the documents submitted to MoEF should be forwarded to the CCF, Regional Office of MOEF, Bhopal.	Complied. Full support is extended to officers of regulatory authorities. Last compliance report for the period of April'16 to Sept.'16 was submitted to all concern authorities vide our letter dated 28.11.2016. Copy of the same is also available on our web site. Regional Officer, MoEF&CC, Bhopal visited APSEZL on 21-22 December'16 for monitoring the implementation of environmental safeguards. Full cooperation was extended to him and his team and all requisite documents including the updated compliance report was submitted to him.
13	In the case of any change(s) in the scope of the project, the project would require a fresh appraisal by this Ministry.	Point noted.
14	The Ministry reserves the right to add additional safeguard measures subsequently, if found necessary, and to take action including revoking of the environment clearance under the provision of the Environmental (Protection) Act, 1986, to ensure effective implementation of the safeguard measures in a time bound and satisfactory manner.	Point noted.

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

Sr. No.	Conditions	Compliance Status as on 31-03-2017
15	All other statutory clearances such as the approvals for storage of diesel from Chief Controller of Explosives, Fire Department Civil Aviation Department, Forest Conservation Act, 1980 and Wildlife (Protection) Act, 1972 etc. shall be obtained, as applicable by project proponent from the respective competent authorities.	Point noted. Diesel is stored in the underground tank located in existing port area and approval of the same from Chief Controller of Explosives is obtained from PESO with License no. P/WC/GJ/14/4671(P291058) dated 18.12.15 and is valid till 31.12.18. Copy of Certificate from CCE was provided in last compliance submission for the period of April'16 to Sep'16 and there is no further change. The approvals of Fire department Civil Aviation Department, Forest Conservation Act 1980 and Wildlife (Protetion) Act 1972 and other applicable approvals will be availed by the project components prior to construction of work if applicable.
16	These stipulations would be enforced among others under the provisions of Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and control of Pollution) act 1981, the Environment (Protection) Act, 1986, the Public Liability (Insurance) Act, 1991 and EIA Notification, 2006.	Point noted.

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

Sr. No.	Conditions	Compliance Status as on 31-03-2017
17	The project proponent should advertise in at least two local Newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the project has been accorded Clearance and copies of clearance letters are available with the Gujarat Pollution Control Board and may also be seen on the website of the Ministry of Environment and Forests at http://www.envfor.nic.in. The advertisement should be made within 10 days from the date of receipt of the Clearance letter and a copy of the same should be forwarded to the Regional office of this Ministry at Bhopal.	Already complied. Not applicable at present. Details submitted to the MoEF & CC along with half yearly compliance report of Apr – 2014 to Sep – 2014. APSEZL has advertised Environmental / CRZ Clearance in two local newspapers as "The Indian Express" (in English language) and "Kutch Mitra" (in vernacular language) on 24.07.14 in due time and copy of the same was submitted vide letter dated 13.08.2014 to Ministry of Environment, Forests & Climate Change, Bhopal.
18	Clearance is subject to final order of the Hon'ble Supreme Court of India in the matter of Goa Foundation Vs. Union of India in Writ Petition (Civil) No.460 of 2004 as may be applicable to this project.	Point noted.
19	Any appeal against this clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.	Point noted.

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

Sr. No.	Conditions	Compliance Status as on 31-03-2017
20	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zilla Parishad/ Municipal Corporation, Urban Local Body and the Local NGO, if any, from whom suggestions/ representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the company by the proponent.	Already complied. Not applicable at present. Details submitted to the MoEF & CC along with half yearly compliance report Apr – 2014 to Sep – 2014. Clearance letter is also put on the website of the Adani ports www.adaniports.com
21	The proponent shall upload the status of compliance of the stipulated EC conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB.	Complied. Last compliance report including results of monitoring data for the period of April'16 to Sept.'16 was submitted to Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB. vide our letter dated 28.11.2016. Copy of the same is also available on our web site www.adaniports.com.
22	The project proponent shall also submit six monthly reports on the status of compliance of the stipulated EC conditions including results of monitored data (both in hard copies as well as by e-mail) to the respective Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB.	Complied. Last compliance report for the period of April'16 to Sept.'16 was submitted to all concern authorities vide our letter dated 28.11.2016. Copy of the same is also available on our web site www.adaniports.com.

Half yearly Compliance report of Environment Clearance for the project "Multi Product SEZ" and CRZ Clearance for the project "Desalination, Sea Water Intake, Outfall Facility and Pipeline at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited" vide MoEF letter No. 10-138/2008-IA.III dated 15th July, 2014

Sr. No.	Conditions	Compliance Status as on 31-03-2017
23	The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environmental (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of EC conditions and shall also be sent to the respective Regional Offices of MoEF by by e-mail	Complied. It is being submitted by the individual unit located within SEZ area. EC Compliance report is uploaded at our website www.adaniports.com.

ANNEXURE A
Compliance Report of CRZ Recommendation

Note:

GCZMA has recommended the CRZ proposal for Sea Water Intake, Outfall system and Pipeline. Construction with respect to Desalination Plant, sea water intake and outfall system has not been started yet. Existing units having requisite environmental permissions for discharging their wastewater if any to the common effluent treatment plant having capacity of 2.5 MLD of MPSEZ Utilities Pvt. Ltd. Treated water is being utilized within the premises of CETP for the gardening / horticulture activities. As soon as the need for discharging the effluent / reject form the desalination plant into sea will arise, constriction work for the intake and outfall will be started.

Compliance Status of CRZ Recommendation given by GCZMA for the Project "Desalination, Sea Water Intake, Outfall Facility and Pipeline" issued vide Letter No. ENV-10-2010-1601-E dated 27th March 2012		
Sr. No.	**Specific Conditions**	**Compliance Status as on 31-03-2017**
Specific Conditions		
1	The provisions of the CRZ Notification of 2011 shall be strictly adhered to by M/s MPSEZ.	Point noted and will be complied. All proposed activities are in line with the EC notification 2006 and CRZ Notification 2011 and their subsequent amendments. It may be noted that no construction activities for the components proposed in the CRZ areas are started yet.
2	The treated effluent meeting with the Gujarat Pollution Control Board (GPCB) norms at the point recommended by NIO shall only be discharged through the said pipeline	Complied. Currently in SEZ area, 2.5 MLD CETP is in operation and treated water of the same is being used for the gardening / horticulture within the CETP premises. At present there Is no outfall pipeline constructed or being constructed.
3	The MPSEZ shall have to ensure that there should not be any mangrove destruction for the proposed project. Also existing mangroves shall have to be protected.	Complied. APSEZL has already committed to protect the 1254 ha. area in and around mundra area as mangrove conservation area. Monitoring with respect to protection and conservation of the said area is carried out by GUIDE, Bhuj. A monitoring report prepared by GUIDE for the same is attached as **Annexure – 3**.
4	The MPSEZ shall have to provide continues monitoring system for effluent quality specifically in respect of Salinity and Temperature since these two are vital parameters looking to the nature of effluent.	Point noted and will be complied. No effluent disposal is being carried out.
5	All the recommendations and suggestions given by the NIO in its marine environment impact assessment reports shall be implemented strictly by M/s MPSEZ.	Complied. Compliance report of environmental management plan and mitigation measures proposed during meeting with expert appraisal committee is attached as **Annexure – 2.**

Compliance Status of CRZ Recommendation given by GCZMA for the Project "Desalination, Sea Water Intake, Outfall Facility and Pipeline" issued vide Letter No. ENV-10-2010-1601-E dated 27th March 2012

Sr. No.	Specific Conditions	Compliance Status as on 31-03-2017
6	The effluent not meeting with the GPCB norms shall not be discharged and shall be stored in the guard ponds and recycled back into the Effluent Treatment Plant for further treatment to achieve the GPCB norms. The MPSEZ shall install necessary facilities for this purpose and strictly ensure the compliance with the GPCB norms, round the clock.	Complied. Effluent treated in CETP meets with GPCB norms and it is used for gardening / horticulture purpose within SEZ premises. Third party analysis of the treated water is being carried out once in a month by NABL and MoEF & CC accredited agency namely M/s. Pollucon Laboratories Pvt. Ltd. Summary of the same for duration from Oct'16 to Mar'17 is mentioned below.

Parameter	Unit	Min	Max	Perm. Limit$
pH	--	6.98	8.08	6.5 – 8.5
SS	mg/L	20	31	100
COD	mg/L	76	104	250
BOD	mg/L	22	32	100

$ Permissible Limits as per CC&A for CETP

Two nos. of Guard Ponds having RCC Structure with total capacity of 3000 KL for storage are available within CETP to store effluent, if not meeting with GPCB norms.

MUPL-CETP has also installed Continuous Effluent Monitoring System as per CPCB guidelines for continuous monitoring of pH, TSS, COD, BOD & Ammonical Nitrogen parameters with alarm/alert system to ensure the compliance round the clock. It is also connected with GPCB as well as CPCB server.

Compliance Status of CRZ Recommendation given by GCZMA for the Project "Desalination, Sea Water Intake, Outfall Facility and Pipeline" issued vide Letter No. ENV-10-2010-1601-E dated 27th March 2012

Sr. No.	Specific Conditions	Compliance Status as on 31-03-2017
7	Comprehensive Environment Impact Assessment Report shall be submitted to this department and recommendations / suggestions given in it shall be implemented.	Complied. Work to carry out Cumulative Impact Assessment study of Mundra region (including SEZ area as well as other industries in the surroundings) is awarded to NABET accredited consultant namely M/s. Cholamandalam MS Risk Services Ltd. Necessary studies have already commenced from March, 2016 and are expected to be completed by July, 2017. Baseline monitoring is conducted for the period Mar – May 2016. Secondary data collection is also completed. A progress report on the same was submitted to MoEF&CC vide our letter dated 10.09.2016 (please refer **Annexure – 6**). After completion of study the final report will also be submitted to concern authorities. Recommendations / suggestions given in the report will be discussed and implemented as agreed.
8	The construction debris and sewage generated during the construction phase shall not be discharged into the creek, sea and estuary or into the CRZ area. The debris shall be removed from the construction site immediately after the construction is over and shall be disposed of as per the guidance of the GPCB.	Point noted and will be complied. It may be noted that no construction activities for the components proposed in the CRZ areas are started The construction debris is being disposed off for filling low lying area outside CRZ area.
9	The construction camps shall be located outside the CRZ area and the construction lobours shall be provided with the necessary amenities, including sanitation, water supply and fuel and it shall be ensured that the environmental conditions are not deteriorated by the construction labours.	Complied. No construction camps are located in CRZ area. Most workers come from nearby villages however, for others; construction camps are located outside CRZ area. All necessary infrastructure and facilities like fuel for cooking, mobile toilets, safe drinking water, medical health care etc. is being provided.

Compliance Status of CRZ Recommendation given by GCZMA for the Project "Desalination, Sea Water Intake, Outfall Facility and Pipeline" issued vide Letter No. ENV-10-2010-1601-E dated 27th March 2012

Sr. No.	Specific Conditions	Compliance Status as on 31-03-2017
10	The ground water shall not be tapped to meet with the water requirements during construction or operation phase in any case.	Complied. APSEZ does not draw any ground water for the water requirement. Present source of water is desalination plant of APSEZ and/or Narmada water through Gujarat Water Infrastructure Limited. Average water requirement of water is 6.5 MLD out of which 3.5 MLD is obtained from Desalination plant whereas 3.0 MLD is obtained from GWIL.
11	A disaster management plan to meet with any eventualities that may arise during construction and/or operation phase shall be prepared and implemented.	Complied. Disaster Management Plan is updated regularly and the updated DMP was submitted to the MoEF & CC along with half yearly compliance report Apr – 2016 to Sep – 2016.
12	The pipeline shall be monitored regularly by the company and it shall be ensured that there is no leak form the pipeline. In case of any eventualities, the company shall immediately stop disposal through the said channel and take the corrective measures in consultation with the GPCB and District Collector.	Point noted and will be complied. It may be noted that no construction activities for the components proposed in the CRZ areas (including pipeline) are started yet.
13	Necessary permission from different departments / agencies under different laws / acts shall be obtained before commencing the construction / pipeline laying activities.	Point noted and will be complied. Necessary permissions will be obtained before start of the construction activities / laying of pipeline. It may be noted that no construction activities for the components proposed in the CRZ areas (including pipeline) are started yet.

Compliance Status of CRZ Recommendation given by GCZMA for the Project "Desalination, Sea Water Intake, Outfall Facility and Pipeline" issued vide Letter No. ENV-10-2010-1601-E dated 27th March 2012

Sr. No.	Specific Conditions	Compliance Status as on 31-03-2017
14	A separate environment cell with equipped personnel shall be created to implement the environment management plan and separate budget shall be provided for this purpose.	Complied. APSEZL has a well structured Environment Management Cell, staffed with qualified manpower for implementation of the Environment Management Plan. Allocation of separate budget has also been done. EMC Organogram is attached as **Annexure – 7**. Separate budget for the Environment protection measures is earmarked every year. All environment and horticulture activities are considered at corporate level and budget allocation is done accordingly. No separate bank account is maintained for the same however, all the expenses are recorded in advanced accounting system of the organization. Budget for environmental management measures (including horticulture) for the FY 2016-17 is to the tune of INR 932 lakh. Out of which, Approx. INR 910 lakh are spent during F.Y. 2016-17 period. Detailed breakup of the expenditures is attached as **Annexure – 8**
15	The cost of the external agency that may be appointed by the department for supervision / monitoring of the project activities during construction / operational phases shall be borne by M/s MPSEZ.	Point noted and will be complied. APSEZ will provide full support to the external agency appointed by any govt. authority after due discussion and understanding. If at all any study is suggested for supervision/monitoring, we will give full co-operation.

Compliance Status of CRZ Recommendation given by GCZMA for the Project "Desalination, Sea Water Intake, Outfall Facility and Pipeline" issued vide Letter No. ENV-10-2010-1601-E dated 27th March 2012

Sr. No.	Specific Conditions	Compliance Status as on 31-03-2017
16	Massive greenbelt development program including the mangrove plantation in 200 ha shall be carried out in consultation with the Gujarat Ecology Commission / Forest Department by M/s MPSEZ or the MPSEZ shall develop or participate in the Bio-Shielding projects to be taken up by the Department through MS university.	Complied. 100 Ha. mangrove plantation is being carried out by SAVE at Tala Tadav village of Khambhat Taluka of Anand district. 100 Ha. mangrove plantation is being carried out by GEC at Vadagam village of Khambhat Taluka of Anand district. Both activities are expected to be completed by next plantation season. APSEZL has developed its own "Dept. of Horticulture" and is taking measures/steps to improving environment. So, far APSEZL have developed total 397 ha area as green belt with plantation of 6,96,918 saplings in APSEZ premises and further green belt area will be developed as per development plan of SEZ. It may be noted that to enhance the marine biodiversity, till date APSEZ has carried out mangrove afforestation in more than 2800 ha. area across the coast of Gujarat. Total expenditure for the same till date is INR 722 lakh. Please refer **Annexure – 3** for further details of the same.

Compliance Status of CRZ Recommendation given by GCZMA for the Project "Desalination, Sea Water Intake, Outfall Facility and Pipeline" issued vide Letter No. ENV-10-2010-1601-E dated 27th March 2012

Sr. No.	Specific Conditions	Compliance Status as on 31-03-2017
17	A large scale socio-economic upliftment program in consultation with the District Collector / DDO shall be carried out. A separate budget shall be provided for this purpose and details be furnished to this Department from time to time.	Complied. APSEZ performs a large scale socio-economic upliftment program and shares with FOKIA (Federation of Kutch Industries Association) chaired by District Collector quarterly. The CSR Activities are planned out at Mundra by Adani Foundation in below four 1 Community Health 2 Sustainable livelihood development -fisher folk 3 Education 4 Rural Infrastructure Development Budget for CSR Activity for the FY 2016-17 is to the tune of INR 1535 lakh. Out of which, INR 1420 lakh are spent. Details of CSR activities carried out by Adani Foundation for Mundra and surrounding area is attached as **Annexure – 9.** The details of expenditures for said activities are submitted to Regional Office MoEF&CC, Bhopal along with half yearly compliance submissions. Last such submission was carried out on 28.11.2016.
18	Environmental Audit report shall be submitted every year. The report shall also cover the change in the coastal and marine environment enroute the proposed pipeline and around disposal point due to commissioning of the proposed activities.	Point noted & will be complied. The project related to pipeline is not yet started.
19	A six monthly progress reports regarding the compliance of the conditions shall be submitted to this department.	Complied. Last compliance report for the period of April'16 to Sept.'16 was submitted to Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB. vide our letter dated 28.11.2016. Copy of the same is also available on our web site www.adaniports.com.

Compliance Status of CRZ Recommendation given by GCZMA for the Project "Desalination, Sea Water Intake, Outfall Facility and Pipeline" issued vide Letter No. ENV-10-2010-1601-E dated 27th March 2012

Sr. No.	Specific Conditions	Compliance Status as on 31-03-2017
20	Any additional condition that may be imposed by this department / MoEF, GOI from time to time shall have to be complied with by M/s MPSEZ. .	Complied MoEF&CC has issued an order vide letter dated 18.09.2015 with certain directions. This condition is part of the directions of the said letter. APSEZL approached NCSCM to carry out the said study. The work is under progress under supervision of the Sr. Scientists of NCSCM. A point wise compliance for each direction of the MoEF&CC order is enclosed as **Annexure – 1.**

Annexure – 1

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Compliance Status of MoEF & CC Order dated 18.09.2015

Based on the report submitted by Sunita Narain committee, MoEF&CC issued a Show Cause Notice (SCN) to APSEZ vide their letter dated 30.09.2013. APSEZ replied to the SCN vide letter dated 14.10.2013. Further, an order (containing 10 directions) was issued by MoEF&CC vide their letter dated 18.09.2015. Compliance to these 10 directions is mentioned below.

Sr. No.	Condition	Compliance Status
i	The proposal of extension of the validity of environmental clearance granted to the North Port vide letter dated 12.01.2009 will be considered separately at later stage.	Point Noted and agreed. After receipt of this order, so far APSEZ has not done any application to MoEF&CC for the proposed North port.
ii	Bocha island, ecologically sensitive geomorphological features and areas in the island and creeks around the island will be declared as conservation zone action plan for its conservation must be prepared. M/s. APSEZ should provide necessary financial assistance for this purpose.	Being complied This reply covers direction no ii, iv and v. APSEZ approached National Center for Sustainable Coastal Management (NCSCM), Chennai to carry out the studies as stated in these directions. The proposal prepared by NCSCM based on the site visit was discussed with GCZMA. The study as per the approved scope of work is initiated by NCSCM. As part of the same, detailed bathymetry, topography and mangrove surveys are carried out. A progress report prepared by NCSCM in this regard is attached as **Annexure – 17.** The cost of the study as per the NCSCM proposal is 315.5 Lakh and 90% of the payment against the same is already made as an advance. Further progress will be submitted upon completion of the study.
iii	The violations of specific condition of all the ECs and CRZ clearances, if any, will be examined and proceeded with the provisions of EP Act, 1986 independently.	Complied The last visit of Regional Officer, MoEF&CC, Bhopal was done on 21st & 22nd December, 2016 for compliance certification. APSEZ provided all requisite information and documents required by the Regional Officer. During the said compliance verification visit, there was no major non-compliance observed. As per the information provided by MoEF&CC, Regional Office, Bhopal they have already submitted the site inspection report to MoEF&CC, New Delhi.
iv	A comprehensive and integrated study and protection of creeks/ mangrove area including buffer zone, mapping of co-ordinates, running	Direction no. iv and v being continuous part of the direction no. ii above, the present status is as per our reply against direction no. ii above.

Sr. No.	Condition	Compliance Status
	length, HTL, CRZ boundary, will be put in place. The plan will take note of all the conditions of approvals granted to all the project proponents in this area e.g. the reported case of disappearance of mangroves near navinal creek. The preservation of entire area to maintain the fragile ecological condition will be a part of the plan in relation to the creeks, mangrove conservation and conservation of bocha island up to baradimata and others.	The study to be carried out by NCSCM covers preparation of plan for protection of creeks/ mangrove area including buffer zone, mapping of co-ordinates, running length, HTL, CRZ boundary. It will also take note of the preservation of entire area to maintain the fragile ecological condition. On completion of the study and acceptance by MoEF&CC, APSEZ will implement the recommendations agreed.
v	NCSCM will prepare the plan in consultation with NIOT, PP and GCZMA. In recognition of the fact that the existing legal provisions under the E(P) Act 1986 do not provide for any authority to impose ERF by the government, the plan will be financed by the PP. the implementation will be carried out by GCZMA. The monitoring of the implementation will be carried by NCSCM.	
vi	There will be no development in the area restricted by the High court of Gujarat. APSEZ shall abide by the outcome of the PIL 12 of 2011 and other relevant cases.	Subject PIL has been disposed off by Hon'ble High Court vide their order dated 17.04.2015 and now there is no restriction on development in the subject area. Please refer **Annexure – 13**.
vii	APSEZ will submit specific action plan to protect the livelihood of fishermen along with budget.	Adani Foundation (AF) is the CSR arm of the Adani Group actively working for upliftment of the communities in the surroundings of various project sites of Adani Group. AF has prepared a specific action plan to protect livelihood of fishermen at Mundra. Please refer **Annexure – 14** for a summary of various initiatives taken by Adani Foundation for protection of livelihood of the fisherfolk community. APSEZ is carrying out various initiatives specific to the Fisherfolk community which includes: • Vidya Deep Yojana • Vidya Sahay Yojana – Scholarship Support • Adani Vidya Mandir • Fisherman Approach in SEZ • Machhimar Arogya Yojana • Machhimar Kaushalya Vardhan Yojana • Machhimar Sadhan Sahay Yojana • Machhimar Awas Yojana

Sr. No.	Condition	Compliance Status
		• Machhimar Shudhh Jal Yojana • Sughad Yojana • Machhimar Akshay kiran Yojana • Machhimar Suraksha Yojana • Machhimar Ajivika Uparjan Yojana • Bandar Svachhata Yojana These initiatives are discussed in detail in the report namely "Silent Transformation of Fisherfolk at Mundra". Said report also includes the information related to the planned expenses to the tune of approx. 13.5 Cr. INR for various initiatives for the next five years (2016 – 2021). Copy of the same is already submitted to MoEF&CC vide our letter dated 10.09.2016 (please refer **Annexure – 6**).
viii	APSEZ will voluntarily return the grazing land, if any, in their possession.	Point noted. All lands are acquired through proper procedure prescribed by State Government. However APSEZ has voluntarily given 400 acres of land back to Zarpara village for the purpose of Gauchar.
ix	A regional strategic impact assessment report with a special focus on Mundra region will also be prepared. The cost towards these studies will also be borne by PP.	MoEF&CC, GOI vide its letter dated 30.09.2013 has requested GCZMA to finalize the Terms of Reference (ToR) for Cumulative Impact Assessment (CIA) studies to be undertaken by the APSEZL. The ToR proposed by APSEZ were discussed and finally approved by GCZMA in their 23rd meeting dated 16.10.2014. Please refer **Annexure – 10** for copy of the same. Work to carry out CIA study of Mundra region (including SEZ area as well as other industries in the surroundings) is awarded to NABET accredited consultant namely M/s. Cholamandalam MS Risk Services Ltd. Necessary studies have already commenced from March, 2016 and are expected to be completed by July, 2017. First Progress report is received on Baseline monitoring is conducted for the period Mar – May 2016. Secondary data collection is also completed. A progress report on the same was submitted to MoEF&CC vide our letter dated 10.09.2016 (please refer **Annexure – 6**).

Sr. No.	Condition	Compliance Status
		After completion of study the final report will also be submitted to concern authorities. Recommendations / suggestions given in the report will be discussed and implemented as agreed.
x	In the subject matter of thermal power plant, the proposed regional strategic impact assessment analysis will take in to account salinity aspect along with its potential environmental impact to suggest future corrective actions as well as the guiding tool on extension and additional of the capacities.	Point noted and being complied. The study mentioned at Sr. No. 9 above covers the necessary study on salinity aspect along with its potential environmental impact.

Annexure – 2

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Compliance Report of EMP & Mitigation Measures

Sr. No.	Condition	Compliance Status
1	Proper maintenance of vehicles & machineries. Preference for PUC certified vehicles only.	Complied. Proper maintenance of company owned vehicles and machineries are carried out regularly. Vehicles having a valid PUC only are preferred.
2	Trucks should be covered during transportation.	Complied.
3	Vermicomposting of biodegradable and kitchen waste.	Complied. Kitchen waste is being converted to compost. Same practice will be extended during further development of SEZ area.
4	Applicable Regulatory Compliances.	Complied.
5	Follow Operational Protocols and Safety procedures.	Complied.
6	Periodic Monitoring.	Complied. Environment Monitoring is being carried out on regular basis in Port & SEZ area through NABL and MoEF accredited agency. Monitoring report for the period from October'16 to March'17 is attached as **Annexure – 5.**
7	Noise levels during piling, transportation and erection of structures etc. should be kept at minimum.	
8	Location is free from existence of reefs, mangrove or any such ecologically sensitive species so conventional method for laying seawater intake and effluent release can be adopted.	Point noted.
9	Work should be executed as per timeframe to avoid congestion of machineries and equipments.	Point noted.
10	Noise levels during piling, transportation and erection of structures etc. should be kept at minimum.	Complied. Environment Monitoring is being carried out on regular basis in Port & SEZ area through NABL and MoEF accredited agency. Monitoring report for the period from October'16 to March'17 is attached as **Annexure – 5.** Necessary measures required, if any, to

Sr. No.	Condition	Compliance Status
		attenuate noise generation are taken on regular basis.
11	Maintain cleanliness to avoid spillage and maintain good sanitation facilities.	Point noted and complied.
12	Effluent release should be as per GPCB/CPCB norms.	The treated water from CETP confirms to the GPCB norms and the same is used for gardening / horticulture purpose within SEZ premises.
13	Locations should be adequately identified with marker buoys.	Point noted and will be complied.

Annexure – 3

CONSERVATION AND MONITORING FOR NATURAL MANGROVE STANDS AT MUNDRA

Report Submitted to

Adani Ports and Special Economic Zone Limited
Mundra, Kachchh

Gujarat Institute of Desert Ecology,
P. B. No. 83, Mundra Road, Bhuj – 370001
November - 2015

CONSERVATION AND MONITORING FOR NATURAL MANGROVE STANDS AT MUNDRA

G.A.Thivakaran
Pranav J. Pandya
G.Thirumaran
Devi Velusamy
Leka Mera

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1 Introduction

Coastal stretch of Kachchh district constitutes the entire northern coast of Gulf of Kachchh (GoK) which is one of the three major Gulf systems of India endowed with very high biological richness and physical and chemical peculiarities. Kachchh coast constitutes about 25.37% and 5.3 % of the coastal stretch of Gujarat and India. In spite of its high aridity (4 in a scale of 1- 4) and poor mean rainfall (340 mm), Kachchh coast has diverse ecological habitats and ecosystems like mangroves, sandy coasts, mudflats, creeks and other tidal incursions which enhance manifold its coastal landscape diversity and natural resources. Besides, extensive mangrove formations and a vast continental shelf of 1,64,000 sq.km facilitates a rich bioresource.

Kachchh coast has mangrove extent of 775 sq.km, constituting 74% of state's mangroves (1046 sq.km) which is the largest mangrove entity in India's west coast. Due to the presence of rich natural resources and favorable natural conditions, Kachchh coast has become a zone of intensive industrial development. Since late 1990's, industrial development is being promoted aggressively in view of its very rich mineral deposits, shortest sea route to Gulf countries and easy availability of land which is at premium in other coastal regions of the state. Announcement of tax holidays post 2001 earthquake by state government provided further impetus for coastal industrial development. Many of these developments are beginning to have implications on ecological, social and economic spheres. Kachchh coast faces threat from climate change, pollution and habitat change which are also important to understand impacts on mangroves.

In order to balance the economic growth and ecological health, MoEF is directing industrial houses to conserve their adjacent ecosystems by formulating management plan for the mangroves if any based on sound scientific principles. Having realized the importance of conserving and protecting the mangrove resources in their

vicinity, Adani Ports and Special Economic Zone Ltd., (APSEZL) instituted this study through Gujarat Institute of Desert Ecology (GUIDE), Bhuj to analyze the present status of mangroves in the conservation zone of 1254 ha in its port vicinity. Based on intensive field studies this report narrates the present environmental status of the conservation zone.

Mundra Port is one of the fastest growing and largest private ports in the country and also a SEZ (Special Economic Zone). The port in year 2013-14 has handled >100 million tons of cargo. The port is equipped with road, rail and air connectivity which has attracted few big and small industries to this area.

On the other hand, the area also harbors a luxuriant mangrove forest which is very close to the Port and SEZ.

The present study has been instituted in order to meet the condition imposed while sanctioning Environmental Clearance (EC) by MoEF, Govt. of India. In conformity to the stipulated condition, efforts are being made to assess the mangrove vegetation structure and status in the 1254 ha of mangroves earmarked for intensive conservation measures.

1.1 Adani Ports and Special Economic Zone Ltd (APSEZL)

Gujarat Adani Port Ltd., now Adani Ports and Special Economic Zone Ltd (APSEZL) started its operations in Mundra during 1998 with an all-weather, open-sea jetty and port backup on Navinal Island. The Port has since then underwent four expansions, namely railway line and container terminal in 2000, Single Point Mooring and Crude Oil Terminal in 2004, a Multipurpose wharf Terminal-II in 2007 and Waterfront development project in 2009 which includes development of North Port, South Port, East Port & West Port. In addition to this now port based special economic zone and two thermal power plants exist which form a major industrial cluster in this coast.

1.2 *Origin of the Study*

Being close to the major port and active SEZ, the earmarked conservation zone encompassing 1254 ha of mangrove has become important area to be monitored regularly. Conservation and management of this mangrove formation has become crucial and an important responsibility of the Port authority. In the light of Port and SEZ expansions, Ministry of Environment and Forest (MoEF, GOI) has asked APSEZL to conserve the potential mangrove areas in its port vicinity and institute regular scientific monitoring studies. The present study was initiated with an aim to investigate the present status of the conservation areas of 1254 ha .

1.3 *Objectives of the Study*

In the backdrop of the narrated industrial development and the interest to conserve mangrove ecosystem in the conservation zone of 1254 ha, the present study was instituted with the following objectives.

- Monitoring of 1254 ha of potential mangrove area for conservation through seasonal assessment of vegetation status (density, growth, regeneration capacity etc.).
- Monitoring mangrove associated macrobenthic communities (which are good indicators of stand health) through seasonal density, diversity and Population studies.
- Monitoring temporal changes in the earmarked conservation zone of 1254 ha through GIS and Remote Sensing (GIS & RS).

1.4 Description of the study Area

Kachchh coast constitutes the entire northern shore of Gulf of Kachchh marked by narrow beaches and wide mudflats. Mangrove extent of Mundra taluka is about 19.1 km^2 distributed mostly along creek systems. Present study area covers the mangrove formation in the conservation zone of 1254 ha located in the eastern part of Mundra coast. The coastal stretch of Mundra is dissected by extensive mudflats and creek systems, many of which harbour good mangrove formations. Major creek systems in the area are Navinal, Bocha, Baradi mata and Kotadi creek. These creeks again divide into minor creek complexes. Many of these creeks support mangrove stands, especially along the eastern and western side of the waterfront area of APSEZ. Koylavali creek is luxuriantly lined by mangrove patches predominant with the species, *A. marina*. Adani Port and Special Economic Zone Ltd.-APSEZ is located at about 3 km from its mouth towards eastern extension. The present study was focused towards the mangrove stand at Bocha Island, East of Bocha, Kotadi creek and Baradimata creek adjoining to the waterfront area of APSEZ which falls within the earmarked conservation zone of 1254 ha (Fig.1.1).

Bocha and East of Bocha

Bocha Island is a finger like projection surrounded by Bocha creek on west and Navinal creek on the east. The MICT container terminal is located right across the Bocha Island at a distance of 100m. The island supports a mature and healthy mangrove stand.

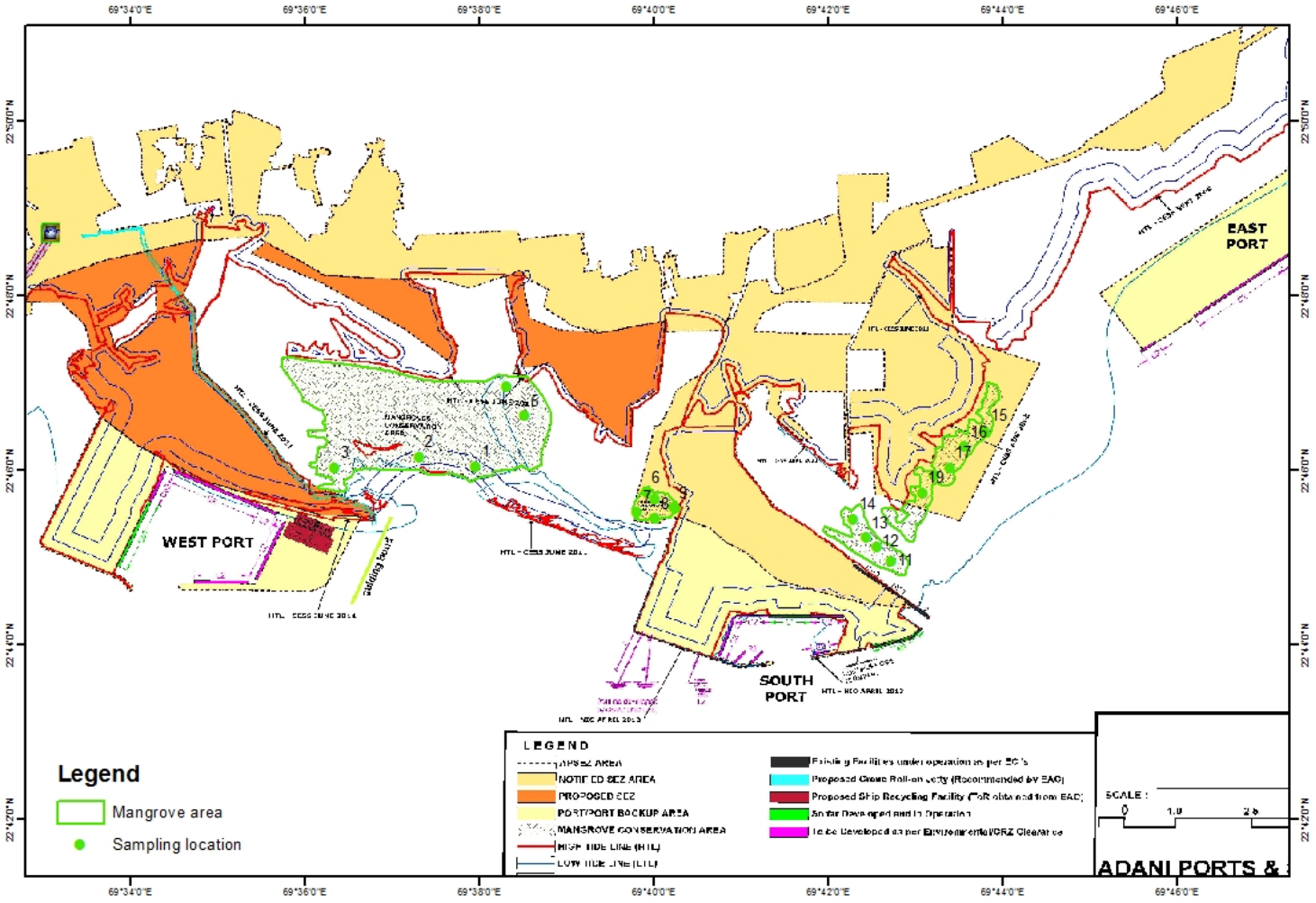
Kotadi and Baradimata creek systems on the western part of APSEZL area include luxuriant mangrove patch. These two creeks bifurcate further at their tail end into several minor creeks forming a complex water ways with many small Islands. Many of these Islands harbor healthy mangrove stands.

Tides at Mundra are mixed, predominantly semidiurnal type with Mean High Water Spring (MHWS) of 6.66 m and Mean High water Neap (MHWN) of 5.17 m. The phase

difference is not uniform for successive tides in the Gulf and it varies as per tidal condition (ICMAM, 2002).

Due to its semi-arid nature, annual rainfall in Kachchh is poor, ranging from 250-350 mm which is often irregular. However, mean rainfall (1932 to 2001) was higher at Mundra (407 mm) comparing other coastal talukas. Rain during monsoon is confined to only 15-20 days and occurs as an instant downpour. Freshwater input into the near coastal waters is quite meager and appears to influence coastal flora like mangroves explaining poor floral diversity. Annual temperature fluctuation in the district is extreme, ranging from 7- 47^{o}C with a yearly average humidity of 60% which increases to 80% during south-west monsoon and decreases to 50% during November-December. The phenomenon of drought is common, with 2 drought year in a cycle of 5 years.

Fig. 1.1 . Mangrove stand at Bocha Island, East of Bocha, Kotadi creek and Baradimata creek in 1254 ha



2 Baseline Information

2.1 *Mangrove Vegetation and Structure*

2.1.1 *Methodology*

i. ***Zoning of the study area****:* Considering the extent of the area, the conservation zone mangrove formation was divided into smaller zones in order to facilitate better evaluation and understanding of the ecosystem. Accordingly, three zones as indicated belowand shown in Figure 2.1 was identified for the purpose of this study;

Zone 1: East of Bocha (area between Bocha and Abhan creek)

Zone 2: Bocha Island (The Island proper to the extent of conservation zone)

Zone 3: Baradimata creek and nearby and areas falling within the embarked zone.

Representative study points covering all the zones were investigated on ground and documented for baseline status

Zone I: East of Bocha (area between Bocha and Abhan creek):

The area between Bocha and Abhan creek holds some of the large and old mangroves and represents one of the healthy mangrove ecosystems of Kachchh (Fig. 2.1). Apart from *Avicennia marina*, the area has good population of another mangrove species, *Ceriopstagal.*

A noticeable patch of cut/lopped mangrove was observed (Lat. 22° 45' 20.3"E; long. 69° 43' 00.5"N) which was reported during the earlier seasonal studies. The same patch after 6 months has shown remarkable natural regeneration with an average density of 70 plants per 100m^2 quadrate. This proves that this area has high potential for natural regeneration if taken care of.

Fig. 2.1 Sampling locations at different mangrove stands in the earmarked 1254 ha at Mundra

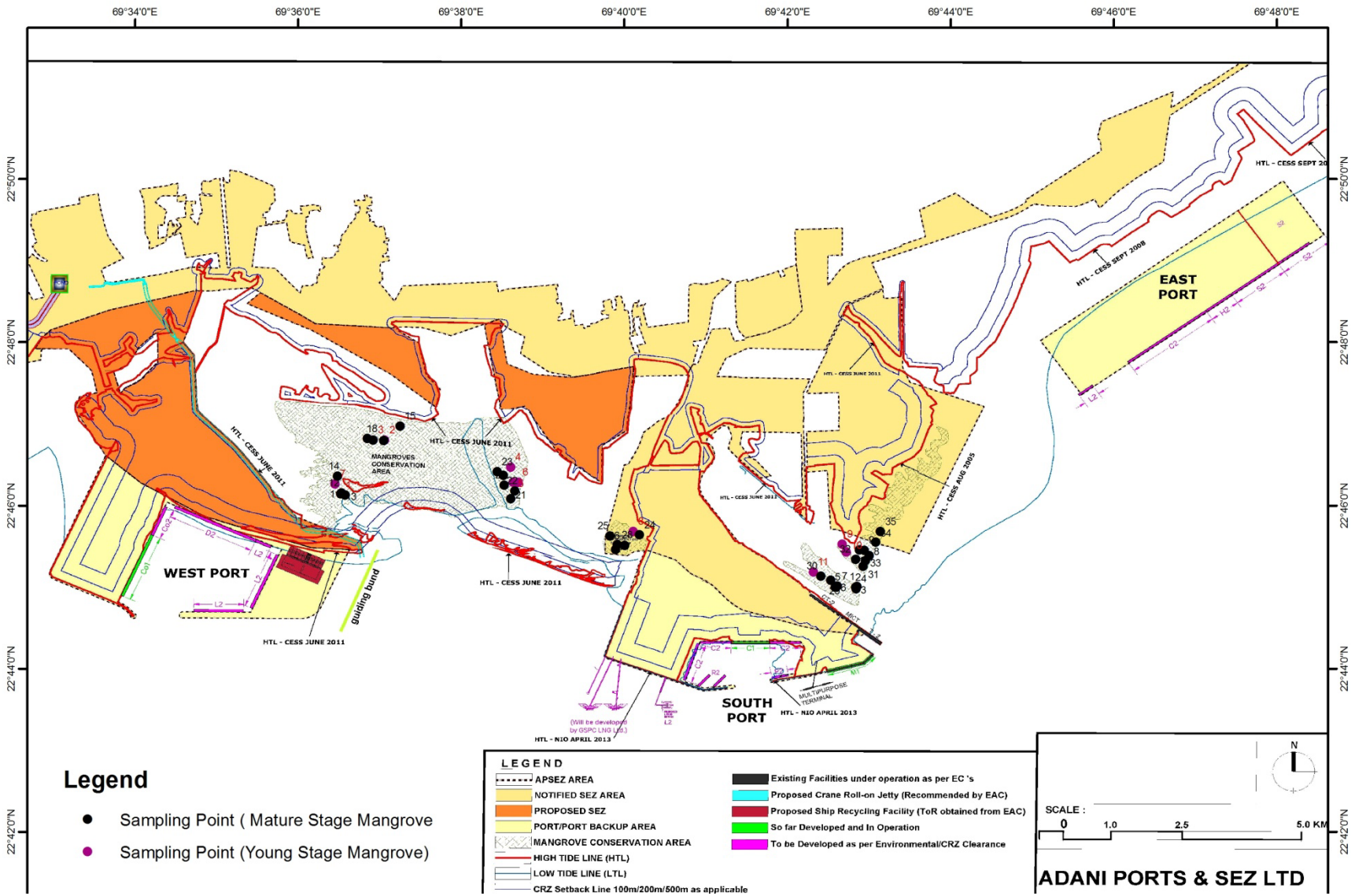


Fig. 2.2 Mangroves in Zone-I- East of Bocha

Zone II: Bocha Island

Bocha Island forms one of the integral areas of the Mundra mangroves with dense and healthy mangrove forests with an average density of 5285 to as high as 15000 trees/ha. Finger like shape of this Island surrounded by tidal waters in all the three sides with high tidal inundation enable the mangroves to develop into a mature and healthy formation. This fully grown healthy mangrove ecosystem has three mangrove species viz. *A. marina, C. tagal*and R. *mucronata.* The Island extends landward on the northern side forming minor creek systems.

Fig. 2.3 Mangroves atBocha Island

Zone III: Area between Navinal creek and west port (Baradimata creek and adjacent areas)

This zone supports complex creek systems formed of Baradimata and Kotadi creeks. Minor Islands supporting healthy mangrove formations characterize this zone. Most of the mangroves in this area are pristine since they are away from human influence. Mangrove stands, especially the thickets along the fringes of creeks in this zone are young and fully grown as compared to the mangroves of Zone I and II. The islands support fully grown mangrove forest and a maximum tree height of 7 m could be recorded in this zone.

Vegetation structure study was carried out at different representative mangrove formations in the conservation zone of 1254 ha. Mundra mangroves are distributed on open coastal stretch, along creeks and Islands. Keeping in mind the tidal cycle and workable conditions, a suitable low tide time was selected to carry out mangrove vegetation study. Since most of the mangrove formations are along the creeks and

on small islands, a fishing boat was used to approach the mangrove formations. Vegetation analysis was carried out during low tide by quadrate method (Mueller-Dombois and Ellenberg, 1967; Kershaw, 1973). Thirty Five random plots of 10 × 10m were laid in different mangrove formations within the study area representing landscapes like creek systems, islands and coastal mangroves to analyse the vegetation structure. In each plot, the total numbers of trees were recorded. Fig. 2.1 shows the study area and sampling plots and quadrates for floral and faunal study.

The simple modified transect method was followed by walking perpendicular to the waterline in the mangroves. At few instances, Point Centre Quarter method (Cottamand Curtis 1956) was also used for the density assessment. For all trees in the plot, tree height and girth at breast height (GBH) were measured. GBH of all mature trees taller than 1 m was measured. To enumerate regeneration and recruitment classes, subplots of 1×1 m and 2×2 m, respectively, were laid randomly within all the bigger plots of 10 × 10m. The regeneration class includes seedlings that are germinating saplings which are less than 50 cm tall and the recruitment class includes well established saplings which are more than 50cm but less than 1m. Density of mature trees, regeneration and recruitment class for each station was expressed as number per hectare (No/ha).

2.1.2 *Results*

Overall structural characters of the mangrove formation in the earmarked area of 1254 ha such as density, height, GBH and the regeneration, recruitment and mature tree classes are presented in Table 2.1 and 2.2, respectively.

Mangrove *Diversity*

In total, three species were recorded in the study area viz. *Avicenna marina, Rhizophoramucronata and Ceriopstagal*. Similar to other mangrove formations of Gulf of Kachchh, Mundra mangroves are dominated by *Avicenna marina*. Small patches of *Rhizopora*sp were seen at Bocha Island and Kotadi creek. A healthy patch

of *C. tagal* was recorded at East of Bocha during the field visits. Mangrove floral diversity is comparatively higher at Mundra region than any other Kachchh coast which mostly has only one species namely, *Avicennia marina*.

Mangrove Density

An overall average mature tree density of 4236 trees/ha was recorded for the dominant species *A. marina*from all the sampled stands within conservation area of 1254 ha (Table 2.1). The other two less dominant species recorded a density of 309 and 343 trees/ha. Transect-wise, occurrence of highest density of 15000trees/ha was recorded at the Bocha creek. This creek complex near the water front showed highly dense mangrove patch with a healthy habitat. Lowest mature tree density of 2000 trees/ha was observed at Bocha Island mangroves having highly mature trees with good spacing. The comparative analysis of tree density revealed that Baradimata creek showed the highest mangrove density with average of 5261/ha (Max. 14000/ha; Min. 2300/ha) followed by Bocha Island with an average density of 5050/ha. This was followed by Kotadi Island (3267/ha) and east of Bocha(3256/ha) (Table 2.1). In general, recorded tree densities are comparable with any healthy mangrove formations of west coast of India.

Tree Height

The mangrove stands within the conservation specific area of 1254 ha showed noticeable variation in tree height. Overall average height recorded from the four different stands was 249 cm (Min. 100 cm – Max. 480 cm) with the maximum plant height of 480 cm recorded at Baradimatha creek (Table 2.1). In other stands, marginal variation was recorded in average height.

Of the 35 quadrates, more than 10 quadrates showed the average height of 200-250 cm.Considering the overall height class of all the four mangrove formations studied, it can be interpreted that most mangrove stands fall in the height range of 200-300 cm(Fig. 2.2).

Tree Girth (Girth at Breast Height-GBH)

Mean Mangrove Girth (GBH) studied at 35 plots ranged from 10 cm to 73 cm (Table 2.1). Overall average girth based on the mean of all the plots was 27 cm. Only Bocha Island showed 5 trees with highest girth in the range of 60 to 120 cm. Most of the mangrove girth recorded fall in the range of 15 to 20cm (Fig.2.3).

Regeneration Class

Average density of regenerating mangroves (saplings with a height of <30 cm) was 59829 plants/ha (Table 2.2) which ranged from 120 plants/ha to 125300 plants/ha. This reflected high regeneration potential of mangroves in the area. A good regeneration of *C. tagal* was recorded (120 plants/ha) at Bocha Island, indicating favorable environment for this species at this site. Similarly, a small regenerating patch *R. mucronata* was recorded from Bocha Island with a regeneration class density of 330 plants/ha. Comparing overall regeneration of *A. marina*, it was seen that recruitment was moderately lower in the area. However, it was observed that regeneration and recruitment in some of the Islands and creek edges near the water front was much higher.

Recruitment *Class*

Average recruitment recorded in the area was 14110 plants/ha which ranged from 45 to 35600 plants/ha (Table 2.2). Less recruitment was evident at older and mature mangrove forests like Bochaapparently due to lack of canopy opening and resultant reduced exposure to sunlight. Vegetation structure and density of mature and younger classes in a forest indicate its regeneration behavior. Analysis of density of younger classes like seedlings (regeneration class) and saplings (recruitment class) generally indicates the future structure the forest and its population will assume. In the present study, high density of regeneration and recruitment classes in majority of the mangrove stands indicate that they are healthy and their germination and recruitment of younger classes is normal which will ensure a good and healthy stand

in future if they did not face any disturbance. Only in patches like Bocha and Kotadi Island, ratio of mature tree to younger classes is very high indicating their climax nature.

Similar to other Kachchh mangroves, mangroves within the conservation zone of 1254 hais dominated by *A. marina* while occurrence of *R. mucronata* and *C. tagal* is patchy and restricted to few mangrove stands like Bocha Island and Kotadi creek. Most of the surveyed areas represent healthy mangrove stands. Moreover, some of the places like Bocha Island, Kotadi Island and of East Bocha represent older mangrove formations. Typically, most of the areas showed very few floral associates. Only at few places, associates like *Sueda*and*Salicornea sp.* were recorded.

Table 2.1 Mangrove vegetation structure and classification in the 1254 ha Conservation Zone

S.No	Site No	Sampling Locations	GPS Locations	*A.marina* Density	*Rhizophora* density /ha	*Ceriops* density/ha	Height (cm)			Girth(cm)		
							Min	Max	Avg.	Min	Max	Avg.
1	1	Bocha Island	22d 45' 0.20" N; 69d 42' 51.00" E	4000	0	0	310	350	330	8	12	10
2	2	Bocha Island	22d 44' 59.70" N;69d 42' 50.10" E	5000	0	0	170	340	220	26	60	43
3	3	Bocha Island	22d 44' 59.10" N; 69d 42' 50.40" E	5800	0	0	240	270	257.5	20	34	27
4	4	Bocha Island	22d 44' 58.60" N; 69d 42' 50.50" E	7600	0	0	156	200	126.2	12	34	23
5	5	Bocha Island	22d 44' 59.80" N; 69d 42' 35.10" E	2000	7100	0	170	340	277.5	7	62	35
6	6	Bocha Island	22d 45' 0.40" N; 69d 42' 35.50" E	5500	0	0	180	340	230	7	90	49
7	7	Bocha Island	22d 45' 0.50" N; 69d 42' 36.50" E	7100	0	0	300	350	239	25	120	73
8	29	Bocha Island	22d 45' 4.93" N; 69d 42' 31.72" E	4550	0	6500	135	200	168	15	54	35
9	30	Bocha Island	22d 45' 7.97" N; 69d 42' 24.54" E	3900	0	5500	126	340	233	17	49	33
		Average-Bocha Island		**5050**	**789**	**1333**	**199**	**303**	**231**	**15**	**57**	**36**
10	8	East of Bocha	22d 45' 23.00" N; 69d 43' 0.00" E	2200	0	0	100	600	340	15	60	38
11	9	East of Bocha	22d 45' 26.90" N; 69d 42' 56.50" E	2800	0	0	100	670	450	21	75	48
12	10	East of Bocha	22d 45' 27.20" N; 69d 42' 53.00" E	3900	0	0	100	390	290	15	28	22
13	31	East of Bocha	22d 45' 15.14" N; 69d 42' 55.66" E	2850	0	0	190	600	395	10	19	15
14	32	East of Bocha	22d 45' 20.33" N; 69d 42' 50.12" E	3100	0	0	210	670	440	15	60	38
15	33	East of Bocha	22d 45' 19.22" N; 69d 42' 57.30" E	3750	0	0	195	390	293	21	75	48
16	34	East of Bocha	22d 45' 32.96" N; 69d 43' 4.80" E	4050	3700	0	280	250	265	15	28	22
17	35	East of Bocha	22d 45' 40.68" N; 69d 43' 8.32" E	3400	0	0	230	450	340	16	49	33
		Average-East of Bocha		**3256**	**463**	**0**	**176**	**503**	**352**	**16**	**49**	**33**
18	11	Baradimata creeks	22d 46' 7.70" N; 69d 36' 34.60" E	5200	0	0	110	250	190	14	30	22
19	12	Baradimata creeks	22d 46' 9.10" N; 69d 36' 32.00" E	5700	0	0	300	450	450	26	45	36
20	13	Baradimata creeks	22d 46' 8.40" N; 69d 36' 31.40" E	4600	0	0	210	520	480	12	48	30
21	14	Baradimata creeks	22d 46' 21.50" N; 69d 36' 28.90" E	14000	0	0	100	330	210	9	18	14
22	24	Baradimata creeks	22d 45' 38.29" N; 69d 40' 11.07" E	2350	0	0	300	245	273	13	19	16
23	25	Baradimata creeks	22d 45' 37.48" N; 69d 39' 49.22" E	3100	0	0	100	240	170	15	26	21
24	26	Baradimata creeks	22d 45' 30.34" N; 69d 40' 0.18" E	2300	0	0	100	220	160	12	20	16
25	27	Baradimata creeks	22d 45' 27.53" N; 69d 39' 53.48" E	4900	0	0	100	210	155	8	26	17
26	28	Baradimata creeks	22d 45' 31.01" N; 69d 39' 54.61" E	5200	0	0	120	225	173	14	30	22

		Average-B.Matha Creeks		**5261**	**0**	**0**	**160**	**299**	**251**	**14**	**29**	**22**
27	15	kotadi creek	22d 46' 58.30" N; 69d 37' 15.00" E	3400	0	0	90	150	100	9	18	14
28	16	kotadi creek	22d 46' 47.60" N; 69d 37' 2.90" E	3500	0	0	120	210	140	6	26	16
29	17	kotadi creek	22d 46' 48.00" N; 69d 36' 55.20" E	4500	0	0	90	210	130	6	15	11
30	18	kotadi creek	22d 46' 49.10" N; 69d 36' 50.80" E	2600	0	0	130	190	160	9	26	18
31	19	kotadi creek	22d 46' 22.04" N; 69d 38' 30.85" E	2950	0	0	170	215	192.5	12	26	19
32	20	kotadi creek	22d 46' 14.81" N; 69d 38' 31.66" E	3100	0	0	240	185	212.5	15	26	21
33	21	kotadi creek	22d 46' 4.73" N; 69d 38' 36.34" E	3250	0	0	156	220	188	21	26	24
34	22	kotadi creek	22d 46' 10.65" N; 69d 38' 39.29" E	3400	0	0	170	180	175	12	17	15
35	23	kotadi creek	22d 46' 24.64" N; 69d 38' 26.41" E	2700	0	0	180	310	245	20	28	24
		Average-Kotadi Creek		**3267**	**0**	**0**	**150**	**208**	**171**	**12**	**23**	**18**
		Overall Average		**4236**	**309**	**343**	**171**	**323**	**249**	**14**	**39**	**27**

Table 2.2 Regeneration and Recruitment details of the sampling points

S.No.	Location	Latitude	Longitude	Species	Regeneration No/ha	Recruitment No/ha
1	Kotadi creek	22d46' 8.40" N	69d36' 31.40" E	*Am*	120000	28000
2	Kotadi creek	22d46' 47.80" N	69d37' 3.60" E	*Am*	28000	6000
3	Kotadi creek	22d46' 48.00" N	69d36' 55.20" E	*Am*	18000	3200
4	Kotadi creek	22d46' 27.90" N	69d38' 36.33" E	*Am*	68200	10300
5	Kotadi creek	22d46' 16.80" N	69d38' 38.23" E	*Am*	85400	15900
6	Kotadi creek	22d46' 16.91" N	69d38' 41.71" E	*Am*	102000	20900
7	Kotadi creek	22d46' 15.70" N	69d36' 27.22" E	*Am*	89500	16400
8	Baradimata	22d45' 40.87" N	69d40' 6.62" E	*Am*	125300	35600
9	East of Bocha	22d45' 31.34" N	69d42' 40.24" E	*Am*	35200	20500
10	East of Bocha	22d45' 25.54" N	69d42' 43.33" E	*Am*	45900	12350
11	Bocha Island	22d45' 10.78" N	69d42' 18.98" E	Ct	120	45
11	Bocha Island	22d45' 10.78" N	69d42' 18.98" E	Rm	330	120
				Average	**59829.17**	**14110**

Ct- Ceriopstagal; Am- Avicennia marina; Rm- Rhizophoramucronata

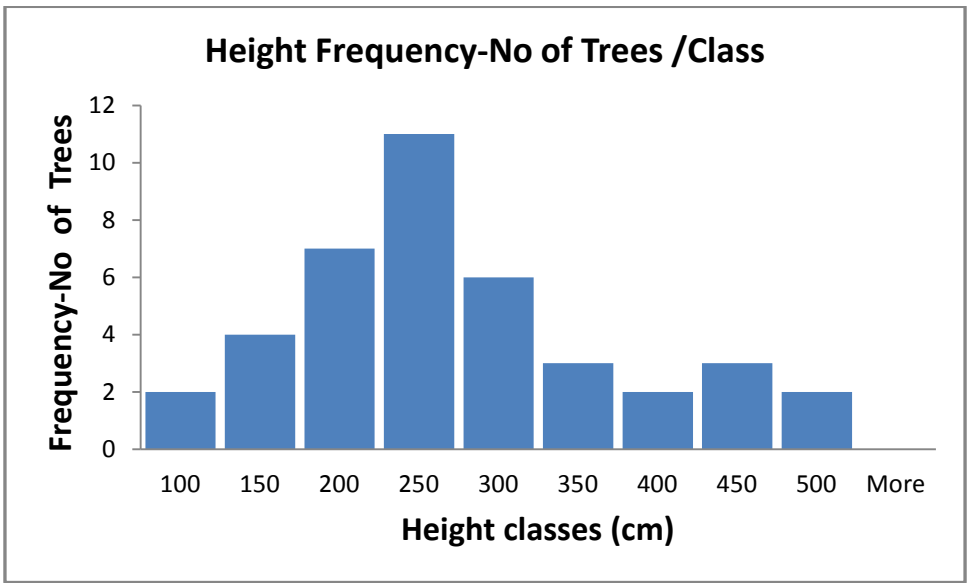


Fig. 2.2 Height freqency classes of mangrove stands at Mundra

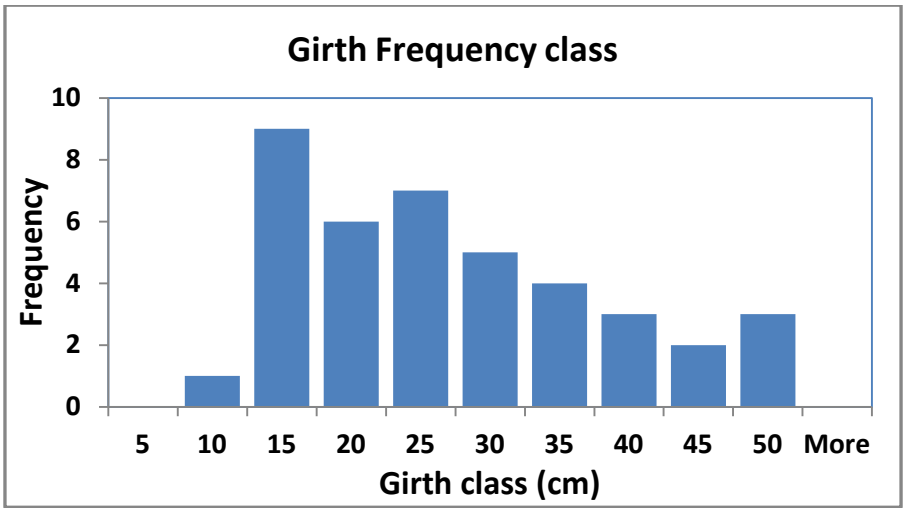


Fig. 2.3 GBH freqency classes of mangrove stands at Mundra

2.2 Mangrove Associated Macrofauna

2.2.1 *Introduction*

Mangrove vegetation plays an important role in maintaining environmental complexity and influencing the diversity and distribution of animals related to the ecological system (Lee, 1998; Roach and Lim, 2000; Liu *et al*., 2006; Gao*et al*., 2005). Afforestration of mangroves increase the diversity of Macrofaunal communities. At the same time, macrofauna plays an important role in mangrove ecological system; they are both the consumers and transporters in the energy flow and material

circulation of the system. Through activities such as ingesting food and digging caves, macrofauna interact with their surrounding environment. Therefore, Macrofaunal community structure is the potential ecological index to recognize environmental changes in mangroves.

Considering these importance of intertidal fauna as a tool to assess the health of any coastal ecosystem, in the present study, intertidal fauna associated with the mangroves of the earmarked conservation zone which comprises Bocha, Baradimatha, Navinal and Kotadi creeks were studied. Major objective of this study is to understand the health of mangrove ecosystem in this stands by investigating different community characters of mangrove associated macrobenthos. This chapter consolidates the findings of three seasonal studies carried out within 1254 ha.

2.2.2 *Methodology*

Macro faunal analysis was carried out during low tide and faunal diversity and density for different mangrove stands was investigated in all the mangrove stands. Standard quadratesampling method was used wherein triplicates of 1.5 X 1.5 ft quadrates were randomly plotted in each 10 X 10 m mangrove plot studied. The result of the quadrate data was pooled to individuals per meter for easy and uniform analysis. Total species, dominant faunal group, average density of animals, etc., were analyzed based on the derived data. In all the four mangrove stands, this study was carried out in three seasons.

2.2.3 *Result*

Faunal Composition

During the study period there were forty-one species of macrofauna recorded at the four different mangrove stands belonging to 7 major groups (Table 2.3). The higher faunal groups were species of Gastropods (10 species), Bivalves (7 species), Crustaceans (12 species), Polychaetes (7 species), mudskipper (1 species), coelenterates (2 species) and others (2species), respectively. Crustaceans and Gastropods were the dominant groups encountered in all the quadrates.

Faunal Density

The highest average density was recorded for isopods (774.3 individuals/m^2) Amphipods (653.7 individuals/m^2) and Tanaids (336.8 individuals/m^2). Lowest average density was recorded for *Crassosrea costae*(4.7 individuals/m^2) and *Scylla serrata* (5.4 individuals/m^2). The seasonal average density was higher in January (winter) (isopod 157.6 individuals/m^2) and November (Post-monsoon) (amphipod 762.2 individuals/m^2). Overall percentage wise abundance of species for different groups and locations revealed that crustaceans comprising crabs, isopods and amphipods were most dominant, constituting 29.2% of the total abundance recorded. This was followed by gastropods (24.4%) and bivalves (17.1%), polychaetes (17.1%), coelenterates (4.9%), mudskipper (2.4%) and others (4.9%) (Fig. 2.4).

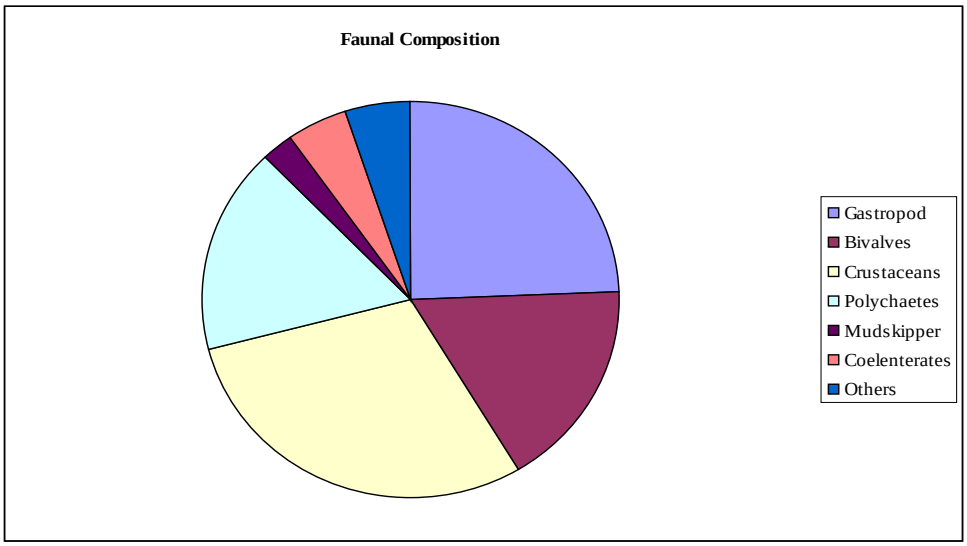


Fig. 2.4 Associated faunal composition of mangrove stands at Mundra

Species Occurrence

The total number of species was maximum (33 species) in January (winter) at Navinal creek and minimum (20 species) in November (Post-monsoon) at Baradimata creek. *Assiminea* species, *Cerithideacingulata*, *Solenlamarcki* and *Ceratonereis mirabilis* were recorded in all the seasons and stations. *Umboniumvestiarium* was recorded in only two stations (Abhan creek and Navinal creek) in November (Table 2.3). Among macrofauna, *Assiminea* sp., *Cerithideacingulata*, *Solenlamarcki* and

*Ceratonereismirabilis*showed 100% of occurrence due to their presence in all the quadrates and they were the highly abundant species. *Umboniumvestiarium* (16.6%)*Donaxcuneatus* (25%) and *Vergularia* species (25%) showed lower frequency of occurrence (Table 2.4).

Table 2.3 Density of different Macrofaunal species in each quadrate

	Season I- January				Season II- June				Season III- Nov.				Average
	BC	**AC**	**NC**	**BMC**	**BC**	**AC**	**NC**	**BMC**	**BC**	**AC**	**NC**	**BMC**	
Gastropods													
Assiminea sp.	178	414	608	342	123	111	206	388	0	12	34	8	202
Cerithideacingulata	321	204	262	189	129	245	194	234	168	65	24	151	182.1
Littorinascabra	43	34	219	64	42	34	201	315					119
Telescopiumtelescopium	11	8	12	9	6	6	6	5					7.8
Haemainea	16	309	343	98	99	167	213	179					178
Melampus	27	21	42	54	12	17	27	17					27.1
*Pythias*p	11	12	18	8	9	6	9	10					10.3
Thais bufo			5						6	24	6	6	9.4
N. dorsatus									25	6	32	6	17.2
Umboniumvestarium										31	54		42.5
Bivalves													
Crassostrea sp.	11	21	62	22	78	125	85	18					52.7
Crassostreaedulis	99	102	58	148	67	90	51	160					96.8
Lingulatranslucida	29		29		26	2	19	5					18.3
Solenlamarcki	23	44	26	12	19	34	21	12	35	21	41	45	27.7
Meretrixcasta	4					12			15	9	6	17	10.5
Pholasorientalis	3	13	1	6					23		6	24	10.8
Donaxcuneatus			3						8		12		7.6
Crustaceans													
*Ocypodes*p	51	41	48	43	32	31	30	27					37.8
*Sesarma*sp	17	9	28	17	20	11	20	15					17.1
Hermit crab	19	12	36	28	10	17	22	19					20.3
B. balanoidus	231	109	93	134	112	146	68	124					127.1
Ucaannulipes	44	28	32	38	29	23	20	28					30.2
*Metaphagraphus*sp	76	102	123	82	30	53	57	30					69.1
M. messor	20	2	18	11	8	21	14	8					12.7

Mud lobster	8	1	8	9	6	9	5	8					6.7
Amphipods	789	1356	3	778	234	328			1283	630	570	566	653.7
Isopods	1139	2333	1		456	234			291	560	822	1133	774.3
Tanaids	456	124	3	567	234	321			255	664	449	295	336.8
Scylla serrata	7	9	8		6	4			6	3	3	3	5.4
Polychaetes													
Ceratonereis mirabilis	28	219	83	127	163	265	81	211	28	9	44	286	128.6
C. costae			3						6	7		3	4.7
*Marphysa*sp.	67	59	63	50	182	67	44	39					71.3
Lumbrinereisheteropoda	9							54	3	12	7	17	
Diopatracuprea		8							25	27	114	21	39
Armandialeptocirrus	11								38	9	55	12	25
Terebellids		5							6	9	15	3	7.6
Fishes (Mudskipper)													
Boleophthalmus sp.	85	124	61	40	85	135	58	40					78.5
Coelenterata													
Sea anemone		4		3	3	2			27	3		3	6.4
Vergularia sp.		7	6								164		59
Others													
Asicidian	23		3			1			38	32		75	28.6
Nemerteans			23			2			33	24	15	15	18.667
Number of Species	31	31	33	25	27	30	22	23	21	20	16	20	25

Table 2.4.Macrofaunal Diversity and their respective frequency

S. No.	Species	Group	Frequency
1	*Assiminea* sp.	Gastropod	100
2	*Cerithideacingulata*	Gastropod	100
3	*Littorinascabra*	Gastropod	66.6
4	*Telescopiumtelescopium*	Gastropod	66.6
5	*Haemainea*	Gastropod	66.6
6	*Melampus*	Gastropod	66.6
7	*Pythia*sp	Gastropod	66.6
8	*Thais bufo*	Gastropod	41.6
9	*N. dorsatus*	Gastropod	33.3
10	*Umboniumvestarium*	Gastropod	16.6
11	*Crassostrea* sp.	Bivalve	66.6
12	*Crassostreaedulis*	Bivalve	66.6
13	*Lingulatranslucida*	Bivalve	50
14	*Solenlamarcki*	Bivalve	100
15	*Meretrixcasta*	Bivalve	50
16	*Pholasorientalis*	Bivalve	58.3
17	*Donaxcuneatus*	Bivalve	25
18	*Ocypode*sp	Crustacean	66.6
19	*Sesarma*sp	Crustacean	66.6
20	*Hermit* crab	Crustacean	66.6
21	*B. balanoidus*	Crustacean	66.6
22	*Ucaannulipes*	Crustacean	66.6
23	*Metaphagraphus*sp	Crustacean	66.6
24	*M. messor*	Crustacean	66.6
25	Mud lobster	Crustacean	66.6
26	Amphipods	Crustacean	83.33
27	Isopods	Crustacean	75
28	Tanaids	Crustacean	83.33
29	*Scylla serrata*	Crustacean	75
30	*Ceratonereis mirabilis*	Polychaete	100
31	*C. costae*	Polychaete	33.3
32	*Marphysa*sp.	Polychaete	66.6
33	*Lumbrinereisheteropoda*	Polychaete	50
34	*Diopatracuprea*	Polychaete	41.6
35	*Armandialeptocirrus*	Polychaete	41.6
36	*Terebellids*	Polychaete	41.6
37	*Boleophthalmus* sp.	Mudskipper	66.6
38	Sea anemone	Colenterata	58.3
39	*Vergularia* sp.	Colenterata	25
40	Asicidian	Others	50
41	Nemerteans	Others	50

2.2.4 *Conclusion*

Mangroves in the study area support diverse assemblage of macrobenthic faunal organisms numbering 41 species. Most of the families and species inhabiting mangrove ecosystem have been recorded from the studied four mangrove stands. These fauna include bivalves and gastropod molluscs, crustaceans such as crabs and amphipods, and families of polychaete worms. Recorded faunal assemblage clearly indicates that the structural complexity of the mangrove environment of Mundra is natural and no indication of stress on the ecosystem could be gleaned based on the composition, density and diversity of the associated faunal assemblage.

2.3 Physico-chemical parameters

2.3.1 *Introduction*

The healthy aquatic ecosystem depends on the physico-chemical and biological characteristics (Venkatesharaju et al., 2010). Major questions in mangrove geochemistry concern the reciprocal interactions between sedimentary substrate and the vegetation (McKee, 1993). Salinity, redox potential, pH and sulphide concentration are pore-water parameters that play key roles in the development of mangroves and their spatial distribution. To cope with the variation of these properties, mangroves have developed many adaptations that give them wide ranges of tolerance. These adaptations result in geochemical modifications in the sediment. Additionally, climate, tidal flooding, vegetation evolution, bioturbation and organic matter content are parameters that also contribute to the complexity of the geochemistry of mangroves.

Crucial basic parameters like pH, pore-water salinity, sediment texture and Total Organic carbon (TOC) were analysed for selected mangrove stands in the present investigation. These parameters are direct indicators of the health status of the mangrove environment. Since they influence the vegetation status of mangroves, alteration in their normal range indicates interference in the ecosystem.

2.3.2 *Methodology*

Standard protocols (APHA, 1995) were followed for the sample collection and analysis. Water samples were collected using sterile polyethylene containers. Salinity (ppt-‰) was estimated using a pre-calibrated Refractometer (Aatago–Japan). Collected pore water was analysed for pH and Salinity.

2.3.3 *Result*

2.4 Water Quality

Salinity

Sea water salinity is the most important factor that determines many life processes. The salinity in the four mangrove stands varied from 36.6ppt to 38.7ppt with an average value of 38.05ppt (Fig 2.5). The salinity was maximum at Kotadi(38.7 ppt) and minimum atBocha (36.8ppt). Recorded values of salinity are within the expected range usually prevailing in mangrove environment.

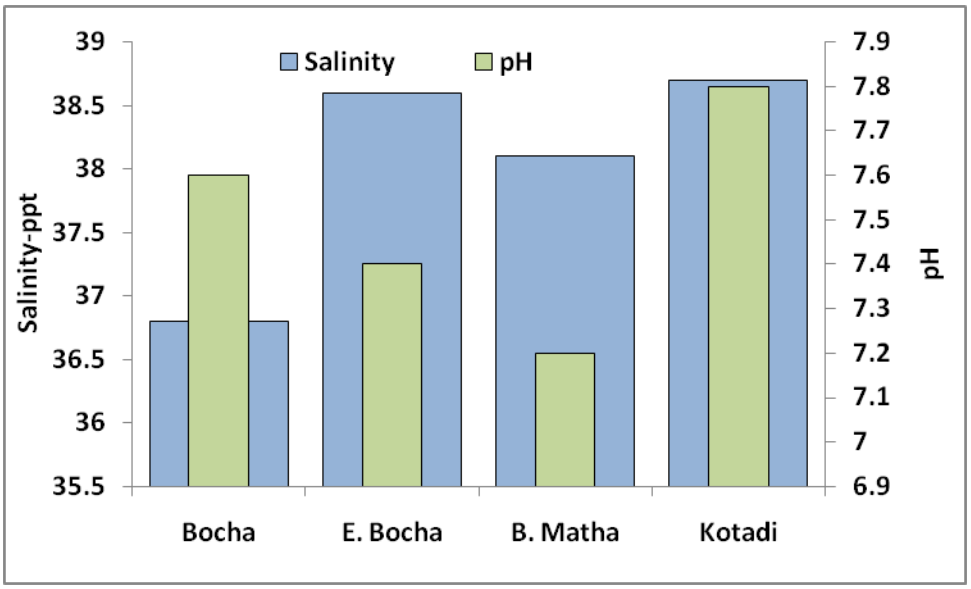


Fig. 2.5 Surface water salinity and pH in the study stations

Hydrogen Ion Concentration

The surface water pH of the study area was moderately alkaline in nature. During the study period, pH ranged from 7.2 to 7.8 with an average value of 7.5 (Fig

2.5). Highest pH of 7.8 was recorded at Kotadi creek and lowest pH was at Baradimatha(7.2) and East of Bocha (7.4).

Pore water Salinity

Pore water salinity in low tide line (LTL) ranged from 35ppt to 46 ppt with an average value of 41.42 ppt (Fig. 2.6). Pore water salinity at mid tide (MTL) and high tide line (HTL) varied from 40.1 ppt to 53 ppt; 44 ppt to 56 ppt, with an average value of 47.01 ppt and 50.76 ppt respectively. The cumulative average of pore water salinity was maximum at Baradimatha, with a value of 50 ppt whereas it was lowest at East of Bocha (43 ppt). Levels of pore water salinity did not show any abnormality and was quite within the expected range.

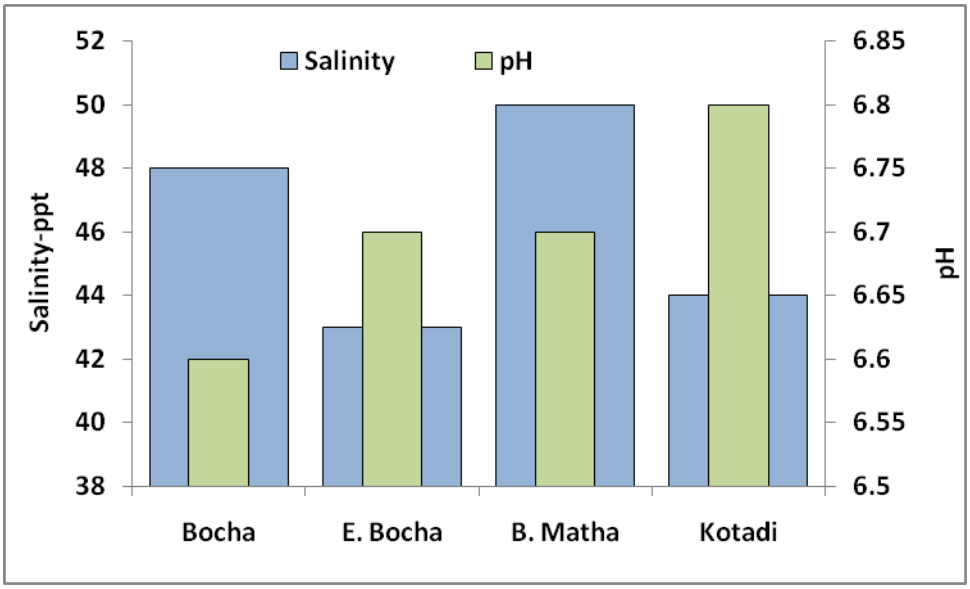


Fig.2.6 Pore water salinity and pH of the study stations

Pore water pH

The pore water pH in all the four studied mangrove stands was marginally acidic in nature. At low tide line it ranged from 6.4 to 7.1 with an average value of 6.68 and maximum was recorded at Navinal and minimum atBaradimatha (Fig. 2.6). Both higher and lower values at mid tide line was observed at Bochawith a value of 6.9 and 6.5. High Tide Line pore water pH ranged between 6.4 to 6.9 with an average value of 6.76 and maximum was recorded at Baradimatha. During the present study the overall pH average of pore water sample recorded maximum in mid tide

line.Overall average of pH in all the four sampling stations fluctuated nominally and ranged from 6.6 to 6.8 (Fig. 2.6).

Dissolved Oxygen

Dissolved oxygen of the present study varied between 3.9 to 4.5 mg/l with an average value of 4.1 mg/l (Fig. 2.7). The higher value was recorded at Baradimathacreek (4.5 mg/l) followed by East of Bocha (4.1 mg/l),Bocha (3.9 mg/l) and Kotadi (3.9 mg/l).

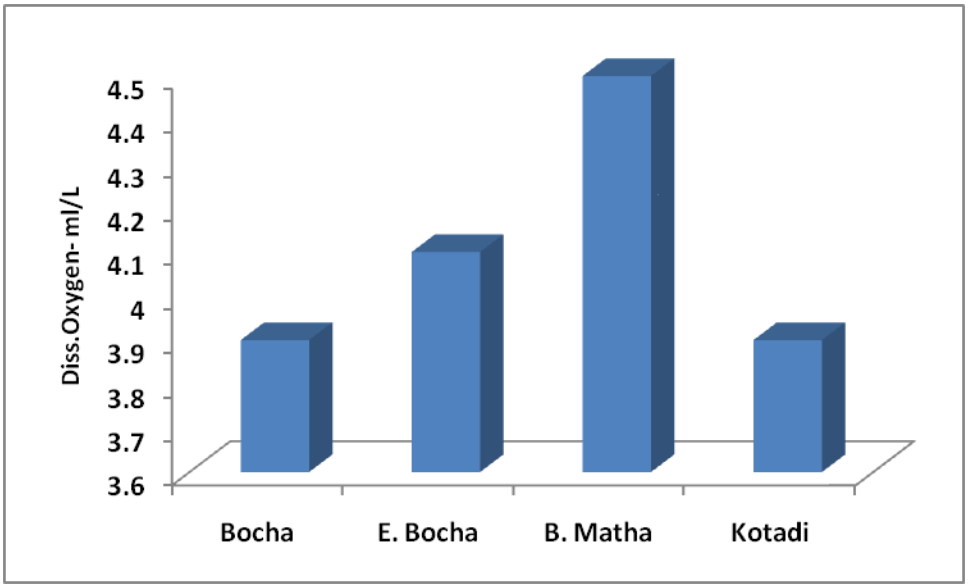


Fig. 2.7 Dissolved Oxygen of the study stations

Turbidity

Turbidity is considered as a good indicator of the quality of watersince it controlsphotosynthesis in the water column. The turbidity in the surface water during the entire study ranged from 89 to 142 NTU with an average of 113 NTU (Fig. 2.8). Maximum (142 NTU) and minimum (89 NTU) were recorded at Bocha and Kotadi creek, respectively. During the present study the levels of turbidity were on the higher side. Generally at mangrove environment, levels of turbidity will be higher.

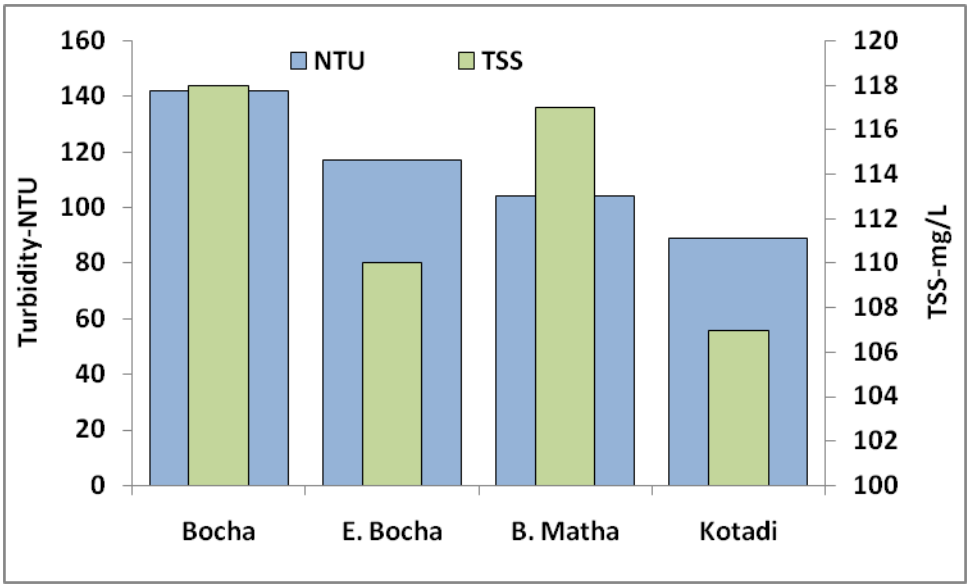


Fig. 2.8 Turbidity (NTU) and TSS in the study stations

Total Suspended Solids

Total suspended solids in seawater originate either from autochthonous (biological) or allochthomous (derived from terrestrial matter) sources. Similar to turbidity, TSS levels in water column also determines photosynthesis and in turn productivity of the water body. During the present investigation, total suspended solid levels ranged from 107 to 118 mg/l with an average value of 113 mg/l (Fig. 2.8). The maximum total suspended solid level (118 mg/l) was recorded at Bocha and minimum (107 mg/l) was at Kotadi.

2.5 Sediment Quality

Sediment Salinity

Sediment salinity of the present study varied from 47ppt to 51 ppt with an average value of 48.75ppt(Fig. 2.9). The maximum salinity of 51 ppt was recorded at Baradimatha followed by East of Bocha(49ppt), Kotadi (48 ppt) and Bocha (47ppt).

pH

Sediment pH in the sampling locations of the four mangrove stands did not vary much and it was 6.8 at Baradimatha and 6.9 in the rest of the three stations (Fig 2.9).

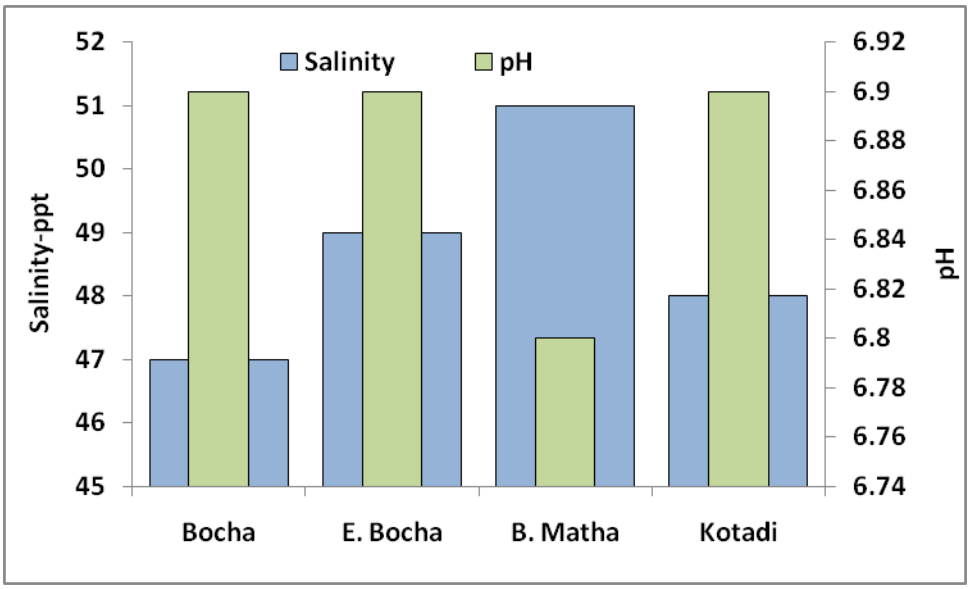


Fig. 2.9 Sediment Sanity and pH concentration of the study stations

Total Organic Carbon

The total organic carbon of the present study ranged between 0.45% to 1.5% with a mean value of 1.06% (Fig. 2.10). Higher TOC value was recorded at east of Bocha(1.5%) followed by Baradimatha(1.3%), Bocha (1 %) and Kotadi creek (0.45 %).

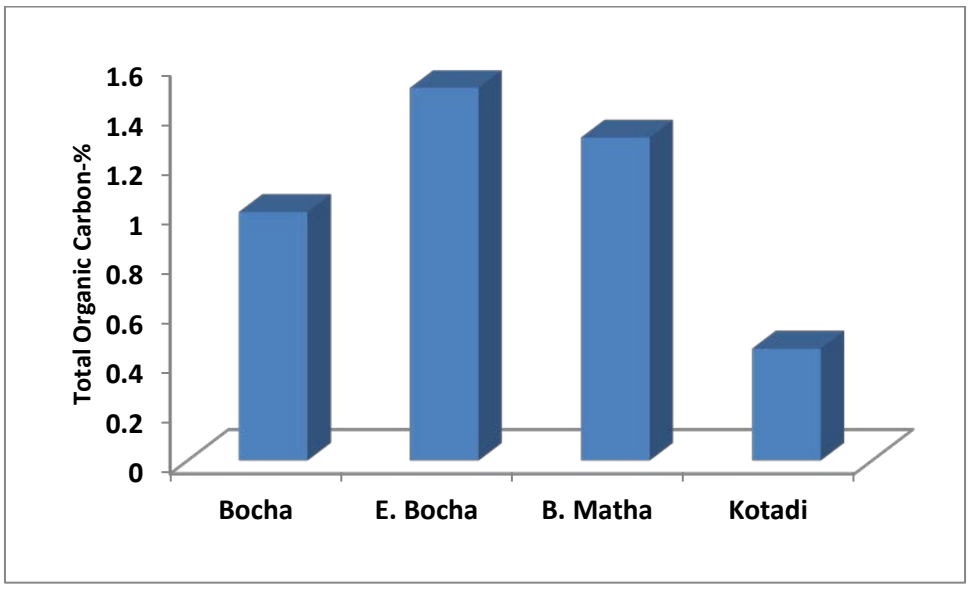


Fig. 2.10. Total Organic Carbon (TOC) in the study Sations

Sediment Texture

Sediment texture of the present study varied widely among stations (Fig 2.11). Sediment texture typically represents percentage composition of sand, silt and clay.

The percentage composition of sand was maximum and minimum at two locations of East Bocha (BQ 3- 68.6% and BQ 2 45.6%) with an average value of 59.5%. The silt composition was maximum in Baradimatha creek (BQ 5-32.6%) followed by Kotadi creek (BQ 8-32.3%) and minimum at Kotadi creek (BQ 9-12.6%) with a mean value of 24.25%. Percentage composition of clay varied from 8.4% to 32% with an average value of 16.24%. Higher composition of clay was recorded at East Bocha (BQ 2) and lower in BQ 7 of Kotadi creek.

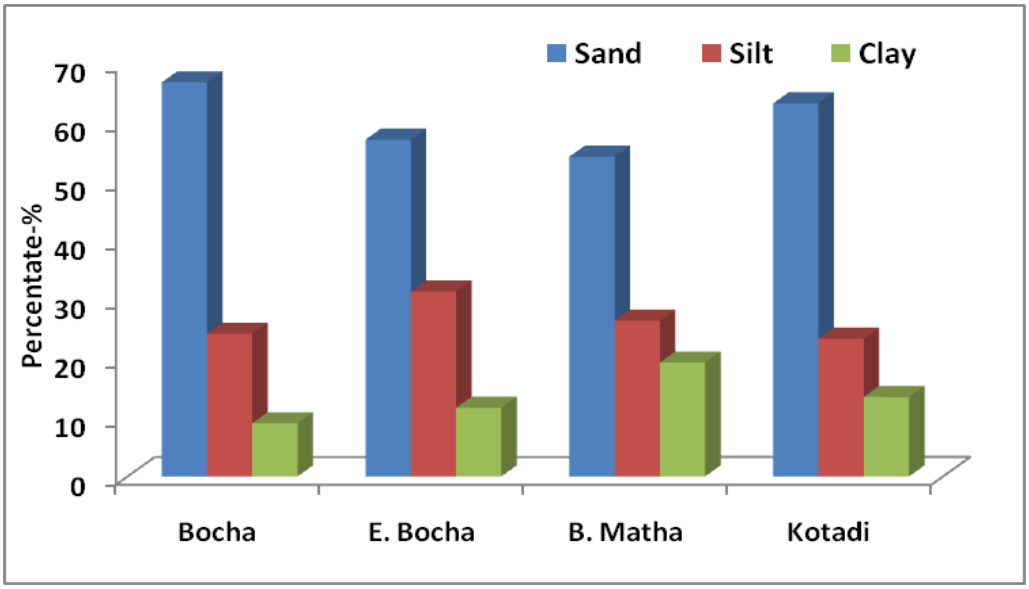


Fig. 2.11Sediment Texture in the study Sations

2.3.4 Conclusion

Analysis of mangrove health through examination of 7 creek water and 2 sediment parameters indicated most of the parameters are well within the prescribed limits for mangrove environment. Important parameters like dissolved oxygen, creek and pore water salinity either comparable with the other mangrove environment or are within the prescribed limits. However, elevated levels of salinity, suspended solids and turbidity could be observed. Higher levels of salinity is apparently due to the aridity of the zone and the resulting poor terrestrial run-off coupled with the high evapo-transpiration rates prevailing in Gulf of Kachchh waters. Suspended sediments and turbidity observed in the present study is on the higher side. Generally,

suspended load (TSS) in Kachchh coast is comparatively higher than southern Gulf waters despite poor fluvial input. This is mainly due to re-suspension of sediments by tidal currents, shallow bathymetry (~60 m) and fine grained sea floor and more importantly, due to the presence of a dynamic barrier in the central gulf, preventing uniform mixing. The main source of sediments to the gulf is the Indus river discharge and its meso and micro-tidal creeks (Chauhan *et al*. 2006; Ramaswamy*et al*. 2007). Recorded values of dissolved oxygen are well within the safer limits.

3 Land-use and Land Cover Changes

3.1 *Introduction*

In order to understand the Land Cover pattern in the earmarked conservation zone of 1254 ha mangrove formation at Mundra during the year 2011, Remote Sensing and GIS technique has been employed. Land cover classification was carried out using digital satellite imagery acquired from NRSA, Hyderabad. Images of LISS III for Mundra area for the year 2011 for the month of February were acquired and used for this study (IRS P6 LISS-III; Pixel Resolution 23.5 m; Band-4). These were brought to UTM projection with spheroid and datum named WGS 84 in UTM zone 42 North.

3.2 *Methodology*

The Methodology employed to delineate the land use is shown below (Fig. 3.1).

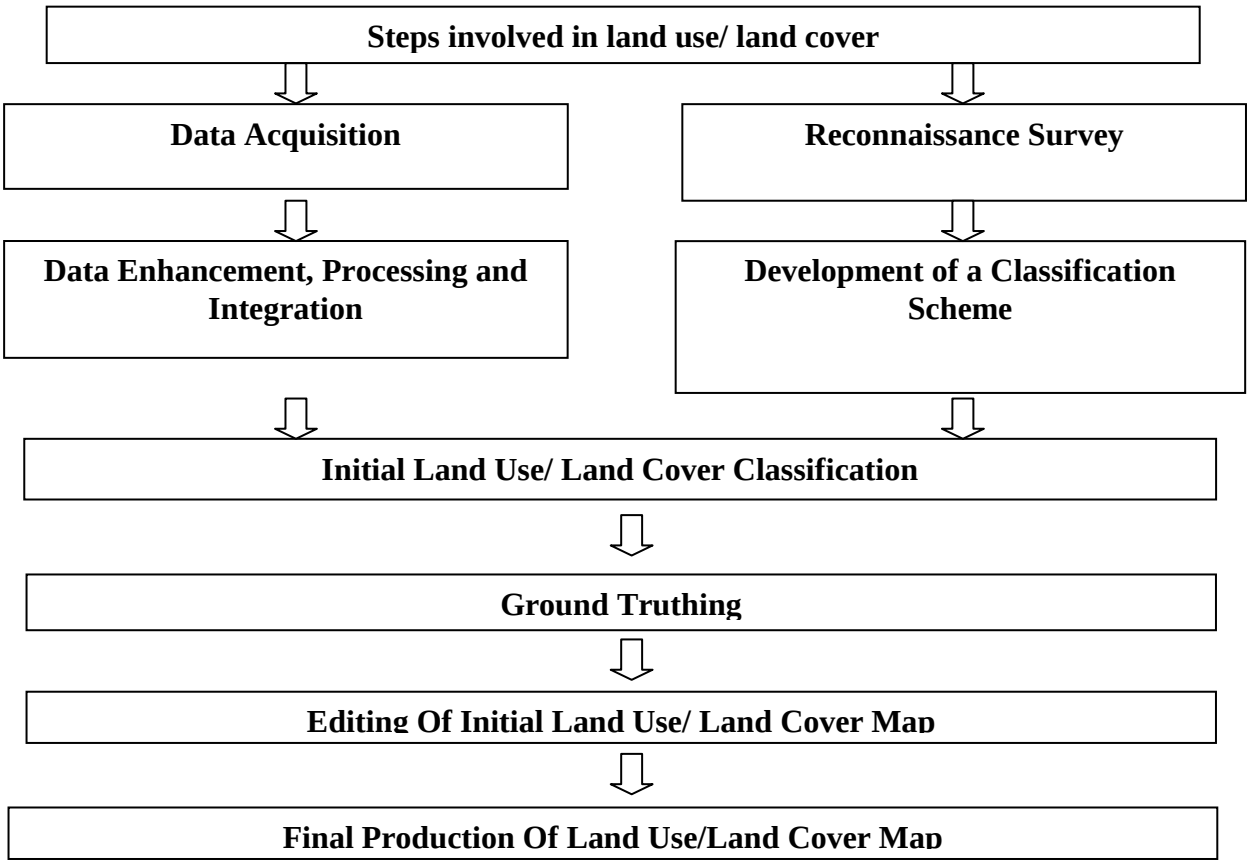


Fig. 3.1 Methodology flowchart

ERDAS Imagine 9.3 was used for satellite image processing, classification and data transformation whereas ARC GIS 9.3 was used for the map preparation. For word processing, graphs and databases, MS WORD and MS EXCEL were used.

Ground truth study comprises of data collection of ground features along with the respective geographical positions in terms of latitudes and longitudes with GPS. The data was interpreted using all the collected information.

Based on the tonal variation and pixel values in the imagery, classification of different land cover patterns including dense and sparse mangroves was generated using Maximum Likelihood supervised classification method.

3.3 *Land Cover pattern in the 1254 ha Conservation Zone during 2011*

In total, five land cover classes were delineated in the earmarked conservation zone of 1254 ha at Mundra coastal belt, *viz*., Dense Mangroves, Sparse Mangroves Mud flats, saline soil and water. Classified land cover pattern of these classes is presented in Fig 3.2 & 3.3 and their areal cover is tabulated in Table 3.1. In the earmarked area, most predominant land feature is mudflats covering 576.14 ha during 2011. Dense and sparse mangroves are about 327.14 and 312.5ha. Saline soils were about 7.58 ha and water spread was 44.73 ha (Table 3.1).

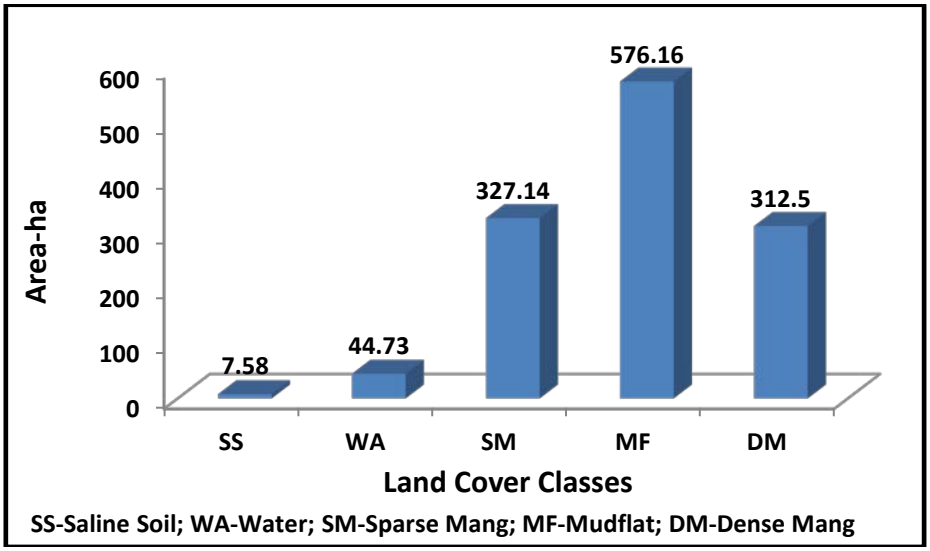


Table 3.2. Land Cover Pattern in the Conservation Zone

Land Cover Type	Area-ha
Saline soil	7.585
water	44.7345
Sparse Mangrove	327.1475
mud flat	576.16
Dense Mangrove	312.5
Total	**1268.127**

Sparse and dense mangroves together constitute about 639.64 ha forming about 51% of the total extent of 1254 ha. Mudflats (576.16 ha) forms about 45.9% proving that there is good scope for plantation activities within the conservation zone.

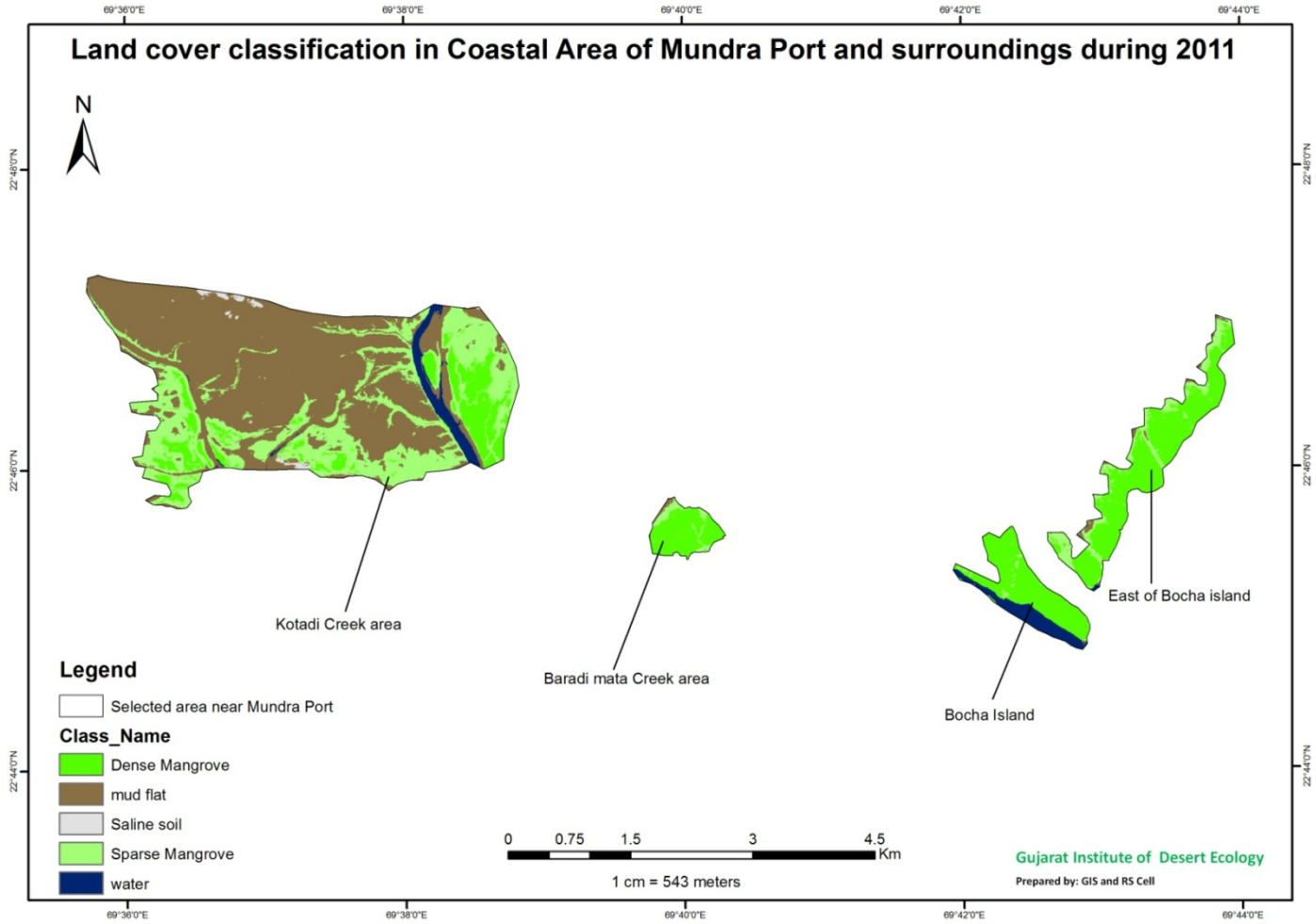


Fig. 3.3 Land Cover Scenario in the conservation zone of 1254 ha during 2011.

4 Threats and Pressures

4.1 *Introduction*

Mundra coast harbours a pristine mangrove ecosystem of Kachchh covering approximately 20 sq.km of mangroves. Coastal belt of Mundra is marked with extensive and rich creek systems which promote ideal condition for the extensive mangrove cover. Present study area covers the mangrove patches located in Mundra coast. Adani Port and Special Economic Zone Ltd. (APSEZ) is a major industrial cluster in the Mundra coast. The on-going activities of port and allied developmental activities like thermal power stations and auxiliary units may exert pressure on the surrounding mangroves and their habitat directly and indirectly prompting this study.

The present study aims to derive a management and conservation plan for the Mundra mangroves. Baseline data on ecological setting of mangroves and other allied biotopes gathered as a part of this study is used to analyse and identify the actual anthropogenic and natural pressures faced by these mangrove formations and formulate viable management and conservation solutions. Apart from the baseline generation, identification of natural and anthropogenic threats and pressures on the mangrove ecosystem is the basic and vital exercise required to derive management and conservation plans. In lieu of this stated background, the present chapter describes the threats and pressures in an overall and point specific manner in Mundra mangroves.

4.2 *Approach*

Basic approach for the present exercise involved identification of threats and pressures on the mangrove ecosystem, assigning cumulative threat/pressure levels for different zones and quantifying magnitude for particular threat/pressure for different locations.

4.3 *Methodology*

Following methodology was adopted for multi-faceted evaluation of threats and pressures.

i. ***Zoning of the study area****:* Considering the extent of the area, the whole Mundra mangrove formation was divided into smaller zones in order to facilitate better evaluation and understanding of the ecosystem. This kind of zoning helps to analyze the root cause of the issues and enable better understanding of the ecosystem level problems. Accordingly, Mundra coast was divided into three zones as indicated below for the purpose of this study;

Zone 1: East of Bocha (area between Bocha and Abhan creek)

Zone 2: Bocha Island (The Island Proper and areas in and around Adani house)

Zone 3: Baradimata creek (Navinal creek to West Port)

Representative study points covering all the zones were investigated on ground and documented for baseline status, prevailing pressures/threats based on direct and indirect evidences, levels and their impacts, etc. Fig. 4.1 shows the demarked zones and the sampling points in the study area.

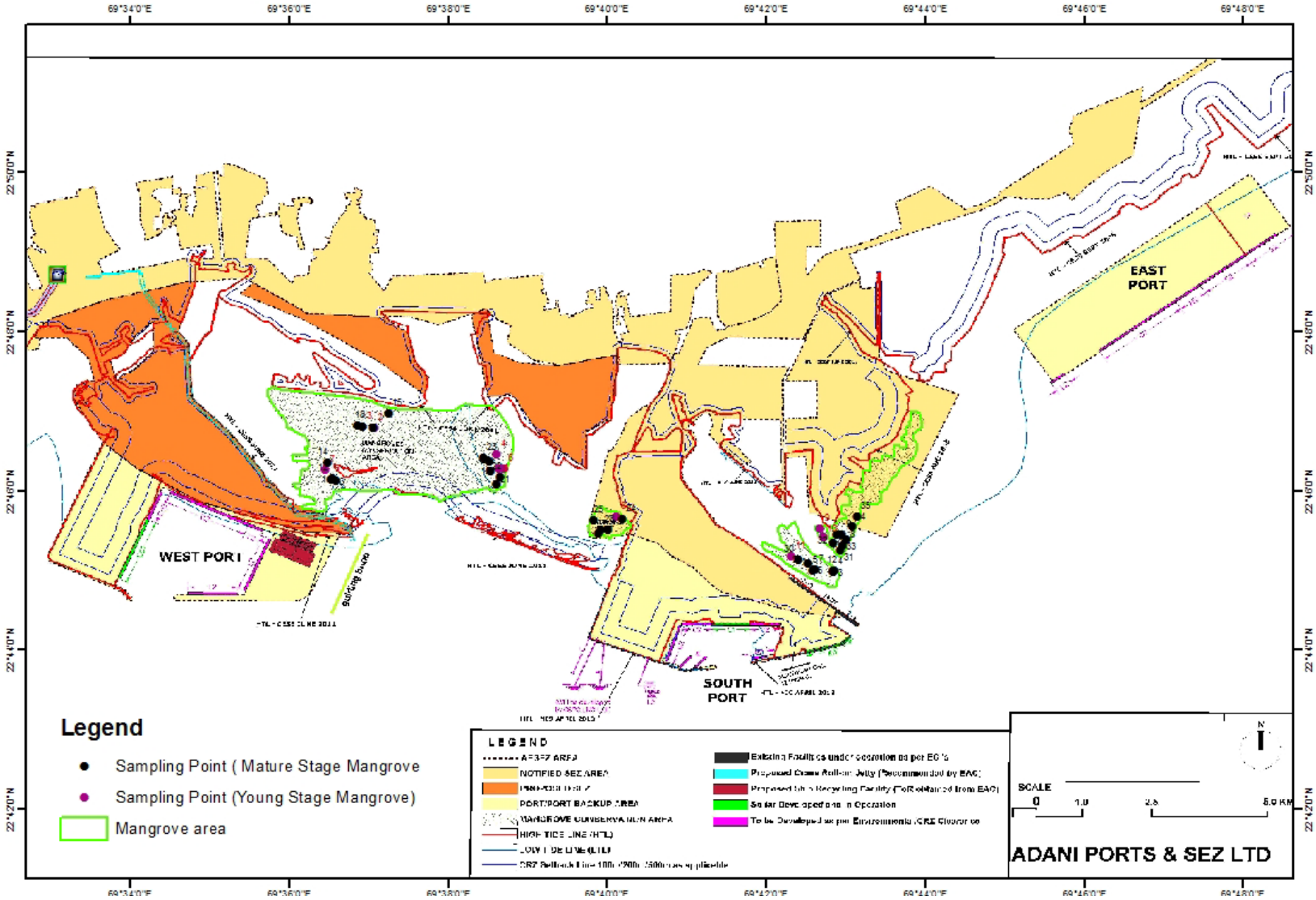


Fig. 4.1. Earmarked zones and sampling points within 1254 ha area of Study

ii. ***Identification of threats and pressures:***On ground surveys were carried out covering the entire study area. The island and creeks were reached by a fishing boat. The pressures and threats were recorded visually at different sites. The threats were categorized into two categories *viz.* Natural and Human induced. Additionally, threats observed by visiting mangrove habitats and those which could be gleaned based on the surrounding activities were recorded. The threats were derived based on ongoing the visual observation in the habitat, forest or the ecosystem. Apart from this, the possible threats which may hamper the healthiness of the ecosystem were also identified and recorded. These probable threats/pressures which may have originated from the ongoing human activities (Transport/Port operations/other SEZ activities), developmental activities, change in geomorphology, encroachment in or close to the mangrove ecosystem, pollution, dredging, local community pressure, etc. were also recorded.

iii. ***Assigning level (score) to the threat and pressures:*** For the sake of better evaluation and understanding, a modified 'Threat –Analysis method' was used. A threat-analysis is designed to assess ecosystems' current and a future response to developmental pressure (Theobald, 2003). A modified threat-analysis was applied to evaluate the pressure and threats in the study area. A simplified Threat - analysis was applied in which factors (pressures/threats) influencing the ecosystem or a species and its potential influence are scored. The score was given in two ways;

a. *Pressure score:* A score out of 10 was given for individual pressure at every site wherein '10' indicate the maximum amount of pressure and '0' no pressure. This quantifies how much pressure a particular site faces, e.g. Cutting and loafing: Score 10.

b. *Pressure Impact:* The severity of impact of each pressure justifies how severe the pressure is for the existing environment.

iv Quantification of pressures:Apart from assigning pressure levels and scores, some of the pressures (e.g. loafed trees, erosion, air borne particulate deposition, etc.,)

were quantified in order to glean and assess the extent of severity. Some of the quantified pressures and the respective methodology adopted are as under;

c. *Cutting and loafing:* A regular quadrate method was employed wherein cut/loafed tree stems were counted per unit area.

d. *Erosion and tree felling:* Felling of healthy plants due to coastal erosion was calculated. Number of trees per unit distance (transect method) were counted and analysed.

e. *Air Borne Particulate deposition on mangrove:* Deposition of particulate (sand/coal particles) was calculated by randomly collecting mangrove leaves and weighing them pre and post cleaning.

4.4 *Result*

Threats and Pressures in general

Promoting industrial development and protecting environment simultaneously is challenging and the balance between both is usually referred to as sustainable development. Mundra mangrove ecosystem is one of the rich mangrove ecosystems of Kachchh. On the other hand, industrial development in terms of SEZ, ports, vessel movement, and other coastal industries along with the local community dependence has imposed pressure on this mangrove ecosystem. Followed by baseline data generation for the area as platform (as discussed in Chapter – 2), the second phase attempted to delineate and quantify threats and pressures for the Mundra mangroves. Following seven threats/pressures were identified as the dominant degrading factors on Mundra mangroves;

i. ***Cutting and lopping***: Lopped remnants of stems at many sites within the study area evidenced the pressure of cutting or lopping of old/healthy mangrove from the area. Discussion with the fishermen and villagers close by indicated that cutting and lopping is regularly

done by fishermen from nearby coastal communities either for fuel wood or fishing purpose.

ii. ***Coastal erosion***: Coastal erosion is believed to be one of the critical threats to the healthy mangrove ecosystem. Many of the creeks and Islands showed signs of erosion that impact mangrove ecosystemresulting in uprooting of fully grown mangrove trees on the fringes of Islands. In places like the Bochacreek, a sign of erosion was observed in the intertidal areas; as a result, the shoreline has reached mangrove proper, and felling of fully mature and grown up trees.For example, Fringes of Bocha creek faces erosion that affects mangrove formation in the island. Erosion is a natural process that gets accelerated due to local geomorphology and other human activities nearby. In a recent study, Anna University, Chennai (**www.iomenvis.nic.in**) has categorized different parts of Gujarat coast as low, medium and highly vulnerable to coastal erosion. Coastal stretch of Kachchh district faces erosion at different degrees and some coastal belts are also marked as accrediting coast similar to other coastal districts of Gujarat. Mundra coast is generally considered to be vulnerable to medium erosion(http://www.gczma.org/uploads/Docs/DetailsofShorelinechanges- Gujarat State.pdf). However, at places like Bocha and Navinal, erosion and accretion was simultaneously recorded in the present study changing the coastal geomorphology.

iii. ***Substrate Nature***: It is important to ensure that habitat alteration do not take place by way of change in substrate nature due to altered suspended particle dynamics as it may pose threat in future in Navinal Island and Bocha creek mouth which will gradually impact the mangrove ecosystem in future. Generally coastal stretches exposed to

high currents and wave action show this phenomenon of changed suspended particle dynamics. Hence, it is important to keep a watch on the natural process of sand accretion due to tidal currents and increased wave action as they are the primary causative factors for change in substrate nature.

iv. ***Modification in natural geomorphology***: Changes induced by human activities when persisting over a long period of time may hamper the healthiness of the ecosystem. Other than developmental activities in close vicinity impacting the present ecosystem, geomorphological processes such as siltation in the natural canals that inundates mangrove proper may lead to structural changes within mangrove forest. It is advisable to keep a watch on such physical changes in the mangrove proper.

v. ***Air Borne Particulate deposition on mangroves***: Mangrove patches close to the port is likely to undergo deposition of air borne particulates on the vegetation. This is likely due to the handling of assorted materials in the nearby port premises. Fine deposition on leaves and other parts of the vegetation may interfere with life supporting activities of the plant like photosynthesis and impedes its physiology and normal metabolic activities. If persists for long, this may affect healthy growth of plant and disturb the aesthetic value of the mangrove ecosystem.

vi. ***Plastic and non-biodegradable debris:*** Plastic and non-biodegradable debris in mangroves was seen at few places. Tidal currents carry this solid waste to the interior of mangroves where they get trapped during the receding tide. A large proportion of this solid waste also originate from local fishing activities as evidenced by materials like discarded fishing nets, plastic sheets, nylon ropes, discarded water bottles, etc.

Severity of Threats and Pressures in General

Identified threats and pressures persisting on Mundra mangroves were categorized as per their severity or impact level.

Definition of severity: Severity is defined as how influential or potentially detrimental a particular threat is in terms of its impact on the ecosystem. Levels were assigned to these different factors wherein;

Level – III: High impact on the mangrove ecosystem

Level – II: Moderately influential

Level – I: Gradual and slow influence

Extent of Pressures

Knowledge of whether the visualized pressure persists at particular point or has a broad scale influence on various mangrove patches defines the extent of the pressure. Percentage was assigned spatially based on in how much area a particular pressure is seen out of the total Mundra mangrove area.

Table 4.1. Severity and extent of pressures and threats in Mundra mangroves

S. No.	Threat/Pressure	Influence level	% extent in entire area	Recorded/Visualized impacts
1	Coastal erosion	Level - III	50%	Uprooting fully grown and old trees, loss of mangrove habitat, removal of frontline mangroves and rendering interior mangroves more vulnerable to erosion.
2	Modification in natural geomorphology	Level - III	60%	Loss of mature mangrove forests (acute and chronic), damage to mangrove regeneration (mudflats), reduced tidal flushing, and impact on adjacent mangrove patches.
3	Cutting and lopping	Level - III	60%	Acute loss of mangroves, habitat change.
4	Change of habitat (sand deposition or land amendments)	Level - II	40 %	Reduction in mudflats, gradual loss of mangroves due to plant death, direct plant removal due to amendment activity, reduction in regenerative and self-healing capacity of the ecosystem.

5	Air Borne Particulate deposition (Sand/coal)	Level - II	40 %	Hampered growth, gradual change in physico-chemical character of soil and water, decreased faunal density, declining aesthetic value
6	Plastic and non-biodegradable debris	Level - I	60 %	Covering pneumatophores, causing harm to soil and water chemistry, impact on burrowing fauna, loss of aesthetic value.
7	Grazing	Level - I	25 %	Hampered growth, stunted mangroves, stamping young classes, hardening of soil, reduced regeneration and recruitment capacity, disturbance to ground fauna, meager fringe mangroves.

It is inferred that the on-going activities along with natural processes may cause change in geomorphology at some places in future along with cutting and lopping, littered plastic and other debris and erosion. Similarly, factors such as change of habitat, particulate deposition and grazing which was visible at few places need to be taken care of. The details of the pressures, their level, their spread in the area and probable impacts on the ecosystem are described in aforementioned Table 4.1.

Threats and Pressures – Site Specific

In order to study the issue at source level and draw out a viable conclusion, identified threats and pressures were studied for each zone (i.e. site specific). This was based on the hypothesis that type and level of pressures will differ from site to site and help in deriving a suitable conservation plan for the ecosystem. With this background, the area was divided into three zones as earlier mentioned (Fig. 4.1) and each zone was elaborated individually.

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<u>Zone I: East of Bocha (area between Bocha and Abhan creek)</u>:

The area between Bocha and Abhan creek holds some of the large and old mangroves and represents one of the healthy mangrove ecosystems of Kachchh (Fig. 4.3). Apart from *Avicennia marina*, the area has good population of another mangrove species, *Ceriopstagal.*

A noticeable patch of cut/lopped mangrove was observed (Lat. 22° 45' 20.3"E; long. 69° 43' 00.5"N) which was reported during the earlier seasonal studies. The same patch after 6 months has shown remarkable natural regeneration with an average density of 70 plants per 100m^2 quadrate. This proves that this area has high potential for natural regeneration if taken care of. Moreover, following on-going pressures and threats were noted at the site;

Fig. 4.3. Erosion and Sand Deposition in Zone-I- East of Bocha

- It was informed by APSEZL that earlier, pipeline was placed in this area for transporting the dredging material which was removed immediately in December 2010. After that APSEZL had replanted that area with mangroves and also gap filling activities are being carried out every year. (Fig. 4.4). However, the cleared approach amidst thick mangroves is used by fishermen to access large trees in the interior mangroves and regular cutting and lopping is evident on both sides of the cleared corridor. In a 10 × 10 m quadrate, 13 trees with 6 total cut and 7 lopped trees were recorded which is apparently attributable to cutting by fishermen. The remains of stems of cut plants indicate the occurrence of the individual lopping of trees might be going on in this area for quite some time.

- The same site has shown habitat change as a result of sand deposition on the mudflat as well as fringe mangroves. The gradual deposition of sand in this site (Lat. 22° 45' 20.3"E; Long. 69° 43' 00.5"N) is altering mangrove habitat nature and thereby change in faunal communities. In addition, deposition of air-borne suspended particulate matter on the vegetation is severe in this site.

Fig. 4.4 Mangrove habitat Degradation

- In this site, the intertidal stretch shows signs of erosion due to direct tidal currents which hit the shore with high velocity. The eroding beach has progressed till the mangrove proper. Intense uprooting of grown trees due to erosion has been noticed in this area.

To sum up three major factors namely erosion, cutting and air borne particulate matter (sand) deposition pose serious threats in Zone I. Quantification and magnitude of each of these threats are shown in Table 4.2.

Table 4.2. Pressure index for Zone – I

S. No.	Pressure/threat	Pressure score (out of 10)	Level
1	Cutting	07	High
2	Particulate (sand) deposition	04	Medium
3	Erosion	06	High

<u>Zone II: Bocha Island and areas in and around Adani house</u>:

Bocha Island forms one of the integral areas of the Mundra mangroves with dense and healthy mangrove forests with an average density of 5285 to as high as 15000 trees/ha. Finger like shape of this Island surrounded by tidal waters in all the three sides with high tidal inundation enable the mangroves to develop into a mature and healthy formation. This fully grown healthy mangrove ecosystem has three mangrove species viz. *A. marina, C. tagal*and*mucronata.* The Island extends landward on the northern side forming minor creek systems behind Adani house. This creek system is fringed by sparse mangrove forest and intermediate mangrove pockets acting as a buffer zone. This area faces variety of threats and pressures due to many natural causes.

Erosion: Erosion due to natural factors seems to play major havoc along the mangrove fringes. In addition, some human activity accelerates and supplements the

natural process of erosion on the fringes of the Island. Low level of erosion was observedin and aroundBocha creek towards Navinaland also on the eastern side in Bocha creek(Fig. 4.5). Based on the present three seasonal observations, it is recommended that management action could be explored as suggested in the proceeding chapters to arrest erosion, especially in the fringes of the mangrove lined Islands.

Fig. 4.5 Erosion on the western and Northern Bocha Island

Tree cutting was also recorded from the island during this study. Signs of cut individual trees were noticed in the interior of the island with total clearance of nearly half a hectare of mangrove patch on the tip of the island (lat. 22° 44' 51.0"E; long. 69° 42' 51.1"N). This mangrove clearance at the tip has exposed the area to direct currents leading to deposition of course sand in the mangrove patch (Fig. 4.6 a & b). As a result, mangrove breathing roots (pneumatophores) are buried in the sand causing mortality of the whole tree. Presently, the process of sand deposition is progressing further and has covered adjacent mangrove mudflat with sand. Modification of the substrate nature and habitat will gradually cause loss of the mangroves and associated fauna.

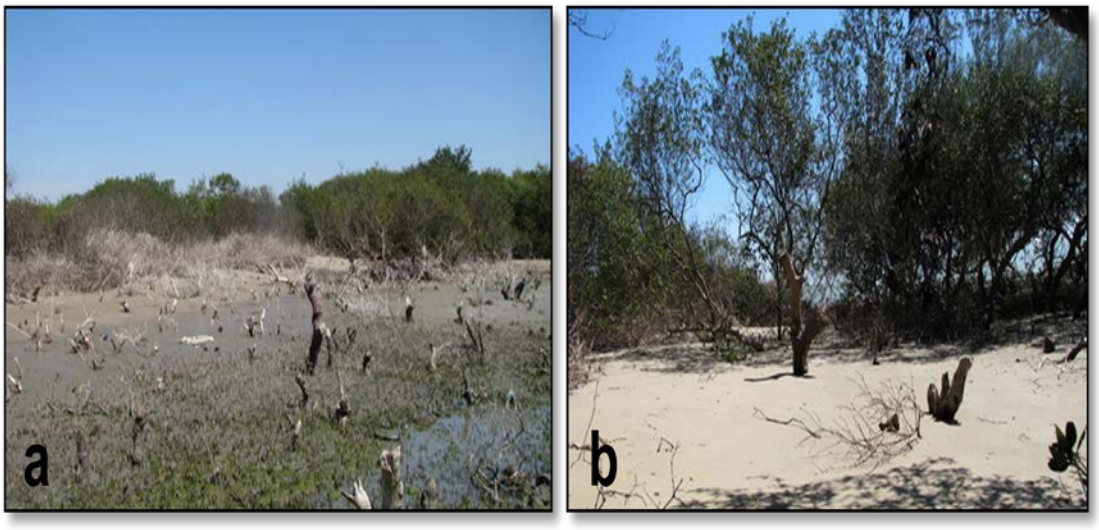

Fig. 4.6 (a) Cutting of mangrove at the tip of Bochaisland (b) Resultant sand deposition in the adjacent mangrove habitat.

Based on the above mentioned pressures recorded during the field visits, following scores can be given for the Zone – II (Table 4.3) to summarize the comments.

Table 4.3. Pressure index for Zone - II

S. No.	Pressure/threat	Pressure score (out of 10)	Level
1	Cutting and lopping	05	Medium
2	Particulate (sand) deposition	04 (overall) 06 (on western Bocha)	Medium
3	Erosion	08	High
4	Solid Waste Deposition-Plastics and other non-degradable waste	04	Medium
5	Change in natural geomorphology (behind Adani house)	06	High

Zone III: Area between Navinal creek and west port (Baradimata creek and adjacent areas)

This zone supports complex creek systems formed of Baradimata and Kotadi creeks. Minor islands supporting healthy mangrove formations characterize this zone. Most of the mangroves in this area are pristine since they are away from human influence. Mangrove stands, especially the thickets along the fringes of creeks in this zone are young and fully grown as compared to the mangroves of Zone I and II. The islands support fully grown mangrove forest and a maximum tree height of 7 m could be recorded in this zone. High degree of pressure and human interventions

that characterize Zone I and II is absent here. Nevertheless, some on-going activities in the mangrove vicinity are likely to induce pressure in this area in future (Table 4.4).

Table 4.4. Pressure index for Zone III

S. No.	Pressure/threat	Pressure score (out of 10)	Level
1	Grazing	03	Low
2	Particulate (coal) deposition	04	Medium
3	Erosion	03	Low
5	Change in natural geomorphology (behind Adani house)	04	Low

Table 4.5 Presence of threat on Mundra mangroves and their long term impact

Pressure	Zone I	Zone II	Zone III	Long term impact
Coastal Erosion	+	+	+	Loss of mangroves, reduction in mangrove area and habitat for regeneration
Modification in natural geomorphology	+	+	-	Gradual reduction in mangrove habitat, loss of mangroves, change in faunal composition
Cutting and lopping	+	+	-	Change in canopy structure, habitat fragmentation
Change of habitat (sand deposition or land amendments)	+	+	-	Gradual death of mangrove, loss of mangrove fauna, induced succession
Particulate deposition (Sand/coal)	-	+	+	Retarded growth rate
Plastic and non-biodegradable debris	+	+	-	Change in chemical properties of soil
Grazing	+	-	-	Altered regeneration & recruitment pattern, stunted growth.

The identified threats and pressure in the study area as narrated above help to design and frame target oriented conservation measures and actions (Table 4.5). Synthesizes types of threats, their presence/absence and their long term impact on Mundra mangroves. Keeping this as a background and baseline information, the chapter discusses the actions and plans for conserving and restoring this mangrove ecosystem.

5 Conservation and Management

5.1 *Introduction*

Mangroves are major ecosystem in the coastal belt of Mundra. It is imperative to conserve this mangrove and ensure that no significant adverse impact is caused to the mangroves in the port vicinity. Meticulous and long term plan to conserve mangroves, especially in the major creek systems like Navinal, Bocha, Aban and Baradimatha is highly imperative. A mangrove conservation plan through protection, regular monitoring and massive plantation is already being implemented by APSEZ authorities and a mangrove plantation of 1215 ha have been implemented in different parts of Kachchh coast till the end of 2015. In addition to this on-going plantation, it would be ecologically sensible to conserve mangroves in the immediate port vicinity. In tune with this, the present report presents plans to conserve natural stands in the immediate port environ which needs to be given priority since established natural stands will render better ecological services than the created one. Mundra mangroves are comparatively more diverse than other Kachchh mangrove stands with the presence of additional true mangrove species such as *Rhizophoramucronata* and *Ceriopstagal,* especially in Navinal and Bharadimatha stands. Special efforts are to be taken to conserve this biodiversity.

In the light of baseline information generated and threats and pressures visualized during the present study, this chapter presents a conservation and management plan for Mundra mangrove ecosystem. This conservation plan attempts to address the pressurized areas, areas which need proper care and other specific issues.

In order to identify conservation priorities, the area was classified into Area of special attention and Areas with Regeneration potential.

5.2 *Areas of Special Attention*

It was observed that some mangrove stands are undergoing rapid degradation because of natural and human pressures like erosion, habitat change and direct

wood cutting. Of all the pressures and threats identified, erosion of coastal belt and mangroves needs to be paid high priority since they threaten many pristine mangrove formations. Hence areas facing erosion are to be considered as areas of special attention. These stands demand appropriate planning, steps and actions in order to check or mitigate further damage.

5.3 *Conservation Plan for Special Attention Areas*

Erosion

Almost the whole fringes of the Bocha Island as well as part of eastern extension of Bocha are directly exposed to high tidal currents and erosion. Similarly, erosion of high magnitude has been recorded in some areas of Zone-III. This ongoing natural process is taking a heavy toll of many fully grown and healthy mangrove trees on the Island periphery. Following actions are recommended for controlling erosion and check further uprooting of mangroves.

- Initial earmarking of erosion prone sites along all the creek system.
- Since the process of erosion is highest along Bocha and east of Bocha it could be controlled only by physical means by constructing appropriate civil engineering structures. Erosion control structures or constructing embankment of stones or any suitable material along the erosion site is strongly recommended. The proposed embankment should be eco-engineering design with a gentle slope of appropriate angle to the tidal action that will allow natural flushing while totally controlling erosion.
- Since construction of stone pitching takes time, other immediate measures have to be resorted to. Trees which are felled due to erosion remain live and partially rooted for days together till they are completely washed off and uprooted. To prevent loss of such grown trees, one viable option is to replant these trees. Fringes of Bocha creek opposite to Container terminal require this measure immediately.

- Oceanographic factors that cause erosion in the immediate port vicinity need to be understood and remedial measures through physical amendments could be explored to abate this on-going natural process. Technical expertise of suitable agencies that has the expertise in civil engineering measures could be utilized.

- A rapid survey through the survey department of APSEZL could be undertaken at regular time intervals to identify coastal stretches within the port limit which are prone to high erosion. These high erosion coastal stretches could be provided with gentle slopes with stone pitching and other civil engineering works which will reduce the rate of erosion.

Cutting and Habitat Change

Individual cutting of trees and mass clearance has been recorded in areas especially in Zone–I (East of Bocha). Following conservative measures are suggested to control this.

- Proper check by appointing regular watch and ward to stop mangrove cutting by locals.

- Developmental plans should be eco-friendly assuring zero mangrove loss.

- Awareness to local community and corporate and security staff about importance of mangrove ecosystem and its conservation.

- The mangrove cleared area should be restored at priority in order to avoid fragmentation of habitats.

5.4 *Regeneration Potential Areas*

Many of mangrove patches shows gradual degradation (as per pressure scores) but simultaneously, such areas have self-healing properties. This could be seen by high regeneration rate as evidenced by appearance of new recruitments. This is quite evident in Baradimatha mangroves (Fig. 5.1). Such areas were considered as Regeneration potential areas. These are mostly found in close vicinity of creek systems which get regular tidal flushing and offer favourable conditions to grow. These habitats do not demand any special actions or amendments and instead allowing those to develop naturally assuring least disturbance or pressure on them can be the best conservation practice for such areas. Every care should be taken to preserve this area from degradation.

Fig. 5.1 shows regeneration stages of mangrove forest in Mundra area
a. Regeneration saplings grown due to seed dispersal
b. Final recruitment
c. A young mangrove forest developed

7.5 *Conservation Plan for Potential Regeneration Areas (PRA's)*

- Potential regeneration areas should be earmarked and well documented. This includes mostly Baradimatha creek and part of Navinal creek. Earmarked Potential Regeneration Areas should be protected with watch and ward.

- In such earmarked Potential Regeneration Areas, regular monitoring of the ratio among different age classes like Regeneration class (<50 cm height), Recruitment class (>50 cm but < 1 m height) and mature trees (> 1m height) will indicate status of the forest and whether it is dynamic or not. High ratio indicates healthiness of the ecosystem and better restoring capacity while low ratio can be indicative of certain pressures which may be natural or anthropogenic. Appropriate remedial measures could be contemplated based on the results. Baseline studies presently carried out indicates a high potential for regeneration in these areas.

- A close watch is required on pressures on these areas. Especially Grazing, erosion or disturbance nearby these areas can lower the natural growth.

- Since these areas show high and healthy natural regeneration, plantation in this area should be avoided so as to allow natural extension of the developing forest.

- Developmental activities in close vicinity could harm PRAs directly or indirectly. Such activities involving change in natural geomorphology can cause irregularity in tidal flushing, change in sediment composition, erosion and sediment deposition on younger classes. Hence, such areas to the maximum possible extent could be avoided for port developmental activities. In the event development becomes imperative, utmost care should be exercised to avoid any adverse impact on the natural stand.

Conservation of Bocha Island

Bocha Island (Zone – II) is one of the important mangrove stands of Mundra supporting healthy, fully grown and functional mangrove ecosystem. The area is undergoing rapid degenerative changes due to the coastal erosion causing shrinkage of the area and uprooting of mature and fully grown trees. The Island needs special

care and attention since it is very close to the MICT Container terminal of Adani Port and thus highly prone to anthropogenic as well as natural threats.

Moreover, the mangrove patch at the tip of Bocha Island is facing erosion threats due to natural causes (Fig. 5.2). The process of erosion is very severe at the tip of the island which faces the open sea directly, rendering it highly susceptible to erosion. Against the advancing tidal currents and the current induced erosion, mature and fully grown mangrove trees act as physical barriers reducing the wave energy and sand deposition by waves. The clearing of mangrove patch has made the interior mangrove vulnerable to high energy waves thereby accelerated the action of erosion. Moreover, it has also caused deposition of coarse sand in the mangrove ecosystem whose substrate is otherwise muddy clay in nature. This is one area which requires immediate attention. Appropriate remedial measures are suggested in the proceeding paragraphs which need to be implemented on priority basis.

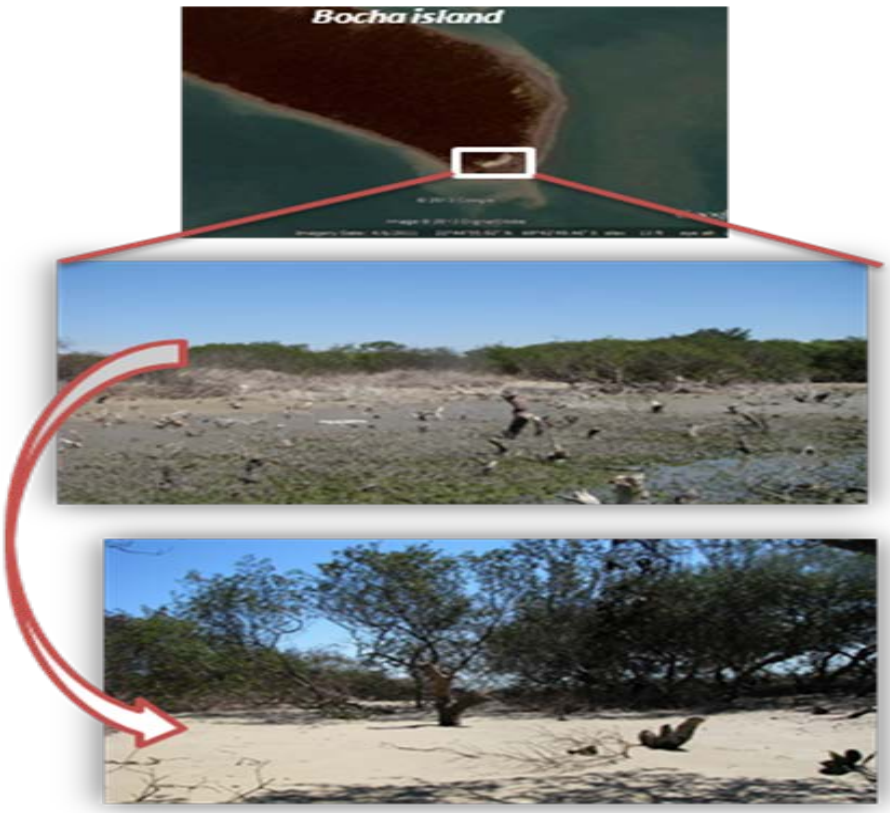

Fig. 5.2 Cleared mangroves and resultant sand deposition-Bocha Island

Restoration Measures for Bocha Mangroves

- Erosion preventive structures like stone pitching; laying multi-dimensional cement blocks(in uneven fashion) in a slope are the best alternatives to prevent erosion in the fringes of Bocha Island. Care should be taken to ensure that the structure should be an eco-engineered design to control erosion to the maximum extent. A gentle slope should be given to such structures which helps in reducing the wave energy and allow tidal flushing also. Uneven blocking will reduce the high energy waves more efficiently besides providing microhabitat to many marine organisms there by supporting and promoting intertidal biodiversity.

- *Restoration model' for Bocha Sand deposition***:** The on-going sand deposition caused due to clearance of frontline mangroves needs to be checked immediately. The solution requires proper civil engineering work to restore the system and check on-going erosion and sand deposition. Restoration structure as indicated in Fig. 5.3 can be erected in which a gentle slope with unevenly designed cement blocks at the fringes will reduce the wave energy and a second line of physical barriers in the form of alternate rows of cemented poles at specific distance will partially block the sand and at the same time allows regular tidal flushing. This cement poles act as substitute to removed mangrove trees. Later, the deposited sand should be removed and the cleared patch can be restored with mangrove plantation. This Restoration model is presented below in Fig. 5.3.

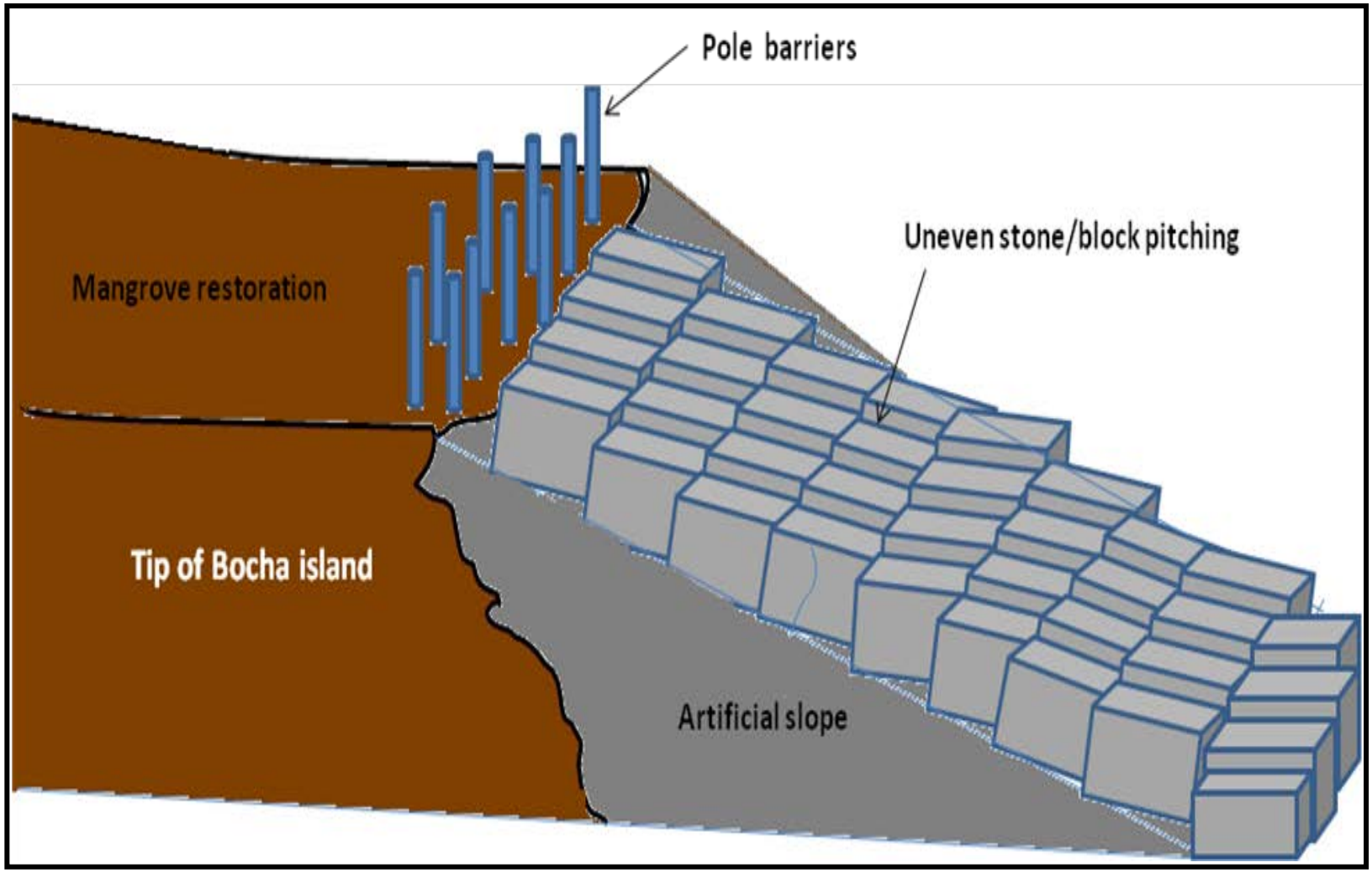

Fig. 5.3 Restoration model for Prevention of Sand deposition at southern tip of Bocha Island.

- The trees uprooted due to erosion at the fringes are still alive can be transplanted in other suitable sites within the Island. Even a moderate survival rate will fetch high environmental gain by restoring a full grown tree to the system. The *partially uprooted live trees can be replanted using soil from the nearby area or open creek once the above narrated civil structure is in place which will offer support and protection to the mangroves.*

- Plastic and other non-degradable waste from the nearby areas finally ends up in mangrove ecosystem carried in by tidal flushing. Moreover, discarded fishing nets and materials of fishermen are also strewn around in the mangrove proper. These, apart from harming the ecosystem, spoil the aesthetic value of the mangrove forest. The area should be declared waste free and measures should be implemented for proper waste disposal.

General Mundra Mangrove Conservation Plan

Apart from above discussed site specific and area specific measures, following are some of the conservative measures which can be implemented for proper conservation and management of Mundra mangroves;

- Proper documentation of Mundra mangroves in terms of Potential Regeneration areas, areas under threat and Restoration areas is required and should be monitored and updated effectively. This will prioritize the conservation and management actions.

- Erosion seems to be the major natural factor at Mundra coast threatening mangroves. Erosion prone sites should be earmarked and as earlier discussed measures can be taken depending on the level of ongoing damage. A Mundra Coast specific erosion study can be instituted focusing on impact level, root cause and mitigation methods. Though the present study has partially touched the issue, a proper

physical oceanographic study will throw more light on responsible factors.

- PRAs (Potential Regeneration Areas) should be allowed to grow naturally and plantation should not be attempted in these areas.

- In addition to mangrove plantation, a simplified restoration or rejuvenation of mangrove will render the ecosystem healthier and ecologically viable. For example, mangrove area behind Adani House (Zone –II) has good sparse mangrove cover. Yet the mangroves are stunted as compared to other areas because of improper tidal flushing. Simple soil amendment like creating more minor channels for proper tidal circulation, widening/deepening of channels will enable enhanced tidal flushing to the degraded mangroves enabling it to grow into a mature and healthy forest ecosystem. In many instances, restoration will yield better results than creating a new plantation.

- Any developmental activities or civil amendment should be well planned in such a way that it should not harm mangrove ecosystem. Specially, the change in natural habitat should not be done even in buffer zone of mangrove ecosystem.

6 *Summary*

Adani Port and SEZ is one of the fastest growing and largest private ports in the country with many allied industrial activities like thermal power plants, storage structures, Special Economic Zones, etc. The port is equipped with road, rail and air connectivity that has attracted many small and big industries to this area.

On the other hand, the area also harbours luxuriant mangrove forests in close proximity to the Port and SEZ. This economic and ecological development in this coast has made the mangrove ecosystem vulnerable necessitating immediate conservation measures.

The ministry of Forests and Environment (MoEF), New Delhi has made it mandatory that mangroves in and around the Mundra region where the APSEZL is located, be preserved through adequate measures. In accordance with this directive, APSEZL authorities engaged Gujarat Institute of Desert Ecology, Bhuj to carry out a study in Mundra mangroves and come out with conservation and management plan. Following this, a three seasonal field investigation was carried out by GUIDE in order to understand the present status of the Mundra mangroves and formulate conservation and management measures. This report presents the outcome of the study.

Three true mangrove species were recorded in Mundra region viz. *Avicenna marina, Rhizophoramucronata and Cereopstagal* with the dominance of *Avicenna marina* with an overall average mature tree density of 6372 trees/ha. Studied mangrove stands showed noticeable variation in tree height that ranged from 100 cm to 570 cm. Girth at Breast Height (GBH) ranged from 6 cm to 120 cm with mean value of 19 cm. High regeneration potential with an average density of 44666 plants/ha has been recorded. High density of younger classes in majority of the mangrove stands indicates that they are healthy and their recruitment of younger classes is normal which will ensure a good and healthy stand in future if left undisturbed. Exception to

this are patches at Bocha and Kotadi Islands where ratio of mature tree to younger classes are very high indicating their climax nature.

Forty-one species of macrofaunawere recorded at the four different mangrove stands belonging to seven major groups such as Gastropods (10), bivalves (7), crustaceans (12), polychaetes (7), mudskipper (1), colenterates (2) and others (2), respectively. Crustaceans and gastropods were the dominant groups. As an indicator of stand health, recorded faunal assemblage clearly establishes that the structural complexity of the mangrove environment of Mundra is natural and no indication of stress on the ecosystem could be gleaned.

Analysis of mangrove health through examination of seven creek water and two sediment parameters indicated most of the parameters are well within the prescribed limits of Central Pollution Control Board (CPCB) for port environment. Values obtained for these parameters are either comparable with the other mangrove environment or are within the prescribed limits.

Threats and pressure acting on Mundra mangroves were investigated by zoning the study are into three major zones, which are as follows.

Zone 1: East of Bocha (area between Bocha and Abhan creek)

Zone 2: Bocha Island, (The Island Proper and areas in and around Adani house)

Zone 3: Baradimata creek (Navinal creek to West Port)

In these three zones, the following seven threats/pressures have been identified as the dominant degrading factors for Mundra mangroves;

***Coastal erosion*:** Coastal erosion is one of the critical threats to the healthy mangrove ecosystem in Mundra coast. In Bocha and east of Bocha, heavy to moderate level of coastal erosion has been recorded. This results in falling of fully grown mangrove trees on the fringes of Islands.

Cutting and lopping: Cutting and lopping is regularly done by fishermen from nearby coastal communities either for fuel wood or fishing purpose. Few patches east of Bocha in Zone-1 showed severe cutting and looping pressures.

Habitat Alteration (sand deposition): Tidal turbulence induced habitat alteration by way of change in substrate nature caused by sand deposition in mangrove has been recorded in Navinal Island and Bocha creek mouth. This gradually degrades the mangrove ecosystem.

Modification in natural geomorphology: Activities that alter natural geomorphology of coast and change or blockage in natural flushing of tidal waters noted in many places like Bocha and east of Bocha.

Air Borne Particulate deposition on mangroves: Mangrove patches close to the port has shown visible deposition of air borne particulates on the vegetation. Fine deposition on leaves and other part of the vegetation interferes with life supporting activities of the plant and impedes its normal metabolic activities.

Plastic and non-biodegradable debris: Stranding of plastic and non-biodegradable debris in mangroves was recorded at many places. Besides, large proportion of solid waste like discarded fishing nets, plastic sheets, nylon ropes, discarded water bottles, etc. were noticed in mangrove proper.

Grazing: *E*vidence of the livestock grazing was recorded in certain patches of mangroves towards western stretches like Baradimatha creek which affects the regenerating mangroves.

Coastal erosion, modification of coastal geomorphology and deposition of plastic and non-degradable wastes received were estimated to be the major threats that scored maximum. Identified threats and pressures were studied in all the three zones. In Zone I (East of Bocha), pressures like cutting (Pressure score 07), air borne particulate deposition (pressure score 04) and coastal erosion (pressure score 06) are the major pressures recorded.

In Zone II (Bocha Island and Adani House) five major pressures/threats have been identified which include cutting and lopping (pressure score 05), particulate sand deposition (pressure score 04), erosion (pressure score 08), solid waste dumping (pressure score 04) and change in coastal geomorphology (pressure score 06).

In Zone III (Baradimatha and adjacent areas), pressures and threats were comparatively moderate and their scoring is as follows: Grazing (pressure score 03), particulate sand deposition (pressure score 04), erosion (pressure score 03) and change in coastal geomorphology (pressure score 04).

Based on the identified pressures and threats the following conservation measures have been suggested.

Almost the whole fringes of the Bocha Island and part of eastern extension of Bocha are facing erosion of high magnitude. In these sites, erosion could be controlled by constructing embankment of stones as per the given model. Oceanographic factors that cause erosion in the immediate port vicinity need to be understood. A rapid survey through the survey department of APSEZL is recommended to identify coastal stretches within the port limit that are prone to high erosion. These high erosion coastal stretches could be provided with gentle slopes with stone pitching and other civil engineering works which will reduce the rate of erosion.

Intensified watch and ward and proper inculcation of knowledge about mangrove ecosystem to port staff could control cutting and lopping in all sites. Developmental activities in close vicinity could harm potential regeneration sites like Baradimatha directly or indirectly. Such activities involving change in natural geomorphology can cause irregularity in tidal flushing, change in sediment composition, erosion and sediment deposition on younger classes. Hence, while undertaking developmental activities in such areas, care should be exercised to avoid any adverse impact on the natural mangrove stands.

Bocha Island (Zone – II), harbouring fully grown and functional mangrove ecosystem is undergoing rapid degenerative changes due to severe process of erosion at the tip of the Island. Erosion preventive structures like stone pitching; laying multi-dimensional cement blocks (in uneven fashion) in a slope are the best alternatives to prevent erosion in Bocha Island. Restoration structures with gentle slope with unevenly designed cement blocks is suggested which will reduce the wave energy and erosion.

Proper documentation of Mundra mangroves in terms of Potential Regeneration areas, areas under threat and Restoration areas is required to prioritize the conservation and management actions.

In general, erosion seems to be the major natural factor at Mundra coast threatening mangroves. Erosion prone sites should be earmarked and physical measures could be taken depending on the level of on-going damage. Mundra Coast specific erosion study can be instituted focusing on impact level, root cause and mitigation methods.

Mangroves at Potential Regeneration Areas like Baradimatha should be allowed to grow naturally and plantation should not be attempted in these areas.

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Annexure – 4

Details of Greenbelt development at APSEZ, Mundra

LOCATION	Total Green Zone Detail Till Up to March - 2017				
	Area (In Ha.)	Trees (Nos.)	Palm (Nos.)	Shrubs (SQM)	Lawn (SQM)
SV COLONY	61.09	28287.00	6965.00	50020.00	80069.00
PORT & NON SEZ	71.96	124946.00	18613.00	62986.78	58455.18
SEZ	94.01	158335.00	15924.00	250449.60	27462.03
MITAP	2.48	8168.00	33.00	1670.00	4036.00
WEST PORT	81.34	181827.00	50221.00	24112.00	22854.15
AGRO- PARK	7.52	17244.00	1332.00	5400.00	2121.44
SOUTH PORT	14.08	25150.00	3430.00	3882.00	4826.97
Samundra Township	48.62	24602.00	12505.00	19978.07	35071.67
Productive Farming (Vadala Farm)	15.69	19336.00	0.00	0.00	0.00
TOTAL (APSEZL)	**396.7**	**587895.0**	**109023.0**	**418498.4**	**234896.4**
		696918.00			

❖ Within Adani Ports & SEZ

❖ **Within Residential Township (Samudra and Shantivan)**

❖ **Within CETP Premises**

adani™

Mangrove Afforestation Detail

S. NO.	Location	FY	Area (Hectare)	Clearance Reference	Plantation/Gap Filling	Species
A.1	Mundra Port Area (Mundra, Kutch)		24.00	Environment Clearace - Mundra (J-16011/13/95-IA.III dated 25 August 1995)	Plantation	Avicennia marina
Total Plantation			**24.00**			
B.1	Mundra Port Area (Mundra, Kutch)		25.00	Environment Clearace - Mundra (J-16011/30/2003-IA.III dated 21 July 2004)	Plantation	Avicennia marina
Total Plantation			**25.00**			
C.1	Luni/Hamiramora (Mundra, Kutch)	2007-08	40.00	CRZ Recommendation - Mundra (Env-10-2005-222-P dated 12 October, 2006)	Plantation	Avicennia marina Rhizophora mucronata Ceriops tagal
C.2		2009-10	10.00		Gap Filling Work	
C.3		2010-11	10.00		Gap Filling Work	
C.4		2011-12	95.40		Plantation	
C.5		2012-13	25.40		Plantation	
C.6		2013-14-15	70.00		Gap Filling Work	
Total Plantation (C.1+C.4+C.5)			**160.80**			
D.1	Kukadsar (Mundra, Kutch)	2012-13	66.50	CRZ Recommendation - Mundra (Env-10-2005-222-P dated 12 October, 2006)	Plantation	Avicennia marina
D.2		2013-14	10.00		Gap Filling Work	Avicennia marina
Total Plantation (D.1)			**66.50**			
E.1	Forest Area (Mundra)	2011-12	50.00	Forest Clearance - Mundra (F.No. 8-2/1999-FC (pt) dated 27 February 2009)	Plantation	Avicennia marina
E.2		2012-13	248.00		Plantation	Avicennia marina
Total Plantation (E.1+E.2)			**298.00**			

S. NO.	Location	FY	Area (Hectare)	Clearance Reference	Plantation/Gap Filling	Species
F.1	Jangi village (Bhachau, Kutch)	2012-13	50.00	CRZ Recommendation - Mundra (Env-10-2005-222-P dated 12 October, 2006)	Plantation	Avicennia marina
F.2		2013-14	20.00		Gap Filling Work	Avicennia marina
Total Plantation (F.1)			**50.00**			
G.1	Jakhau Village (Abdasa, Kutch)	2007-08	40.10	CRZ Recommendation - Mundra (Env-10-2005-222-P dated 12 October, 2006)	Plantation	Avicennia marina Rhizophora mucronata Ceriops tagal
G.2		2008-09	10.00		Gap Filling Work	
G.3		2009-10	10.00		Gap Filling Work	
G.4		2011-12	50.00	Environment Clearance - Dahej (11-37/2007-IA-III dtd 11 November, 2008)	Plantation	
G.5		2013-14	20.00		Gap Filling Work	
G.6		2012-13	30.00		Gap Filling Work	
G.7		2012-13	20.50	CRZ Recommendation - Mundra (Env-10-2005-222-P dated 12 October, 2006)	Plantation	
G.8		2012-13	200.00	Environment Clearance - Mundra (10-47/2008-IA.III dtd. 12th Jan,2009)	Plantation	
G.9		2013-14-15	50.00		Gap Filling Work	
Total Plantation (G.1 + G.4 + G.7 + G.8)			**310.60**			
H.1	Sat Saida Bet (Kutch)	2014-15	250.00	Commitment with KPT for 250 Ha. - Tuna (By undertaking dated 3 June, 2013)	Plantation	Avicennia marina
H.2	Sat Saida Bet (Kutch)	2016-17	5.00	Commitment with KPT for 5 Ha. Bio-Diversity-Tuna.	In Progress.	Bio Diversity (Three Var.)
H.3	AKBTPL, Tuna Area	2016-17	30.00		Gap Filling Work-In Progress	Avicennia marina
Total Plantation			**255.00**			

S. NO.	Location	FY	Area (Hectare)	Clearance Reference	Plantation/Gap Filling	Species
I.1	Village Dandi (Navsari)	2006-07	200.00	CRZ Recommendation - Mundra (Env-10-2005-222-P dated 12 October, 2006)	Plantation	Avicennia marina Rhizophora mucronata Ceriops tagal
I.2		2007-08	100.00		Plantation	
I.3		2007-08	100.00	Environment Clearance - Dahej (11-37/2007-IA-III dtd 11 November, 2008)	Plantation	
I.4		2008-09	200.00	CRZ Recommendation - Mundra (Env-10-2005-222-P dated 12 October, 2006)	Plantation	
I.5		2010-11	200.00		Plantation	
Total Plantation (I.1 + I.2 + I.3 + I.4 + I.5)			**800.00**			
J.1	Village Talaza (Bhavnagar)	2011-12	50.00	Environment Clearance - Dahej (11-37/2007-IA-III dtd 11 November, 2008)	Plantation	Avicennia marina
J.2	Village Narmada (Bhavnagar)	2014-2015	250.00	CRZ Recommendation - Mundra (Env-10-2005-222-P dated 12 October, 2006)	Plantation	Avicennia marina
Total Plantation (J.1 + J.2)			**300.00**			
K.1	Village Malpur (Bharuch)	2012-13-14	200.00	CRZ Recommendation - Dahej ENV-10-2006-71-P dtd 29th May, 2007	Plantation	Avicennia marina
K.2	Village Kantiyajal (Bharuch)	2014-15	50.00	CRZ Recommendation - Hazira ENV-10-2012-30-E dtd 11th May,2012	Plantation	Avicennia marina
K.3	Village Devla Bharuch	2014-15	50.00		Plantation	Avicennia marina
K.4	Village Devla Bharuch	2015-16	100.00		Plantation	Avicennia marina
Total Plantation (K.1 + K.2 + K.3 + K.4)			**400.00**			
L.1	Village Tada Talav (Khambat, Anand)	2015-16	100.00	Environment and CRZ clearance - Mundra SEZ (10-138/2008/IA.III dated 15 July 2014)	Plantation	Avicennia marina
L.2	Village Tada Talav (Khambat, Anand)	2015-16	100.00		Plantation	Avicennia marina
Total Plantation (L.1 + L.2)			**200.00**			
G. Total (Plantation+ Gapfilling)			**2889.90**			

Dandi

Hamiramora

Jakhau

Dandi

Annexure – 5

"HALF YEARLY ENVIRONMENTAL MONITORING REPORT"

FOR

ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.
TAL: MUNDRA, KUTCH, MUNDRA – 370 421

MONITORING PERIOD:

OCTOBER 2016 TO MARCH 2017

PREPARED BY:

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T 0820 - 821 ISO 9001:2008 ISO 14001:2004 OHSAS 18001:2007

RESULTS OF STP WATER OUTLET

SR. NO	TEST PARAMETERS	Unit	AMSIPL STP OUTLET						
			Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	March-17	TEST METHOD
1	pH	--	7.02	7.38	6.81	7.51	7.17	7.26	IS3025(P11)83Re.02
2	Total Suspended Solids	mg/L	18	22	14	26	24	22	IS3025(P17)84Re.02
3	BOD (3 days @ 270 C)	mg/L	12	16	8	19	11	8	IS 3025 (P44)1993Re.03Edition2.1
4	Residual Chlorine	mg/L	0.6	0.6	0.6	0.5	0.7	0.8	APHA(22nd Edi)4500 Cl

SR. NO	TEST PARAMETERS	Unit	ADANI HOSPITAL STP OUTLET						
			Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	March-17	TEST METHOD
1	pH	--	6.98	6.97	7.02	7.16	7.12	7.16	IS3025(P11)83Re.02
2	Total Suspended Solids	mg/L	20	22	16	16	24	26	IS3025(P17)84Re.02
3	BOD (3 days @ 270 C)	mg/L	19	16	19	14	19	16	IS 3025 (P44)1993Re.03Edition2.1
4	Residual Chlorine	mg/L	0.5	0.8	0.6	0.6	0.8	0.7	APHA(22nd Edi)4500 Cl

*Below Detection limit

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

Dr. Arun Bajpai
Lab Manager (Q)

RESULT OF CETP OUTLET

SR. NO.	TEST PARAMETERS	UNIT	CETP OUTLET						TEST METHOD
			Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	March-17	
1	pH	--	7.50	7.32	8.08	7.12	6.98	7.24	IS3025(P11)83Re.02
2	Temperature	°C	30	25	29	29	29	30	IS3025(P9)84Re.02
3	Colour	Co-pt	50	60	30	50	70	50	IS3025(P4)83Re.02
4	Total Suspended Solids	mg/L	28	31	28	20	26	36	IS3025(P17)84Re.02
5	Oil & Grease	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22nd Edi)5520D
6	Phenolic Compound	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	IS3025(P43)92Re.03
7	Ammonical Nitrogen	mg/L	1.77	1.96	1.64	1.40	5.59	1.80	IS3025(P34)88Cla.2.3
8	BOD (3 Days @ 27 °C)	mg/L	26	24	24	22	32	28	IS 3025 (P44)1993Re.03Edition2.1
9	COD	mg/L	104	94	90	76	96	94	APHA(22nd Edi) 5520-D Open Reflux
10	Chloride as Cl	mg/L	840	819	482	726	719	614	IS3025(P32)88Re.99
11	Sulphate as SO_4	mg/L	68	68	45.4	95.4	98.13	98.48	APHA(22nd Edi)4500 SO_4 E
12	Total Dissolved Solids	mg/L	1500	1575	1258	1956	1544	1386	IS3025(P16)84Re.02
13	SAR	--	3.39	3.91	5.44	2.26	2.39	1.92	By Calculation
14	Sodium as Na	%	36.67	53.91	44.36	48.66	44.81	46.54	AAS APHA(22nd Edi) 3500 NA B/ Flame Photometer
15	Copper as Cu	mg/L	0.016	0.027	0.024	0.017	0.021	0.019	AAS APHA(22nd Edi)3111 B
16	Nickel as Ni	mg/L	0.020	0.031	0.021	0.013	0.019	0.026	AAS APHA(22nd Edi)3111 B
17	Cyanide as CN	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22nd Edi)4500CN E
18	Boron as B	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22nd Edi)4500 B
19	Insecticides/Pesticides	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	GC MS
20	Bio-assay Test	--	95 % Survival of fish after 96 hours in 100 % CETP Outlet effluent	90 % Survival of fish after 96 hours in 100 % CETP Outlet effluent	90 % Survival of fish after 96 hours in 100 % CETP Outlet effluent	95 % Survival of fish after 96 hours in 100 % CETP Outlet effluent	95 % Survival of fish after 96 hours in 100 % CETP Outlet effluent	95 % Survival of fish after 96 hours in 100 % CETP Outlet effluent	OECD 203 B/IS: 6582-1971
21	Residual Chlorine	mg/L	0.5	0.6	0.5	0.5	0.7	0.8	APHA(22nd Edi)4500 Cl

*Below Detection Limit

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

Dr. Arun Bajpai
Lab Manager (Q)

544, BelgiumTowers, Ring Road, Opp. Linear Bus Stand, Surat-395003. (Guj.).
Tele-Fax: (0261)2455751, 2601106, 2601224. E-Mail: pollucon@gmail.com. Website: www.pollucon.com

RESULTS OF AMBIENT AIR QUALITY MONITORING

SAMUDRA TOWNSHIP					
Sr. No.	**Date of Sampling**	**Particulate Matter (PM10) µg/m3**	**Particulate Matter (PM 2.5) µg/m3**	**Sulphur Dioxide (SO2) µg/m3**	**Oxides of Nitrogen (NO2) µg/m3**
1	01/10/2016	71.61	33.68	7.83	18.60
2	05/10/2016	62.71	30.77	12.49	30.65
3	08/10/2016	76.67	42.41	15.72	27.59
4	12/10/2016	47.70	18.71	10.44	20.69
5	15/10/2016	54.65	23.53	17.46	34.28
6	19/10/2016	75.58	38.66	14.79	21.60
7	22/10/2016	64.29	34.51	8.73	24.38
8	26/10/2016	70.21	40.33	19.45	32.40
9	28/10/2016	81.62	35.75	16.39	29.26
10	02/11/2016	69.60	27.44	14.84	30.97
11	05/11/2016	80.27	44.49	7.89	15.26
12	09/11/2016	60.33	34.51	19.65	21.22
13	12/11/2016	89.91	52.38	16.56	29.33
14	16/11/2016	76.80	47.40	22.72	33.75
15	19/11/2016	52.40	20.79	18.34	26.12
16	23/11/2016	71.43	40.74	10.45	23.58
17	26/11/2016	58.31	31.60	13.41	18.31
18	30/11/2016	65.69	35.75	17.18	20.39
19	03/12/2016	44.77	19.54	13.28	30.39
20	07/12/2016	55.39	26.61	18.68	23.25
21	10/12/2016	69.42	30.77	11.24	17.20
22	14/12/2016	58.31	22.45	16.46	35.63
23	17/12/2016	74.48	42.41	19.52	33.15
24	21/12/2016	62.28	28.69	9.61	27.62
25	24/12/2016	84.18	47.40	23.35	38.21
26	28/12/2016	67.40	31.60	19.22	24.40
27	31/12/2016	52.28	18.71	7.78	20.26
28	04/01/2017	68.32	37.42	22.23	34.10
29	07/01/2017	50.32	22.45	10.52	26.15
30	11/01/2017	76.31	32.43	18.53	37.66

Continue..

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

Dr. Arun Bajpai
Lab Manager (Q)

SAMUDRA TOWNSHIP					
Sr. No.	**Date of Sampling**	**Particulate Matter (PM10) µg/m3**	**Particulate Matter (PM 2.5) µg/m3**	**Sulphur Dioxide (SO2) µg/m3**	**Oxides of Nitrogen (NO2) µg/m3**
31	14/01/2017	59.29	26.61	12.27	31.61
32	18/01/2017	66.30	38.50	15.88	38.50
33	21/01/2017	78.38	34.51	13.23	27.20
34	25/01/2017	52.58	16.63	8.73	19.53
35	28/01/2017	65.33	29.52	11.36	24.69
36	01/02/2017	80.27	43.65	20.24	32.88
37	04/02/2017	69.29	37.42	16.41	29.55
38	08/02/2017	55.63	20.37	13.46	30.52
39	11/02/2017	72.59	33.68	10.42	25.20
40	15/02/2017	58.37	25.36	8.71	21.27
41	18/02/2017	63.80	30.35	14.95	34.22
42	22/02/2017	52.82	23.70	19.60	38.61
43	25/02/2017	62.71	27.44	9.47	15.40
44	01/03/2017	69.29	38.66	17.58	36.79
45	04/03/2017	50.38	23.70	14.88	25.44
46	08/03/2017	42.58	17.46	11.71	33.17
47	11/03/2017	68.38	26.61	8.73	30.37
48	15/03/2017	77.89	44.49	20.82	42.75
49	18/03/2017	53.80	20.37	13.41	39.25
50	22/03/2017	62.28	28.69	16.61	27.33
51	25/03/2017	84.30	41.58	10.15	19.34
52	29/03/2017	58.31	25.36	18.86	23.36
	TEST METHOD	**IS:5182(Part 23):Gravimetric CPCB - Method (Vol.I,May-2011)**	**Gravimetric- CPCB - Method (Vol.I,May-2011)**	**IS:5182(Part II):Improved West and Gaeke**	**IS:5182(Part VI):Modified Jacob & Hochheiser (NaOH-NaAsO2)**

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

Dr. Arun Bajpai
Lab Manager (Q)

SAMUDRA TOWNSHIP CUSTOMER CARE					
Sr.No.	**Date of Sampling**	**Particulate Matter (PM10) µg/m3**	**Particulate Matter (PM 2.5) µg/m3**	**Sulphur Dioxide (SO2) µg/m3**	**Oxides of Nitrogen (NO2) µg/m3**
1	01/10/2016	77.51	38.72	9.58	20.36
2	05/10/2016	54.28	25.40	10.52	28.22
3	08/10/2016	83.23	48.72	18.75	22.25
4	12/10/2016	76.19	40.39	8.74	17.72
5	15/10/2016	62.53	29.50	14.21	29.17
6	19/10/2016	87.20	46.63	12.23	15.32
7	22/10/2016	58.61	24.57	11.72	21.20
8	26/10/2016	78.29	35.39	17.53	38.71
9	28/10/2016	67.40	28.73	13.98	26.35
10	02/11/2016	58.37	23.73	12.59	27.39
11	05/11/2016	86.72	48.72	10.53	18.57
12	09/11/2016	67.52	30.40	16.58	30.29
13	12/11/2016	73.48	43.72	14.96	26.23
14	16/11/2016	87.80	54.55	19.67	39.27
15	19/11/2016	69.21	29.56	9.44	20.19
16	23/11/2016	94.30	52.46	13.46	19.64
17	26/11/2016	82.63	45.38	7.87	15.55
18	30/11/2016	75.53	39.56	11.33	23.44
19	03/12/2016	59.88	28.73	10.53	23.11
20	07/12/2016	64.21	32.48	13.42	27.74
21	10/12/2016	75.28	38.72	8.68	20.34
22	14/12/2016	50.31	18.74	19.23	31.43
23	17/12/2016	62.83	35.39	16.55	28.50
24	21/12/2016	84.49	39.56	14.95	22.42
25	24/12/2016	75.59	43.72	12.51	28.66
26	28/12/2016	60.60	26.65	6.99	34.21
27	31/12/2016	71.19	21.65	15.74	30.58
28	04/01/2017	55.61	30.40	19.80	28.71
29	07/01/2017	78.17	35.39	17.48	21.24
30	11/01/2017	51.27	25.40	22.88	32.68

Continue..

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

Dr. Arun Bajpai
Lab Manager (Q)

SAMUDRA TOWNSHIP CUSTOMER CARE					
Sr.No.	**Date of Sampling**	**Particulate Matter (PM10) µg/m3**	**Particulate Matter (PM 2.5) µg/m3**	**Sulphur Dioxide (SO2) µg/m3**	**Oxides of Nitrogen (NO2) µg/m3**
31	14/01/2017	67.58	29.56	13.20	24.37
32	18/01/2017	59.28	26.46	10.43	34.54
33	21/01/2017	71.31	31.64	8.80	19.14
34	25/01/2017	64.39	23.73	16.58	31.74
35	28/01/2017	57.59	21.65	6.18	27.31
36	01/02/2017	69.27	38.72	10.53	20.69
37	04/02/2017	58.31	30.40	13.25	23.40
38	08/02/2017	46.52	16.66	15.90	27.39
39	11/02/2017	78.17	40.39	8.63	19.85
40	15/02/2017	86.30	34.56	12.21	30.41
41	18/02/2017	70.77	39.56	9.72	21.59
42	22/02/2017	57.47	28.73	11.41	24.24
43	25/02/2017	75.53	42.47	7.16	17.41
44	01/03/2017	57.59	32.48	14.81	31.24
45	04/03/2017	64.27	29.56	11.40	28.71
46	08/03/2017	51.57	26.65	8.62	25.57
47	11/03/2017	75.83	37.47	12.58	29.77
48	15/03/2017	67.22	40.39	10.45	33.54
49	18/03/2017	46.82	17.49	16.72	36.59
50	22/03/2017	55.61	24.57	5.23	30.61
51	25/03/2017	76.61	36.64	7.84	22.99
52	29/03/2017	68.18	21.65	10.33	32.60
	TEST METHOD	**IS:5182(Part 23):Gravimetric CPCB - Method (Vol.I,May-2011)**	**Gravimetric- CPCB - Method (Vol.I,May-2011)**	**IS:5182(Part II):Improved West and Gaeke**	**IS:5182(Part VI):Modified Jacob & Hochheiser (NaOH-NaAsO2)**

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

Dr. Arun Bajpai
Lab Manager (Q)

RESULT OF AMBIENT AIR QUALITY MONITORING

WTP- NEAR CETP						
Sr.No.	**Date of Sampling**	**Particulate Matter (PM10) µg/m3**	**Particulate Matter (PM2.5) µg/m3**	**Sulphur Dioxide (SO2) µg/m3**	**Oxides of Nitrogen (NO2) µg/m3**	**Hydrogen sulphide(H2S) µg/m3**
1	01/10/2016	83.41	43.68	15.85	26.23	BDL*
2	05/10/2016	72.63	38.69	19.61	36.67	BDL*
3	08/10/2016	92.31	52.42	23.54	42.39	BDL*
4	12/10/2016	67.57	34.53	13.16	34.19	BDL*
5	15/10/2016	73.24	42.48	21.82	37.70	BDL*
6	19/10/2016	94.81	51.59	17.26	29.30	BDL*
7	22/10/2016	78.17	40.77	14.87	31.38	BDL*
8	26/10/2016	95.72	55.75	22.74	43.56	BDL*
9	28/10/2016	88.29	39.52	18.43	38.17	BDL*
10	02/11/2016	80.67	36.61	22.83	38.60	BDL*
11	05/11/2016	93.22	54.50	18.29	26.34	BDL*
12	09/11/2016	84.57	47.43	25.20	35.24	BDL*
13	12/11/2016	98.59	57.41	20.13	39.44	BDL*
14	16/11/2016	91.52	51.59	28.97	45.45	BDL*
15	19/11/2016	75.62	34.53	23.71	37.53	BDL*
16	23/11/2016	86.83	49.51	17.44	31.23	BDL*
17	26/11/2016	71.23	38.69	15.86	25.38	BDL*
18	30/11/2016	95.60	50.76	19.82	29.37	BDL*
19	03/12/2016	65.62	34.53	18.17	43.66	BDL*
20	07/12/2016	82.68	38.69	22.84	34.47	BDL*
21	10/12/2016	95.30	55.75	15.80	29.67	BDL*
22	14/12/2016	70.38	32.45	25.29	41.55	BDL*
23	17/12/2016	86.28	47.43	22.84	37.60	BDL*
24	21/12/2016	77.81	57.41	17.44	39.28	BDL*
25	24/12/2016	93.29	53.67	20.41	32.17	BDL*
26	28/12/2016	79.21	37.44	14.27	42.20	BDL*
27	31/12/2016	88.59	40.36	19.69	28.62	BDL*
28	04/01/2017	84.33	46.60	25.72	39.15	BDL*
29	07/01/2017	71.23	30.37	19.64	34.60	BDL*
30	11/01/2017	94.50	50.76	28.38	45.57	BDL*

Continue …

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

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Lab Manager (Q)

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WTP- NEAR CETP						
Sr.No.	**Date of Sampling**	**Particulate Matter (PM10) µg/m3**	**Particulate Matter (PM2.5) µg/m3**	**Sulphur Dioxide (SO2) µg/m3**	**Oxides of Nitrogen (NO2) µg/m3**	**Hydrogen sulphide(H2S) µg/m3**
31	14/01/2017	82.50	43.68	21.62	37.55	BDL*
32	18/01/2017	91.58	52.45	18.75	42.62	BDL*
33	21/01/2017	85.61	49.51	16.96	30.47	BDL*
34	25/01/2017	79.27	36.61	22.35	28.48	BDL*
35	28/01/2017	92.62	54.50	14.27	35.40	BDL*
36	01/02/2017	86.58	48.68	17.69	28.33	BDL*
37	04/02/2017	79.58	42.44	20.63	32.41	BDL*
38	08/02/2017	64.28	28.71	23.64	35.88	BDL*
39	11/02/2017	92.37	54.50	15.76	38.40	BDL*
40	15/02/2017	71.59	36.61	18.31	33.34	BDL*
41	18/02/2017	89.33	44.52	11.38	29.59	BDL*
42	22/02/2017	75.31	33.70	24.76	34.27	BDL*
43	25/02/2017	84.33	49.51	13.18	24.76	BDL*
44	01/03/2017	77.63	42.44	19.50	42.62	BDL*
45	04/03/2017	82.62	35.36	22.91	37.22	BDL*
46	08/03/2017	64.40	30.37	15.85	35.41	BDL*
47	11/03/2017	92.37	53.67	24.41	44.74	BDL*
48	15/03/2017	86.40	48.68	17.49	36.51	BDL*
49	18/03/2017	75.62	29.54	21.20	41.13	BDL*
50	22/03/2017	83.17	33.70	23.62	34.16	BDL*
51	25/03/2017	96.52	55.75	13.17	31.38	BDL*
52	29/03/2017	80.43	32.45	16.79	39.01	BDL*
TEST METHOD		**IS:5182(Part 23):Gravimetric CPCB - Method (Vol.I,May-2011)**	**Gravimetric- CPCB - Method (Vol.I,May-2011)**	**IS:5182(Part II):Improved West and Gaeke**	**IS:5182(Part VI):Modified Jacob & Hochheiser (NaOH-NaAsO2)**	**IS:5182(Part VII) 1973**

*Below detection limit

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

Dr. Arun Bajpai
Lab Manager (Q)

544, BelgiumTowers, Ring Road, Opp. Linear Bus Stand, Surat-395003. (Guj.).
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RESULT OF AMBIENT AIR QUALITY MONITORING

PUB/ADANI HOUSE								
Sr. No.	Date of Sampling	Particulate Matter (PM10) µg/m^3	Particulate Matter (PM 2.5) µg/m^3	Sulphur Dioxide (SO2) µg/m^3	Oxides of Nitrogen (NO2) µg/m^3	Carbon Monoxide as CO mg/m^3	Hydrocarbon as CH_4 mg/m^3	Benzene as C_6H_6 µg/m^3
1	04/10/2016	77.30	42.47	14.95	32.26	0.46	BDL*	BDL*
2	07/10/2016	64.53	36.64	19.74	23.70	0.62	BDL*	BDL*
3	11/10/2016	82.69	52.47	15.85	27.15	0.73	BDL*	BDL*
4	14/10/2016	72.52	41.57	10.48	34.68	0.66	BDL*	BDL*
5	18/10/2016	93.42	45.39	7.92	18.73	0.53	BDL*	BDL*
6	21/10/2016	58.58	23.74	9.97	22.24	0.24	BDL*	BDL*
7	25/10/2016	61.18	34.56	16.89	36.34	0.55	BDL*	BDL*
8	28/10/2016	90.63	54.55	12.92	31.60	0.52	BDL*	BDL*
9	31/10/2016	56.72	22.49	8.74	20.23	0.41	BDL*	BDL*
10	01/11/2016	66.02	20.40	9.54	25.63	0.81	BDL*	BDL*
11	04/11/2016	57.59	32.48	16.76	35.82	0.74	BDL*	BDL*
12	08/11/2016	61.68	34.56	12.81	29.36	0.54	BDL*	BDL*
13	11/11/2016	52.63	22.49	8.78	23.07	0.90	BDL*	BDL*
14	15/11/2016	74.70	33.73	11.21	21.63	0.69	BDL*	BDL*
15	18/11/2016	82.51	45.39	6.21	36.70	0.45	BDL*	BDL*
16	22/11/2016	50.27	28.73	17.50	39.00	0.57	BDL*	BDL*
17	25/11/2016	84.99	48.72	13.26	24.90	0.24	BDL*	BDL*
18	29/11/2016	76.31	42.47	7.93	18.45	0.65	BDL*	BDL*
19	02/12/2016	91.18	52.47	7.18	31.32	0.52	BDL*	BDL*
20	06/12/2016	84.61	47.47	11.89	20.88	0.44	BDL*	BDL*
21	09/12/2016	96.33	44.56	15.75	24.60	0.25	BDL*	BDL*
22	13/12/2016	72.59	36.64	18.62	38.63	0.58	BDL*	BDL*
23	16/12/2016	55.73	23.74	20.61	30.02	0.72	BDL*	BDL*
24	20/12/2016	62.17	26.65	16.68	35.50	0.50	BDL*	BDL*
25	23/12/2016	80.27	38.73	19.69	40.10	0.94	BDL*	BDL*
26	27/12/2016	75.32	35.40	13.78	33.65	0.66	BDL*	BDL*
27	30/12/2016	59.38	22.49	10.37	26.63	0.82	BDL*	BDL*
28	03/01/2017	56.78	30.40	15.27	21.67	0.57	BDL*	BDL*
29	06/01/2017	82.38	50.39	18.87	24.21	0.87	BDL*	BDL*
30	10/01/2017	69.61	32.48	17.01	34.68	0.64	BDL*	BDL*

Continue …

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

Dr. ArunBajpai
Lab Manager (Q)

RESULT OF AMBIENT AIR QUALITY MONITORING

PUB/ADANI HOUSE								
Sr. No.	Date of Sampling	Particulate Matter (PM10) µg/m^3	Particulate Matter (PM 2.5) µg/m^3	Sulphur Dioxide (SO2) µg/m^3	Oxides of Nitrogen (NO2) µg/m^3	Carbon Monoxide as CO mg/m^3	Hydrocarbon as CH_4 mg/m^3	Benzene as C_6H_6 µg/m^3
31	13/01/2017	73.39	41.64	12.17	38.49	0.38	BDL*	BDL*
32	17/01/2017	81.33	45.73	6.45	27.63	0.73	BDL*	BDL*
33	20/01/2017	49.71	28.73	9.92	22.41	0.70	BDL*	BDL*
34	24/01/2017	68.19	31.65	13.18	33.74	0.82	BDL*	BDL*
35	27/01/2017	83.37	42.47	19.27	35.15	0.23	BDL*	BDL*
36	31/01/2017	52.63	23.32	14.41	30.58	0.49	BDL*	BDL*
37	03/02/2017	73.58	40.39	15.12	26.22	0.84	BDL*	BDL*
38	07/02/2017	55.73	31.65	12.06	36.71	0.58	BDL*	BDL*
39	10/02/2017	62.67	27.48	16.97	41.53	0.46	BDL*	BDL*
40	14/02/2017	51.20	22.49	10.65	27.79	0.80	BDL*	BDL*
41	17/02/2017	88.27	52.47	18.90	31.46	0.36	BDL*	BDL*
42	21/02/2017	71.29	44.56	21.36	39.62	0.21	BDL*	BDL*
43	24/02/2017	82.51	38.73	8.78	29.37	0.62	BDL*	BDL*
44	28/02/2017	77.80	34.56	19.36	25.05	0.79	BDL*	BDL*
45	03/03/2017	76.49	27.48	17.73	26.49	0.25	BDL*	BDL*
46	07/03/2017	57.59	24.57	9.85	21.98	0.58	BDL*	BDL*
47	10/03/2017	86.47	31.65	15.11	38.15	0.53	BDL*	BDL*
48	14/03/2017	60.31	33.73	14.01	23.84	0.62	BDL*	BDL*
49	17/03/2017	74.32	46.64	8.98	29.44	0.31	BDL*	BDL*
50	21/03/2017	63.60	29.57	19.94	42.39	0.34	BDL*	BDL*
51	24/03/2017	58.89	22.49	10.60	33.38	0.45	BDL*	BDL*
52	28/03/2017	70.42	34.56	7.25	18.84	0.47	BDL*	BDL*
53	31/03/2017	81.20	30.40	16.90	32.64	0.15	BDL*	BDL*
	TEST METHOD	**IS:5182(Part 23):Gravimetric CPCB - Method (Vol.I,May-2011)**	**Gravimetric-CPCB - Method (Vol.I,May-2011)**	**IS:5182(Part II):Improved West and Gaeke**	**IS:5182(Part VI):Modified Jacob & Hochheiser (NaOH-NaAsO2)**	**NDIR Digital Gas Analyzer**	**SOP: HC: GC/GCMS/Gas analyzer**	**IS 5182 (Part XI):2006/CPCB Method**

*Below detection limit

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

Dr. ArunBajpai
Lab Manager (Q)

RESULT NOISE LEVEL MONITORING

Result of Noise level monitoring [Day Time]

SR. NO.	Name of Location	SAMUNDRA TOWNSHIP STP					
		Result [Leq dB(A)]					
	Sampling Date & Time	19/10/2016	09/11/2016	14/12/2016	18/01/2017	03/02/2017	22/03/2017
1	6:00-7:00	56.4	58.5	53.4	60.4	62.4	54.5
2	7:00-8:00	59.2	61.5	57.1	58.1	60.2	58.4
3	8:00-9:00	63.4	63.4	62.4	61.8	65.3	64.5
4	9:00-10:00	62.4	62.9	68.1	65.4	67.2	64.2
5	10:00-11:00	68.7	66.3	65.4	64.2	67.2	67.6
6	11:00-12:00	66.1	66.8	70.4	64.8	70.2	64.2
7	12:00-13:00	62.9	65.1	68.4	63.5	73.8	68.5
8	13:00-14:00	69.7	63.4	63.4	69.8	69.3	65.4
9	14:00-15:00	67.4	64.9	66.4	65.2	65.2	63.2
10	15:00-16:00	62.4	64.8	66.8	62.8	63.9	65.3
11	16:00-17:00	68.1	67.3	63.4	65.4	67.3	67.5
12	17:00-18:00	70.9	62.7	62.5	66.9	68.3	62.4
13	18:00-19:00	65.1	62.8	68.4	63.4	62.1	65.3
14	19:00-20:00	63.4	67.8	67.4	62.8	63.2	62.3
15	20:00-21:00	65.4	68.2	67.1	65.4	65.2	61.2
16	21:00-22:00	68.1	66.1	62.5	62.7	66.9	61.8
Day Time Limit*		75 Leq dB(A)					

Result of Noise level monitoring [Night Time]

SR. NO.	Name of Location	SAMUNDRA TOWNSHIP STP					
		Result [Leq dB(A)]					
	Sampling Date & Time	19/10/2016	09/11/2016	14/12/2016	18/01/2017	03/02/2017	22/03/2017
1	22:00-23:00	58.1	59.5	59.4	63.1	58.4	67.3
2	23:00-00:00	56.1	57.2	62.1	65.1	60.4	64.2
3	00:00-01:00	62.1	58.8	61.4	68.4	60.2	60.4
4	01:00-02:00	59.4	62.2	60.4	60.7	63.4	62.4
5	02:00-03:00	63.1	63.4	60.8	60.8	61.4	61.3
6	03:00-04:00	62.4	59.3	61.4	63.4	63.2	60.3
7	04:00-05:00	61.4	57.4	63.4	58.4	61.7	60.1
8	05:00-06:00	61.8	64.8	59.4	60.4	60.3	62.6
Night Time Limit*		70 Leq dB(A)					

Result of Noise level monitoring [Day Time]

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

Dr. Arun Bajpai
Lab Manager (Q)

SR. NO.	Name of Location	SAMUNDRA TOWNSHIP CUSTOMER CARE					
		Result [Leq dB(A)]					
	Sampling Date & Time	05/10/2016	23/11/2016	07/12/2016	11/01/2017	08/02/2017	08/03/2017
1	6:00-7:00	52.4	56.5	69.1	56.1	54.7	57.3
2	7:00-8:00	57.1	62.4	55.4	60.4	58.3	55.5
3	8:00-9:00	63.4	61.9	53.4	62.4	63.2	60.3
4	9:00-10:00	61.4	65.8	60.4	60.4	68.3	65.3
5	10:00-11:00	62.8	66.4	61.5	65.7	65.2	61.2
6	11:00-12:00	65.4	61.8	63.4	62.4	65.2	61.7
7	12:00-13:00	62.4	61.5	59.5	60.4	69.4	63.8
8	13:00-14:00	64.8	68.9	62.4	68.1	67.4	65.3
9	14:00-15:00	68.4	60.5	65.4	63.5	63.1	62.7
10	15:00-16:00	66.1	65.9	65.1	63.8	61.8	62.3
11	16:00-17:00	62.4	62.4	63.4	65.4	60.4	65.3
12	17:00-18:00	69.8	56.8	67.1	61.8	65.3	62.3
13	18:00-19:00	66.4	67.9	62.4	64.7	65.8	63.7
14	19:00-20:00	63.4	62.4	62.8	62.4	68.4	65.3
15	20:00-21:00	62.4	66.6	61.8	62.8	63.2	62.4
16	21:00-22:00	63.7	67.2	63.1	65.4	63.8	65.4
Day Time Limit*		75 Leq dB(A)					

Result of Noise level monitoring [Night Time]

SR. NO.	Name of Location	SAMUNDRA TOWNSHIP CUSTOMER CARE					
		Result [Leq dB(A)]					
	Sampling Date & Time	05/10/2016	23/11/2016	07/12/2016	11/01/2017	08/02/2017	08/03/2017
1	22:00-23:00	62.4	58.4	59.4	62.4	62.4	60.3
2	23:00-00:00	54.1	54.3	53.4	56.1	56.3	60.5
3	00:00-01:00	50.1	56.3	58.4	52.7	50.4	57.3
4	01:00-02:00	59.8	62.9	55.1	50.4	52.5	52.6
5	02:00-03:00	57.1	61.4	50.4	53.8	48.4	54.7
6	03:00-04:00	56.4	53.9	47.1	58.1	56.3	50.4
7	04:00-05:00	62.4	60.5	49.5	58.7	58.3	59.4
8	05:00-06:00	61.8	60	50.7	61.5	61.9	62.5
Night Time Limit*		70 Leq dB(A)					

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

Dr. Arun Bajpai
Lab Manager (Q)

RESULTS OF NOISE LEVEL MONITORING

Result of Noise level monitoring [Day Time]

SR. NO.	Name of Location	CETP					
		Result [dB(A) Leq]					
	Sampling Date & Time	12/10/2016	02/11/2016	01/12/2016	02/01/2017	01/02/2017	01/03/2017
1	6:00-7:00	57.1	67.2	58.1	63.1	59.3	57.7
2	7:00-8:00	58.1	62.2	62.4	65.8	61.7	60.3
3	8:00-9:00	63.0	69.6	65.4	65.7	64.3	67.4
4	9:00-10:00	65.4	64.5	61.8	62.4	69.3	65.4
5	10:00-11:00	68.1	68.5	69.4	69.2	70.3	64.5
6	11:00-12:00	62.4	70.2	62.8	63.5	65.2	68.3
7	12:00-13:00	70.1	68.0	63.4	72.1	68.3	67.4
8	13:00-14:00	72.6	69.5	64.8	70.5	65.3	65.3
9	14:00-15:00	68.1	67.3	69.4	68.4	65.9	62.5
10	15:00-16:00	65.4	65.2	65.1	68.1	67.3	68.3
11	16:00-17:00	68.1	63.9	61.8	62.4	69.2	64.5
12	17:00-18:00	63.4	68.9	68.4	65.1	64.2	68.3
13	18:00-19:00	65.1	64.5	64.8	68.4	68.2	70.3
14	19:00-20:00	72.1	64.5	69.4	61.7	62.9	68.8
15	20:00-21:00	70.1	64.2	61.4	60.4	65.3	65.3
16	21:00-22:00	68.5	68.9	60.8	60.8	62.8	67.4
Day Time Limit*		75 dB(A) Leq					

Result of Noise level monitoring [Night Time]

SR. NO.	Name of Location	CETP					
		Result [dB(A) Leq]					
	Sampling Date & Time	12/10/2016	02/11/2016	01/12/2016	02/01/2017	01/02/2017	01/03/2017
1	22:00-23:00	62.1	59.6	60.7	65.1	60.4	58.4
2	23:00-00:00	64.2	58.4	65.4	63.4	62.4	60.3
3	00:00-01:00	59.7	63.4	68.4	61.7	58.2	63.4
4	01:00-02:00	62.4	63.8	62.4	61.8	62.5	61.4
5	02:00-03:00	68.1	61.2	60.4	68.4	62.3	60.4
6	03:00-04:00	65.4	64.8	65.4	65.2	65.2	60.2
7	04:00-05:00	66.2	62.9	62.4	61.2	61.2	58.4
8	05:00-06:00	66.2	67.1	61.5	63.8	63.8	59.4
Night Time Limit*		70 dB(A) Leq					

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

Dr. Arun Bajpai
Lab Manager (Q)

RESULTS OF NOISE LEVEL MONITORING

Result of Noise level monitoring [Day Time]

SR. NO.	Name of Location	PUB/ADANI HOUSE					
		Result [Leq dB(A)]					
	Sampling Date & Time	04/10/2016	01/11/2016	20/12/2016	03/01/2017	10/02/2017	21/03/2017
1	6:00-7:00	62.4	62.8	62.5	63.4	65.3	60.3
2	7:00-8:00	65.1	63.5	66.4	60.4	67.8	63.4
3	8:00-9:00	62.4	68.4	69.4	68.4	67.3	62.3
4	9:00-10:00	65.7	64.9	62.4	65.1	70.2	67.4
5	10:00-11:00	67.1	71.2	72.1	72.4	72.3	65.6
6	11:00-12:00	62.8	73.1	70.8	70.5	66.4	68.4
7	12:00-13:00	68.1	67.4	65.4	65.8	66.9	70.4
8	13:00-14:00	63.1	68.6	62.4	63.4	69.3	65.3
9	14:00-15:00	65.1	62.9	68.4	61.5	65.3	69.4
10	15:00-16:00	72.4	66.8	66.4	68.4	63	69.7
11	16:00-17:00	69.4	68.9	63.4	70.4	64.1	67.3
12	17:00-18:00	68.1	65.8	65.1	67.1	62.3	65.3
13	18:00-19:00	65.4	66.1	61.7	67.8	62.4	63.8
14	19:00-20:00	66.1	67.5	68.4	65.1	60.2	64.3
15	20:00-21:00	68.1	67.3	66.7	61.4	64.2	67.4
16	21:00-22:00	62.8	62.8	62.4	62.8	65.1	63.8
Day Time Limit*		75 Leq dB(A)					

Result of Noise level monitoring [Night Time]

SR. NO.	Name of Location	PUB/ADANI HOUSE					
		Result [Leq dB(A)]					
1	Sampling Date & Time	04/10/2016	01/11/2016	20/12/2016	03/01/2017	10/02/2017	21/03/2017
2	22:00-23:00	62.1	64.8	65.4	65.1	67.3	67.4
3	23:00-00:00	66.4	65.3	63.4	61.5	67.1	68.3
4	00:00-01:00	62.4	61.4	63.8	63.4	64.2	63.2
5	01:00-02:00	58.7	60.9	68.4	59.5	65.3	60.1
6	02:00-03:00	54.1	62.7	61.4	60.4	68.2	60.4
7	03:00-04:00	59.2	61.7	63.7	60.8	67.2	62.4
8	04:00-05:00	60.4	62	60.4	65.4	62.8	65.3
9	05:00-06:00	61.7	64.8	62.4	64.2	65.4	63.6
Night Time Limit*		70 Leq dB(A)					

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

Dr. ArunBajpai
Lab Manager (Q)

Minimum Detection Limit [MDL]

Water parameter(mg/L)		
Sr. No.	**Test parameter**	**MDL**
1	Total Suspended Solids	1
2	Oil & Grease	1
3	BOD	3
4	COD	5
6	Total Dissolved Solids	3
7	Sulphate	0.3
8	Ammonical Nitrogen	0.05
9	Nickel	0.01
10	Phenolic Compound	0.001
11	Fluoride	0.01
12	Copper	0.013
13	Sulphide	0.01
15	Cyanide	0.0001
16	Residual Chlorine	0.1
17	Boron	0.02
17	Insecticides/Pesticides	0.01
19	Nitrate Nitrogen	0.15
20	Phosphorous	0.15
21	Petroleum Hydrocarbon	0.01
22	Lead	0.005
23	Mercury	0.0005
24	Zinc	0.022
25	Cadmium	0.001
26	Arsenic	0.00015
Sediment parameter(mg/kg)		
1	Petroleum Hydrocarbon	0.2

Ambient Air Parameter		
Sr. No.	**Test parameter**	**MDL**
1	Particulate Matter (PM10)	10
2	Particulate Matter (PM 2.5)	10
3	Sulphur Dioxide (SO_2) (µg/m^3)	5
4	Oxides of Nitrogen (µg/m^3)	5
5	Hydrogen Sulphide as H_2S (µg/m^3)	6

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

Dr. Arun Bajpai
Lab Manager (Q)

MINIMUM DETECTION LIMIT [MDL]

Ambient Air Parameter		
Sr. No.	**Test parameter**	**MDL**
1	Particulate Matter (PM10)	10
2	Particulate Matter (PM 2.5)	10
3	Sulphur Dioxide (SO2) (µg/m3)	5
4	Nitrogen Dioxide (NO2) (µg/m3)	5

Stack parameter		
Sr. No.	**Test parameter**	**MDL**
1	Particulate Matter (mg/Nm3)	10
2	Sulphur Dioxide(ppm)	1.52
3	Oxides of Nitrogen (ppm)	2.65

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

Dr. Arun Bajpai
Lab Manager (Q)

CHENNAI
Testing redefined
TESTING LABORATORY PRIVATE LIMITED
CIN : U74999TN2008PTC067568
www.ctllabs.in
www.foodenvironmenttesting.com

TEST REPORT

TEST REPORT NO: CTL/CH/N-0258/2016-17 DATE : 25.04.2016

SAMPLE DRAWN BY CHENNAI TESTING LABORATORY PVT LTD

COMPANY NAME	**M/s. Cholamandalam MS Risk Services Limited,**
ADDRESS	'Parry House', 3rd Floor, No:2 NSC Bose Road, Chennai - 600 001.
SAMPLE DESCRIPTION	Soil
PROJECT AT	Adani Mundra, Kutch District, Gujarat
SAMPLING LOCATION	Navinal
SAMPLE QUANTITY	1 Kg
PACKING	Received in Packed Condition
SAMPLE RECEIVED ON	13.04.2016
ANALYSIS STARTED ON	15.04.2016
ANALYSIS COMPLETED ON	22.04.2016

S.NO	PARAMETERS	METHOD	UNITS	RESULTS
1	Texture	FAO Method(Page No.25)2007	-	Silt
2	pH	EPA Method-9045 D Rev4,2004	-	8.0
3	Moisture	IS 2720 (Part 2):1973 (R.2010)	%	7.86
4	Conductivity	IS 14767 : 2000	µs/cm	1035
5	Specific gravity	IS 2720 (Part 3) Sec-1, 1980	g/cm^3	1.45
6	Porosity	FAO Method(Page No.39)2007	%	52.24
7	Sodium as Na	IS 10158-1982(RA 2003)	mg/kg	654
8	Available Nitrogen		mg/kg	358
9	Nitrate Nitrogen	FAO Method(Page No.66)2007 (Phenol disulfonic acid Method)	mg/kg	73
10	Available Phosphorus	FAO Method(Page No.75), 2007 (Olsen's Method)	mg/kg	166
11	Calcium as Ca	FAO Method(Page No.44), 2007 (EDTA Titrimeteric Method)	mg/kg	54
12	Magnesium as Mg		mg/kg	20
13	Acidity as $CaCO_3$	Titrimetric Method	mg/kg	Nil
14	Alkalinity as $CaCO_3$	FAO Method(Page No.46)2007	mg/kg	327
15	Sulphate as SO_4	FAO Method(Page No.80)2007	mg/kg	845

For Chennai Testing Laboratory Pvt Ltd

Verified by

Authorised Signatory

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Chennai - 600 032 | Tamil Nadu | India | Telefax : +91-44-2250 1757

CHENNAI
Testing redefined
TESTING LABORATORY PRIVATE LIMITED
CIN : U74999TN2008PTC067568
www.ctllabs.in
www.foodenvironmenttesting.com

TEST REPORT

TEST REPORT NO: CTL/CH/N-0258/2016-17 DATE : 25.04.2016

S.NO	PARAMETERS	METHOD	UNITS	RESULTS
16	Boron	FAO Method(Page No.93), 2007 (Carmine Method)	mg/kg	1.2
17	Total Organic Carbon	FAO Method (Pg. No.61) 2007 (walkley Black wet combustion method)	%	0.45
18	Chloride as Cl	FAO Method(Page No.48)2007 (Titrimetric Method)	mg/kg	610
19	Sodium Absorption Ratio	IS 11624-1986(RA.2001)	-	10.1
20	Bulk Density	FAO Method(Page No.35)2007	g/cm^3	1.41
21	Water Holding Capacity	CTL/SOP/SOIL/024	%	50.43
22	Cation Exchange Capacity	FAO Method(Page No.54) (Flame Photometric Method)-2007	meq/100 g	15.63
23	Available Potassium	FAO Method(Page No.77) (Flame Photometric Method)-2007	mg/kg	331
24	Iron as Fe	EPA 3050B–1996 (Rev-2)/EPA 7380-1986	%	1.08
25	Cadmium as Cd	EPA 3050B–1996 (Rev-2)/EPA 7130-1986	mg/kg	BDL (DL:2.0)
26	Chromium as cr	EPA 3050B–1996 (Rev-2)/EPA 7190-1986	mg/kg	BDL (DL:5.0)
27	Manganese as Mn	EPA 3050B–1996 (Rev-2)/EPA 7460-1986	mg/kg	340.25
28	Lead as Pb	EPA 3050B–1996 (Rev-2)/EPA 7420-1986	mg/kg	BDL (DL:5.0)
29	Zinc as Zn	EPA 3050B–1996 (Rev-2)/EPA 7950-1986	mg/kg	120.63
30	Copper as Cu	EPA 3050B–1996 (Rev-2)/EPA 7210-1986	mg/kg	32.19
31	Mercury as Hg	EPA 7471A-2007 (Rev-2)	mg/kg	BDL (DL:0.2)
32	Molybdenum as Mo	EPA 3050B–1996 (Rev-2)/EPA 7480-1986	mg/kg	BDL (DL:10.0)

BDL - Below Detection Limit; DL - Detection Limit

END OF REPORT

For Chennai Testing Laboratory Pvt Ltd

Verified by

Authorised Signatory

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Telefax : +91-44-2250 1757

Annexure – 6

o/c

adani™

10.09.2016

To,
Scientist 'D' (IA-III section)
Ministry of Environment, Forests & Climate Change, Govt. of India
Indira Paryavaran Bhavan,
Jorbagh
New Delhi – 110 003

Kind attn.: Dr. Sudheer Chintalapati

Subject: Compliance of directions issued by MoEF & CC vide order for disposal of Show Cause Notices

Reference: (1) MoEF&CC letter no. F. No. 10-47/2008-IA-III, dated 18.09.2015
(2) MoEF&CC letter no. F. No. 10-47/2008-IA-III, dated 23.08.2016

Dear Sir,

Further to the order issued vide above mentioned reference – 1, a compliance status of the directions was submitted to MoEF&CC as part of the six monthly compliance report against the EC & CRZ clearance of the Water Front Development Project as well as EC & CRZ clearance of Mundra SEZ project. Copy of the status of the compliance is attached here. In view of the letter at reference – 2, please refer below table for status of various studies stipulated in the order dated 18.09.2015.

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Sudheer
12/9/2016.

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We hope this information is in line with your requirement.

Thanking you,
Yours faithfully,

Shalin Shah
Head – Environment

Copy to:

1) The Principal Secretary, Department of Forest & Environment and Chairman, GCZMA, Govt. of Gujart, Sachivalaya, Gandhinagar, Gujarat.
2) The Director, National Centre for Sustainable Coastal Management (NCSCM), Koodal Building, Anna University Campus, Chennai - 600 025.
3) Additional Principal Chief Conservator of Forests (C), Ministry of Environment, Forest and Climate Change, Regional Office (WZ), E-5, Kendriya Paryavaran Bhawan, E-5 Arera Colony, Link Road-3, Ravishankar Nagar, Bhopal - 462016.

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9/c

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10.09.2016

To,
Scientist 'D' (IA-III section)
Ministry of Environment, Forests & Climate Change, Govt. of India
Indira Paryavaran Bhavan,
Jorbagh
New Delhi – 110 003

Kind attn.: Dr. Sudheer Chintalapati

Subject: Compliance of directions issued by MoEF & CC vide order for disposal of Show Cause Notices

Reference: (1) MoEF&CC letter no. F. No. 10-47/2008-IA-III, dated 18.09.2015
(2) MoEF&CC letter no. F. No. 10-47/2008-IA-III, dated 23.08.2016

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12/09/16

10.09.2016

To,
Scientist 'D' (IA-III section)
Ministry of Environment, Forests & Climate Change, Govt. of India
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Jorbagh
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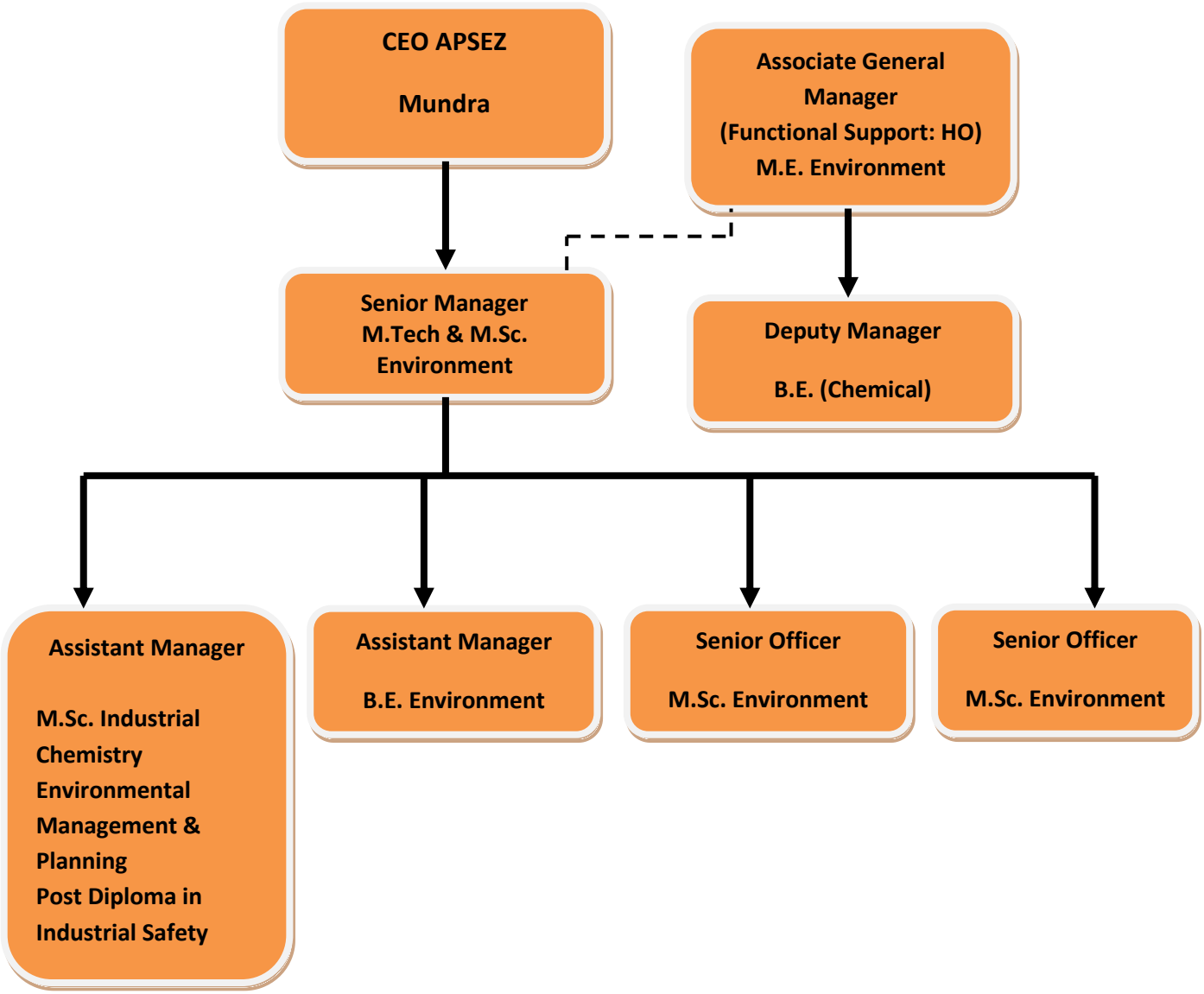
Annexure – 7

Organogram of Environment Management Cell, APSEZ, Mundra



Annexure – 8

Cost of Environmental Protection Measures

Sr. No.	Activity	Cost incurred (INR in Lakh)			Budgeted Cost (INR in Lakh)
		2014 – 15	2015 – 16	2016 – 17	2016 – 17
1.	Environmental Study / Audit and Consultancy	29.87	45.45	36.78	49.98
2.	Legal & Statutory Expenses	11.26	3.30	4.76	7.88
3.	Environmental Monitoring Services	23.76	26.80	27.95	32.82
4.	Hazardous Waste Management & Disposal	9.56	34.56	12.52	12.75
5.	Environment Day Celebration	7.01	7.18	6.71	12.00
6.	Treatment and Disposal of Bio-Medical Waste	1.00	1.22	1.27	1.44
7.	Mangrove Plantation	127.97	53.28	46.18	30.00
8.	Mangrove Monitoring & Conservation	36.75	20.36	26.20	40.00
9.	Horticulture Expenses	380.27	434.72	555.00	516.00
10.	O&M of Sewage Treatment Plant and Effluent Treatment Plant (including STP, ETP of Port & SEZ & Common Effluent Treatment Plant)	30.78	18.18	61.50	98.85
11.	Expenditure of Environment Dept. (Apart from above head)	184.91	135.90	131.83	130.32
	Total	**843.14**	**837.73**	**910.70**	**932.04**

Annexure – 9

Adani Foundation, Mundra

2016-17 ANNUAL REPORT

Adani Foundation
Adani House, Port Road, Mundra – Kutch 370 421
[info@adanifoundation.com] [www.adanifoundation.com]

Index

Message from Head, Adani Foundation, Mundra....

The year 2016-17 has passed off with passion and courage to work for the commitment given to the community. It is essential that sustained growth is achieved at rural level along with the industrial development. This can be made possible by involving more and more people in the rural development programme.

This year conceded with more streamline procedure of grievance mechanism, milestone achievement in malnourishment project, considerable impact created by fisherman amenities projects and new era defined in agriculture projects.

The people of Kutch, especially that of Mundra, have generously supported the activities carried out by the Adani Group or else this wouldn't have been possible. Their determination, understanding and commitment have strengthened the development even more.

Our Achievement would not be possible without the ultimate support by Mr. Rakshit Shah, Executive Director - APSEZ and plentiful faith and passionate support by Dr. (Mrs.) Priti G Adani, Managing Trustee – Adani Foundation.

Mr. Mukesh Saxena
Head,
Adani Foundation

Community Health

It is not a coincidence that the first four letters of health is "Heal". Instilling health pursuing activities and ensuring availability of quality health care services to the remote areas is the objective of this sector. Committed to "Health for All" the Foundation runs Mobile Health Care Units, Rural Clinics, Special Innovative Projects i.e. Health Card to Senior Citizens, "Suposhan"- Fighting to Mal nourishment in Mundra and Kidney Stone Project and Variety of Health Related Camps.

Mobile Dispensaries & Rural Clinics

The population of Mundra block is spread over various villages. Due to inadequate transportation facilities, the villagers have to face many hardships even for reaching to the doctor in case of common diseases. The medical expenses and zero earning per day add surplus to their hardships.

To help them in the above mentioned health related problems, the service of mobile medical van has been started by the Adani Foundation in Mundra block. In big villages, rural dispensaries have been started considering their population and area.

The Adani Foundation runs two mobile health care units – One at Mundra and the other at Bitta. Main objective of Mobile Van is to reduce travel time, hardships and expenses. Two mobile health care units cover 29 villages at Mundra, 8 villages at Bitta and 06 fishermen settlements. Around 121 types of general and life saving medicines are available in these units. It has turned out to be a boon for women and children as the service is availed at their door - step.

The Adani Foundation operates Rural Dispensaries in 08 villages of Mundra block, 03 villages of Anjar block and at SEZ Gate. At these dispensaries, health services are provided free of charge for two hours daily by a doctor and a volunteer.

Sr.	Month	MHCU Month wise Data-2016/17	Rural Clinic OPD Data-2016/17
1	April	2714	2833
2	May	2873	2505
3	June	2947	3055
4	July	3262	3550
5	Aug.	3197	3712
6	Sep.	4384	3659
7	Oct.	2865	3631
8	Nov.	3890	3513
9	Dec.	4242	3513
10	Jan.	3936	3989
11	Feb.	4367	3790
12	March	3900	3200
	Total	42547	40950

Details of transaction

Sr.	Month	Sr.Citizen
1	April	677
2	May	648
3	June	698
4	July	757
5	Aug,	815
6	Sep.	822
7	Oct.	871
8	Nov.	742
9	Dec	808
10	Jan	833
11	Feb	896
12	March	800
	Total	9367

Health Cards to Senior Citizens

- Expected Outcome

Rapport building with families of old age persons and other stakeholders. 62 villages will be covered through this intervention.

District Civil Hospital in Bhuj will take care of all planned medical interventions. Only emergency and primary treatment cost will be incurred from Adani Hospital Mundra

- Expected Impact

Social security for old age persons (as health matters in old age). Building good image and long run relationship.

Health Cards to Senior Citizens

The major junctures of human life are - childhood, adulthood and old age. The first phase is well looked after by the parents and second phase is of self-reliant but the last phase is a dependent one. The needs of old people are less looked after. When people become old, they start living a life of aloofness and solitude. Therefore, the Adani Foundation has started the Adani Health Programme for the aged to look after their health. To address the health care issues related to ageing, AF launched a 3 year long pilot project – 'Adani Vadil Swasthya Yojna' on 20th February 2011 at Mundra and further extended the same for the next three years i.e. up to 2017. Under this programme, the individuals aged 60 years and above are benefitted. Health Cards are issued to them with the purpose of providing adequate and timely treatment. The families consisting of aged ones with a yearly income of Rs. 2 lacs or more get a Blue Card. The Blue Card holders can avail diagnosis facility and treatment at a subsidized rate in the Adani hospitals, Mundra. The families with a yearly income of less than Rs. 2 lacs are issued a Green Card. Green Card holder aged people get treatment for illness in Adani hospitals, Mundra with an aid up to the limit of Rs. 50,000/- within a period of 3 years.

During the year 2016-17, total 9367 transactions were done by 7487 card holders of 66 villages of Mundra Taluka. They received cash less medical services under this project.

In Green Card category, 6665 aged people got treated for various illness & diseases at Adani hospitals, Mundra with an aid up to a limit of Rs. 50,000/- within the period of 3 years.

The 822 Blue Card Holders can avail diagnosis facility and treatment at a subsidized rate in the Adani hospitals, Mundra.

Scheme is continue since six years and We are planning to extend the project for next three years period.

"Suposhan"

Basis of Requirement

Malnutrition amongst Children, Adolescent girls and Women in India is an alarming phenomenon. (In India: 48 % or 54 million children under-five years were stunted. India accounted for 33 %of stunted children in the world. As per Global Nutrition Report released recently, Children below five years- 38.7 % Stunted and 15.1%are wasted. 69.5% children6-59 months old, 55.8% adolescent girls aged 15-18 years, 55.3% women aged 15-49 years have Anaemia. Moreover anaemia prevalence in pregnant women is as high as 58.7%) Curbing Malnutrition was part of Millennium Development Goals and again focussed through second and third Sustainable Development Goals on Zero hunger and Good Health & Wellbeing respectively.

Sr. No.	Detail of Village & Work	No of total
1	Total village	61
2	Pending village	7
3	Villages in progress	54
4	Total sangini	28
5	Total Anganwadi in Mundra block	104
6	Total cover Anganwadi	86
7	Pending Anganwadi	20
8	Anthropometric study	7101
9	SAM children	22
10	MAM children	9
11	CMTC admitted	16
12	Total adolescent group	169
13	Reproductive women group	185
14	FGD	369
15	Hb testing(adole. girls and women)	2292
16	RUTF distribution	23
17	PRA	6
18	Camps-CMTC (SAM-MAM)	2
19	No. of beneficiaries	106
20	Total household survey	18185
21	family based counselling	83
22	Total events of project	95
23	Total sangini meeting	10
24	Total training	6

"Suposhan "

A child's entire life is determined in large measures by the food given to him/her during his/her first five years because childhood is the period of rapid growth and development. Nutrition is one of the most influencing factors in this period. Malnutrition substantially raises the risk of infant and child deaths, and increases the vulnerability to a variety of diseases in later life.

Project Suposhan is initiated with the objectives

- **Curb malnutrition amongst Children,**
- **Adolescent girls and Women in our CSR villages**
- **To reduce malnutrition and anaemia amongst adolescent girls and pregnant & lactating women by 70% in three years**
- **Reduction IMR and MMR**
- With combined efforts of Adani Foundation health team, ICDS and Child malnourishment treatment centre of GoG, we had identified 45 malnourished children and started intervention as per their illness. Now, 14 children reached to normal category and it is achievement of Adani Foundation. RUTF distribution done to 23 children and it really started to give magical results and positive response of parents for RUTF therapy has increased our enthusiasm.

- Adolescent girls group forming is in progress Total 169 groups are already formed. HB Testing completed for 2292 girls. We are getting good support in HB testing as the Touch HB machine is needle less capacity.
- Likewise more than 180 groups are formed for reproductive age group women. In this age group we are getting most appreciable response due to most of our Sangini are of the same age.

Support for Medical Aid to Deprived

The scope of the organization extended up to providing best health care facilities to the needy, poor, challenged and not so well-to-do families for the treatment of illness and diseases. It is not always possible to predict the medical expenses. Moreover, those who are economically not so sound, become indebted for lifetime in case of certain illnesses. Therefore, Adani Foundation provides primary health care and financial assistance for ailments such as kidney related problems, paralysis, cancerous and tumor surgeries, neurological and heart problems, blood pressure, diabetes etc.

In current month we organized two medical examination camps in which **Medical Support was given to 1413 People from Mundra, Bhadreshwar, Zarpara, Shekhadia Nana Mota Kapaya, Bhujpur, Vadala, Wandi and other villages under our work area.**

Medical Supports		
1	April	58
2	May	50
3	June	40
4	July	43
5	Aug.	95
6	Sep.	96
7	Oct.	85
8	Nov.	98
9	Dec.	166
10	Jan.	257
11	Feb.	225
12	March	200
	Total	**1413**

Implementation Strategy

Base line data was provided for Mundra Taluka in initial phase of Project.

•Total Number Aanganwadis in the selected area
•Information on Sub-centers/ Primary Health Centres/ Community Health centres/ Referral Hospitals
•Availability of Healthy worker- male & female both, ANMs, LHVs, Doctors, specialists such as Gynaecologist, Paediatricians, Pharmacist, Dietician Lab. Technician, Nursing Staff etc. at above centres (Number & names with contact details)
•Selected areas' Birth rate, Death rate, Infant Mortality Rate, Mother Mortality Rate, Sex ratio, Child Sex ratio against district, state and national average
•Total number of beneficiaries and against that enrolled beneficiaries at Anganwadi/ICDS: 0-6 year children, Adolescent girls, pregnant women and lactating mothers
•Identified malnourished and anaemic children/ adolescent girls and women (numbers & name as well as current level of malnutrition & anaemia with dates- Base Line data)
•Current Inputs provided through the Government machineries
•Other services available through CBOs, NGOs etc.- Details of inputs and contact details of those organizations
•Understanding & Listing of area specific cultural and behavioural barriers

Expected Outputs

Community Health vertical at each location would focus on project on "Curbing Malnutrition amongst Children, Adolescent girls and Women "with combined approach of community management of Malnutrition and Anaemia and necessary medical treatment components.

- Each child and especially malnourished will be mapped with growth chart
- Regular inputs of RUTF treatment when necessary.
- FDGs with mothers and adolescent girls.
- Village meeting one in a month at every village
- Health camp every month
- Awareness campaigns.

Expected Outcomes

To reduce the occurrence of malnutrition amongst Children by 95 % in three years
•To reduce malnutrition and anaemia amongst adolescent girls and pregnant & lactating women by 70% in three years
•To create awareness about the issue of malnutrition and anaemia and related factors amongst all stakeholders and role they may play in curbing the issue
•To create a pool of resources to be utilised for combating the issue of Malnutrition and Anaemia
•To support efforts in reducing IMR and MMR

General Health Camp Data

Sr.no.	Month	Date	Place	Total Patinets
1	16-Apr	26827.04.2016	Tuna- Wandh Health Camp	74
2	16-Apr	15.4.2016	Samuh Sadi Mundra	81
3	16-Apr	9.4.2016	Ganesh mandir Mela	31
4	16-May	384.05.2016	Tuna- Wandh Health Camp	111
5	16-May	8.5.2016	Boliya Samuh Sadi	76
6	16-Jul	20.7.2016	Govt.School Health Camp-Bhadreshwar	178
7	16-Aug	16-Aug	Marin police through Medical Camp-Bhadreshwar	37
8	16-Aug	13 to 15.8.2016	Bharadi Mata Camp Navinal	100
9	16-Sep	2 to 9.9.2016	Shiv puran Katha Vandh	275
10	16-Oct	24.10.2016	Uras – Luni & Garib Kalyan Melo-Mundra	218
11	16-Dec	13.12.2016	Bukhari pir melo-Mundra	110
12	16-Dec	26.12.2016	Juna Bandar	53
13	17-Jan	27.01.2017	AVM-Bhadreswar	14
14	01-Feb	18.02.2017	Seth R.D. High school - Health Camp	210
		Total		**1568**

Health Camps

Various health camps are organized at regular intervals to meet the specific requirements of the community. Screening camps are organized regularly as per the route map planned in coordination with Adani Hospitals. **During the year 2016-17, 14 specialty camps were organized and 1568 Patients were benefitted.**

CALMED PROJECT- Collaborative Actions in Lowering Maternity Encounters Death

Adani Foundation has been looking after the health requirements of Mundra block for a long time. It has got a rich experience to address the preventive and curative health measures at Mundra belt. Therefore it was assessed by the Adani Foundation team that the most burning problem of this region is to cure Maternal Health, therefore, The demand was raised from the AF staff to improve the maternal health. Looking at the strengths of AF the following role has been identified. The prime objective is to reduce maternal and new born mortality through a collaborative cascade of training, briefings, publicity and monitoring. An effective programme to reduce maternal mortality (MDG 5A) requires collective efforts by Government, Professionals and Communities to deal with medical and administrative issues in a top down and bottoms up approach as both the approaches are important and complimenting to one another.

Activities proposed for this project are Selection of CHC/PHC, Training of trainers, AF Involvement in Target Areas, Identification of Needs in Target Areas, Implementation-mechanism, Publicity, and Communication-A Preparing Training Materials in MCH- Funding - Reporting: The project consultant of this project will submit monthly planning to AF

Capacity building inputs to AF staff in Maternal and child health situation so that at the initial stage they can reduce the maternal encountered death at Mundra Block. Implementation Strategy of the project: Master trainers has identified i.e. doctors from Adani Foundation, Adani Hospitals Mundra and Gujarat Adani Institute of Medical Sciences. Co - trainers would also be selected. These Master trainers had further percolated the knowledge and skill to ANM/ ASHA for the last 2 years and will continue current year also.

Health Awareness session Data- April to December-2016			
Month	Topic	Villages	Total
April	Health Hygiene & Cleanliness	Ganesh Mandir- Luni	80
June	Health Hygiene & Cleanliness	Govt.School- Bhadreshwar	70
July	Diseases & Personal Hygiene in monsoon season	Govt.school - Moti Bhujpur	370
Aug.	Personal Hygiene in monsoon season	Govt.School- Moti Khakhar	75
Sep.	Health Hygiene & Cleanliness	Govt.school- Zarpara	325
Oct.	Dengue fever information & Awareness Generation session	Govt.school- Gundala	75
Nov.	Personal Hygiene & Cleanliness	Govt High .School – Moti Bhujpur	210
Dec.	HIV-aids information & Awareness Generation session	Bed collage Mundra	110
	Total		1315

AWARENESS SESSIONS BY MEDICAL OFFICERS:

Awareness sessions at various schools and colleges were conducted to sensitize the future generations and teachers for further cooperation and coordination on various topics of women health. We had included women health issues such as anemia, menstrual disorders, breast cancer, cervical cancer etc. to promote awareness among the people. **During this year more than 1300 students are benefitted by awareness sessions**

Urinary stone – Dialysis Treatment

Drinking water of Mundra contains high Fluoride (amount of salt). Hence, the proportion of patients with urinary stone and kidney failure is more . A project for patients who need dialysis is thus initiated so that the poor patients can receive the treatment at Adani hospitals. The main objective of providing dialysis treatment is to help the extremely needy patients to live a healthy life.

Total 5 Patients were being supported for regular dialysis (twice in a week) during this year.

PHYSIPTHERAPY CAMPS

Adani Foundation is providing physiotherapy service to differently abled children's in coordination with BRC-Mundra. **This year total 18 children have taken physiotherapy at Adani hospital.**

Gujarat Adani Institute of Medical Sciences

Gujarat Adani Institute of Medical Science is the first Medical College of Kutch region. It started in partnership with Adani Group and Government of Gujrat in the year 2009. This college was affiliated by the Medical council of India in the year 2014 for the MBBS with 150 seats per year. Gujarat Adani Institute of Medical Science is affiliate with the first digital university "Krantiguru Shyamji Krishna Verma Kutch University". In GAIMS, currently 750 students are studying, The GAIMS Medical College is situated in heart of Bhuj city on a large plot of 27 acres.

A teaching hospital (G K General Hospital) with 700 beds is established with GAIMS in which patients of Kutch are getting subsidized medical facilities. The Hostel facility is also available for the students in the campus only. The accommodation facility is given to the staff of GAIMS.

- Adani Foundation Team has initiated coordination with GKGH hospital since last year and established a reception area for the smooth patient coordination and preparation for the social networking programme.
- Adani Foundation organized General Health Camps and Speciality Camps in various interior villages of Kutch in coordination with GKGH which created magical impact and benefitted 3335 patients. Adani Foundation Bhuj Health team has also organized more than ten awareness camps and village level meetings at 293 villages of Kutch regarding services of GKGH.
- **Dead body medical van** – Dignity to death is one of the noble initiatives taken up by the Adani Foundation. If any death occurs in GKGH, dead bodies are shifted to the native village of the concerned in the Kutch District free of cost. **Total 584 dead bodies privileged till now to different locations in Kutch**.

Disease wise Data					
Month	Dengue	Jaundice	Malaria	HIV	TB
April	7	0	0	8	55
May	11	35	2	7	46
Jun	4	46	1	4	35
July	1	149	6	4	47
Aug	3	54	19	6	48
Sep	25	80	33	3	32
Oct	49	41	27	6	35
Nov	75	18	35	18	26
Dec	29	7	11	3	24
Jan	16	6	5	0	40
Feb	15	5	7	0	32

OPD/IPD Data		
Month	OPD	IPD
April	16221	2130
May	15652	2223
Jun	15420	2232
July	16819	2396
Aug	18494	2597
Sep	19121	2575
Oct	17919	2471
Nov	19998	2541
Dec	23053	8534
Jan	22693	7381
Feb	23217	7241

Safe child Project Annual Analysis			
No.	Month	Students	School
1	June	573	3
2	July	1489	7
3	August	1305	6
4	September	1964	6
5	October	1007	4
6	November	68	1
7	December	882	5
8	January	163	5
9	February	204	3
Total		**7507**	**38**

Death Body Van Data			
No.	Month	AF Van	Death in GKGH
1	April	51	72
2	May	46	134
3	Jun	52	103
4	July	51	115
5	Aug	50	115
6	Sep	54	72
7	Oct	50	82
8	Nov	59	75
9	Dec	53	73
10	Jan	60	77
11	Feb	58	64
	Total	584	982

Education

Education is one of the most important stepping stones to bring about a unified development in any community. The Adani Foundation, through its rigorous surveys and assessments, could understand that it was education which should be taken up to bring about a real change in the status of the fisher folk communities. Following are some of the major education initiatives taken up by the foundation.

Balvadi		
Sr.	Village & Bandar	Children
1	Juna Bandar	50
2	Luni Bandar	28
3	Bavdi Bandar	35
4	Zarapra	32
	Total	145

Vidya Sahay Yojana – Scholarship Support

Under this programme, special attention is given to motivation higher education by providing books. The Adani Foundation provided transport facilities to students from Std. 6 to 8, studying in nearby villages. Bicycles have been distributed to students who have enrolled for higher education. The Foundation also gave scholarships to the students of ITI, Diploma Engineering and Degree Engineering.

Empowering lives and broadening their scope for economic opportunities, Adani Foundation's initiatives introduced under 'Sustainable Livelihood Development Program', have been founded on community based approaches. In the villages at Mundra Taluka, several communities are economically side-lined and weaker that depend on a sole income source or are unemployed. Sustainable livelihood projects have been launched to cater financial independence through building local partnerships, providing diverse livelihood avenues, inculcate the attitude to establish savings, equipping to earn and updating local skills by making use of existing resources to encourage self-reliant lifestyles. Participation is encouraged by launching specific projects for fishermen communities, farmers and cattle owners, youth and women.

Vidya Deep Yojana

A lot of efforts were put in towards a school preparedness programme by empowering 'Balwadis' at Fisherfolk settlements. Under the Machhimar Vidya Deep Yojana, the Adani Foundation constructed four 'Balwadis', at different settlements, for children between the age group of two and a half years to five years. This programme focuses on the development of basic age-appropriate learning concepts, discipline, regularity, awareness about health, hygiene, cleanliness and also provides nutritious food. **Total beneficiaries of Vidya deep Yojana is 145 students**

Machhimar Arogya Yojana

A healthy person can work well and earn for his family. Hence it is necessary to provide medical facilities to cure and prevent them and to provide then the treatment of diseases prevailing among the people specially women; children and elderly person, especially due the lack of balanced nutritious diet.

Mobile Health Care Unit - the mobile dispensaries have been run by the Adani Foundation since 2009. The mobile dispensary is available not only in the Vasahats/Settlements but also near the coast where the fishermen, can avail the facilities as and when needed. **Total average 7801 fishermen were benefitted by Mobile Dispensary every year.**

1. Apart from this, a number of subsidiary initiatives such as health awareness camps, medical check-ups, etc. are conducted by the Adani Foundation at frequent intervals, to provide the fisher folk community with the much needed and required information and assistance.
2. **Medical Financial Support –Adani Foundation has extended financial assistance to more than 1187 financially challenged patients from the Fisher Folk Community in case of medical urgency during this year.**
3. Health Card for Senior Citizen Project – This is one of the major and prominent and the most innovative project of the Adani Foundation. Under this scheme Health Cards were given to the to Senior Poverty Stricken Citizens to provide them financial support to combat with their health related needs. **The project for the senior citizens is popularly known as Vadil Swasthya Yojana and till date 263 senior citizens from fisher folk community are enrolled in the scheme.** They are getting cash less medical services uptoRs. 50,000 for three years. Besides this, follow up with the card holders is a regular activity. It has been observed that card holders treat the card as an important document. Most of them keep these cards in their wallets with other important documents and cards.

Machhimar Awas Yojana

Fishermen who stay at vasahat/settlement at the seashore have been provided with appropriate shelter to protect them from the harsh weather. A special design of foldable housing was chosen on the basis of consultation with residents. These shelters are equipped with basic facilities such as toilets and pure drinking water to provide them clean and hygienic residences. **164 refurbished shelters have already been handed over to fishermen families at Juna Bandar. Another 110 shelters, with the additional advantage electricity facilities, are being made at Luni Bandar**..

Sughad Yojana

A total of 230 toilets have been constructed at three Fisherman related Villages at Mandvi Taluka and Randh Bandar. The construction of infrastructure was also accompanied by a continuous awareness campaign on hygiene, sanitation and use of toilets in particular.

Toilet Block		
Sr.	Village & Bandar	Qty
1	Modhva	156
2	Tragadi	6
3	Randh Bandar	8
4	Chachh Zarpara	60
	Total	230

Machhimar Kaushalya Vardhan Yojana

Apart from formal education, special programmes were conducted to enhance employability of the youth. Based on the need assessment, several trades were introduced by the Adani Skill Development Centre in Mundra, where the youth from the Fisherfolk communities could join and get vocational training for a number of technical and non-technical skills. These vocational trainings are unique as they include practical sessions and simulation activities. **This programme has benefited 94 youths by various training.**

Machhimar Shudhh Jal Yojana

In order to reduce the hardships faced by women, potable water was provided this year to the communities of this region. Water tank platforms have been constructed and tanks have been set up in order to provide clean potable drinking water to the community. **A total of 93000 litres of water was supplied to 728 households from different settlements on a daily basis.**.

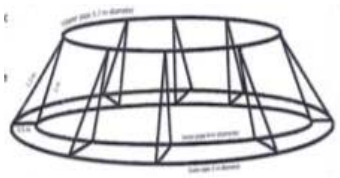
Machhimar Ajivika Uparjan Yojana

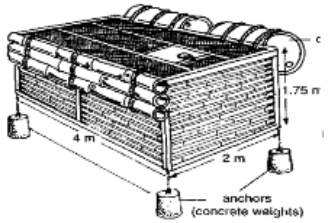
The 'Ajivika Uparjan Yojana' was implemented to promote and support alternative livelihoods among the Fisherfolk communities during the non-fishing months. The Foundation introduced 'Mangrove Nursery Development and Plantation' in the area as an alternate income generating activity for the people of the region. Both men and women received training on Mangrove plantation, moss cleaning, etc. as per requirements. The Foundation provided them with employment equivalent to **3315** man–days. In addition to this, employment worth of **25,000** man-days has been provided till date. The Foundation has also supported **42** Pagadiya fishermen as painting labourers by providing them with employment of **5068** man–days.

Income Generation Activities : Painting Labour work and Mangroves plantation

Name of Fishermen	Year-2015-16	16-Apr	16-May	16-Jun	16-Jul	16-Aug	16-Sep	16-Oct	16-Nov	16-Dec	17-Jan	17-Feb	Apr to Feb Year-16-17 Total	Total Man-days	Order Amount Rs.
Vagher Talab Osman	2969	70	0	278	115	115	200	170	191	150	85	156	1530		3262568
Vagher Abbas Suleman	2961	240	400	268	185	70	168	204	200	200	216	208	2359		3417469
Vagher Mubark Iliyas	1090	150	40	160	232	145	150	110	35	15	80	62	1179		1903536
Total	7020	460	440	706	532	330	518	484	426	365	381	426	5068	12088	8583573

	Man-days											
Sr.	Name of Fishermen	Village	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Total	Order Amount Rs
1	Mubarak Alimamad Vagher	Shekhadiya	167	167							334	100200
2	Abdul Satar Jam	Shekhadiya	167	167							334	100200
3	Ismail Hajibhai Jam	Shekhadiya	167	167							334	100200
4	Sidhik Hasan Reliya	Luni	216	216							432	129600
5	Latif Suleman Manjaliya	Luni	183	183							366	109800
6	Jakab Hasan Manjaliya	Luni	290	270	115	60	60	60	60	60	975	340000
7	Manek Jakariya Suleman	Bhadreswar	292	308							600	180000
	Total		1482	1478	115	60	60	60	60	60	3375	1060000





New Initiatives : Cage culture

Fishing occupation and Port business coexists. When we started port operations, condition of Fisherfolk community was deprived. After inception of CSR arm of Adani Group – Adani Foundation in 1996, strategy was planned based on priorities for socio-economic development of Fisherfolk community. The fishers of the Shekhadia fishing village (Juna Bandar) are one of the stakeholders of the Adani Port Ltd., Mundra. The Company likes to intervene to provide quality livelihood to the fishers especially the women under their CSR funds.

The main objectives for promotion of alternative livelihood is to raise the economic standard of fisher folk, second is to reduce the pressure on fishing effort.

It was reported that about big numbers of fisher folks are willing to change their occupation; therefore, Cage culture aimed to provide alternative employment and encouraging them to shift from full-time to part-time fishing.

The Institute shall provide training to the selected fishers in live lobster handling, seed transportation and quality testing, cage fabrication and deployment, lobster husbandry practices, harvest and marketing etc. with sufficient hands on exposure at the sea cage farm owned by the CMFRI at Veraval. First phase of exposure and cage fabrication is completed. Launching of cage is done in presence of Dr. Koya (CMFRI) in March.

New Initiatives : Polyculture

Polyculture is the practice of culturing more than one species of aquatic organisms in the same unit area (marine, pond, streams and rivers). The principle of Polyculture is that production of more organisms in the particular unit area having different food habits.

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The activities involved i.e. capacity building, expert inputs, machineries, seeds of fish and fish food. We will identify feasible sites for the Polyculture and implement the activities with participation of fisher folk committees who will take whole responsibilities. These Polyculture will add value to the fishing occupation of the local fisher folk community.

Exposure visit : Fish Research Centre at Okha

The Seaweeds are macrophysics algae, a primitive type of plants lacking true roots, stems and leaves. The word seaweed gives the wrong impression that it is a useless plant. Seaweeds are wonder plants of the sea and highly useful plants. Seaweeds grow in the shallow waters. Root system and conducting tissues like land plants are absent in seaweeds. Most of them have hold-fast for attachment and some drift loose in the sea. Adani Foundation Team (PO:SLD) has visited Okha for the same.

Seaweeds new renewable source of food, energy, chemicals and medicines. Provides valuable source of raw material for industries like health food, medicines, pharmaceuticals, textiles, fertilizers, animal feed etc.

Agriculture & Animal Husbandry

Adani Foundation puts efforts in Mundra block for consistent betterment in livelihood sector. The organization has carried out remarkable activities in the agricultural and animal husbandry sectors.

Drive for Technology to use in agriculture

- We have initiated Programme for Awareness of Farmers in collaboration with KVK. The outreach is approximate 70 farmers of 5 villages
- The purpose of this project is to initiate village wise integrated agricultural & allied development for sustaining agriculture and socio economic situation of farming community of Mundra block.
- This year Main Focused Activities

1. **Biogas Support to 9 Nos of farmers (AF, Beneficiaries and Govt support)**
2. **Kitchen Garden Kit distribution to 20 Farmers**
3. **Soil Health cards analysis : 25**
4. **Organic farming Related 15 Demonstration for "Jivamrut" at Zarpara**
5. **20 Tissue culture Date palm demonstration is sucessfully done with farmers of Zarpara**

Women Empowerment Projects

Encouraging women, to take control of their lives and building their confidence whether they are single, married or a widow; is one of the initiatives under the sustainable livelihood development program.

- Considering this situation, We have started our training programme with two major women's group of Villages near Adani Power and Adani Ports. Both the groups of women (90 women in total) successfully completed their training for preparing washing powder, phenyl, liquid for cleaning utensils and hand wash etc.
- We have selected 6 women groups having 15 members each, as per their ability for different work i.e. accounting, banking, leadership, marketing, administration etc.
- As a further step to bring sustainability, we thought to start a shop "Saheli Mahila Gruh Udyog" at Shantivan Colony after discussion with the Administrative Department of Ports and Power regarding the supply of the material, rate etc.
- Our pilot project is preparing Washing Powder and Phenyl. We are planning to start Home Made Products after discussion with HOD and Random groups of ladies in colonies and villages.
- **Till date "Saheli Mahila Gruh Udyog "has annual turn over of Rs. 3.70 Lacs.**
- **After one year of Pilot phase, Saheli Mahila Gruh Udyog includes 70 women. We are planning to convert "Saheli Mahila Gruh Udyog" into Producer company. Planning for 1. Production of Hygiene Products 2. Edible products and 3. Handicraft items with capacity building of women group**

Marketing Linkages : Dates

To promote Date : Amrut fal of Kutchh, AF did various linkages for marketing. By this support, **more than 1000 Kg Selling** at Adani Residential Colonies, Ahmedabad and Surat with good rate .

Food for cattle

The organization provides fodder during the time of scarcity and the last 3 months of summer every year. During this period, fodder is regularly sent to every village with the help of the local people. This has given stability to the families who earn their livelihood through animal husbandry.

In order to meet the demand of fodder, the Adani Foundation purchases it from the regional farmers. This gives them fair rates in return.

This year we have given 59,224 mann fodder worth Rs. 127.00 Lacs approximately.

Exposure Visits

- 30 Farmers visited and discussed about results of Jivamutra and Kitchen Garden Feedback & "Agri Asia" Agriculture Technology Exhibition
- Animal Hostel visit Himatnagar and Gauchar Development workshop attended by Jayram Rabari and Karsan Gadhavi
- Group of farmers were taken to exposure visit of organic farming and bio gas bottling plant at Vaghodiya. This is totally new concept in agriculture. Organic products are demand of today's period. Bio gas plant is eco friendly and gives very good result

Coordination with Government for Widow and Senior Citizen Scheme

- We are playing the role of facilitator in case of tie up with Government Scheme for Widows, Senior Citizens and Handicapped people.
- The identity cards are issued to two persons for the handicapped in coordination with Bhuj Samaj Suraksha Khata for regular visit and follow up.
- **Last year, 63 widows and 40 Senior citizens and 351 handicapped - total 454 members got benefitted** from the approval of pension certificate. The financial benefit of the senior citizen yojana is Rs. 400 per month and the widow scheme is of Rs. 900 per month.

No.	Scheme Name	Total	Remark
1	Medical Certificate for specially abled	136	Under medical camp and G.K. General Hospital, Bhuj
2	Buss pass for specially abled and I card	109	Samaj Surakha Khata at Bhuj
3	Sadhan Sahay	30	Bicycle 15, Tricycle-9, wheelchair -2, hearing machine -1, lage-1
4	Physiotherapy – Children	10	Coordination with B.R.C and Adani hospital
5	I.G Sadhan Sahay	41	Sewing machine-36, hand cart-3 , computer kit 1
6	Sadhan Sahay	23	By Adani foundation
7	Handicap pension	2	Sant surdas Yojana – Samaj suraksha – bhuj
8	Widows pension	63	Mamlatdar Kacheri Mundra
9	Senior Citizens pension	40	Mamlatdar Kacheri Mundra
	Total benefits	**454**	

Beti Vadhavo Abhiyan

Beti Vadhavo programme was organized in **32** Villages in the presence of Village Sarpanch and other leaders. We explained people about the various topics i.e. importance of girl child, Sex Ratio, Gender Equality and laws regarding Child abortion. This initiative was well accepted by community and we have observed a visible change in their mindset.
We have facilitated **500** daughters with Kit (Small Bed sheet, Mosquito net, Soap and Cream with nutritious food for mother)

Education

In the present era, improvement in quality of educational services and a sound infrastructure for higher education is required so that the children are prepared to be globally competitive.

Education in its broadest, general sense is the means through which the aims and habits of a group of people lives on from one generation to the next.

Adani Foundation has marked out FOUR major core areas for peripheral Developmental work, amongst them "EDUCATION PROGRAMME" is one of the major areas where we work on following Objectives:

- To fill the gap – understanding the importance & urgency of requirement through Material or Infrastructural Support
- Render support to improved School Environment
- Efforts for 100 % enrollment & retention of eligible children in Govt. Primary Schools
- Provide conducive & healthy environment along with nutritious food to Children of Fisherman at Vasahat by means of Balwadis

Key Focus:

- Efforts to Improve Quality of Education
- Child Education & Nurturing
- Propagate Child Friendly Environment at schools
- Community Participation
- Maximum [100%] enrollment and retention in Schools

Project UDAAN

Udaan is a learning based initiative focused on the youth coming from various schools across the state of Gujarat. Under this project, a two day free of cost exposure tour is organized wherein students are given a chance to visit the Adani Port, Adani Power & Adani Willmar facilities to get an insight upon the large scale business activity carried out at each of them.
Specifically students from high school (9th to 11th grade) are encouraged to take part in the exposure tours. It is believed that students of this age would be able to absorb the learning in a better way which could help them shape their lives by aspiring for big. The spread of the schools extends to various districts in Gujarat. There is a specific effort to reach out to schools in the rural areas. Other than schools even colleges where the exposure visit seems to be helping the curriculum are encouraged.
Till Date Total 2230 Schools and 169953 students have been part of project UDAAN.

Material Support

Adani Foundation is supporting for improving quality of Education, under the Teaching Learning Material to schools for Teachers & Students.
Role on infrastructure is must to achieve quality of Education. Many studies highlight that lack of infrastructure is also affected the school dropout ratio. Good & proper infrastructure is attracting children for school. So A.F. is also trying to full fill need of infrastructure in schools. Where there is no provision of Gov. grant & school's required support A.F. is there. **During this period AF provided RO Plant at Tunda Wandh Primary School and constructed Science laboratory at School at Mundra.**
In month of February 2017, supported district level annual event Kasturba Gandhi Kanya Vidyalaya. Addition to this Sound system given to Primary Schools at Siracha, Tunda Wandh and Vallabh Vidyalaya. Furniture support to Science School Mundra and Block resource center Mundra

Shala Praveshotsav

To motivate children for schooling by providing them welcome kit / Education kit and to Create conducive environment for children for **"Joyful Learning" during Shala Praveshotsav.**
Govt. has wide spread network of 111 Govt. Primary Schools in total 61 villages of Mundra Taluka, 3 villages in Anjar Taluka and two villages of Mandvi Taluka. Every Year on an average 2500 to 2700 children gets enrolled in 1st Std. in Taluka. **For 2016 - 17 total 2500 children got enrolled & Adani Foundation provided the "Enrollment Kit" to all new enrollee in Taluka. .**

Adani Education Development Center

Kutchh District is very poor in case of Primary Education. Educational Standards of Govt. School is considerably depraved. As per Government Figures, among 103 schools of Mundra Taluka, only 10 schools are in "A" Grade. It continuously destroying our young generation in absence of proper direction and base. keeping this situation in view, We have initiated Coaching center at Zarpara. **After getting good results (62 students were in D grade now only 4 students are in D grade, 8 students in C Grade, 30 students are in B grade and 20 are reached to A grade) this year we have planned to start at Navinal Village**

Other activities organized throughout the year

No	village	School's name	Activity	Beneficiaries
1	Jabalpur	Jabalpur Primary school.	Drawing Competition	47
2	Tuna	Tuna Group Primary school	Drawing & Fancy Dresses Comp.	371
3	Zarpara	Pransla (Zarpara) Primary school.	Essay Writing	115
4	Nana Kapaya	Nana Kapaya Primary school.	Quiz Competition	235
5	Gundala, Bhujpur	Gundala, Bhujpur, Mundra High school.	Costal Day Calibration	150
6	Tunda	Tunda Primary school.	Quiz Competition	178
7	Kandagara	Kandagara Wadi Vistar Primary school.	Quiz Competition	45
8	Zarpara, Shekhadia	Zarpara, Shekhadia, Navinal Primary school.	Balotsav Camp	115
9	Luni,Goyarasama,Baroi	Luni, Goyarsama, Baroi school	Elocution Competition	678
10	Zarpra	Zarpara kanya shala	Svachhata Abhiyan Program	57
11	Shekhadiya	Shekhadia Primary School	Svachhata Abhiyan Program	52
12	Mundra	B.Ed. Collage Mundra	Youth Day celebration	89
13	Mota Bhadia	vadi primary school	elocution	162
14	Mota Kandagra	primary school	quiz competition	338
			Total :-	**2632**

Adani Vidya Mandir, Bhadreshwar

Adani Vidya Mandir, a unique Gujarati medium school was started in June 2012 at Bhadreshwar village of Mundra Taluka. The objective behind setting up this school is to provide free education to children of fishermen and economically challenged families. The foundation provides nutritious food to the pupils including lunch and snacks every day. Special care is taken to provide high quality education and overall development of children. The children are groomed to go back to their families and communities and be the agents to change.
In the Year 2015-16, Adani Vidya Mandir became a school having classes from 1st to 10th with total strength of 395 students. Right now 137 students are coming from Fisher folk communities.
Additional Coaching for new enrolled students was structured upto 17th May, 2015. Main objective is to make the new students cope up with new syllabus. Remedial Teaching has been started for Mathematics and Science subject. In addition to quality education, we focus on overall health, co-curricular activities and sports related events.

The Annual sports Day Celebration was held on January 28, 2017. Shri Sharad Sharma was the special guest for the occasion. It was witnessed by around 150 parents, village leaders and teachers of other government schools.

Also it is privilege to share that farewell was organized for Board going students at Vidya Mandir. Executive director APSEZ and Head AF Mundra remained present and encouraged students and all the teachers of AVMB for tirelessly working with the students to bring them up to this level.

RURAL INFRASTRUCTURE DEVELOPMENT

Building a strong community relationship is the key to progress of Adani Foundation. The programs such as Education, Health and Sustainable livelihood development play a very important role in building this strong relationship with the community. These three programs are incomplete without the inclusion of the Rural Infrastructure Development program.

Whatsoever be the budget strategies for Infrastructure development, desired change is possible only if emphasis is laid on participation and leadership of the pupils therein. It is for this reason that Adani Foundation insists on including members of Gram Panchayat as well as thoughtful individuals from the rural areas for the implementation of programme. A remarkable development is the result of the joint efforts of the Adani Group and the Gram Panchayat. For the welfare of the rural area, the Gram Panchayat writes a requisition letter to Adani Foundation according to its primary needs. On the basis of this letter, several requisitions are registered in the "Request register". According to this registration, the programme is being implemented under the permission and guidance of the Gram Panchayat through appropriate decision - making.

It is important to build new structures. It is equally important to maintain these with ease and regularity. Adani Foundation has designed, planned and built a strong infrastructure for the betterment of education, community health, agriculture and living standards,

Under this core area, the Projects undertaken including construction of various infrastructures in villages as per requirements.

- Education Related Projects: Education is the most powerful weapon which you can use to change the world." To improve the quality of education and to improve school environment, the Adani Foundation supports for infrastructure development on request basis. Adani Foundation carries out the construction of assembly hall, classrooms, computer labs, space for midday meal, playground, school walls, washrooms etc. as per the needs and preferences of the school. It is aimed at providing facilities in education sector to the present generation.

- **We have constructed Science laboratory at Govt Science School at Mundra. We have repaired toilets and kitchen at Adani Vidya Mandir at Bhadreshwar.**

- Health Related Projects: The proposed work was related to our major core area – health. Adani Foundation has constructed individual toilets at Juna Madhapar, Dinara and Varnora village at Bhuj as per request from District collector. Also constructed 230 individual toilets for Fisherman Vasahats.

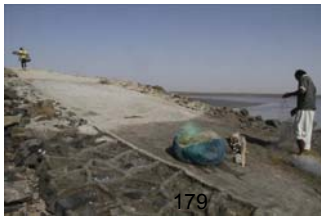
Other Projects: Some Projects we took up to fulfill the demands of communities. We have completed Canal connecting pond and river at Bhujpur, Shed Construction at Gundala, Construction of approach road at vadi Vistar at Zarpara.

- **Water Conservation Projects**: Scarcity of potable water in Kutch has led to acute problems in its coastal region. In Mundra, people mostly use ground water for drinking. Unfortunately this water has a high level of TDS which causes bone and kidney diseases. To alleviate this situation, the Adani Foundation has taken initiatives for water conservation including construction of check dams and pond deepening
- **This year Adani foundation carried out pond deepening in Dhrub, Mota Bhadiya Village and constructed earthen bund construction across the river at Baroi and Bhujpur village.**

- **Drinking Water Related Projects**: Potable drinking water is basic requirement of any village. For better health and hygiene of village drinking water should be clean and pure. So, this project will create positive and effective social impact. **Adani Foundation has installed RO Plant at Chhach Vistar at Zarpara. Also constructed UG tank 1.0 lacs lit capacity at Rampar village of Anjar Taluka.**

- Fisherman Related Projects: The primary objective of Adani Foundation is the development of the marginalized section of the region. The welfare of the Fisher Folk Community is of prime importance. In order to raise the standard of living of the fisherman community, Adani Foundation is active in providing good roads to reach ports and other remote corners

- Adani Foundation has also constructed platforms for drinking water, solar light, space for drying fish, etc. The construction of temporary residence of fishermen in order to provide them healthy lifestyle is being looked under the Fisherman Housing Programme by the Adani Foundation. In 2015-16, Adani Foundation constructed 2300 Mtr approach road for Pagadiya fisherman. We have refurbished 140 shelters at Juna Bandar.



Adani Skill Development Centre

Adani Skill Development Centre (ASDC) is playing a pivotal role in implementing sustainable development in the state.

Several miscellaneous industries exist in Kutch district. Considering the same, Adani Skill Development Centre has initialized in the Mundra block so that the needs of these industries are fulfilled, the local youth is enrolled in various training/ skill courses and the distance between both is minimized.

- The objective of this center is to impart different kinds of training to the students of 10th, 12th, college or ITI from surrounding areas. Thus, various employment-oriented trainings are organized to optimize the skills, art and knowledge through proper guidance and direction.
- Due to social and cultural traditions, various training programme are organized at school OR village level for youth and women so that they can gain its benefits in the future as well.
- Adani Skill Development Centre provides opportunities to the young people to become self-reliant, responsible and active citizens

Skill development trainings administered by ASDC
Each training module of ASDC is well-designed to make the learning more effective. Hands on experiment are the key factor to enhance learning in all the courses offered by ASDC.

IT- Basic Computer
Word, Excel, Power Point, Internet, Web Browser detail

Tally ERP 9
Basic Accounts, Voucher Entry, Ledgers, Group Creation, VAT, TDS, Service tax, Excise etc. is taught for 60 days to benefit students of class XII and above having commerce background.

Spoken English
Grammar, Tenses, Vowels, Articles, Prepositions, Phonetics, Tenses, Communication Skills etc. are offered especially for students and working people. This course duration is of 60 days.

Auto mobile Assistance
Training is regarding Units and Dimensions, Measuring & Marketing (Preparation of jobs for welding, Dismantling and assembly of components), Inspection, Preventive Mtc. And repair of bearing, gearbox, couplings, and TPM, Condition Monitoring, Kaizen
All the trainings are offered at either ASDC centre, at Port, at Power plant, at specific villages depending on the need of the module and the students. Certificate for each course is given by ASDC or by partner institute.

O&M of Coal Handling System at Ports
This module includes Induction at Port + First Aid + Safety training, GSU (Grab Ship unloaded) Crane Theory training, GSU Crane Simulator training, Commercial Documentation O & M of coal handling Activities Stacker Reclaimer Theory training, Silo Theory Training, Conveyor Theory Training, On Job Training conveyor.

Checker cum RTG Crane Operator
Students get training regarding Safe Operating Practices, RTG Controls and Functions, Pre-Operational and Operational Checks, Driving, Hoisting and Lowering Loads, Operations - Transferring Loads for three months.

Mechanical & Electrical work of Container Terminal
It includes training of Crane Operation & maintenance for two months and minimum qualification is ITI Fitter & Electrical

Stitching & Bagging Machine Operator
It includes Stitching and bagging operation in FCC 7 plant. It is for 1 Month and min. qualification required is 10 Pass.

Checker
Students gets basic Induction on (Safety, Fire, First Aid, Security, CT), Export Import procedures, Identification of containers, Container construction, Hazardous classification & Symbols, Role of yard checker, Role of deck checker, Role of Wharf checker, Bay Plan, Awareness of RDT, Custom Seal.

Forklift operator training
Forklifts are an **incredibly useful tool**, and in many cases are absolutely essential for the transport of goods in storage facilities, warehouses and construction sites. They tend to be fairly simple to operate, especially for people who can drive a car, and they help to lift loads that other readily accessible workplace machine cannot. They are therefore extremely common in a lot of different industries.

ASDC is proud that along with generating employment, it has also been a source of inspiration for entrepreneurship.

Vision:

To systematize the skill development efforts in the Nation and create an environment where youth and women not only get some vocational training but also gets some gainful employment, entrepreneurship and self- respect.

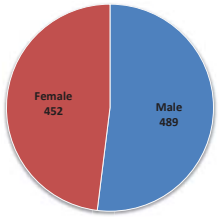
Objective:

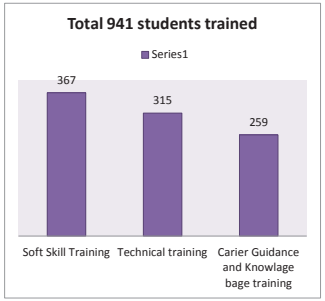
- Bridge the wide gap in demand & supply of human power.
- Awareness regarding availability, needs and vision for career development and education.
- Facilitation, spreading awareness, creating new opportunity to upgrade skills through organizing various skill trainings in the region.
- To improve overall status of rural Youth and women in the society by enhancing confidence and entrepreneurship in them.
- Encouraging youth for participatory approach in social and economic activity and helping them to keep away from addictions, to become self-dependent, and empower them to live a dignified life.
- To build a feeling of harmony in the society by creating a rapport of goodwill, mutual trust and respect.

Skill development trainings administered by ASDC

Each training module of ASDC is well-designed to make the learning more effective.

Total trained of Male & Female





Adani Skill Development Centre, Mundra

Course wise status, 1st April 2016 to 31st March 2017

Sr. No.	Course Name	Location	Male	Female	No of students
1	IT Basic Computer	ASDC Mundra	10	1	11
2	IT Basic Computer	ASDC Mundra	6	3	9
3	Tally Erp9.	ASDC Mundra	4	2	6
4	IT Basic Computer	ASDC Mundra	2	2	4
5	Vocation Training	Zarpara High School	59	36	95
6	Basic Computer-RTG student	ASDC Mundra	16	0	16
7	Basic Computer-RTG student	ASDC Mundra	8	0	8
8	IT Basic Computer	AVMB	33	6	39
9	IT-Basic Computer	Adani House	18	0	18
10	Mehnadi work	Gundala	0	21	21
11	Mehnadi work	Gundala	0	17	17
12	Dori work training	Gundala	0	20	20
13	Dori work training	Gundala	0	19	19
14	IT Basic computer-RTG Student	ASDC	8	0	8
15	IT Basic computer-RTG Student	ASDC	7	0	7
16	IT Basic computer-RTG Student	ASDC	8	0	8
17	IT Basic computer	Luni Bandar	14	0	14
18	IT Basic computer	Luni Bandar	6	9	15
19	IT Basic computer	ASDC	6	1	7
20	IT-Basic Computer	Adani House	25	0	25
		Total - A	**230**	**137**	**367**

Other Training					
Sr. No.	Course Name	Location	Male	Female	No of students
1	Mobile Repairing	ASDC Mundra	12	0	12
2	Stitching & Bagging Machine Operator	APSEZ	7	0	7
3	Beauty Parlour	Nana Kapaya	0	24	24
4	Beauty Parlour	ASDC Mundra	0	21	21
5	Checker Cum RTG Crane Operator	APSEZ	14	0	14
6	Tailoring	ASDC Mundra	0	18	18
7	Tailoring	ASDC Mundra	0	13	13
8	Beauty Parlour	Mundra	0	20	20
9	Mechanical & Electrical training of Container Terminal	APSEZ	6	0	6
10	Tailoring	ASDC	0	20	20
11	Forklift operator training	MSPVL	8	0	8
12	Checker Cum RTG Crane Operator	APSEZ	23	0	23
13	Tailoring	Old port	0	15	15
14	Tailoring	Old port	0	15	15
15	Beauti Parlour	MICT	0	23	23
16	Forklift operator training	MSPVL	14	0	14
17	Tailoring	Bhorara	0	15	15
18	Tailoring	Bhorara	0	17	17
19	Tailoring	Zarapara-Chach wadi	0	15	15
20	Tailoring	Zarapara-Chach wadi	0	15	15
		Total - B	84	231	315

"Swachchh Bharat" Movement

Adani Vidya Mandir gives momentum to "Swachchh Bharat" movement at Bhadreshwar in coordination with government schools of Bhadreshwar.
Total 450 Students participated in drive Several activities were carried out during the day that marked the uniqueness of this drive. Shri Mukesh Saxena, (Head CSR) specially remained present on the occasion to motivate and participate in this event. He shared that a cleanliness drive was initiated by the Adani Vidya Mandir at Bhadreshwar, Mundra. Having a clean and hygienic living environment is utmost important for health and profession, but providing for the same is equally challenging

Model Making Competition Certification

We had organized Model Making Competition among Technical Students of Kutchh District in Aug 2014. Three Winners of the Competition constructed replica of their model at Nana Kapaya, Baroi and Gundala Village under guidance of Engineers Team of Adani Foundation Which will be used as Medical Center at Gundala and Nana Kapaya and residence for poorest of poor at Baroi Village. Launching of Booklet of process documentation and Certification of Students organized on 9th July 2016

Support to Blind Girls from AKPG

Adani Foundation Mundra Supported blinded girls of Andh Kanya Prakash Gruh by purchasing rakhis made by them.
Fisherman leader of Navinal Anwar bhai created best example of Hindu Muslim unity by tying Rakhi from differently abled girls from Andh Kanya Prakash Gruh, Ahmedabad. Not only that, They gave donation to institute... This shows binding of our team so deeply and socially with fisherman community...

Important Events

SEA OF CHANGE : A JOUNRNEY OF TRANSFORMATION OF FISHERFOLK

Adani Foundation Mundra Team has transcribed about Life of Fisherman and its transformation. The Book was launched by Shri Gautam Adani and appreciated by all dignitaries.

"Panjo Medavo"

Adani Foundation Mundra has organized "Panjo Medavo" Programme on 27th Aug 2016 Saturday Evening, Total 170 local people including Sarpanch, village leaders and NGO working for welfare of community including media.
Mr. Mukesh Saxena, CSR head Adani Foundation shared that development of business is only possible with whole hearted support of local community. He gave confirmation that Adani foundation team is for community and will remain always !! Main attraction of the event was Kutchhi folk music by "Survani – the traditional artist support group" of Kutchh.

International Coastal Clean up Day

The International Coastal Clean-up is one of the largest volunteer efforts in the world dedicated to the health of our oceans. Every year, 20th September is dedicated to this noble cause of cleaning our beaches / shorelines impounded with lots of waste material which is considered non-biodegradable in nature and considered hazardous to the ocean health. Indian Coast Guard had been associated with this international event in India and has been organizing clean-up drive for our beaches once in a year to represent its concern for the overall ocean health and generating awareness among public. Coast Guard Authority being in Mundra would be organizing a clean-up operation in coordination with Adani Foundation.
Adani Foundation gives momentum to "Swachchh Bharat" movement at Juna Bandar, Mundra with Fisher folk community.

Adani Premiere League

Adani Foundation, Mundra organized Cricket Tournament, **"Adani Premiere League"** among fishermen community to promote healthy sportsmanship and harmonically transparent community relationship among fisher folk of Mundra and Anjar Taluka from 13.07.2015 to 23.07.2015. The Adani Premiere League by Adani Foundation started on 13.07.2016 at Shantivan Colony Cricket Ground. Total 44 Teams of 12 villages and 528 Fisherman participated. Teams from Villages Zarpara, Navinal, Shekhadia, Modhava, Salaya, Mundra, Tragadi, Luni, Sanghad, Gundiyali, Bhadreshwar & Vandi (Tuna) participated with great enthusiasm.

Safety awareness for fisherman

Safety awareness program for fisherman community was organized on 16th Sep 2016 in coordination with Indian coast guard, Air force and Fisheries department. Commandant Pradip Kumar did live demo for using different equipment like boya, ring and life jackets for safety purpose. Mr. Mukesh Saxena had given information about coastal safety and measures

Community Speaks....

"Adani Vidya Mandir has carved our future !!!"

In the Mundra Taluka of Kutch district there is a village named Bhadreshwar. The population of this village is approx. 9000 to 9500.Wherin resides the people of different castes like Darbar, Harijan, Vagher, Bhrahmin, Lohana ,Darzi and Jains. These people find an occupation in the nearby companies and others continue their ancestral occupation and get an income. The community like Vagher and Manek are included in the activities of fishing. Fishing is their only means of finding Remuneration. Hence they are known as Sagar khedu. For their survival they completely sustain on these. The lives of the fishermen are full of velour. But the level of education is very low. They go fishing for 8 months. There is stagnancy in work during the rainy season. During those seasons they celebrate all their cultural festivities. With an aim that the children from the fisher folk community move forward in the field of education,
Adani Foundation encourages them by various means. As a result the children form the fishermen community and the nearby locations are admitting to the Adani Vidhyamandir School in Bhadreshwar. Here the children receive quality education and nutritious food .In this school the underprivileged children from the nearby villages also gain education. With the progress in the field of education there is also a change observed amongst the fishermen families. The younger generation is also ready to leave their family occupation of fishing and progress in the field of education. Similar is the case of Haji Mohamad Sale.
He was disinterested in studying. He was very irregular, would not concentrate in class. He completed Std 7 with difficulty continuing the fishing lifestyle along with schooling. In this phase the Adani Foundation boosted his confidence by frequently visiting and with proper guidance he was admitted in the Adani Vidhyamandir, Bhadreshwar.
When they started he was very weak in Reading, writing and mathematics. Moreover he could not communicate with the co-students. In this phase they obtained education from the Adani Vidya Mandir .After receiving personal attention from the teachers he started improving gradually. Presently He is studying in class 9 and participating in all the extra curriculum activities. After having a talk with him we realized that he is having future plans too. Haji replied that he wants to be a soldier when he grows up. For which he runs, does physical activities and is always mentally prepared for any sports activities. He realized the strengths only after getting educated.
Today the importance of education has increased in the fisher folk community. Moreover the parents are also equally realizing the importance. Those who were not interested in Primary education are taking further education. Hence the fishermen communities are thankful to Adani Foundation for making these changes possible

SAMANVAY

Samanvay - A Seminar was organized to define social responsibility with the perspective of Development on September 20, 2016 at Adani House, Auditorium, Port road, Mundra, Kutch.
More than 35 Organizations namely Agakhan Rural Support Programme, Kutchh Navnirman Abhiyan. Vivekanand Research & Training Institute (VRTI), Navchetan Andhjan Mandal, Welspun Limited, Coastal Gujarat Power Limited, Ashapura group of industries, Sarv Seva Sangh, Kutch Mahila Vikas Sangathan (KMVS), Arid Community & Technology, SETU, Sahjeevan Trust, Veerayatan and Yusuf Meher Ali Centre (YMC) etc. took part in this Seminar. All NGO and Corporate shared their view for development from one common platform and impactful Work.
The Chief Guest: Shri Apurva Oza (CEO, Agakhan Rural Support Programme) and other Distinguished guests were:
Mr. Lalji Prajapati, Navchetan Andhajan Mandal
Shri Lalbhai Rambhiya, Head CSR AARTI Group of Industries
Shri Ramesh Gor, Coordinator, Vivekanand Research & Training Institute
Smt. Raginiben Vyas (Head-CSR, Ashapura group of Industries)
Dr.Punam Gupta (Welspun Limited)
Smt. Lataben Sachdey, KMVS
Shri Pradip Ghosal (Head – CSR, CGPL)
Dr. Yogesh Jadeja, Arid Community & Technology
Shri Dharmendra Kumar, Director, YMC
Shri Jadavjibhai Shethia, from Sarva Seva Sangh

CSR Conclave : Adani Foundation

Adani foundation CSR Conclave- II was held on 14th and 15th October 2016 at AMDC, Ahmedabad. Sh. P.N. Roy Chowdhury briefed the participants regarding the CSR conclave and substantiated few activities being carried out at various sites of AF. He said that mature sites should start transformative CSR rather than demand based CSR.
Dr. Malay Mahadevia underlined the need for adding sensitivity in all CSR activities and Business we do. He further highlighted that through our CSR efforts, we are transforming to be a responsible corporate.
Dr. Pritiben G. Adani shared the vision of Adani Foundation. She shared about sustainable CSR linked with Business. Respected A Nath Sir was felicitated by long service award. All eleven CSR Sites from various places of India shared that startvision for five years. Mr. Ennarasu (CEO, APSEZ) shared the strategies for designing long term vision. Mr. Mukesh Saxena (COO, SEZ Operations) and Head (CSR-AF Mundra) had presented Startvision for Mundra and Tuna CSR Projects.

Singing Sea Bird : Balvadi at Bandar

The Girl named Amina is 3 years old. She lives at Zarpara Bandar with her Family. She was living in unhygienic and unhealthy condition. Due to this condition she used to fall sick frequently. After joining Balvadi, she learned the importance of hygiene and started to remain clean. By nutritious food given in Adani Balvadi, she could keep herself healthy. Moreover, she learned to speak English Alphabets and now she sings poems and songs with full enthusiasm.

Her parents expressed their gratitude to foundation in the words "Adani e Amari dikri ni jindagi sudhari didhi".

Senior Citizen Scheme is blessing !

Ameena ben, a resident of Shekhadia Village, never ever thought of that in spite of having three sons she will have to lead a life of desertion. None of them had time to look after her and she was suffering from high blood pressure and stomach problems.
She was worried about increasing health problems due to old age. During Senior Citizen health camp organized in her village she came to know about this facility. Adani Foundation arranged for critical drugs through senior citizen scheme. Due to regular intervention with Adani hospital she is now absolutely fine and living gracious life with smile.
She always says with gratitude: "Adani hospital provides very good service with lots of care and love. Thanks to Adani for giving me new life with self-respect.

"I AM SPECIALLY BLESSED NOT DISABLED!!!"

Myself Naresh Maheshwari 13 years old boy resident of village Baroi, 3 Kms Distant from Mundra. I am physically disabled since birth. My parents are working as a Labour and can not take me for treatment or physiotherapy. My panchayat leader got news that for disable children physiotherapy treatment is available at Adani hospital. I started for the same and got very good results after regular treatment and exercises suggested by orthopedic doctor and physiotherapist . Now I can walk with help of stick, I am really thankful to Adani foundation for great help.

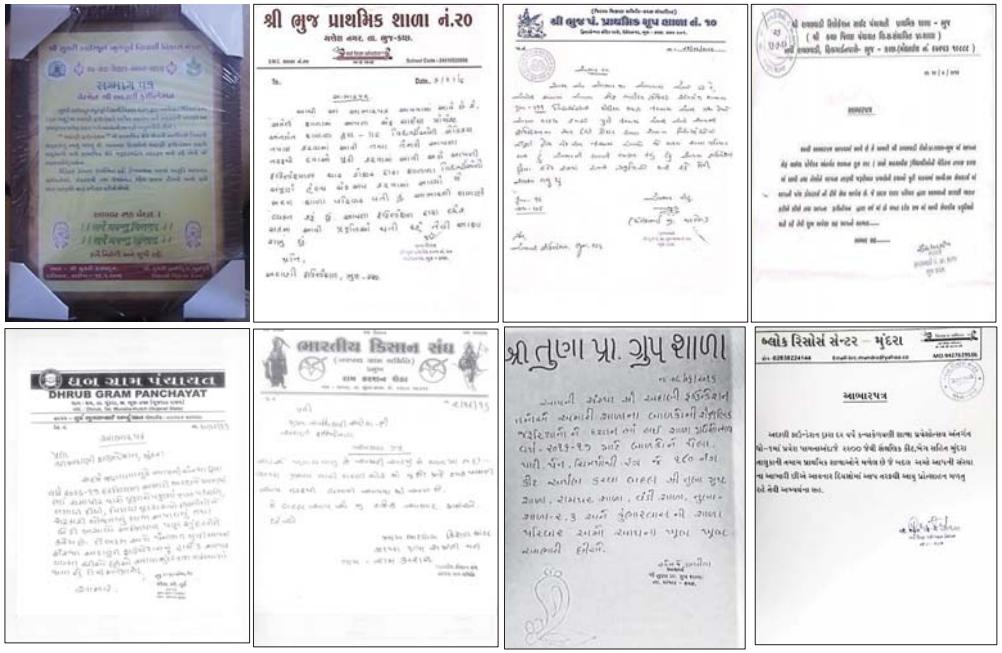
Healthcare at Door step!

Recently our primary health services are availed to 29 villages through the medium of mobile medical van. As many as 121 types of medicines are available in it. These services are liked by the people on a large scale. It has turned out like a boon for women and children as the service is availed at door - step.
Bhorara is a village approximately 20 km away from Mundra wherein resides **Krishna Maheshwari** who was financially, health-wise and socially unstable until she availed help from AF at Mundra. She settled in Bhorara 5 years ago when she got married. she suffered from Abscess and Skin disease
Our Medical officer of Mobile Health Care Unit helped her a lot. He regularly went her home to change bandages and for dressing of abscess. Now she is completely alright and able to move and walk.
Her blessings to Adani Foundation in her worlds ***" Due to Adani Foundation Medical Van I got fast relief, Doctor take care like my own family member"***

Visitors

- Mr. Michael Stephen, Mr. David Moor & Ms. Allison Joyce, Journalist Team from Australia along with MR. Jeyakumar Janakaraj (CEO Australia Port) visited Juna bandar for Adani Foundation Activity & Discussion with Fisher folk Group.
- Visit of Mr. Naren Karunakaran–The Economics Times on 28th June, 2016-visited Luni bandar and discussed with local fisherman about Mangrove plantation work at Luni site. He also visited Juna bandar & Discussed with Fisher folk Group for activities of CSR by Adani Foundation.
- Visit of Mr. Sudhakar B.- Head HR Energy Business- visited at Junabadar for Adani Foundation Activity & dissuasion with Fisher folk Group.
- Visit of auditors of OeEB Bank for review of CSR Activities at Juna Bandar. Presentation and information sharing was arranged at Adani House.

Appreciations Letters



નાના કપાયાના શાંતિ વિહાર ખાતે અદાણી ફાઉન્ડેશન દ્વારા 'પાંજો મેળાવડો' યોજાયો

પાંજો મેળાવડો

અદાણી ફાઉન્ડેશન દ્વારા શાંતિવન કોલોની ખાતે આયો

દ્રષ્ટિહીન બહેનો દ્વારા બનાવેલ સુંદર ર

કલાત્મક ડીઝાઈનની રાખડીઓનું પ્રદર્શ

પ્રતિભાઓને પ્રોત્સાહીત કરવા મુન્દ્રા તેમજ આ

જનતા પણ બહોળી સંખ્યામાં જો

દ્રામાં માછીમારો દરિયાઈ

રક્ષા અંગે માહિતગાર થયા

ા બંદર ખાતે માછીમારો માટે માર્ગદર્શક કાર્યક્રમ યોજાયો

મુન્દ્રામાં છાત્રોએ

ગે વિચારો વ્યક્

મુંદરામાં સમન્વય તળે વિચારોનું

તાલુકા હેલ્થ ઓફીસ-મુંદરા, અદાણી ફાઉન્ડેશન અને આ.ઈ.સી.-બેસના સંયુક્ત ઉપક્રમે

મુંદરા મધ્યે 'બેટી વધાવો' વિષય પર સેમીનારનું આયોજન

સૂતા મૃત્યુદર શૂન્ય કરવાનો લક્ષ્યાંક

વડીલ-નિવૃત્તોને પ્રાયોરિટી કાર્ડ અર્પણ

દહીંસરામાં આરોગ્ય કેન્દ્ર ઉદ્‌ઘાટન

સમયે સરોવર માટે દશ લાખ ફાળવાયા

સાદવાહ કેમ્પ અંતર્ગત

૪૩૦ દર્દીની તપાસણી

Adani Foundation, Mundra CSR Budget Utilization 2016-17					
Sr. No.	Program	Budget 2016-17	Expenditure	Expenditure	Total Expenditure
			Apr.16 to Sept.16	Oct.16 to Mar.17	2016-17
A.	**Admin Expense**	**136.44**	**62.54**	**60.76**	**123.30**
B.	**Education**				
(i)	Education Initiative	49.40	12.28	29.22	41.50
(ii)	Adani Vidya Mandir-Bhadreshwar	125.78	46.19	59.24	105.43
(iii)	Shanti Vihar (Project Udaan)	303.26	109.53	186.63	296.16
	Sub Total	**478.44**	**168.00**	**275.09**	**443.09**
C.	**Community Health**	**271.18**	**62.37**	**181.01**	**243.38**
D.	**Sustainable Livelihood Development**	**240.90**	**117.97**	**102.01**	**219.98**
E.	**Rural Infrastructure Development**	**408.24**	**105.30**	**285.78**	**391.08**
	GRAND TOTAL	**1535.20**	**516.18**	**904.65**	**1420.83**

ANNEXURE – 10

Minutes of the 28th meeting of the Gujarat Coastal Zone Management Authority held on 22-04-2016

The 28th meeting of the Gujarat Coastal Zone Management Authority (GCZMA) was held on 22-04-2016 under chairmanship of Shri Punamchand Parmar, IAS, Principal Secretary, Forests & Environment Department and Chairman, GCZMA in the Committee Room, Forests and Environment Department, Gandhinagar. A list of the members and other participants, who attended the meeting, appears at **Annexure-A**. Also a list of the representative of various project proponents, who have made presentation before the Authority appears at **Annexure-B**.

Initiating the meeting, with the permission of the Principal Secretary, Forests & Environment Department, and Chairman of GCZMA, the Member Secretary, GCZMA, welcomed all the members of the newly constituted GCZMA and other participants. He also brief all the members regarding functions and duties of the GCZMA as per constitution order of the MOEF&C, GOI.

Then after he briefed the Members of the GCZMA about the agenda items for the meeting and various actions taken by the Department in compliance of the various decisions taken during last meeting.

The agenda wise discussion and decisions taken thereafter is as under:

➔AgendaitemNo:28.1:-

❖Compliance report with respect to the decision taken in the 27th meeting of the GCZMA, which was held on 15-09-2015.

a) **Preparation of an action plan for development of Bio- Shielding project for entire area between Dahej and Hazira by way of planting various species of vegetation, such as mangroves, seaweeds, sea grass, casuarinas to control the soil erosion, stabilize the area sand for protection in case of Tsunami in association with any institute / Organization having some experience in this Field.**

The GEC apprised the authority that the GEC visited potential sites as recommended by the M.S. University and they have completed

28.17 Strengthening of GCZMA through manpower, infrastructures and purchasing Instruments like advance cameras, GPS meter etc.

The Authority was apprised that the Secretariat of Gujarat Coastal Zone Management Authority is working in the Directorate (Environment) in the Forests and Environment Department, Government of Gujarat as PS, F&ED is the chairman of GCZMA and Director(Environment) is the Member Secretary of the GCZMA. At present, the work related to GCZMA is being looked after by the Director(Env) along with all other works related to Environment Sector of the State. There is only three Deputy Environment Engineers working under Directorate on loan service from GPCB. No other supporting staff is there. Moreover, it is also require to strengthen the GCZMA by providing adequate infrastructure like colour printers, computers, advanced cameras, GPC meters etc and also providing sufficient men powers to assists the GCZMA for better implementation of CRZ Notification 2011 in the State including to carry out work related to various court.

The Authority decided that the necessary proposal in this regard necessary action would be initiated by the Forests and Environment Department to strengthen the GCZMA. The other instruments would be purchased trough GMB from the GCZMA account being maintained by the GMB.

28.18 Issues related to M/S Adani Port and SEZ Limited as per Directions issued by the MOEF&CC,GOI

The Authority was apprised that the Ministry of Environment, Forests and Climate Change, Government of India has issued an office order No: F.NO.10-47/2008-IA.III dated 18th September, 2015 with reference to Show Cause notice dated 15-12-2010 issued to M/S Adani Port and SEZ Limited for alleged violations. The Ministry has issued detailed order with following directions specific directions:

"A comprehensive and integrated conservation plan including detailed bathymetry study and protection of creeks/mangroves area including buffer zone , mapping of co-ordinates , running length , HTL, CRZ boundary will be put in place. The plan will take note of all the conditions of approvals granted to all project proponents in this area e.g. the reported 188

case of disappearance of mangrove near Navinal creek. The preservation of entire area to maintain the fragile ecology conditions will be a part of the plan in relation to the creeks, mangrove conservation and conservation of Bocha island up to Bharadimata and others.

The NCSCM will prepare the plan in consultation with NIOT, PP and GCZMA.. In recognition of the fact that the existing legal provisions under E(P) Act 1986 do not provide for any authority to impose ERF by the Government, the plan will be financed by the PP. The Implementation will be carried out by GCZMA. The monitoring of the implementation will be carried by NCSCM"

The representative of NCSCM, Chennai made a presentation before the GCZMA on the draft scope of work for preparation of a comprehensive and integrated conservation plan including detailed bathymetry study and protection of creeks/mangroves area including buffer zone , mapping of co-ordinates , running length , HTL, CRZ boundary.

After detailed deliberation and discussion, the Authority decided to constitute a committee of following members from GCZMA under chairmanship of PCCF(WL) to finalize scope of work to be carried out by the for NCSCM as per directives issued by the MOEF&CC, GOI

1. Shri J.A,Khan, IFS, PCCF(WL) ---------- Chairman
2. Shri H.S.Singh, Retd. PCCF, Member GCZMA--------Member
3. Shri H.B. Chauhan, ISRO, Member GCZMA----------Member
4. S.K.Chaturvedi,IFS, MS, GEC, Member GCZMA------Member
5. Shri Rajesh. I. Shah, Member, GCZMA ----------Member
6. Shri Hardik Shah, IAS, Director(Env)& MS, GCZMA—Convener

28.19 **<u>Table Agenda</u>- CRZ Clearance for proposed up gradation of for widening and improvement of Wamleshwar Ankalwa – Dhamrad, Aniyadra , Sunerkhurd Road at Taluka: Hansot, Dist: Bharuch Under National Cyclone Risk Mitigation Project(NCRMP) Funded By G.S.D.M.A (World Bank Assisted) in the State of Gujarat by the Road and Building Department, Government of Gujarat**

The Authority was further apprised that the Road and Building and Panchayat Department has approached this Department for seeking the

ANNEXURE – 11

National Centre for Sustainable Coastal Management
(Ministry of Environment, Forest & Climate Change, Government of India)
Koodal Building, Anna University Campus, Chennai 600025, INDIA

Dated 01/06/2016

To

M/s Adani Port and SEZ Ltd
Adani House, Near Mithakhali Six Roads,
Navarangpura, Ahmedabad,
Gujarat- 380 009.

[Kind Attn: Shri Shalin Shah, Head-Environment (HSE), AP&SEZ]

Sub: Preparation of Comprehensive and Integrated Conservation Plan for the APSEZ area including detailed bathymetry study and protection of creeks/mangrove area including buffer zone, mapping of co-ordinates, running length, HTL and CRZ boundary -Reg

Ref: E-mail dated 10th May 2016 from Shri Shalin Shah, Head - Environment (HSE), Adani Ports and SEZ Ltd.

Sir,

Please refer to your e-mail dated 10th May 2016 in continuation of the meeting of Gujarat Coastal Zone Management Authority (GCZMA) held on 22nd April 2016 proposing research studies to be undertaken for Adhani Port & SEZ by NCSCM.

2. In this regard, please find enclosed the following documents for taking further necessary action at your end:

(i) Contract Agreement for the above task

(ii) ToR indicating scope of work, description of tasks, methodology for bathymetric/topographic survey, schedule of activities, budget estimate and deliverables.

3. The total cost for the above task is Rs. 315.50 lakhs (Service tax as applicable will be charged extra)

Yours sincerely,

1/6/2011

(Dr. R. Ramesh)
Director

Phone: (+91) 44 2230 0108, Fax: (+91) 44 2230 0108,
Website: www.ncscm.org

CONTRACT ACGREEMNT

The Contract Agreement is made and entered into on this Day of .....(month)... (Year) between M/S Adani Port Special Economic Zone (here in after referred as "the Client") and the Director, National Centre for Sustainable Coastal Management (NCSCM),Chennai (herein after referred as" the Consultant ")

1. Background:

The Client has requested the Consultant to undertake the tasks proposed in the Terms of Reference (ToR) attached as Annex I to this contract to comply with part of Environmental clearance condition of Ministry of Environment, Forest and Climate Change vide their order F.No.10-47/2008-IA.III dt. 18 Sept. 2015.

2. Scope of the contract

The scope of present consultancy is to prepare a Comprehensive and integrated conservation plan for the APSEZ area of the Client including detailed bathymetry study and protection of creeks/mangrove area with buffer zone, mapping of co-ordinates, running length, HTL, CRZ boundary.

3. Study Area:

The Study area will be the Adani Port Special Economic Zone and associated environment as indicated in ToR.

4. Terms of Reference (ToR) proposed to be undertaken to address the scope of services

Refer Annex I to this contract agreement

5. Performance of Service:

The Consultant shall perform its services in line with the Scope as defined in para No.2.of ToR and shall carry out its obligations hereunder with skill, care, diligence, efficiency and economy, in accordance with generally accepted techniques, prudent practice and with professional scientific and consulting standards. It shall also observed sound management and technical practices, and employs appropriate advanced technology and methods. The Consultant shall always, in respect to any matter relating to this Contract agreement, as faithful advisors/representatives to the Client support and safeguard the legitimate interest in any dealing with sub-contractors or third parties. The Consultant shall use reasonable

endeavours to complete the Services within the time or programme agreed upon between the Parties.

6. Period of Consultancy:

The period of consultancy shall be for a period of 15 months. The date of start will be from the third quarter of the year 2016 subject to the condition that required funds as indicated in Para 10 of this contract agreement will be provided at least 2 months in advance to the Consultant. Delay in payment will correspondingly increase the project duration. In case the execution of contract involves more time on account of unforeseen conditions, a request in this regard will be made by the Consultant to extend the contract period.

7. Obligation of Client:

Refer Para 5 of ToR in Annex I attached to this contract agreement.

8. Consultancy Cost:

The fixed fee of the Consultancy is approx. Rs.315.50 lakhs and variations that may occur are indicated in the variation clause of this agreement

9. Variation of cost

Probable variations that may arise in the consultancy fee are indicated at Para 8 of the ToR attached as annex to this contract agreement

10. Payment Terms:

10.1 **Zero Time Payment:** 90%of the Consultancy cost after signing the contract agreement

10.2 **Balance Payment:** 10% after submission of final report.

At every stage, the Consultant will raise separate invoice for an equal amount. Payment will be made after deduction of applicable statutory levy on this contract.

11. Limitation of Liability:

11.1 The Consultant undertakes to exercise reasonable skill and care in performing the services, and shall be liable only for negligent failure in performing the Services.

11.2 The Client and the Consultant agree that the total liability of the Consultant arising out of, or in connection with this agreement shall not, unless otherwise agreed in writing,

exceed the amount of the Consultant's Fees actually realized pursuant to this agreement. Further, notwithstanding anything in this Contract Agreement to the contrary in no event shall the Consultant be liable for any direct damages for loss of profit, loss of production, loss of contracts or for any financial loss or for any special, indirect or consequential loss or damages including without limitation damages for loss of profit, loss of production, loss of contracts or any financial loss however caused including without limitation the fault, breach of contract, tort (including the concurrent or sole and exclusive negligence) breach of duty, strict liability or otherwise and whether a claim is based on contract , tort, at law in equity or otherwise.

12. Confidentiality:

The Consultant along with its personnel, employees, management, affiliates, agents, advisors and Consultants shall not disclose any property or confidential information/data relating to Project without the prior written consent of the Client.

13. Dispute Resolution:

13.1 All claims, disputes and other matters in question arising out of or related to this Contract agreement, which cannot be resolved amicably, shall be submitted to final and binding arbitration.

13.2 The arbitration will be conducted and administered in accordance with the Indian Arbitration and Conciliation Act 1996. The arbitral tribunal shall comprise of 3 (three) arbitrators nominated as provided hereinafter. The consultant and the client shall each nominate one (1) arbitrator and the third arbitrator shall be selected by mutual agreement of the first two arbitrators.

13.3 All arbitration proceedings shall be conducted in the English language and the place of arbitration shall be Chennai. The arbitral tribunal shall decide any dispute or claim referred before it, strictly in accordance with the governing law (which shall be Indian law). The arbitral award rendered by the arbitral tribunal shall be in writing and shall set forth in reasonable details the facts of the disputes and the reasons for the arbitrators' decision.

14. Governing Law:

This contact agreement shall be governed by and interpreted in accordance with laws in force in India.

15. General:

15.1 In the event any of the terms stated herein are contrary to any previous understanding, commitments or agreements whether written or oral between the Parties, the terms of this Contract agreement shall prevail.

15.2 Nothing in this contract agreement confers or purports to confer on any third party any benefit or any right to enforce any term of this Contract agreement.

15.3 The Consultant's relationship with the client is that of an independent service provider, and nothing in this Contract agreement is intended to, or should be construed to, create a partnership, agency, joint venture or employment relationship. The Consultant will not be entitled to any of the benefits, which the Client may make available to its employees.

Authorised Signatory
For and on behalf of Consultant

Authorised Signatory
For and on behalf of Client

Annex

Terms of Reference for Consultancy services to Adani Port Special Economic Zone

1 Background

The Ministry of Environment and Forests have accorded Environmental Clearance (EC) vide Letter No. F.No.10-138/2008-IA.III dt.15th July, 2014 to M/s Adani Ports and Special Economic Zone Ltd (APSEZ), the Client, to set up a multi-product SEZ at Mundra, Kachchh, Gujarat (Fig.1). The project involves development of SEZ in a notified SEZ area of 6641.2784 ha for which Environmental and CRZ clearance has been given. The activities proposed in the SEZ include:

- Processing zones
- Non-processing zones
- Warehousing zones
- Road network (trunk as well as internal)
- Bridges or culverts over natural drains
- Rail and IT communication networks
- Effluent collection network
- Water supply through freshwater sources and desalination
- Conservation & drainage network
- Effluent collection network
- Social infrastructure
- Existing/proposed airstrip
- Municipal solid waste disposal site
- Utilities & supporting infrastructure
- Disposal of treated sewage, effluents and brine from desalination plant

The SEZ covers both inland and water front areas (Fig. 1). Industrial plots will be made by APSEZ and shall be given to the firms that would be setting up individual industries of above types who need to obtain EC before initiating their projects. The industries envisage utilizing the services of Adani port for transport of imported and exported goods.

Fig.1. Map indicating location of APSEZ

While according EC to the project, the MoEF&CC have stipulated General and Special conditions in its letter F.No.10-138/2008-IA.III dt 15 July 2014 and was further reviewed. Finally,in its order F.No.10-47/2008-IA.III dt 18 Sept. 2015, it the following directions relevant to NCSCM were given:

A Comprehensive and integrated conservation plan including detailed bathymetry study and protection of creeks/mangrove area including buffer zone, mapping of co-ordinates, running length, HTL, CRZ boundary will be put in place. The plan will take note of all the conditions of approvals granted to all project proponents in this area, e.g., the reported case of disappearance of mangroves near Navinal creek. The preservation of entire area to maintain fragile ecological condition will be a part of the plan in relation to the creeks, mangrove conservation and conservation of BochaIsland up to Baradimata and others.

NCSCM will prepare the plan in consultation with NIOT, PP and GCZMA. In recognition of the fact that the existing legal provisions under the E(P) Act 1986 do not provide for any authority to impose ERF by the Government, the plan will be financed by the PP. The implementation will be carried out by GCZMA. The monitoring of the implementation will be carried by NCSCM.

Accordingly the Client namely APSEZ requested NCSCM (Consultant) vide their email dated 10 May 2016 requested NCSCM to submit a proposal for preparation of a plan containing the above aspects. The present Terms of Reference has been prepared to accomplish the tasks sought by the Client

2 Scope of Work

The scope of present consultancy is to prepare a Comprehensive and integrated conservation plan for the APSEZ area including detailed bathymetry study and protection of creeks/mangrove area including buffer zone, mapping of co-ordinates, running length, HTL, CRZ boundary.

3 Study Area

The study area is the land and aquatic areas of AP SEZ as indicated in Fig.1.

3.1 Description of Services (Tasks proposed for preparation of the plan)

Following major tasks are involved in accomplishing the scope of services:

a. Detailed bathymetry of creeks including the ones distributed in the seawater side, along with mapping of co-ordinates, running length, HTL, CRZ boundary within the Mundra Port and APSEZ area

b. Mapping of mangroves distributed in the Mundra Port and APSEZ area including their seaward side with buffer zones and

c. Preparation of a Comprehensive and Integrated plan for preservation and conservation of mangroves and associated creeks

3.2 Description of tasks

3.2.1 Mapping of rivers, creeks, canals etc. and bathymetric survey

The area has numerous medium and small creeks distributed in a complex manner (Fig. 2). An attempt has been made using satellite data of 2013 (Google Earth) to isolate the major and minor creeks besides rivers, streams etc to estimate length of these water bodies, which is provided in Table 1.

Table 1: Length and number of Major/Minor Rivers and associated canals in the region

Id	*Name of River / Creek*	*No. of Streams*	*Approximate Length (km)*
1	Khari River		9.71
	Streams	13	2.14
2	Daneshwari River		4.65
	Streams	5	1.01
3	Kotadi Creek		62.60
	Streams	329	84.76
4	Bochaavalochhelo		2.55
	Streams	3	1.13
5	Nagavanti River		4.53
	Streams	17	6.37
6	Baradimata Creek		51.48
	Streams	337	84.58
7	Jidal River		2.44
	Streams	6	2.50
8	Navinal Creek		11.72
	Streams	51	16.40
9	Bocha Creek		7.81
	Streams	94	25.41
10	Phot River		17.28
	Streams	79	37.47
11	Bhukhi River		11.35
	Streams	123	34.72
12	Bhukhi River and Khari River between Streams	124	74.37
13	Khari River		2.54
	Streams	106	81.39
	Total	**1287**	**640.94**

As per the above table, the total approximate estimated length for which bathymetry to be measured is for 640 line km. **Mapping will be carried out only for the water bodies that are associated or leading to creeks.** This may vary as some of the creeks/branches may be too shallow for making any measurement. **The actual line km will be known only at the time of survey.** Expert assistance will be taken in field planning of field survey and for fixing locations.

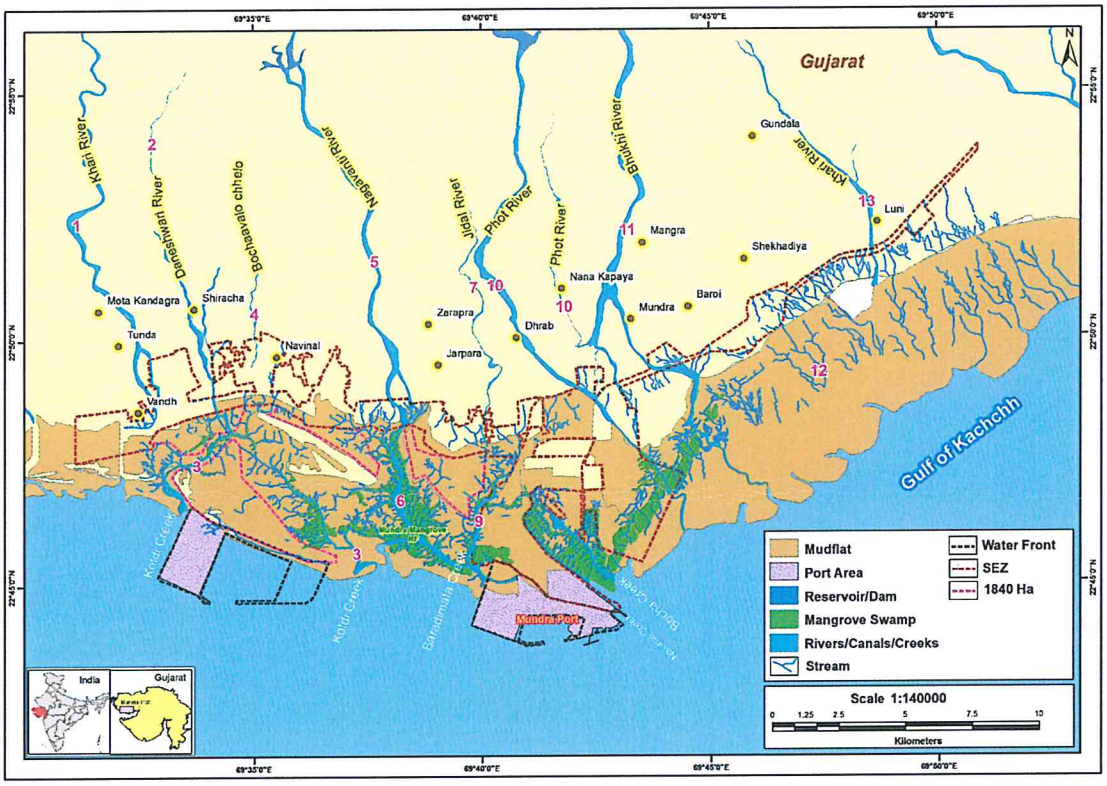


Fig. 2: Major rivers,creeks, canals and minor streams in the APSEZ.

a. Methodology proposed for bathymetric/topographic survey

A preliminary survey using graduated poles will be carried out to determine approx. depth of water bodies and locations for survey will be finalised. An appropriate echosounder will be used to measure bathymetry for rivers, creeks and canals. For other shallow water bodies (depth < 0.5m) tide poles will be used to measure the depth. Water depth data will be collected at close transects and it would be not less than 500m intervals during high tide. During low tide topographic data will be collected in the exposed area and also to the neighbouring dry marshy areas (for the purpose of preparation of action plan for mangroves) using RTK GPS.

Measurements made will be represented with reference to MSL as appropriate to the location. A suitable benchmark will be established at appropriate locations by transferring the level from the nearby Survey of India benchmark location. The depth recordings will be corrected for tide by deploying suitable tide gauge.Necessary quality control of data will be performed.The collected data will be plotted as bathymetry charts and will be added as a part of the database.

Mapping of creeks, rivers etc. will be made in GIS using LISS IV images (of latest year) with finer details verified using images from CARTOSAT/World View. Steps involved in mapping are given in Fig.3. Co-ordinates of creeks will be obtained from field survey. HTL will be drawn based on Aerial photographs available with Survey of India. The CRZ boundaries will be drawn based on HTL contours and habitats distributed along the creek.

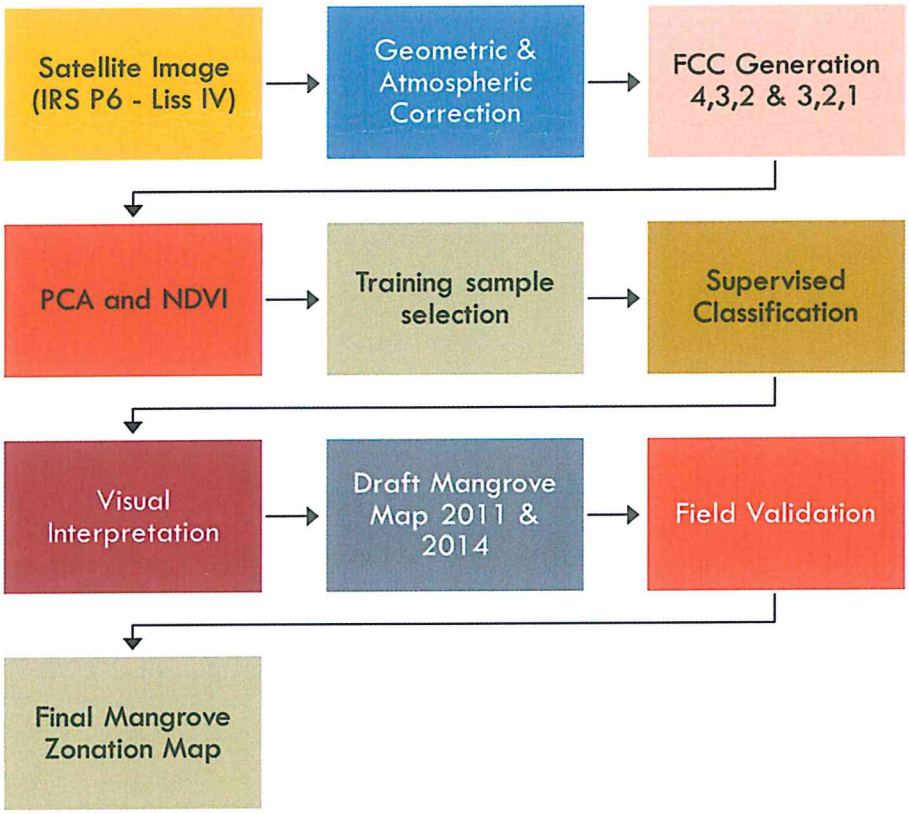


Fig.3. Flow diagram on steps involved in preparation of maps

3.2.2 Mapping of Mapping of mangroves and buffer zones and assessment of health of mangroves

Mundra is a coastal taluk at the northern flank of the Gulf of Kachchh and has a wide intertidal area. This area has been known to be rich in mangroves (13.35 sq.km- source BISAG) and is second largest next to Kori creek. The mangrove vegetation was found essentially on Navinal, Bocha, Aban and Baradimatha creeks and adjoining intertidal mud flats (Fig.2). This scenario started changing when this area was identified for the major port development and during various stages of Port development.

In order to assess the current status of mangroves and creeks and to explore the possibility of ensuring free flow of seawater in to the existing mangrove areas from already existing water sources like creeks and rivers, it is proposed to prepare maps of mangroves and integrate them in creek maps of the Port and APSEZ. Although, studies have been conducted by various agencies on mapping of mangroves, the information available does not facilitate detailed assessment on health of the mangroves as the scale of maps are lower say 1:25000 scales. Therefore, mangrove maps at a scale of 1:10000 or 1:5000 will be prepared to fill this gap.

Classification of mangroves existing in the site will be made as (i) Pristine(undisturbed), (ii)vulnerable to degradation, (iii) degrading and (iv) degraded. Further, it is also necessary to identify the area under natural regeneration and areas suitable for plantation. In order to accomplish these tasks, preparation of an action plan for preservation and conservation of mangroves of APSEZ is essential. The present activity helps in development of proposed Comprehensive Integrated Plan.

a. Tasks to be undertaken

i. Preparation mangrove maps in 1:10000/1:5000 Scale maps along with buffer using latest available satellite image of 2014 and validating 2014 data with field observations in the third quarter of 2016.
ii. Assessment of status of mangrove areas and associated water ways including dry areas around the creeks (using topographic data collected) to explore the possibility of supply of creek water to the mangrove areasthro appropriate methods esp. using hydrodynamic modeling

Proposed activities to carry out the above tasks include:

b. Preparation of mangrove and habitat maps

LISS IV Satellite data of latest year (2014 or latest) will be procured and used for preparation of 1:10000/1:5000 scale maps of mangrove areas. Extensive ground truth data on dense sparse species level etc., will be collected to validate the satellite data. Data on distribution of various species of mangrove plants, associated fauna and flora shall also be collected. Since natural flow of tidal and fresh water affect the mangroves, detailed observations will be made on the tidal incursions, depth of creeks and rivers in the area (from the bathymetry data

collected and creek maps prepared), rate of sedimentation in water ways and anthropogenic impacts (pollution, embankments, animal grazing, cutting of trees etc.). A long-term digital database on mangroves and associated habitats of Mundra region will be developed to facilitate long-term monitoring of environment of Mundra area. Steps involved in preparation of mangrove and creek maps are given below (Fig.3).

c. Assessment of health of mangroves and associated habitat

Based on data collected, thorough annual assessment on loss and gain of mangrove and creek area and their health along with changes in distribution of species will be made between the present conditions or as suggested by MoEF&CC etc.

d. Socio-economic survey

e. Since there are villages surrounding the mangrove area, information on extent of their dependence on resources of mangroves and creeks is essential. A onetime survey will be conducted to collect data on users of mangroves, extent of their dependence etc.

3.2.3 Preparation of a Comprehensive and Integrated Conservation Plan

The data collected on bathymetry of creeks, tide level and mangroves will be used in a hydrodynamic model to evaluate the gradient and depth available for flow of sea water in the mangrove areas. Based on the results obtained, strategies will be suggested for deepening and other related aspects so as to facilitate flow of water in to the mangrove and associated mud flat areas including dry areas around the mangroves that has suitable substratum for growth of mangroves. Recommendations relevant to conservation of mangroves and creeks made in the report of SunitaNarain (2013) will also be taken into account while preparing the plan. Socio-economic aspects will be taken in to account while suggesting the strategies.

4 Implementation Arrangements

The scope of the work and related in tasks will be implemented by NCSCM. If required external institutions/firms will be engaged to conduct the field investigations

5 Obligations of the Client

The client shall provide all maps, charts, reports etc., available with them related to the scope of the Work. Field facilities and accommodation to the Consultants personnel in the Guest houses of the Client shall also be provided

6 Schedule of activities

Tasks	Months
Reconnaissance Survey	1-2
Bathymetry survey	3-6
Mangrove initial mapping, field validation and collection of field data on associated organisms	3-6
Socio-economic survey	3-6
Bathymetry data analysis and preparation of charts	5-8
Mapping of mangroves and preparation of 1:10000 /1:5000 scale maps	5-8
Development of action plan for mangrove conservation	9-12
Preparation of draft report	13-14
Preparation of final report	15

7 Performance indicators

- Survey of bathymetry and topography completed and contour maps produced
- Maps on distribution of mangroves and creeks developed and health status reported
- GIS database on distribution and health of mangroves and associated creeks and biodiversity of the aquatic habitats developed
- Extent of dependence by local communities on resources of mangrove assessed
- Comprehensive Integrated Plan for preservation and conservation of mangroves and associated creeks prepared

8 BUDGET

Rs. in lakhs

Item	Amount
Mapping of creeks, waterways	28.20
Bathymetry and topographic survey of creeks including cost of hiring sub-consultants	128.00*
Development of plan for mangroves and related field survey including topographic and socio-economic survey including cost of hiring sub-consultants	80.20*
Engagement of expert consultants and project personnel	16.00
Sub- Total	**252.40**
Institutional charges (25%) as charges for use of manpower, equipment, computers, software etc.,	63.10
Total	**315.50****

* Approximate cost indicated. Charges will be made as per actual line km/ha surveyed @ Rs.20000 per line km/ha.

** Service tax as applicable and will be charged extra

9 Reports

Half- yearly reports on progress of activities carried out will be submitted to the Client

10 Deliverables

- Detailed close grid bathymetry of rivers, creeks and canals and topographic charts indicating locations where deepening of creeks/mouth is required to facilitate permanent flow of seawater
- 1:10000 or 1:5000 scale maps indicating distribution of mangroves and creeks in Mundra, assessment of health of mangroves
- Comprehensive Integrated Plan for preservation and conservation of mangroves and associated creeks

ANNEXURE – 12

GOVERNMENT OF GUJARAT
FORESTS & ENVIRONMENT DEPARTMENT
BLOCK NO. 14, 8TH FLOOR, SACHIVALAYA
GANDHINAGAR - 382 010.

HARDIK SHAH
DIRECTOR (ENVIRONMENT) &
MEMBER SECRETARY, GCZMA

Ph : (079) 23251062
Fax : (079) 23252156
Web: www.gczma.org
E-mail direnv@gujarat.gov.in

Ref. No.ENV-10-2013-118-E *December 19, 2014*

To,
Shri P.N.Roy Chowdhury
Head-Environment
M/S Adani Port and SEZ Limited,
Adani House, Near, Mithakhali Six Roads,
Navarangpura, Ahmedabad

Sub: Approval of the TORs for Cumulative Impact Assessment studies to be undertaken by the APSEZL-regarding

Ref: (1) Letters No: F.NO.10-47/2008-IA-III dated 30th September, 2013addressed to the Principal Secretary, Forests and Environment Department, Government of Gujarat, and Chairman, GCZMA received from the Ministry of Environment and Forests, Government of India

(2) Minutes of the meeting of 23rd GCZMA meeting

Dear Sir,

Based on various complaint/representation received about violations of the CRZ Notification 2011 and Environmental Clearances conditions by the APSEZL, the MOEF, GOI constituted a five member committee under Chairperson of Smt Sunia Narain, CSE, Delhi to make site visit and to conduct inspection and submit the report to the MOEF, GOI. The above said Committee visited the site and submitted its report to MOEF, GOI on 18-04-2013 with various recommendations.

After detailed examination of the recommendations made by the committee and response submitted by the APSEZL, the MOEF, GOI has accepted the recommendations of the Committee. Now based on the recommendations made by the Committee in its report, the MOEF, GOI vide its letter dated 30th September, 2013 has requested State Government and Gujarat Coastal Zone Management Authority to take

various actions including to guide and supervise the Cumulative Impact Assessment studies to be undertaken by the APSEZL for the project already granted so that future developments can be assessed for clearance based on cumulative impacts. Accordingly, the APSEZL was requested to submit draft TORs. The APSEZL submitted draft TORs.

The matter was discussed in the 11th and 12th Technical Committee meetings , which were held on 17-05-2014, and 21-07-2014 and the APSEZL was requested to submit details about detailed methodology to be adopted for each components to be included in CEIA alongewith locations, time frame, various models to be used for Air , water, Soil, flora , fauna and marine environment, hydrology of the area(River, Nallah etc), Biodiversity(Each parts should be elaborated) and Socioeconomic study. It was also suggested to come out with certain crucial parameter(like PHCs, DO, Heavy metals etc) to be included in the study. It would be useful to consider the impact of disposal of sewage from the Mundra Town to identify the future impacts on the region. It was also decided to call detailed draft TORs as per above discussion. The matter was discussed in the 23rd GCZMA meeting, which was held on 16-10-2014 and it was decided to approve TORs as discussed during Technical Committee's meetings.

Considering the decision of GCZMA, the State Government hereby approves TORs for Cumulative Impact Assessment studies to be undertaken by the APSEZL as follows:

Following components would be included as part of CEIA:

- Effects on ambient conditions such as the incremental contribution of pollutant emissions in an air shed
- Increases in pollutant concentrations in a water body or in the soil or sediments, or their bioaccumulation
- Reduction of water flow in a watershed due to multiple withdrawals
- Increases in sediment loads on a watershed or increased erosion.
- Interference with migratory routes or wildlife movement.

- Secondary or induced social impacts, such as in-migration, or more traffic congestion and accidents along community roadways owing to increases in transport activity in a project's area of influence.
- Coastal erosion and hydrodynamic aspects
- Disturbances to the coastal eco-system and mud-flats
- Regional ecological and biodiversity aspects
- Natural steams and storm water runoff
- Fresh water resources (quality and quantity)
- Ground water resources (quality and quantity)
- Sea water ingression and salinity issues
- Regional air quality impacts
- Regional traffic scenarios
- Solid and hazardous waste disposal aspects
- Fishing and horticulture aspects
- Socioeconomic impacts
- Studies about the biodiversity, Oil Spill, Hazardous Chemical Handling Plan, Offsite an Onsite emergency Plan shall have to be incorporated.
- Long-term Plan and Short term plan shall also be prepared.

All existing facilities developed within 10 km radius would be considered for the study.

The following areas and period for study would be considered for CEIA:

- For Air quality monitoring boundaries will be 10Km from APSEZ area.
- For Water quality monitoring boundaries will be decided after the study of watershed in the APSEZ area.
- For marine monitoring the boundaries will be 12 Nautical Miles from the APSEZ area
- For socioeconomic study administrative boundaries of Mundra Taluka, Mandvi Taluka and some villages from Anjar Taluka will be considered

- Pre development status and development till next **15 years** will be considered as part of proposed cumulative impact assessment.
- Impact scenarios after 5 years, 10 years and 15 years will be predicted.

The APSEZL has obtained several clearances based on various EIA reports prepared, which could be used for identification of future impacts based on the collection of present data and using models for prediction impacts and comparing with present data , which could established the usefulness of models to be used for future predictions of impacts.

It is also suggested to include the number of locations to be used for CEIA and Impacts on marine biota including the mangroves in the region and terrestrial flora and fauna of the region.

As a part of the Regional Economic Development, the APSEZL may include Economic and Social study, longitivity etc. The Health study may include the Occupational changes /health profiles of villagers.

The APSEZL shall submit compliance report to the GCZMA/ MOEF&CC, GOI along with outcomes of all study reports with negative and positive impacts

Thanking You

Yours sincerely,

(Hardik Shah)

ANNEXURE – 13

IN THE HIGH COURT OF GUJARAT AT AHMEDABAD

WRIT PETITION (PIL) NO. 12 of 2011

FOR APPROVAL AND SIGNATURE:

HONOURABLE THE ACTING CHIEF JUSTICE MR. VIJAY MANOHAR SAHAI

and

HONOURABLE MR.JUSTICE R.P.DHOLARIA

==========

1 Whether Reporters of Local Papers may be allowed to see the judgment ?

2 To be referred to the Reporter or not ?

3 Whether their Lordships wish to see the fair copy of the judgment ?

4 Whether this case involves a substantial question of law as to the interpretation of the Constitution of India or any order made thereunder ?

==========

KHETI VIKAS SEVA TRUST THROUGH ITS OFFICE BEARERS - NARAN & 2....Applicant(s)

Versus

STATE OF GUJARAT & 5....Opponent(s)

==========

Appearance:

MR SIRAJ R GORI, ADVOCATE for the Applicant(s) No. 1 - 3

MR PARTH BHATT, AGP for the Opponent(s) No. 1 , 3

MS DHARMISHTA RAVAL, ADVOCATE for the Opponent(s) No. 2

MR MIHIR THAKORE, SENIOR ADVOCATE assisted by MR ABHISHEK MEHTA AND MR VIVAN SHAH FOR M/S TRIVEDI & GUPTA, ADVOCATE for the Opponent(s) No. 4

to the respondent-company and they have developed the area pursuant to such Environmental Clearance and allotment of lands. The committee constituted by the Ministry of Environment and Forests (MoEF), New Delhi to look into the complaints regarding severe impact upon environment safety and integrity committed by M/s.Adani Port and SEZ Ltd has submitted its detailed report with recommendation to the Government of India and the same is under consideration of the competent authorities. In view of the aforesaid observations made by the committee, we are convinced that no directions is required to be issued in the matter and the complaint and grievance raised by the petitioner appears to be misplaced.

65. In view of the aforesaid discussion, we do not find any merit in this writ petition. This writ petition fails and is accordingly dismissed. No order as to cost.

(V.M.SAHAI, ACJ.)

(R.P.DHOLARIA,J.)

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ANNEXURE – 14

Details of various Initiatives taken by Adani Foundation for betterment of livelihood of fishermen at Mundra

#	Name of Scheme	Brief	No of beneficiaries	Amount (Rs. in Lacs)
Following initiatives carried out by Adani Foundation are directly related to the betterment of fishermen livelihood.				
1	**Machhimar Sadhan Sahay Yojana**	Fishing material support was provided by AF at Mundra as per the requests of Pagadiya fishermen. According to their needs, fishing nets, ropes, buoys, ice boxes, crates, weighing scales, anchors, solar lights etc., were provided. Before these provisions were made available, fisher-folk had to buy materials from traders which were very expensive for them. In order to survive professionally, they needed the materials and would try to buy them with borrowed money, eventually suffering from debts.	2600	22.84
2	**Machhimar Kaushalya Vardhan Yojana**	Apart from providing formal education special programs to enhance youth employability was also taken up. Based on need assessment a number of trades were introduced through the Adani Skill Development Centre in Mundra, where in fisher folk youth could join and get a number of technical and non-technical training.	113	32.6
3	**Safety fisher-folk community**	Distance Alarm Transmission System – DATS' project was introduced in order to promote safety of the fishermen. Forced to be at sea to earn their livelihood puts the lives of many fishermen at risk. AF at Mundra introduced this unique concept for their safety	50	0.5
4	**Machhimar Ajivika Uparjan Yojana**	During the non-fishing months, the fishermen under usual circumstances were benefited by other alternate economic activity to sustain them. Under such cases due to the paucity of their available funds and resources, it became extremely difficult for a majority of them to survive. Looking at the miseries the Foundation introduced 'mangrove plantation' in the area as a means of alternate income generating activity for the fisher folk community during the non-fishing months. Both men and women from the communities received trainings on Cheriya Plantation, moss cleaning etc. required for mangrove plantation. The program again was developed holistically, where focus was not only given on income generation but this initiative was seen as an important means to ensure environment sustainability.	600	91.77
In addition to the above mentioned initiatives, Adani Foundation is also providing viarous other supports in other dimentions such as Infrastructure Development, Community Health and Education support. Details of the same are mentioned below.				
5	**Machhimar Awas Yojana**	Fishermen stayed at vasahat/settlement at sea shore in gunny bag shanties in hot sun, wild winds and harsh winters. Participatory and consultative process with residents chose a special design of foldable housing. At Bandar: A project titled 'Home Sweet Home' made possible appropriate shelters for the fishermen who reside near the coastline all year round except the rainy season. Shelters, equipped with basic facilities of a toilet and pure drinking water have been constructed for living while fishing and to provide a healthy and hygienic residence. Total 250 shelters at Juna Bandar and Luni Bandar	1250	137
6	**Sughad Yojana**	Toilets for men and women are constructed at all three Vasahats. Infrastructure was accompanied with continuous awareness campaign on hygiene sanitation and use of toilets in particular.Total 117 Toilets constructed.	2350	42
7	**Machhimar Akshay kiran Yojana**	Solar street lights at each settlement have been installed. For fish landing shed and school extension room have been fitted with solar invertor allowing late evening video shows for awareness and fish sorting work at ease. 119 Solar Lights are installed	2350	51.46
8	**Machhimar Sugam Path Yojana**	Fishermen used to have problems of traveling from Vasahat to the village. To solve this issue and facilitate travel route, approach roads were constructed to Vasahat. As per requirement, GSB road, earthen road, metal road etc., were provided and a 13.7 Km approach road was constructed at Juna Bandar, During Development of SEZ area, Special and dedicated approach for fisherman has been constructed at necessary places. The approaches are regularly being used by fisherman for travelling to the respective Bandars.Total length of the same is 23.00 Kms	2350	637

9	**Machhimar Shudhh Jal Yojana**	This scheme of providing potable water has helped in reducing the drudgery of women and contributed largely towards general wellbeing. Water to the community - daily 85,000 ltr water is supplied at different settlements	3450	45
10	**Machhimar Vadil Swasthaya Yojana**	This project is for senior citizen popularly known as Vadil Swasthya Yojana and till date 280 senior citizens from Fisher folk community are enrolled in the scheme and getting cash less medical services upto Rs.50,000 for three years.	1400	29.33
11	**Machhimar Swasthaya Yojana**	The Fisher folk communities are disposed to several water and air abided diseased due to exposure to unhygienic working conditions. Frequently Special Health care Camps are organized at Vasahat. Our Mobile health care unit van regularly visit fisher folk settlements.	10382	8.22
12	**Machimar Vidya Deep Yojana**	A great amount of effort was put in developing school preparedness programs by empowering 'Balwadis' at Fisherfolk settlements. The Balvadi workers were given specific trainings to work with the children so that same could be inculcated in them. Mother's involvement in the local bodies was highly appreciated and made use of. Under the Machhimar Vidya Deep Yojana, Adani Foundation constructed four balwadis at different settlement for kids between 2.5 years to 5 years age. The program is inclusive of nutritious food, awareness on health, hygiene, cleanliness, discipline, regularity and development of basic age appropriate conceptions.	144	38.34
13	**Machimar Vidya Sahay Yojana**	All the basic and education supportive facilities have been created to promote education in fisher folk community i.e. cycle support, scholarship support, fee support etc	360	16.63

ANNEXURE – 15

F. No. 10-47/2008-IA-III
Government of India
Ministry of Environment, Forest and Climate Change
(IA – III Division)

To

Dated: 18th September, 2015

M/s Adani Port and SEZ Ltd
Adani House, Near Mithakhali Six Roads,
Navarangpura, Ahmedabad,
Gujarat- 380 009.

ORDER

Subject: **Order on the Show Cause Notices dated 15.12.2010 and 30.09.2013 issued for alleged violations –Reg.**

Reference: (i) Show Cause Notice dated 15.12.2010 issued to M/s Adani Port and SEZ Limited (Formerly Mundra Port and SEZ Limited); and

(ii) Show Cause Notice dated 30.09.2013 issued to M/s Adani Port and SEZ Limited and Gujarat Maritime Board

Whereas, Ministry had granted Environment and CRZ clearance on 12.01.2009 to M/s Adani Port and SEZ Limited (Formerly Mundra Port and SEZ Limited) for the development of Port facilities at Mundra, District Kutch, Gujarat.

2. Whereas, on representation from Shri Bharat Patel, General Secretary, Machchhi Mar Adhikar Sangarsh Sangathan, Ministry conducted a site inspection on 06-07th December, 2010. The Site inspection revealed certain violations related to construction of airport, township, and hospital and destruction of mangroves. On 15.12.2010, a Show Cause Notice was issued to the project authorities followed by a direction on 23rd February, 2011 to project authorities not to undertake any reclamation activity and not to initiate any new construction work in the CRZ area.

3. Whereas, Kheti Vikas Sewa Trust filed PIL No. 12 of 2011 in the High Court of Gujarat alleging violation of Environment / CRZ Clearance by M/s Adani Port and SEZ Limited. Hon'ble High Court passed an order directing inquiry into the alleged destruction of mangroves by project authorities and imposed stay on development works. The inquiry was conducted by a Committee comprising Member Secretary, Gujarat Coastal Zone Management Authority (GCZMA) and PCCF, Gujarat. Based on the report of the Committee, the Hon'ble High Court passed an interim order according to which project authority was permitted to carry out development activities in certain portions of the project areas. The areas in which work could be carried out and the prohibited areas had been marked on a map, mentioned in the Hon'ble High Court order.

4. Whereas, in the affidavit filed by the Ministry in the Hon'ble High Court of Gujarat, it was submitted that 'the issues related to destruction of mangroves, shore-line changes due to

reclamation, seismic/tsunami events, socio-economic implications etc. need to be examined by a multi –disciplinary committee of experts /relevant institutions.'

5. Whereas, complaints from Kheti Vikas Sewa Trust had also been received directly in the Ministry regarding impact on environment by the project activities of M/s Adani Port and SEZ Ltd.

6. Whereas, in view of the seriousness of the issues involved in the matter, Ministry constituted a five member Committee to make a site visit, to conduct an inspection and submit the report to MoEF.

7. Whereas, the Committee submitted its report on 18.04.2013 with various recommendations.

8. Whereas, M/s Adani Port and SEZ Ltd. had submitted its response / action plan on the recommendations of the report.

9. Whereas, Ministry after detailed examination of the recommendations made by the committee, response submitted by M/s Adani Port and SEZ Ltd., and has accepted the recommendations of the Committee.

10. Accordingly, the Ministry had issued Show Cause Notice with the following direction on 30.09.2013 under Section 5 of the Environment (Protection) Act, 1986:

(i) North Port area and Bochha Island should be declared as conservation zone and that the area should be protected. All the creeks, water bodies and reclaimed land should be restored and brought back to pre- 2005 status within six months.
(ii) Submit details of the airstrip/ aerodrome including the location with coordinates, facilities, dimensions etc. along with the details of clearances obtained.
(iii) Ensure that all the projects constructed within the SEZ should possess EC under EIA Notification, 2006 as applicable. The details shall be submitted.
(iv) Prepare a specific action plan to protect the livelihood of fishermen whose marine ecology, and catch and access to the sea have been seriously affected by the violations committed by the Project Proponent within six months with a specific plan for fishermen, their access and protection of their livelihood. The plan should include a clear schedule of implementation and monitoring. Further, APSEZ Ltd shall provide necessary support for the development of exclusive fishing harbour as Badreshwar.
(v) Carry out Cumulative Impact Assessment studies under the supervision of the State Government for the projects already granted so that future developments can be assessed for clearance based on cumulative impacts. Shall submit proposed ToRs for the approval of MoEF through State Environment Department.
(vi) Shall consider the voluntary return of Gauchar or village common land and also invest in improving productivity of this land with villagers.
(vii) APSEZ Ltd shall submit Disaster Management Plan of the different projects to the State Government so as to enable the State Government to put in place a District Disaster Management Plan to ensure human safety in and around the project area.
(viii) As a deterrent for non-compliance and violations, APSEZ Ltd shall set up an Environment Restoration fund- distinct and separate from CSR activities under Company Law- amounting to Rs. 200 crores or 1% of project cost, whichever is

higher, to be used for remediation of environmental damage in Mundra. The Fund will be operated under the Chairmanship of Secretary E&F, and will include following activities as enumerated by the Committee.

(a) Protection of marine ecology;
(b) Protection and conservation of mangroves, including development of new mangrove conservation areas;
(c) Restoration and conservation of creeks;
(d) Independent studies and monitoring of the entire project areas, including cumulative impacts and public data disclosure systems.
(e) Social infrastructure and livelihood support for fishers community, including development of access of fishers from their temporary settlements to villages".

11. Whereas, it was also decided to keep the clearance granted to North Port in abeyance pending decision on the Show Cause Notice and further directed to maintain status quo ante for any constructions/development in the North Port site.

12. Whereas, Gujarat Maritime Board (GMB) was found to be in legal possession of some of the land in the project area of M/s APSEZ Ltd and as well as having operation in the area surrounding to that of M/s APSEZ Ltd, the of GMB was also issued Show Cause Notice on 30.09.2013.

13. Whereas, the comments and responses from Gujarat Maritime Board and GCZMA were also received on the relevant issues including upon the responses and action plan submitted by M/s APSEZ Ltd.

14. **Analysis of the responses of Project Proponent on the issues raised in SCN dated 30.09.2013:**

Issue (i): North Port area and Bochha Island should be declared as conservation zone and the area should be protected. All the creeks, water bodies and reclaimed land in these areas should be restored and brought back to pre- 2005 status within six months.

Response of APSEZL, Project Proponent(PP)

APSEZL has informed that North Port area is not in their possession. APSEZL has committed to conserve 88 ha of mangrove area of Bocha Island as per the EIA studies carried out by NIO in terms of EC dated 12/19.1.2009 for Waterfront Development Project.

Response of GMB with respect to Show Cause Notice issued to them on 30.09.2013:

Bocha Island, Bocha creek and surrounding creek-lets are extensively used by Fishermen which necessitate maintenance dredging from time to time. It would be unwise to do restoration for those stray mangroves which did not exist prior to 1980 since fish production in this area has increased. However, for restoration of the same stray mangroves, it is advisable to carry out Environmental Impact Assessment Studies through a nationally reputed institute and under their guidance, restoration activities can be carried out as the area falls in CRZ.

Total area of 1114 acres of land acquired for port development, consists of (a) Bocha Island admeasuring 718 acres and (b) the adjoining land admeasuring 396 acres under reference. Out of 718 acres of area, around 211 acres (88 Ha) of area is mangrove conservation area for Adani Ports and SEZ Ltd. GMB has proposed that the remaining area of approximately 500 acres for mangrove afforestation be declared as conservation area and suggested that existing 396 acres of

land may be utilized for permissible activities for port after securing fresh Environment and CRZ clearance.

Analysis
GMB has not committed on restoration of creeks and asked the Ministry to commence a scientific study. Request of GMB to utilize 396 acres is not accepted since it may add load / impact on the Bocha Island.
In order to maintain the existing creeks systems and mangroves, a comprehensive and integrated conservation plan including detailed bathymetry study and protection of creeks/ mangrove area including buffer zone, mapping of co-ordinates, running length, HTL, CRZ boundary should be put in place. The plan should take note of all the conditions of approvals granted to all the project proponents in this area e.g. the reported case of disappearance of mangroves near Navinal creek. The preservation of entire area to maintain the fragile ecological condition should be a part of the plan in relation to the creeks, mangrove conservation and conservation of Bocha Island upto Baradimata and others. Bocha Island, ecologically sensitive geomorphological features and areas in the island and creeks around the Island should be declared as conservation zone.

NCSCM should prepare the plan in consultation with NIOT, PP and GCZMA. The plan should be financed by the PP. The implementation should be carried out by GCZMA. The monitoring of the implementation should be carried by NCSCM

Issue (ii): **Details of the airstrip/ aerodrome including the location with coordinates, facilities, dimensions etc. along with the details of clearances obtained**

Response of PP
PP submitted details on the airstrip/aerodrome including the location with coordinates, facilities, dimensions etc. along with the details of clearances obtained.

Analysis
This relates to the SEZ project and hence was dealt separately.

Issue (iii): **Ensure that all the projects constructed within the SEZ should possess EC under EIA Notification, 2006 as applicable. The details shall be submitted.**

Response of PP
PP has submitted the details of projects and the documents in support of requirement of approvals including EC, wherever necessary.

Analysis
The issue of clearance to SEZ along with connected court matters were dealt separately.

Issue (iv) **Prepare a specific action plan to protect the livelihood of fishermen whose marine ecology, and catch and access to the sea have been seriously affected by the violations committed by the Project Proponent within six months with a specific plan for fishermen, their access and protection of their livelihood. The plan should include a clear schedule of implementation and monitoring. Further, APSEZ Ltd shall provide necessary support for the development of exclusive fishing harbour as Badreshwar.**

Response of PP

APSEZ has informed that it never restricted or created any hindrance to any authorized fishermen for approaching the sea for their fishing related activities and has provided specific approach corridors for fishermen movement through their area. Additionally, PP has been working with all the fishermen groups in Mundra for providing them livelihood support for their socio-economic upliftment, healthcare, education and infrastructure facilities

Analysis

PP has not submitted specific action plan as sought. PP has submitted only the details of the approach corridors developed for fishermen along with the year of construction and cost. PP has stated that they are working with all fishermen groups in Mundra for providing them livelihood support for their Socio- economic upliftment. PP should submit specific action plan to protect the livelihood of fishermen along with budget.

Issue (v) **Shall consider the voluntary return of Gauchar or village common land and also invest in improving productivity of this land with villagers.**

Response of PP

After discussion with local people of Zarpara village, APSEZ has voluntarily given back approx. 400 acres of land to Zarpara village for gauchar purpose, in spite of the fact that the Hon'ble Supreme Court of India has dismissed the appeal of villagers challenging the allotment of Gauchar land. APSEZ will always eager to help them in the best possible manner. APSEZ will consider the suggestion and do the needful.

Analysis

Since PP agreed to the recommendation, time limit may be specified to comply.

Issue (vi) **APSEZ Ltd shall submit Disaster Management Plan of the different projects to the State Government so as to enable the State Government to put in place a District Disaster Management Plan to ensure human safety in and around the project area.**

Response of PP

APSEZ has already prepared Disaster Management Plan which has been already submitted to State Disaster Management Authority.

Analysis: None

Issue(vii) **As a deterrent for non-compliance and violations, APSEZ Ltd shall set up an Environment Restoration fund- distinct and separate from CSR activities under Company Law- amounting to Rs. 200 crores or 1% of project cost, whichever is higher, to be used for remediation of environmental damage in Mundra**

Response of PP

There is no non-compliance or violation of the terms of the environmental clearance dated 12/19.1.2009. Therefore, PP has requested that the Ministry should reconsider the setup of environmental restoration fund for an amount of Rs.200 crores which has been subjectively arrived at. PP has spent substantial amount in various activities for socio environment development.

PP requested for substantial reduction in the amount of development fund keeping in mind their CSR contributions as well as the challenge faced by the infrastructure sector in the current

economic scenario. PP is open to suggestions of any concrete projects and proposals which may meet the objects and purpose of environment and well-being of people at large.

Analysis
The Multi-disciplinary Committee apart from violation on North Port area, has pointed out degradation in the mangrove conservation area near the lighthouse at the South port.

Further, the High Court of Gujarat in PIL 12 of 2011, based on the site visit report by a Committee, imposed stay on carrying construction in certain area near south port. The case is pending.

In view of the above, it can be concluded that the response of the PP that 'there is no non-compliance or violation of the terms of EC' is incorrect. The violations of specific condition of all the ECs and CRZ clearance, should be proceeded with the provision of EP Act, 1986 independently.

The existing legal provisions under the Environment (Protection) Act, 1986 do not provide for any authority to impose ERF by the Government.

Analysis of the issue raised in SCN dated 15.12.2010: Location of Samundra / Sterling with respect to CRZ based on the earlier observation by MoEF site visit.

Analysis
The GCZMA was asked for reassessment of the matter relating to location of Samundra township/sterling hospital with respect to CRZ boundary.
According to report of GCZMA dated 13.2.2014, a Committee was constituted consisting GCZMA, Director, BISAG, Gandhinagar, Officer from Space Application Centre, ISRO, Ahmedabad, District Inspector of Land Record, Collector, Kutch, Town Planning Officer, Kutch, to review and make reassessment of the matter relating to Samudra Township/ Sterling hospital. The Committee made site visits, collected coordinates, prepared map in 1: 2000 scale and overlapped on CRZ map prepared by CESS by DILR. The report of the committee was discussed in the Gujarat CZMA meeting which decided to forward it to MoEF.
It is noted that the township and Hospital were located beyond CRZ boundary.

Analysis of other recommendations of the Committee:

(i) Carry out Cumulative Impact Assessment studies under the supervision of the State Government for the projects already granted so that future developments can be assessed for clearance based on cumulative impacts. Shall submit proposed ToRs for the approval of MoEF through State Environment Department.

It was recommended that the State Government shall guide and supervise the Cumulative Impact Assessment studies to be undertaken by the APSEZL for the project already granted so that future developments can be assessed for clearance based on cumulative impacts.
According to the Director, Environment, GOG, the Committee constituted to finalize the action plan and modalities of the Environmental Restoration Fund including GMB will supervise the Cumulative Impact Assessment studies. Draft TORs would be asked from APSEZL to examine and finalised the same after including suggestions of the Committee.

(ii) There is a need to create a monitoring system to ensure that corrective action suggested by this report is taken within a time-bound manner

It was recommended to set up a joint monitoring committee of GCZMA, GPCB and RO Bhopal to carry out monitoring of development / compliance of the conditions and directions for two years. GCZMA replied vide letter dated 24.12.2013 that it was decided to constitute the committee as suggested.

15. In having taken note of the entire facts of the case as elaborated above, the following directions are issued:

i. *The proposal of extension of the validity of Environmental clearance granted to the North Port vide letter dated 12.1.2009 will be considered separately at a later stage.*

ii. *Bocha Island, ecologically sensitive geomorphological features and areas in the Island and creeks around the Island will be declared as conservation zone and action plan for its conservation must be prepared. M/s APSEZ should provide necessary financial assistance for this purpose.*

iii. *The violations of specific condition of all the ECs and CRZ clearances, if any, will be examined and proceeded with the provision of EP Act, 1986 independently.*

iv. *A comprehensive and integrated conservation plan including detailed bathymetry study and protection of creeks/ mangrove area including buffer zone, mapping of co-ordinates, running length, HTL, CRZ boundary will be put in place. The plan will take note of all the conditions of approvals granted to all the project proponents in this area e.g. the reported case of disappearance of mangroves near Navinal creek. The preservation of entire area to maintain the fragile ecological condition will be a part of the plan in relation to the creeks, mangrove conservation and conservation of Bocha Island up to Baradimata and others.*

v. *NCSCM will prepare the plan in consultation with NIOT, PP and GCZMA. In recognition of the fact that the existing legal provisions under the E(P) Act 1986 do not provide for any authority to impose ERF by the Government, the plan will be financed by the PP. The implementation will be carried out by GCZMA. The monitoring of the implementation will be carried by NCSCM.*

vi. *There will be no development in the area restricted by the High Court of Gujarat. APSEZ shall abide by the outcome of the PIL 12 of 2011 and other relevant cases.*

vii. *APSEZ will submit specific action plan to protect the livelihood of fishermen along with budget.*

viii. *APSEZ will voluntarily return the grazing land, if any, in their possession.*

ix. *A regional strategic impact assessment report with a special focus on Mundra region will also be prepared. The cost towards these studies will also be borne by the PP.*

x. *In the subject matter of thermal power plant, the proposed regional strategic impact assessment analysis will take in to account salinity aspect along with its potential environmental impact to suggest future corrective actions as well as the guiding tool on extension and addition of the capacities.*

16. The show –cause notices to the APSEZL are disposed of.

(Bishwanath Sinha)
Joint Secretary
18/09/2015

Copy to

1. The Principal Secretary, Forests and Environment Department, Government of Gujarat, Sachivalaya, Gandhinagar– 382010, Gujarat
2. The Chairman, Gujarat Coastal Zone Management Authority & Principal Secretary, Forests and Environment Department, Government of Gujarat, Sachivalaya, Gandhinagar– 382010, Gujarat
3. Gujarat Maritime Board, GMB Head Quarters, Sector 10-A, Gandhinagar - 382 010, Gujarat

ANNEXURE – 16

adani™

23rd May 2016

The Joint Secretary – IA.III
Ministry of Environment, Forests and Climate Change,
Government of India,
Indira Paryavaran Bhawan,
Jor Bagh Road,
New Delhi – 110 003.

Subject: Condition (iv), (v) and (vi) under specific condition imposed as part of the Environmental / CRZ clearance for the Multi Product SEZ and desalination project at Mundra

Reference: EC & CRZ clearance dated 15.7.2014 to Multi-Produce SEZ at Mundra

Dear Sir,

We refer to the specific condition nos. (iv), (v) and (vi) in the EC & CRZ clearance dated 15.7.2014 granted to Multi-Product SEZ at Mundra (copy attached as **Annexure - 1**) and would like to submit as under.

The Ministry appointed a committee headed by Ms. Sunita Narain for inspection of M/s. Adani Ports and SEZ Ltd, Mundra. The committee submitted its report and the Ministry issued a show cause notice dated 30.9.2013 (copy attached as **Annexure - 2**).

In the said show cause notice dated 30.9.2013, it was stated that "*North Port area and Bocha Island should be declared as conservation zone and the area should be protected. All the creeks, water bodies and reclaimed land in these areas should be restored and brought back to pre- 2005 status within six months*".

While the said show cause notice dated 30.9.2013 was pending for adjudication, the EC & CRZ clearance dated 15.7.2014 was granted to Multi-Product SEZ at Mundra, inter alia, on the following specific conditions, amongst others.

"(iv) Bring the creeks to the condition as was seen in the satellite map of 2005 which will be a "reference" satellite map and a copy of which shall be sent to you separately.

(v) Submit once in a year latest satellite map which can be compared with the reference satellite map of 2005 to ensure that no modification in the creeks, rivers, mangroves and mouth of creeks has taken place.

(vi) Any direction issued by the MoEF with respect to the report submitted by Ms. Sunita Narain Committee shall be complied with by the Proponent as applicable."

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As is evident, the aforesaid conditions were imposed in the said EC & CRZ clearance dated 15.7.2014 because of the pendency of the same issue for consideration with the Ministry at the relevant time. Subsequently, the Ministry adjudicated the show cause notice and passed final order dated 18.9.2015 (copy attached as **Annexure - 3**) whereby it issued certain directions and disposed of the said show cause notice dated 30.9.2013.

In respect to the issue of restoring all the creeks, water bodies and reclaimed land in these areas and bringing back it to pre-2005 status within six months, the Ministry has passed the following directions in its order dated 18.9.2015.

iv. A comprehensive and integrated conservation plan including detailed bathymetry study and protection of creeks/mangrove area including buffer zone, mapping of co-ordinates, running length, HTL, CRZ boundary should be put in place...

v. NCSCM will prepare the plan in consultation with NIOT, PP and GCZMA. In recognition of the fact that the existing legal provisions under the E(P) Act 1986 do not provide for any authority to impose ERF by the Government, the plan should be financed by PP. The implementation should be carried out by GCZMA. The monitoring of the implementation should be carried by NCSCM.

The Ministry has now adjudicated the issue of restoring all the creeks, water bodies and reclaimed land in these areas and bringing back it to pre-2005 status in terms of its final order dated 18.9.2015 as above and thus, any conditions in respect of bringing the creeks and water bodies area at Mundra back to pre-2005 condition, including that in the EC & CRZ clearance dated 15.7.2014, should be consistent with the final order dated 18.9.2015 of the Ministry in this regard.

In view of the above and also the condition no (vi) of the EC & CRZ clearance dated 15.7.2014, we humbly state and submit that the special condition nos. (iv) and (v) of the EC & CRZ clearance dated 15.7.2014 granted to Multi-Product SEZ at Mundra have become redundant and are not required to be complied with.

Kindly acknowledge receipt of this letter.

Thanking you.

Shalin Shah
Head, Environment

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Annexure - 1

F. No. 10-138/2008-IA.III
Government of India
Ministry of Environment & Forests

Paryavaran Bhawan,
CGO Complex, Lodhi Road,
New Delhi - 110 003.

Dated: July 15, 2014

To
M/s Adani Port and SEZ Ltd
Adani House, Near Mithakhali Six Roads,
Navarangpura, Ahmedabad,
Gujarat- 380 009.

Subject: EC for proposed Multi- Product SEZ and CRZ clearance for Desalination, sea water intake, outfall facility and pipeline, at Mundra by M/s Adani Port and SEZ Ltd. – Reg.

This has reference to letter No. ENV-10-2010-1601-E dated 27.03.2012 of the Director (Environment) & Additional Secretary, Govt. of Gujarat and your subsequent letters dated 10.05.2012, 14.05.2012, 26.05.2012 and 29.04.2013 seeking prior Environmental and CRZ Clearance for the above project under the EIA Notification, 2006 and Coastal Regulation Zone Notification, 2011. The proposal has been appraised as per prescribed procedure in the light of provisions under the EIA Notification, 2006 and the Coastal Regulation Zone Notification, 2011 on the basis of the mandatory documents enclosed with the application viz., the Questionnaire, EIA, EMP, recommendations of the State Coastal Zone Management Authority and the additional clarifications furnished in response to the observations of the Expert Appraisal Committee constituted by the competent authority in its meetings held on 16th –17th April, 2012, 4th –5th June, 2012 and 9th -10th July, 2012.

2. It is, interalia, noted that the project involves development of multi product SEZ on a plot area of 18,000 ha. of which 6641.2784 ha. is presently notified under Special Economic Zone (SEZ). As per the proponent, the Multi product SEZ at Mundra comprising of various processing zones, non-processing zones, warehousing zones, Road Network (trunk as well as internal), Bridges or culverts over natural drains, Rail Network, IT-Telecommunication network, Electrical Network, Water supply, conservation & drainage Network, Effluent collection network, Desalination Plant with proposed intake & outfall locations, Common Effluent Treatment Plants & Sewage Treatment Plants, Natural Gas line network, Social Infrastructure, Existing Airstrip, Municipal Solid Waste Disposal site, utilities & supporting infrastructure etc. For the first phase of development total water requirement will be 150 MLD. Power requirement will be approx. 360 MW. Desalination plant of 150 MLD output capacity is proposed. 11 MLD water will be sourced through Narmada water pipeline. Two CETP each of capacity 50 MLD and 17 MLD as well as STP of 62 MLD is proposed. This will require 375 MLD of seawater intake and 241 MLD of treated waste water outfall into the sea. For final phase of development total water requirement will be 450 MLD and power requirement will be approx. 1000 MW.

3. A suitable seawater intake point has been identified on the eastern end of the approved East Port Basin at Latitude 22°48'30.76"N; Longitude 69°46'34.06"E where a depth of 6 m below CD would be available after the port development. As per modelling study the combined discharge of 241MLD which includes 16MLD from CETP and 225 MLD from desalination plant as RO reject is expected having 57.57ppt of salinity, 14.41 mg / l of BOD and 94.39 mg/l of COD. After careful consideration of many aspects a suitable outfall location is identified on the west of the Eastern basin at Latitude 22°46'44.04"N; Longitude 69°45'5.51"E taking advantage of the expected 7.5m below CD basin depth. The outfall pipe line length is approximately 5.7 km and diffuser designed to attain a minimum dilution of 40-50 times.

4. The Centre for Earth Science Studies demarcated HTL, LTL and CRZ area. As per the CESS report and GCZMA, out of 6641.2784 ha of SEZ area, 1473.39 ha area falls within CRZ area. No SEZ industrial activity is proposed in the CRZ area. Only the Desalination plant pipeline for intake and outfall is proposed in CRZ areas. The Gujarat SCZMA in their 14th meeting held on 27-02-2012 considered the proposal of intake, outfall facilities, Desalination plant and laying pipeline and recommended the same vide their letter no.ENV-10-2010-1601-E dated 27th March 2012. Gujarat Pollution Control Board has granted Consent to Establishment of Marine outfall (NOC) vide letter dated 10.11.2011. The length of the intake will be approximately 5 Kms. As the sea water intake demand is 15000m3/h, drawal by pipe system is suitable by incorporating a wet well structure at the location. The intake point proposed is within the proposed East Port basin with a depth of 6 m below CD. The projected quantity of water can be transported through a single pipe of 1.3 m dia with a flow velocity of 3 m/ s or with a 1.6 m pipe with flow velocity of 2m/s.

5. The Expert Appraisal Committee, after due consideration of the relevant documents submitted by the project proponent and additional clarifications furnished in response to its observations, have recommended for the grant of Environment and CRZ Clearance for the SEZ in an area of 8481.2784 ha. However, SEZ for 1840 ha has been approved in principle by Ministry of Commerce and Industries.

6. Hon'ble High Court of Gujarat in WP No. 21 of 2013 vide order dated 13.01.2014 has directed that the Ministry to take a decision of its own so far as the issue of grant of environmental clearance is concerned considering the position prevailing as on date and also the aspects which have been highlighted by us in this judgment, within a period of thirty days from the date of this judgment without fail. Further, vide order dated 27.01.2014 Hon'ble Supreme Court in SLP No. 1526 of 2014 which was filed against the Order of High Court by the Respondent-1 has passed order that in case, the MOEF is unable to complete the process within the time stipulated by the High Court, it will be open for them to approach this Court for extension of time. Accordingly, Ministry has filed a petition before the Hon'ble Supreme Court seeking extension of two months time.

7. It is noted from the Judgement dated 13.01.2014 of Hon'ble High Court of Gujarat in PIL 21 of 2013 the Hon'ble Court has construed the grant of lease to units prior to

obtaining EC by M/s APSEZL as violation of EIA, Notification, 2006. Therefore, according to the OMs dated 12.12.2012 and 27.06.2013, PP was addressed for Board Resolution and the State Government was addressed to take credible action against the PP for the violation. Direction under Section 5 of E(P)Act, 1986 was also issued to APSEZ not to take up and allow any further construction activity within SEZ till the grant of clearance.

8. Further, Hon'ble Supreme Court video order dated 02.05.2014 in SLP 1526 of 2013 had ordered for stay of Ministry's letter dated 3.04.2014 addressed to Government of Gujarat to initiate legal action for the violation, also directed that the Ministry to complete the process of EC within eight weeks.

9. M/s APSEZ Ltd. has stated that the Board resolved that since the matter is sub-judice before the Hon'ble Supreme Court of India, will fully abide by the out come of the decision of the Hon'ble Supreme Court.

10. In view of the above and to comply with the orders of Hon'ble Courts, Ministry hereby accords necessary Environment Clearance for proposed Multi- Product SEZ in an area of 6641.2784 ha and CRZ clearance for desalination, seawater intake, outfall facility and pipeline for as per the provisions of Environmental Impact Assessment Notification – 2006 and its subsequent amendments and Coastal Regulation Zone Notification, 2011, subject to strict compliance of the terms and conditions as follows:

11. PART A - SPECIFIC CONDITIONS

(i) *PP shall abide by the final order/decision of Hon'ble Supreme Court in SLP (Civil) no. 1526/2014 and connected matters.*

(ii) *Properly conserve the creeks, river and the mangroves area in the area.*

(iii) *Ensure that mouths of all the creeks are kept open to ensure flushing of the creeks.*

(iv) *Bring the creeks to the condition as was seen in the satellite map of 2005 which will be a "reference" satellite map and a copy of which shall be sent to you separately.*

(v) *Submit once in a year latest satellite map which can be compared with the reference satellite map of 2005 to ensure that no modification in the creeks, rivers, mangroves and mouth of creeks have taken place.*

(vi) *Any direction issued by the MoEF with respect to the report submitted by Ms Sunita Narain Committee shall be complied with by the Proponent as applicable.*

(vii) *At its cost get Inspection study done once in a year by the organizations like NEERI or any organization approved by this Ministry to - (i) ensure compliance of all the EC conditions (ii) development of SEZ meeting of the environment norms, and (iii) advise any mid-term correction that can be introduced depending on the recommendation of the independent Third Party.*

(viii) "Consent for Establishment" for the SEZ shall be obtained from Gujarat Pollution Control Board under Air and Water Act and a copy shall be submitted to the Ministry before start of any construction work at the site.

(ix) PP shall get detailed bathymetry done for all the creeks and rivers within Port and SEZ areas along with mapping of co-ordinates, running length, HTL, CRZ boundary, mangrove areas including buffer zone through NCSCM / NIOT. PP shall also get prepared a detailed action plan for conservation and protection of creeks/ mangrove area etc through NCSCM / NIOT and submit the same to GCZMA for their examination and recommendation. GCZMA will submit its recommendations to MoEF for approval.

(x) PP shall demarcate the CRZ area on land with GPS coordinates in consultation with GCZMA/ the agency which has done the HTL/LTL demarcation for the area. There shall be no allotment of plot/s in CRZ area to industries. No industrial activity within CRZ area except the port and harbor & the foreshore facilities shall be allowed as committed

(xi) Till the approval of action plan for conservation and protection of creeks/ mangrove area, the CRZ area within SEZ shall be demarcated as "No Development Zone". PP shall not allow/ undertake any development in CRZ area of SEZ.

(xii) The implementation of action plan approved by the MoEF shall be monitored by the NCSCM/ NIOT. Compliance with action plan shall be submitted to GCZMA and to MoEF, RO. at Bhopal along with six monthly monitoring report.

(xiii) PP shall earmark separate budget for the implementation of the above action plan. The details of the expenditure shall be submitted to GCZMA and to MoEF, RO. at Bhopal along with six monthly monitoring report.

(xiv) All the industry in SEZ shall be connected through impervious drainage lines to the STP/ CETP for the discharge of their sewage or industrial effluent. There shall not be any discharge to creeks / rivers. PP shall be accountable for implementing this condition and necessary clause shall be incorporated in the MoU while allotting the plot to the individual industries

(xv) PP shall not carry out any river course modification.

(xvi) The individual industrial units shall obtain prior EC under EIA Notification, 2006 as applicable.

(xvii) Proponent shall identify 200 ha of land for mangrove plantation as per the condition laid by SEAC.

(xviii) 50 meter buffer from the existing mangrove area should be provided for any developmental activity,

(xix) *Proponent shell develop the green belt with 3 layers of canopy all along the periphery.*

(xx) *All the recommendation of the EMP shall be complied with in letter and spirit. All the mitigation measures submitted in the EIA report shall be prepared in a matrix format and the compliance for each mitigation plan shall be submitted to MoEF along with half yearly compliance report to MoEF-RO.*

(xxi) *There shall be no disturbance to the sand dunes. The pipelines shall be laid using advanced method viz. Horizontal Directional Drilling (HDD) so as to avoid disturbance to the sand dunes/ creeks/ mangroves.*

PART – B. GENERAL CONDITIONS

Construction Phase.

(i) *Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.*

(ii) *A First Aid Room will be provided in the project both during construction and operation of the project.*

(iii) *All the topsoil excavated during construction activities should be stored for use in horticulture/landscape development within the project site.*

(iv) *Disposal of muck during construction phase should not create any adverse effect on the neighbouring communities and be disposed, taking the necessary precautions for general safety and health aspects of people, only in approved sites with the approval of competent authority.*

(v) *Soil and ground water samples will be tested to ascertain that there is no threat to ground water quality by leaching of heavy metals and other toxic contaminants.*

(vi) *Construction spoils, including bituminous material and other hazardous materials, must not be allowed to contaminate watercourses and the dump sites for such material must be secured so that they should not leach into the ground water.*

(vii) *Any hazardous waste generated during construction phase should be disposed off as per applicable rules and norms with necessary approvals of the Gujarat Pollution Control Board.*

(viii) *The diesel generator sets to be used during construction phase should be low sulphur diesel type and should conform to Environment (Protection) Rules prescribed for air and noise emission standards.*

(ix) *The diesel required for operating DG sets shall be stored in underground tanks and if required, clearance from Chief Controller of Explosives shall be taken.*

(x) *Vehicles hired for bringing construction material to the site should be in good condition and should have a pollution check certificate and should conform to applicable air and noise emission standards and should be operated only during non-peak hours.*

(xi) *Ambient noise levels should conform to residential standards both during day and night. Incremental pollution loads on the ambient air and noise quality should be closely monitored during construction phase. Adequate measures should be made to reduce ambient air and noise level during construction phase, so as to conform to the stipulated standards by CPCB/GPCB.*

(xii) *Fly ash should be used as building material in the construction as per the provisions of Fly Ash Notification of September, 1999 and amended as on 27th August, 2003. (The above condition is applicable only if the project site is located within 100 Kms of Thermal Power Stations).*

(xiii) *Ready mixed concrete must be used in building construction.*

(xiv) *Storm water control and its re-use should be regulated as per CGWB and BIS standards for various applications.*

(xv) *Water demand during construction should be reduced by use of pre-mixed concrete, curing agents and other referred best practices.*

(xvi) *Permission to draw ground water shall be obtained from the competent Authority prior to construction/operation of the project.*

(xvii) *Separation of grey and black water should be done by the use of dual plumbing line for separation of grey and black water.*

(xviii) *Fixtures for showers, toilet flushing and drinking should be of low flow either by use of aerators or pressure reducing devices or sensor based control.*

(xix) *Use of glass may be reduced by upto 40% to reduce the electricity consumption and load on air-conditioning. If necessary, use high quality double glass with special reflective coating in windows.*

(xx) *Roof should meet prescriptive requirements as per Energy Conservation Building Code by using appropriate thermal insulation material to fulfill requirements.*

(xxi) *Opaque wall should meet prescriptive requirement as per Energy Conservation Building Code which is proposed to be mandatory for all airconditioned spaces while it is aspirational for non-airconditioned spaces by use of appropriate thermal insulation material to fulfil these requirement.*

(xxii) The approval of the competent authority shall be obtained for structural safety of the buildings due to earthquake, adequacy of fire fighting equipments, etc. as per National Building Code including protection measures from lightning etc.

(xxiii) Regular supervision of the above and other measures for monitoring should be in place all through the construction phase, so as to avoid disturbance to the surroundings.

(xxiv) Under the provisions of Environment (Protection) Act, 1986, legal action shall be initiated against the project proponent if it is found that construction of the project has been started without obtaining environmental clearance.

Operation Phase

(i) The PP while issuing the allotment letter to individual member units shall specifically mention the allowable maximum quantity of water usage and effluent generated by each member unit.

(ii) The PP shall establish an environmental monitoring cell with all the potential polluting units as members to review the environmental monitoring data and suggest improvements.

(iii) Treated affluent emanating from STP shall be recycled/reused to the maximum extent possible. Treatment of 100% grey water by decentralised treatment should be done. Discharge of unused treated affluent shall conform to the norms and standards of the Pollution Control Board. Necessary measures should be made to mitigate the odour problem from STP.

(iv) The solid waste generated should be properly collected and segregated. Wet garbage should be composted and dry / inert solid waste should be disposed off to the approved sites for land filling after recovering recyclable material.

(v) Diesel power generating sets proposed as source of back up power for elevators and common area illumination during operational phase should be of enclosed type and conform to rules made under the Environment (Protection) Act, 1986. The height of stack of DG sets should be equal to the height needed for the combined capacity of all proposed DG sets. Low sulphur diesel should be used. The location of the DG sets may be decided in consultation with the Gujarat Pollution Control Board.

(vi) Noise should be controlled to ensure that it does not exceed the prescribed standards. During night time the noise levels measured at the boundary of the building shall be restricted to the permissible levels to comply with the prevalent regulations.

(vii) Green belt of adequate width and density preferably with local species along the periphery of the plot shall be raised so as to provide protection against particulates and noise.

(viii) *Weep holes in the compound walls shall be provided to ensure natural drainage of rain water in the catchment area during the monsoon period.*

(ix) *Rain water harvesting for roof run- off and surface run- off, as plan submitted should be implemented.*

(x) *The ground water level and its quality should be monitored regularly in consultation with Central Ground Water Authority.*

(xi) *Traffic congestion near the entry and exit points from the roads adjoining the proposed project site must be avoided. Parking should be fully internalized and no public space should be utilized.*

(xii) *A Report on the energy conservation measures conforming to energy conservation norms finalised by Bureau of Energy Efficiency should be prepared incorporating details about building materials & technology, R & D Factors etc and submitted to the Ministry along with six monthly monitoring report.*

(xiii) *Energy conservation measures like installation of CFLs/TFLs for the lighting the areas outside the building should be an integral part of the project design and should be in place before project commissioning. Used CFLs and TFLs should be properly collected and disposed off/sent for recycling as per the prevailing guidelines/ rules of the regulatory authority to avoid mercury contamination. Solar panels may be used to the extent possible.*

(xiv) *Adequate measures should be taken to prevent odour problems from solid waste processing plant and STP.*

(xv) *The buildings should have adequate distance between them to allow movement of fresh air and passage of natural light, air and ventilation.*

(xvi) *The environmental safeguards contained in the EIA Report should be implemented in letter and spirit.*

(xvii) *Adequate drinking water facility be provided.*

(xviii) *Incremental pollution loads on the ambient air quality, noise and water quality should be periodically monitored after commissioning of the project.*

(xix) *Application of solar energy should be incorporated for illumination of common areas, lighting for gardens and street lighting in addition to provision for solar water heating. A hybrid system or fully solar system for portion of the apartments should be provided.*

(xx) *Ozone depleting substance (Regulation & Control) Rules should be followed while designing the air conditioning system of the project.*

12. Officials from the Regional Office of MOEF, Bhopal who would be monitoring the implementation of environmental safeguards should be given full cooperation, facilities and documents / data by the project proponents during their inspection. A complete set of all the

documents submitted to MoEF should be forwarded to the CCF, Regional office of MOEF, Bhopal

13. In the case of any change(s) in the scope of the project, the project would require a fresh appraisal by this Ministry.

14. The Ministry reserves the right to add additional safeguard measures subsequently, if found necessary, and to take action including revoking of the environment clearance under the provisions of the Environmental (Protection) Act, 1986, to ensure effective implementation of the suggested safeguard measures in a time bound and satisfactory manner.

15. All other statutory clearances such as the approvals for storage of diesel from Chief Controller of Explosives, Fire Department, Civil Aviation Department, Forest Conservation Act, 1980 and Wildlife (Protection) Act, 1972 etc. shall be obtained, as applicable by project proponents from the respective competent authorities.

16. These stipulations would be enforced among others under the provisions of Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and control of Pollution) act 1981, the Environment (Protection) Act, 1986, the Public Liability (Insurance) Act, 1991 and EIA Notification, 2006.

17. The project proponent should advertise in at least two local Newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the project has been accorded Clearance and copies of clearance letters are available with the Gujarat Pollution Control Board and may also be seen on the website of the Ministry of Environment and Forests at http://www.envfor.nic.in. The advertisement should be made within 10 days from the date of receipt of the Clearance letter and a copy of the same should be forwarded to the Regional office of this Ministry at Bhopal.

18. Clearance is subject to final order of the Hon'ble Supreme Court of India in the matter of Goa Foundation Vs. Union of India in Writ Petition (Civil) No.460 of 2004 as may be applicable to this project.

19. "Any appeal against this clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010".

20. A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zilla Parisad/Municipal Corporation, Urban Local Body and the Local NGO, if any, from whom suggestions/ representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the company by the proponent.

21. The proponent shall upload the status of compliance of the stipulated EC conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB.

22. The project proponent shall also submit six monthly reports on the status of compliance of the stipulated EC conditions including results of monitored data (both in hard copies as well as by e-mail) to the respective Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB.

23. The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of EC conditions and shall also be sent to the respective Regional Offices of MoEF by e-mail.

(Lalit Kapur)
Director (IA-III)

Copy to:

1. The Principal Secretary, Forest and Environment Department, Block no. 14/ 8 floor Sachivalaya, Gandhinagar – 382 010 Gujarat.
2. The Chairman, Central Pollution Control Board, Parivesh Bhavan, CBD-cum-Office Complex, East Arjun Nagar, Delhi – 110 032.
3. The Member Secretary, Gujarat Coastal Zone Management Authority & Director,(Environment) Forests & Environment Department, Block No. 14, 8th Floor, Sachivalaya, GandhiNagar-382.
4. The Chief Conservator of Forests, Ministry of Environment and Forests, Regional Office, Western Region, Kendriya Paryavaran Bhavan, Link Road No. 3, Ravishankar Nagar, Bhopal – 462016 (M.P.)
5. The Member Secretary, Gujarat State Pollution Control Board, Paryavaran Bhawan , Sector 10-A, Gandhi Nagar 382043, Gujarat
6. Director (EI), Ministry of Environment and Forests.
7. Guard File.
8. Monitoring File.

(Lalit Kapur)
Director (IA-III)

REGD. POST

F. No. 10-47/2008-IA-III
Government of India
Ministry of Environment & Forests
(IA – III Division)

Paryavaran Bhawan,
CGO Complex,
Lodhi Road, New Delhi

Dated: 30th September, 2013

To

M/s Adani Port and SEZ LTd
Adani House, Near Mithakhali Six Roads,
Navarangpura, Ahmedabad,
Gujarat- 380 009.

Subject: Issue of Show Cause Notice for alleged violations - Reg.

Whereas, Ministry had granted Environment and CRZ clearance on 12.01.2009 to M/s Adani Port and SEZ Limited (Formerly Mundra Port and SEZ Limited) for the development of Port facilities at Mundra, District Kutch, Gujarat.

2. Whereas, on representation from Shri Bharat Patel, General Secretary, Machchhi Mar Adhikar Sangarsh Sangathan, Ministry conducted a site inspection on 06-07th December, 2010. The Site inspection revealed certain violations related to construction of airport, township, and hospital and destruction of mangroves. On 15.12.2010, a show cause notice was issued to the project authorities. Further, the Ministry issued directions on 23rd February, 2011 to project authorities not to undertake any reclamation activity and not to initiate any new construction work in the CRZ area.

3. Whereas, Kheti Vikas Sewa Trust filed PIL 12 of 2011 in the High Court of Gujarat alleging violation of Environmental Clearance by M/s Adani Port and SEZ Limited. The High Court passed an order directing inquiry into the allegation of destruction of mangroves by project authorities and imposed stay on development works. The inquiry was conducted by Member Secretary, Gujarat Coastal Zone Management Authority (GCZMA) and PCCF. Based on the report of the committee, the High Court passed an interim order according to which project authority can carry out development in certain portions. The areas in which work can be carried out and the areas in which prohibition will remain were marked on a map, mentioned in the High Court order.

4. Whereas, in the affidavit filed by the Ministry in the Hon'ble High Court of Gujarat, it was stated that 'the issues related to destruction of mangroves, shore-line changes due to reclamation, seismic/tsunami events, socio-economic implications etc. need to be examined by a multi – disciplinary committee of experts /relevant institutions.

5. Whereas, complaints have also been received from Kheti Vikas Sewa Trust regarding impact on environment, by the project activities of M/s Adani Port and SEZ Ltd.

6. Whereas, in view of the seriousness of the issues involved in the matter, Ministry constituted a five member committee to make a site visit and to conduct an inspection and submit the report to MoEF.

7. Whereas, the Committee submitted its report on 18.04.2013 with various recommendations. In the Committee's assessment there is evidence of violation/ Non-Compliance of EC conditions.

8. Whereas, M/s Adani Port and SEZ Ltd. had submitted its response/ action plan on the recommendations of the report.

9. Whereas, Ministry after detailed examination of the recommendations made by the committee and response submitted by M/s Adani Port and SEZ Ltd., has accepted the recommendations of the Committee.

10. Accordingly, now under Section 5 of the Environment (Protection) Act, 1986, you are hereby directed to

(i) North Port area and Bochha Island should be declared as conservation zone and the area should be protected. All the creeks, water bodies and reclaimed land in these areas should be restored and brought back to pre- 2005 status within six months.

(ii) Submit details of the airstrip/ aerodrome including the location with coordinates, facilities, dimensions etc. along with the details of clearances obtained.

(iii) Ensure that all the projects constructed within the SEZ should possess EC under EIA Notification, 2006 as applicable. The details shall be submitted.

(iv) Prepare a specific action plan to protect the livelihood of fishermen whose marine ecology, and catch and access to the sea have been seriously affected by the violations committed by the Project Proponent within six months with a specific plan for fishermen, their access and protection of their livelihood. The plan should include a clear schedule of implementation and monitoring. Further, APSEZ Ltd shall provide necessary support for the development of exclusive fishing harbour as Badreshwar.

(v) Shall consider the voluntary return of Gauchar or village common land and also invest in improving productivity of this land with villagers.

(vi) APSEZ Ltd shall submit Disaster Management Plan of the different projects to the State Government so as to enable the State Government to put in place a District Disaster Management Plan to ensure human safety in and around the project area.

(vii) As a deterrent for non-compliance and violations, APSEZ Ltd shall set up an Environment Restoration fund- distinct and separate from CSR activities under Company Law- amounting to Rs. 200 crores or 1% of project cost, whichever is higher, to be used for remediation of environmental damage in Mundra. The Fund will be operated under the Chairmanship of Secretary E&F, and will include following activities as enumerated by the Committee.

(a) Protection of marine ecology;
(b) Protection and conservation of mangroves, including development of new mangrove conservation areas;
(c) Restoration and conservation of creeks;
(d) Independent studies and monitoring of the entire project areas, including cumulative impacts and public data disclosure systems.
(e) Social infrastructure and livelihood support for fishers community, including development of access of fishers from their temporary settlements to villages".

In view of the violations noted and recommendations made by the Committee, you are requested to explain within 15 days of receipt of this notice as to why the clearance granted to the North port shall not be cancelled.

Pending decision on the Show Cause Notice, the clearance granted to North Port is kept in abeyance. Therefore the status quo ante for any constructions/development in the North Port site as on date should be maintained.

You are requested to submit response/ action plan on the above directions. Please also note that in case you desire to be heard in person, this should be explicitly indicated in your reply.

Please note further that in case no response is received within the time frame of fifteen days indicated above, final directions may be passed without any further reference to you and formal action in terms of E(P) Act, 1986 may also be initiated.

This issues with the approval of the Competent Authority.

Yours faithfully,

(Lalit Kapur)
Director (IA-III)

Copy for information and necessary action to:-

1. The Principal Secretary, Forests and Environment Department, Government of Gujarat, Sachivalaya, Gandhinagar– 382010, Gujarat
2. The Chairman, Gujarat Coastal Zone Management Authority & Principal Secretary, Forests and Environment Department, Government of Gujarat, Sachivalaya, Gandhinagar– 382010, Gujarat
3. Gujarat Maritime Board, GMB Head Quarters, Sector 10-A, Gandhinagar-382010.
4. Shri Lakhwinder Singh, Principal Chief Conservator of Forests(Central) Kendriya Paryavaran Bhavan, Link RoadNo.3, Bhopal-462016
5. The Chairman, Gujarat State Pollution Control Board, Paryavaran Bhawan, Sector 10 A, Gandhinagar-382010.

Annexure - 3

F. No. 10-47/2008-IA-III
Government of India
Ministry of Environment, Forest and Climate Change
(IA – III Division)

Dated: 18th September, 2015

To

M/s Adani Port and SEZ Ltd
Adani House, Near Mithakhali Six Roads,
Navarangpura, Ahmedabad,
Gujarat- 380 009.

ORDER

Subject: **Order on the Show Cause Notices dated 15.12.2010 and 30.09.2013 issued for alleged violations –Reg.**

Reference: (i) Show Cause Notice dated 15.12.2010 issued to M/s Adani Port and SEZ Limited (Formerly Mundra Port and SEZ Limited); and

(ii) Show Cause Notice dated 30.09.2013 issued to M/s Adani Port and SEZ Limited and Gujarat Maritime Board

Whereas, Ministry had granted Environment and CRZ clearance on 12.01.2009 to M/s Adani Port and SEZ Limited (Formerly Mundra Port and SEZ Limited) for the development of Port facilities at Mundra, District Kutch, Gujarat.

2. Whereas, on representation from Shri Bharat Patel, General Secretary, Machchhi Mar Adhikar Sangarsh Sangathan, Ministry conducted a site inspection on 06-07th December, 2010. The Site inspection revealed certain violations related to construction of airport, township, and hospital and destruction of mangroves. On 15.12.2010, a Show Cause Notice was issued to the project authorities followed by a direction on 23rd February, 2011 to project authorities not to undertake any reclamation activity and not to initiate any new construction work in the CRZ area.

3. Whereas, Kheti Vikas Sewa Trust filed PIL No. 12 of 2011 in the High Court of Gujarat alleging violation of Environment / CRZ Clearance by M/s Adani Port and SEZ Limited. Hon'ble High Court passed an order directing inquiry into the alleged destruction of mangroves by project authorities and imposed stay on development works. The inquiry was conducted by a Committee comprising Member Secretary, Gujarat Coastal Zone Management Authority (GCZMA) and PCCF, Gujarat. Based on the report of the Committee, the Hon'ble High Court passed an interim order according to which project authority was permitted to carry out development activities in certain portions of the project areas. The areas in which work could be carried out and the prohibited areas had been marked on a map, mentioned in the Hon'ble High Court order.

4. Whereas, in the affidavit filed by the Ministry in the Hon'ble High Court of Gujarat, it was submitted that 'the issues related to destruction of mangroves, shore-line changes due to

reclamation, seismic/tsunami events, socio-economic implications etc. need to be examined by a multi –disciplinary committee of experts /relevant institutions.'

5. Whereas, complaints from Kheti Vikas Sewa Trust had also been received directly in the Ministry regarding impact on environment by the project activities of M/s Adani Port and SEZ Ltd.

6. Whereas, in view of the seriousness of the issues involved in the matter, Ministry constituted a five member Committee to make a site visit, to conduct an inspection and submit the report to MoEF.

7. Whereas, the Committee submitted its report on 18.04.2013 with various recommendations.

8. Whereas, M/s Adani Port and SEZ Ltd. had submitted its response / action plan on the recommendations of the report.

9. Whereas, Ministry after detailed examination of the recommendations made by the committee, response submitted by M/s Adani Port and SEZ Ltd., and has accepted the recommendations of the Committee.

10. Accordingly, the Ministry had issued Show Cause Notice with the following direction on 30.09.2013 under Section 5 of the Environment (Protection) Act, 1986:

(i) North Port area and Bochha Island should be declared as conservation zone and that the area should be protected. All the creeks, water bodies and reclaimed land should be restored and brought back to pre- 2005 status within six months.

(ii) Submit details of the airstrip/ aerodrome including the location with coordinates, facilities, dimensions etc. along with the details of clearances obtained.

(iii) Ensure that all the projects constructed within the SEZ should possess EC under EIA Notification, 2006 as applicable. The details shall be submitted.

(iv) Prepare a specific action plan to protect the livelihood of fishermen whose marine ecology, and catch and access to the sea have been seriously affected by the violations committed by the Project Proponent within six months with a specific plan for fishermen, their access and protection of their livelihood. The plan should include a clear schedule of implementation and monitoring. Further, APSEZ Ltd shall provide necessary support for the development of exclusive fishing harbour as Badreshwar.

(v) Carry out Cumulative Impact Assessment studies under the supervision of the State Government for the projects already granted so that future developments can be assessed for clearance based on cumulative impacts. Shall submit proposed ToRs for the approval of MoEF through State Environment Department.

(vi) Shall consider the voluntary return of Gauchar or village common land and also invest in improving productivity of this land with villagers.

(vii) APSEZ Ltd shall submit Disaster Management Plan of the different projects to the State Government so as to enable the State Government to put in place a District Disaster Management Plan to ensure human safety in and around the project area.

(viii) As a deterrent for non-compliance and violations, APSEZ Ltd shall set up an Environment Restoration fund- distinct and separate from CSR activities under Company Law- amounting to Rs. 200 crores or 1% of project cost, whichever is

higher, to be used for remediation of environmental damage in Mundra. The Fund will be operated under the Chairmanship of Secretary E&F, and will include following activities as enumerated by the Committee.

(a) Protection of marine ecology;
(b) Protection and conservation of mangroves, including development of new mangrove conservation areas;
(c) Restoration and conservation of creeks;
(d) Independent studies and monitoring of the entire project areas, including cumulative impacts and public data disclosure systems.
(e) Social infrastructure and livelihood support for fishers community, including development of access of fishers from their temporary settlements to villages".

11. Whereas, it was also decided to keep the clearance granted to North Port in abeyance pending decision on the Show Cause Notice and further directed to maintain status quo ante for any constructions/development in the North Port site.

12. Whereas, Gujarat Maritime Board (GMB) was found to be in legal possession of some of the land in the project area of M/s APSEZ Ltd and as well as having operation in the area surrounding to that of M/s APSEZ Ltd, the of GMB was also issued Show Cause Notice on 30.09.2013.

13. Whereas, the comments and responses from Gujarat Maritime Board and GCZMA were also received on the relevant issues including upon the responses and action plan submitted by M/s APSEZ Ltd.

14. **Analysis of the responses of Project Proponent on the issues raised in SCN dated 30.09.2013:**

Issue (i): North Port area and Bochha Island should be declared as conservation zone and the area should be protected. All the creeks, water bodies and reclaimed land in these areas should be restored and brought back to pre- 2005 status within six months.

Response of APSEZL, Project Proponent(PP)
APSEZL has informed that North Port area is not in their possession. APSEZL has committed to conserve 88 ha of mangrove area of Bocha Island as per the EIA studies carried out by NIO in terms of EC dated 12/19.1.2009 for Waterfront Development Project.

Response of GMB with respect to Show Cause Notice issued to them on 30.09.2013:
Bocha Island, Bocha creek and surrounding creek-lets are extensively used by Fishermen which necessitate maintenance dredging from time to time. It would be unwise to do restoration for those stray mangroves which did not exist prior to 1980 since fish production in this area has increased. However, for restoration of the same stray mangroves, it is advisable to carry out Environmental Impact Assessment Studies through a nationally reputed institute and under their guidance, restoration activities can be carried out as the area falls in CRZ.
Total area of 1114 acres of land acquired for port development, consists of (a) Bocha Island admeasuring 718 acres and (b) the adjoining land admeasuring 396 acres under reference. Out of 718 acres of area, around 211 acres (88 Ha) of area is mangrove conservation area for Adani Ports and SEZ Ltd. GMB has proposed that the remaining area of approximately 500 acres for mangrove afforestation be declared as conservation area and suggested that existing 396 acres of

land may be utilized for permissible activities for port after securing fresh Environment and CRZ clearance.

Analysis

GMB has not committed on restoration of creeks and asked the Ministry to commence a scientific study. Request of GMB to utilize 396 acres is not accepted since it may add load / impact on the Bocha Island.

In order to maintain the existing creeks systems and mangroves, a comprehensive and integrated conservation plan including detailed bathymetry study and protection of creeks/ mangrove area including buffer zone, mapping of co-ordinates, running length, HTL, CRZ boundary should be put in place. The plan should take note of all the conditions of approvals granted to all the project proponents in this area e.g. the reported case of disappearance of mangroves near Navinal creek. The preservation of entire area to maintain the fragile ecological condition should be a part of the plan in relation to the creeks, mangrove conservation and conservation of Bocha Island upto Baradimata and others. Bocha Island, ecologically sensitive geomorphological features and areas in the island and creeks around the Island should be declared as conservation zone.

NCSCM should prepare the plan in consultation with NIOT, PP and GCZMA. The plan should be financed by the PP. The implementation should be carried out by GCZMA. The monitoring of the implementation should be carried by NCSCM

Issue (ii): **Details of the airstrip/ aerodrome including the location with coordinates, facilities, dimensions etc. along with the details of clearances obtained**

Response of PP

PP submitted details on the airstrip/aerodrome including the location with coordinates, facilities, dimensions etc. along with the details of clearances obtained.

Analysis

This relates to the SEZ project and hence was dealt separately.

Issue (iii): **Ensure that all the projects constructed within the SEZ should possess EC under EIA Notification, 2006 as applicable. The details shall be submitted.**

Response of PP

PP has submitted the details of projects and the documents in support of requirement of approvals including EC, wherever necessary.

Analysis

The issue of clearance to SEZ along with connected court matters were dealt separately.

Issue (iv) **Prepare a specific action plan to protect the livelihood of fishermen whose marine ecology, and catch and access to the sea have been seriously affected by the violations committed by the Project Proponent within six months with a specific plan for fishermen, their access and protection of their livelihood. The plan should include a clear schedule of implementation and monitoring. Further, APSEZ Ltd shall provide necessary support for the development of exclusive fishing harbour as Badreshwar.**

Response of PP

APSEZ has informed that it never restricted or created any hindrance to any authorized fishermen for approaching the sea for their fishing related activities and has provided specific approach corridors for fishermen movement through their area. Additionally, PP has been working with all the fishermen groups in Mundra for providing them livelihood support for their socio-economic upliftment, healthcare, education and infrastructure facilities

Analysis

PP has not submitted specific action plan as sought. PP has submitted only the details of the approach corridors developed for fishermen along with the year of construction and cost. PP has stated that they are working with all fishermen groups in Mundra for providing them livelihood support for their Socio- economic upliftment. PP should submit specific action plan to protect the livelihood of fishermen along with budget.

Issue (v) **Shall consider the voluntary return of Gauchar or village common land and also invest in improving productivity of this land with villagers.**

Response of PP

After discussion with local people of Zarpara village, APSEZ has voluntarily given back approx. 400 acres of land to Zarpara village for gauchar purpose, in spite of the fact that the Hon'ble Supreme Court of India has dismissed the appeal of villagers challenging the allotment of Gauchar land. APSEZ will always eager to help them in the best possible manner. APSEZ will consider the suggestion and do the needful.

Analysis

Since PP agreed to the recommendation, time limit may be specified to comply.

Issue (vi) **APSEZ Ltd shall submit Disaster Management Plan of the different projects to the State Government so as to enable the State Government to put in place a District Disaster Management Plan to ensure human safety in and around the project area.**

Response of PP

APSEZ has already prepared Disaster Management Plan which has been already submitted to State Disaster Management Authority.

Analysis: None

Issue(vii) **As a deterrent for non-compliance and violations, APSEZ Ltd shall set up an Environment Restoration fund- distinct and separate from CSR activities under Company Law- amounting to Rs. 200 crores or 1% of project cost, whichever is higher, to be used for remediation of environmental damage in Mundra**

Response of PP

There is no non-compliance or violation of the terms of the environmental clearance dated 12/19.1.2009. Therefore, PP has requested that the Ministry should reconsider the setup of environmental restoration fund for an amount of Rs.200 crores which has been subjectively arrived at. PP has spent substantial amount in various activities for socio environment development.

PP requested for substantial reduction in the amount of development fund keeping in mind their CSR contributions as well as the challenge faced by the infrastructure sector in the current

economic scenario. PP is open to suggestions of any concrete projects and proposals which may meet the objects and purpose of environment and well-being of people at large.

Analysis
The Multi-disciplinary Committee apart from violation on North Port area, has pointed out degradation in the mangrove conservation area near the lighthouse at the South port.

Further, the High Court of Gujarat in PIL 12 of 2011, based on the site visit report by a Committee, imposed stay on carrying construction in certain area near south port. The case is pending.

In view of the above, it can be concluded that the response of the PP that 'there is no non-compliance or violation of the terms of EC' is incorrect. The violations of specific condition of all the ECs and CRZ clearance, should be proceeded with the provision of EP Act, 1986 independently.

The existing legal provisions under the Environment (Protection) Act, 1986 do not provide for any authority to impose ERF by the Government.

Analysis of the issue raised in SCN dated 15.12.2010: Location of Samundra / Sterling with respect to CRZ based on the earlier observation by MoEF site visit.

Analysis
The GCZMA was asked for reassessment of the matter relating to location of Samundra township/sterling hospital with respect to CRZ boundary.
According to report of GCZMA dated 13.2.2014, a Committee was constituted consisting GCZMA, Director, BISAG, Gandhinagar, Officer from Space Application Centre, ISRO, Ahmedabad, District Inspector of Land Record, Collector, Kutch, Town Planning Officer, Kutch, to review and make reassessment of the matter relating to Samudra Township/ Sterling hospital. The Committee made site visits, collected coordinates, prepared map in 1: 2000 scale and overlapped on CRZ map prepared by CESS by DILR. The report of the committee was discussed in the Gujarat CZMA meeting which decided to forward it to MoEF.
It is noted that the township and Hospital were located beyond CRZ boundary.

Analysis of other recommendations of the Committee:

(i) Carry out Cumulative Impact Assessment studies under the supervision of the State Government for the projects already granted so that future developments can be assessed for clearance based on cumulative impacts. Shall submit proposed ToRs for the approval of MoEF through State Environment Department.

It was recommended that the State Government shall guide and supervise the Cumulative Impact Assessment studies to be undertaken by the APSEZL for the project already granted so that future developments can be assessed for clearance based on cumulative impacts.
According to the Director, Environment, GOG, the Committee constituted to finalize the action plan and modalities of the Environmental Restoration Fund including GMB will supervise the Cumulative Impact Assessment studies. Draft TORs would be asked from APSEZL to examine and finalised the same after including suggestions of the Committee.

(ii) There is a need to create a monitoring system to ensure that corrective action suggested by this report is taken within a time-bound manner

It was recommended to set up a joint monitoring committee of GCZMA, GPCB and RO Bhopal to carry out monitoring of development / compliance of the conditions and directions for two years. GCZMA replied vide letter dated 24.12.2013 that it was decided to constitute the committee as suggested.

15. In having taken note of the entire facts of the case as elaborated above, the following directions are issued:

i. *The proposal of extension of the validity of Environmental clearance granted to the North Port vide letter dated 12.1.2009 will be considered separately at a later stage.*

ii. *Bocha Island, ecologically sensitive geomorphological features and areas in the Island and creeks around the Island will be declared as conservation zone and action plan for its conservation must be prepared. M/s APSEZ should provide necessary financial assistance for this purpose.*

iii. *The violations of specific condition of all the ECs and CRZ clearances, if any, will be examined and proceeded with the provision of EP Act, 1986 independently.*

iv. *A comprehensive and integrated conservation plan including detailed bathymetry study and protection of creeks/ mangrove area including buffer zone, mapping of co-ordinates, running length, HTL, CRZ boundary will be put in place. The plan will take note of all the conditions of approvals granted to all the project proponents in this area e.g. the reported case of disappearance of mangroves near Navinal creek. The preservation of entire area to maintain the fragile ecological condition will be a part of the plan in relation to the creeks, mangrove conservation and conservation of Bocha Island up to Baradimata and others.*

v. *NCSCM will prepare the plan in consultation with NIOT, PP and GCZMA. In recognition of the fact that the existing legal provisions under the E(P) Act 1986 do not provide for any authority to impose ERF by the Government, the plan will be financed by the PP. The implementation will be carried out by GCZMA. The monitoring of the implementation will be carried by NCSCM.*

vi. *There will be no development in the area restricted by the High Court of Gujarat. APSEZ shall abide by the outcome of the PIL 12 of 2011 and other relevant cases.*

vii. *APSEZ will submit specific action plan to protect the livelihood of fishermen along with budget.*

viii. *APSEZ will voluntarily return the grazing land, if any, in their possession.*

ix. *A regional strategic impact assessment report with a special focus on Mundra region will also be prepared. The cost towards these studies will also be borne by the PP.*

x. *In the subject matter of thermal power plant, the proposed regional strategic impact assessment analysis will take in to account salinity aspect along with its potential environmental impact to suggest future corrective actions as well as the guiding tool on extension and addition of the capacities.*

16. The show –cause notices to the APSEZL are disposed of.

(Bishwanath Sinha)
Joint Secretary
18/09/2015

Copy to

1. The Principal Secretary, Forests and Environment Department, Government of Gujarat, Sachivalaya, Gandhinagar– 382010, Gujarat
2. The Chairman, Gujarat Coastal Zone Management Authority & Principal Secretary, Forests and Environment Department, Government of Gujarat, Sachivalaya, Gandhinagar– 382010, Gujarat
3. Gujarat Maritime Board, GMB Head Quarters, Sector 10-A, Gandhinagar - 382 010, Gujarat

ANNEXURE – 17

NCSCM
NATIONAL CENTRE FOR SUSTAINABLE COASTAL MANAGEMENT
Ministry of Environment, Forest & Climate Change, Government of India

Prof. Dr. R. Ramesh
PhD (JNU) PhD (McGill)
Director

No.1/12/2016-Fin

Date: 20 May 2017

Dear Mr. Shalin Shah

This is regarding the Consultancy project on Comprehensive and Integrated Conservation Plan for Adani Port Special Economic Zone Ltd area awarded to NCSCM by the APSEZ Ltd., vide your service order no. PURC/F/012 dt.29.8.2016. As requested by your office, we have prepared a Progress report as per activities mentioned in the Terms of Reference annexed to the agreement related to this order. A copy of the progress report giving details of progress made up to May, 2017 is enclosed.

Best regards,

R Ramesh

To
Mr. Shalin Shah
Associate General Manager – Environment
Adani Ports and Special Economic Zone Ltd
Adani House, Shikhar,
Nr. Mithakali Circle, Navrangpura
Ahmedabad 380 009, Gujarat

Anna University Campus, Chennai 600 025. India
Phone (+91) 44 22200600 Fax (+91) 44 22200700 Email : rramesh@ncscm.res.in; rramesh_au@yahoo.com
www.ncscm.res.in

National Centre for Sustainable Coastal Management

Progress report* on Consultancy services to Adani Ports Special Economic Zone Ltd.

1 Background

The Ministry of Environment and Forests have accorded Environmental Clearance (EC) vide Letter No. F.No.10-138/2008-IA.III dt.15th July, 2014 to M/s Adani Ports and Special Economic Zone Ltd (APSEZ), to set up a multi-product SEZ at Mundra, Kachchh, Gujarat (Fig. 1). The project involves development of SEZ in a notified SEZ area of 6641.2784 ha for which Environmental and CRZ clearances have been given. The activities proposed in the SEZ include:

- Processing zones
- Non-processing zones
- Warehousing zones
- Road network (trunk as well as internal)
- Bridges or culverts over natural drains
- Rail and IT communication networks
- Effluent collection network
- Water supply through freshwater sources and desalination
- Conservation & drainage network
- Effluent collection network
- Social infrastructure
- Existing/proposed airstrip
- Municipal solid waste disposal site
- Utilities & supporting infrastructure
- Disposal of treated sewage, effluents and brine from desalination plant

The SEZ covers both inland and water front areas (Fig. 1). Industrial plots will be made by APSEZ and shall be given to the firms that would be setting up individual industries of above types who need to obtain EC before initiating their projects. The industries envisage utilizing the services of Adani port for transport of imported and exported goods.

* ***as of May 2017***

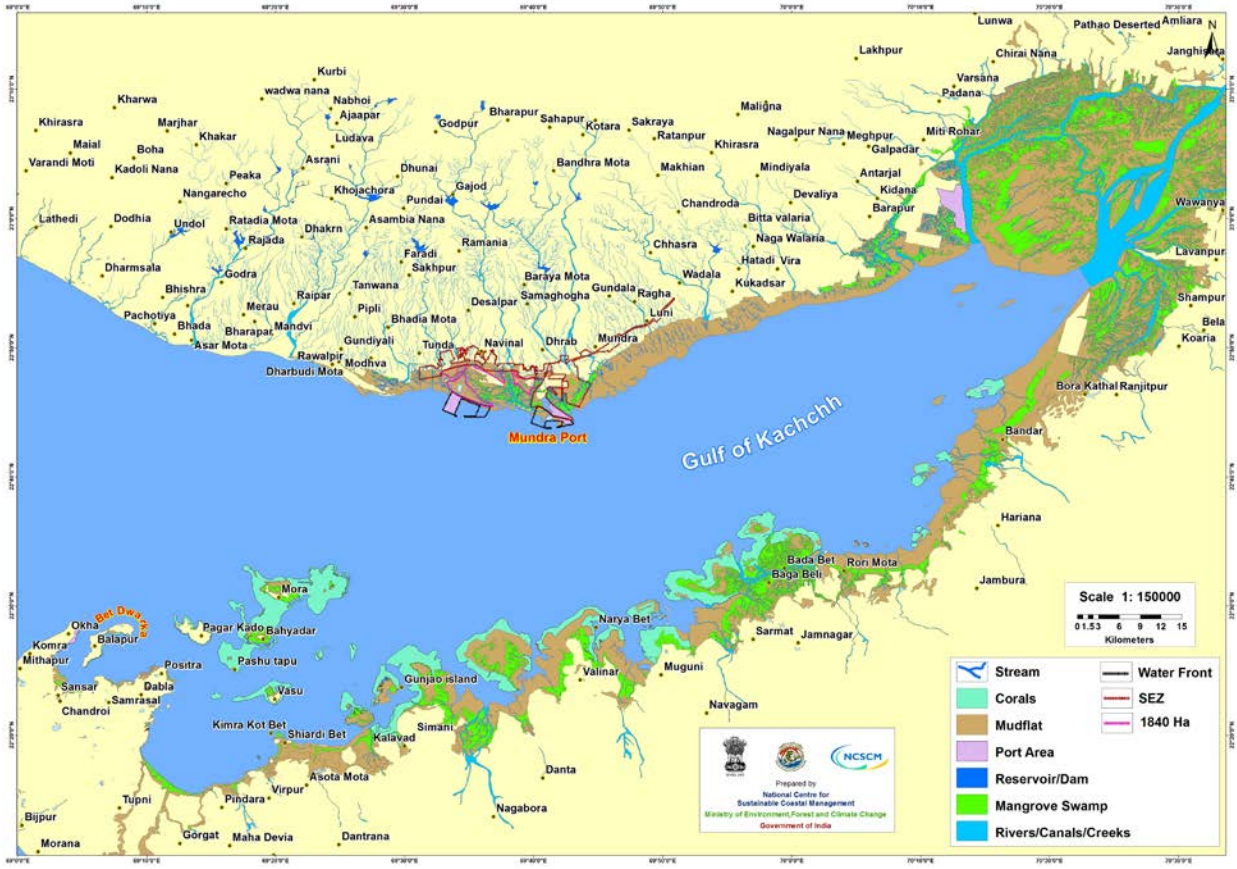

Fig.1: Map of Ecosystems of Gulf of Kachchh (as of 2011) indicating location of Mundra Port with APSEZ boundary

While according Environmental Clearance (EC) to the project, the MoEF&CC have stipulated General and Special conditions in its letter F.No.10-138/2008-IA.III dt 15 July 2014 which were further reviewed. Further to the Show Cause Notices issued to APSEZ by MoEF&CC, the final order vide F.No.10-47/2008-IA.III was issued on 18 Sept. 2015 which contained special conditions, two of which (sr. no iv and v of the order) are as follows:

(iv) A Comprehensive and integrated conservation plan including detailed bathymetry study and protection of creeks/mangrove area including buffer zone, mapping of co-ordinates, running length, HTL, CRZ boundary will be put in place. The plan will take note of all the conditions of approvals granted to all the project proponents in this area, e.g., the reported case of disappearance of mangroves near Navinal creek. The preservation of entire area to maintain the fragile ecological condition will be a part of the plan in relation to the creeks, mangrove conservation and conservation of Bocha Island up to Baradimata and others.

(v) NCSCM will prepare the plan in consultation with NIOT, PP and GCZMA. In recognition of the fact that the existing legal provisions under the E(P) Act 1986 do not provide for any authority to impose ERF by the Government, the plan will be financed by the

PP. The implementation will be carried out by GCZMA. The monitoring of the implementation will be carried by NCSCM.

Accordingly the APSEZ Authorities requested National Centre for Sustainable Coastal Management (NCSCM) to undertake the above tasks. After required preparatory works, the project work commenced from January, 2017

2 Scope of Work

The scope of present consultancy is to prepare a comprehensive and integrated conservation plan for the creeks and mangroves of APSEZ area including a detailed bathymetry study and studies requiring suggesting measures for protection of creeks/mangrove area with other aspects such as buffer zone for mangroves, mapping of co-ordinates, running length, HTL, CRZ boundary.

3 Study Area

The study area includes creek, mangrove and associated mud flat areas within and around the boundary of APSEZ as indicated in Fig.2.

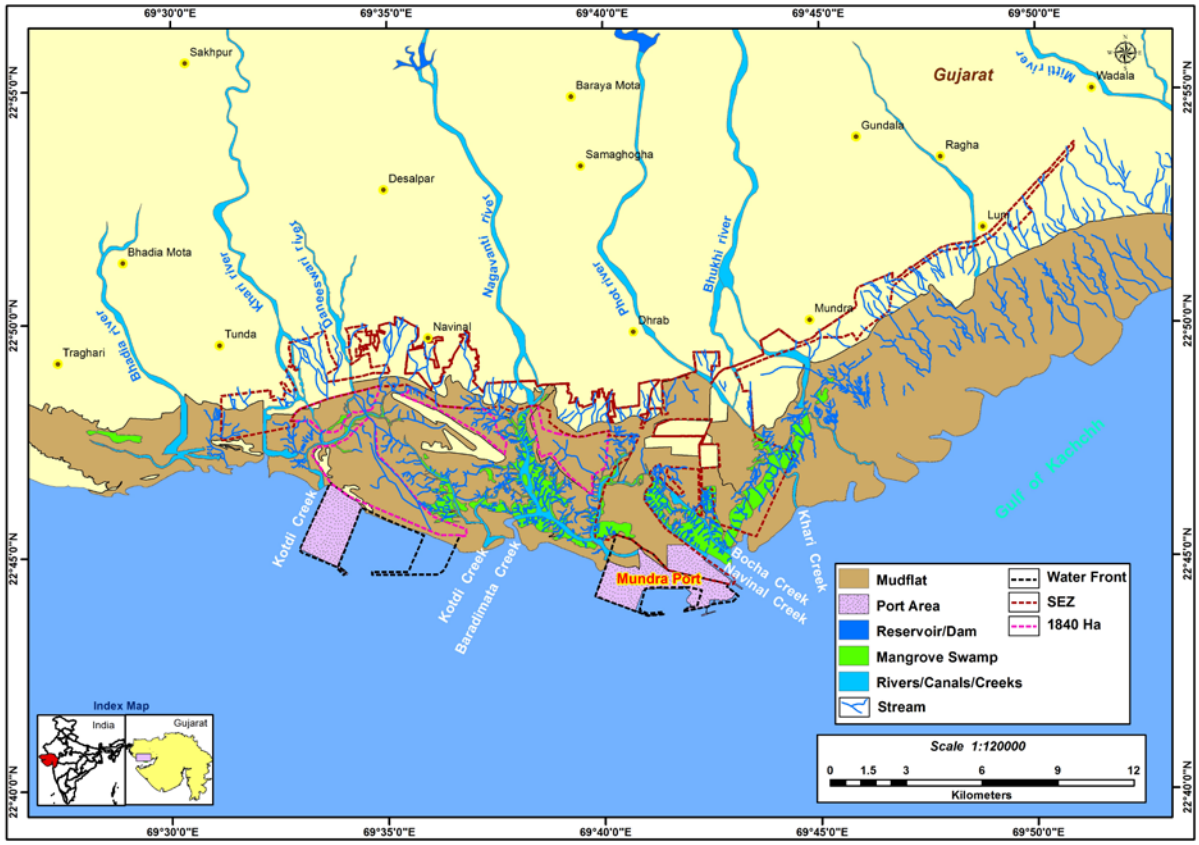

Fig. 2: Map of Northern part of Gulf of Kachchh indicating creeks and mangroves (as of 2011) in and around APSEZ boundary

3.1 Tasks to be undertaken

Following are the major tasks involved in accomplishing the scope of work:

i. Detailed bathymetry of major creeks and their major branch channels (subject to accessibility) including the ones distributed in the seawater side, along with mapping of co-ordinates, running length, HTL, CRZ boundary within and around the APSEZ area including Mundra (GMB) Port
ii. Mapping of mangroves distributed in the Mundra Port and APSEZ area including their seaward side with buffer zones and
iii. Preparation of a Comprehensive and Integrated plan for preservation and conservation of mangroves and associated creeks

3.2 Progress made till May 2017

3.2.1 Mapping of creeks, canals etc. and bathymetric survey

a. Mapping of creeks

The APSEZ area has five major creeks namely i) Kotdi creek originating from Daneshwari River with two branches, ii) Baradimatha creek originating from Nagavati river with two branches, iii) Navinal creek adjoining main Adani Port iv) Bocha creek and v) Khari creek originating from Phot river. These creeks with branches of channels are distributed in a complex manner (Fig. 2).
These creeks along with mangroves have been mapped using satellite images of 2017 (Google Earth Pro) and field verification of features in the map including running length of creeks, HTL is in progress (Fig. 2).

b. Bathymetry survey of creeks

The bathymetry survey involves collection of data on depth in creeks and major branching channels having a depth of 0.5 m. The tasks that are involved in measurement of bathymetry include:

a. *Measurement of bathymetry with tide correction using Echosounder / tide pole and also using RTK/Total station depending on the depth of the creek, branch channels, mangrove and mudflat areas,*

b. *RTK (topography) measurements during low tide period till the end wet part of the wet creeks below 0.5 m deep, mud flat and dried mangrove areas, if any,*

c. *Tide correction to bathymetry data using appropriate number of tide gauges/ tide staff*

d. *Development of geo database for storing data collected and preparation of bathymetry and topographic charts in 1:10,000 and 1:5,000 scales respectively.*

3.2.2 Description of Methodology

Bathymetry survey involves measurement of depth of creeks and major branch channels originating from the creeks. The method used to measure the depth is based on echosounder for depth > 0.5 m and tide pole for locations < 0.5 m. A dual beam echosounder was used to measure the depth in deeper areas and a graduated tide pole is used in shallow areas (<0.5 m of depth). Bathymetry measurements are made during high tide and tide corrections are necessary to account for tide induced water depth. For this purpose, tide gauges calibrated tide poles were placed at regular intervals to obtain water levels during different time period of bathymetry measurement. The data collected is processed in Hypack software which has programmes for tide correction of bathymetry data. In dry channel branches of main creeks, Real Time Kinematic GPS is used to determine bottom levels with respect to adjoining ground. All the bathymetry data collected are presented in a chart with reference to Chart Datum.

4 Progress made so far:

The bathymetry survey of above-mentioned 5 creeks (with branches) was initiated in April 2017 in association with M/s Indomer Coastal Hydraulics, Chennai who is specialized in bathymetry measurements. The measurements were carried out using Ceeducer PRO Echosounder/ Garmin Echosounder supported by Trimble DSM 232 DGPS Beacon Receiver (to co-record position for every depth measurement), HYPACK MAX Data collection and processing software.

The survey was carried out using low draft survey vessel equipped with safety gears. The echosounder transducer was mounted by positioning below the water surface. The DGPS receiver antenna was mounted on the mast vertically in line with the transducer, so that it represents the exact coordinates of the location where the depth is simultaneously measured by the transducer. The necessary inputs were given in HYPACK data collection software before the commencement of the survey.

The planned track lines were displayed on the monitor at wheel for navigation. Watch guards were positioned at bow, transducer/antenna and heave compensator at rear end. The data was continuously collected in the onboard PC along each transect. After each day of data collection, the entire data was downloaded to external hard disc and stored. The recorded data will include: date, time, latitude, longitude, X coordinate, Y coordinate and heave. The depth data was recorded at 0.2 sec interval.

Bathymetry measurements have been completed in all the 5 creeks and the surveyed areas are indicated in Fig.3. In smaller channels with depths <0.5 m and adjoining mud flats, collection of topographic data is in progress and expected to be completed in June 2017. Thereafter, the entire data collected will be processed using Hypack software with corrections on tidal variation and transducer draught and the depth values will be presented in maps with contour intervals.

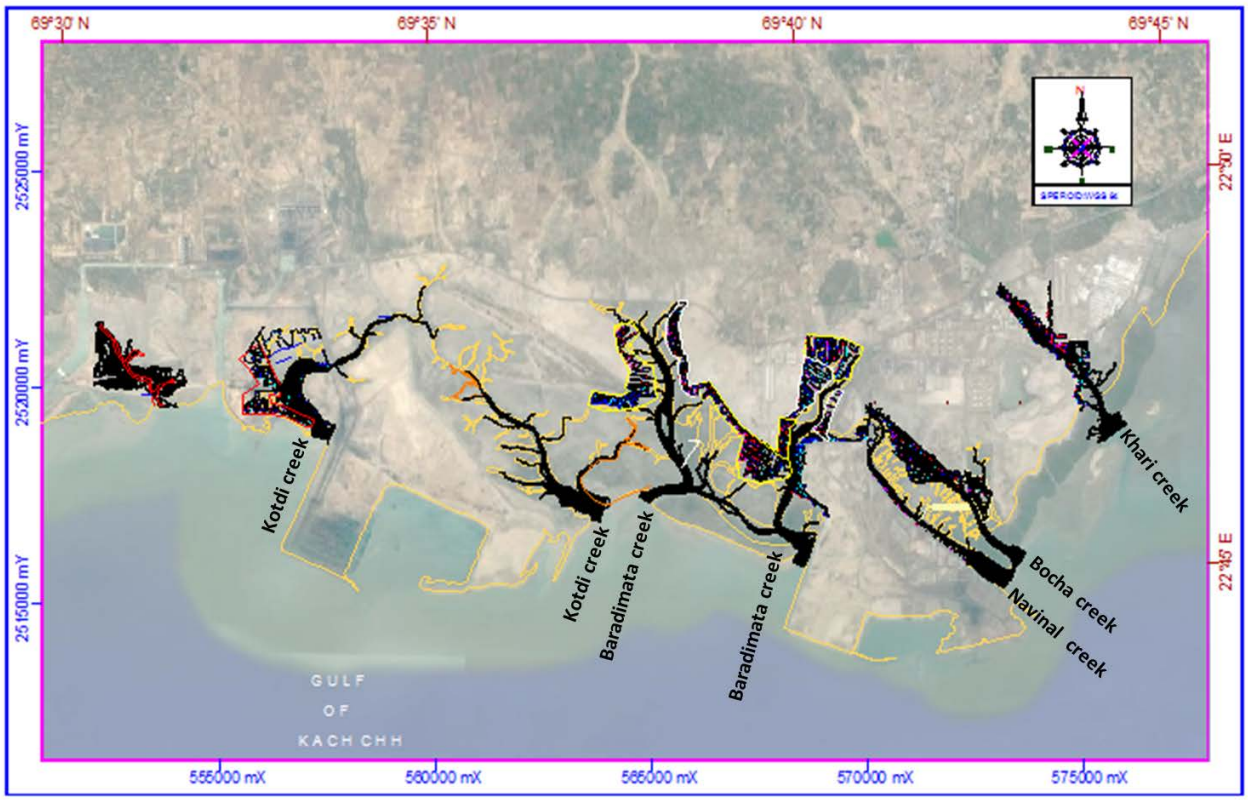

Fig.3: Bathymetry Survey – Completed areas indicated in black colour

4.1 Mapping of mangroves

Mundra is a coastal taluk at the northern flank of the Gulf of Kachchh and has a wide intertidal area. This area has been known to be rich in mangroves and is second largest next to Kori creek. The mangrove vegetation was found essentially around Kotdi, Baradimatha, Navinal, Bocha, and Khari creeks and adjoining intertidal mud flats (Fig. 2).

In order to assess the current status of mangroves and creeks and to explore the possibility of ensuring free flow of seawater into the existing mangrove areas from already existing water sources like creeks, it is proposed to prepare maps of mangroves and integrate them in creek maps of the Port and SEZ. Although studies have been conducted by various agencies on mapping of mangroves, the information available does not facilitate detailed assessment on health of the mangroves as the scale of maps are lower (1:25,000 scales). Therefore,

mangrove maps at a scale of 1:10,000 or 1:5,000 will be prepared to fill this gap. Classification of mangroves existing in the site will be made as (i) dense, (ii) sparse and (iii) degrading/degraded. Further, it is also necessary to identify the area under natural regeneration and areas suitable for plantation. In order to accomplish these tasks, preparation of a conservation plan for preservation and conservation of mangroves and creeks of APSEZ is essential. The present activity will help in development of proposed comprehensive Integrated Plan.

a. Tasks to be undertaken

i. Preparation of mangrove maps in 1:10,000/1:5,000 scale along with buffer using latest available satellite image of 2017 and validating data with field observations.
ii. Assessment of status of mangrove areas and associated waterways including dry areas around the creeks (using bathymetry and topographic data collected) to explore through appropriate methods such as hydrodynamic modelling the potential of supply of creek water to the mangrove areas esp. in degraded areas

b. Progress made so far

A map of mangroves of the APSEZ has been prepared using satellite imagery of Google Earth Pro Satellite data of the year 2017. Collection of extensive ground truth data on dense sparse species level etc. has been initiated to validate the satellite data. The validation survey so far (May 17) has been completed for Bocha island and part of the Baradimata creek area. Data on distribution of various species of mangrove plants, associated fauna and flora have been collected. The survey will be continued for mangroves of other creeks in the coming months. After completion of the validation survey, maps on mangrove and associated creeks will be prepared.

4.2 Proposed actions on remaining activities

The other planned activities include socio-economic survey of villages around the APSEZ region to study the dependence of people on mangroves and its resources and preparation of conservation plan of creeks and mangroves. A questionnaire for survey of creeks is under preparation and the work will be initiated in June 2017. Regarding preparation of conservation plan focussing on possibilities of restoration of degraded mangroves, it is proposed to construct a tide flow model for each creek and associated mangrove area. The model output will indicate the extent of penetration of tidal water into the inner part of the mangroves especially in degraded mangroves. For this purpose, several scenarios will be created by changing depths of channels to explore the

possibility of increasing tidal flow into the degraded mangrove areas. The most technically feasible scenario will be chosen for suggestion of increasing tidal flow (by dredging at model indicated locations) so that the degraded areas get adequate tide water and these areas become viable for mangrove restoration. First level construction of such model for Bocha Island and associated creeks has been completed. After obtaining the processed bathymetry and topography data, the flow modelling work will be undertaken. The outcome on socio-economic survey and tidal modelling will be useful for preparation of the proposed conservation plan aiming to develop strategies for gradual restoration of degraded/lost mangroves in the technically feasible areas. The remaining tasks on HTL and CRZ mapping are in progress.

ANNEXURE – 18

भारतीय गैर न्यायिक

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અમદાવાદ-સીટી સીવીલ કોર્ટના સ્ટાંપ

લેનાર ની સહીઃ

For, Adani Ports and Special Economic Zone Ltd.

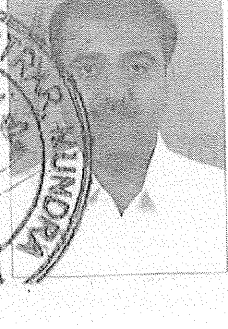
LEASE DEED

MDR 6995 | 82 2015

This **LEASE DEED** (the "**Deed**") is executed at Mundra, Dist. Kutch, State of Gujarat on this 20th day of July, 2015.

BY AND BETWEEN

ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED, (Formerly known as Mundra Port and Special Economic Zone Limited), a company incorporated under the provisions of the Companies Act 1956, having its registered office at "Adani House", Near Mithakhali Six Roads, Navrangpura, Ahmedabad – 380 009 (hereinafter referred to as the "*Lessor*" which expression shall, unless excluded by or repugnant to the context be deemed to include their successors in titles and assignees) of the FIRST PART.



भारतीय गैर न्यायिक

एक सौ रुपये Rs. 100

₹. 100 ONE HUNDRED RUPEES

सत्यमेव जयते

भारत INDIA

INDIA NON JUDICIAL

ગુજરાત GUJARAT AM 016627

30 MAR 2015

For, Adani Ports and Special Economic Zone Ltd.

MDR 6945 2 82 2015

AND

MUNDRA SOLAR TECHNOPARK PRIVATE LIMITED, a company incorporated under the provisions of the Companies Act 1956, having its registered office at "Adani House", Near Mithakhali Circle, Ahmedabad – 380 015 (hereinafter referred to as the "***Lessee***" which expression shall, unless excluded by or repugnant to the context, be deemed to include their successors in titles and permitted assigns) of the SECOND PART.

Both Lessor and Lessee shall individually be referred to as "**Party**", and, collectively as "**Parties**".

Mundra Solar Technopark (P) Ltd. AHMEDABAD

Adani Ports and Special Economic Zone Ltd. AHMEDABAD

WHEREAS

(A) The Government of India (hereinafter referred to as the **"Government"**) has permitted the Lessor vide Letter of Approval dated 12th April 2006 bearing No.F.2/11/2003-EPZ to establish a Multi-product SEZ at Taluka: Mundra, Gujarat (hereinafter referred to as **"Mundra SEZ"**). The Development Commissioner has earmarked processing and non-processing areas as per provisions of Special Economic Zones Act- 2005 (hereinafter referred to as the "SEZ Act").

(B) The Lessee is desirous of being a Co-Developer and also to take on lease a plot of land in the processing area of the Mundra SEZ for setting up a Electronics Manufacturing Cluster (EMC) (herein after referred to as the **"Facility"**), the Lessor has agreed to lease to the Lessee, the plot of land and has earmarked an area of 511.34 acres of land, in the processing area (hereinafter referred to as the **"Land"**) more particularly described in the Schedule A hereunder on the terms and conditions hereinafter recorded. Actual measurement of Land to be done jointly by Lessor and Lessee prior to the Lessee taking over the possession of the Land.

(C) The Lessee is satisfied in all respects with regard to the right, title and authority of the Lessor to enter into this Lease Deed.

(D) The Lessee has received Co-Developer status from Ministry of Commerce and Industry, Department of Commerce, Government of India, (**"MoC"**) vide the Co-Developer Approval (**"Co-Developer Approval"**) bearing letter referenceF.2/11/2003-EPZ dated 1st July 2015 for the proposed Facility to be set up by the Lessee in Mundra SEZ.

(E) The Parties have agreed to enter into this Deed on the terms and conditions stipulated in this Deed.

NOW THIS DEED WITNESSETH AS FOLLOWS:

1. In consideration of Annual Lease Rent (as hereinafter defined) reserved and the covenants and conditions hereinafter contained to be observed and performed by the Lessee, apart from other agreed

Gujarat or by any other authorities, Central, State or Local or service providers of Common Effluent Treatment Plant (CETP) otherwise competent and the Lessee shall discharge the same in the manner laid down by the Lessor or the Government of Gujarat or the respective authority concerned. The Lessee shall also indemnify and keep indemnified the Lessor against the consequences of any breach or non-compliance with any of the provisions, directions or conditions as aforesaid;

4.23 to keep the Co-Developer Approval valid through the Term of the lease of Land;

4.24 to limit the usage of water to the maximum quantity of 3000 KLD and generation of effluent to the maximum quantity 2500 KLD and sewage waste 10 KLD. In case of any change in the aforesaid quantity, the same shall be varied only with the mutual written consent of both the parties.

4.25 The Lessee, subject to such permissions as may be required, shall be entitled to assign, sub-lease, sublet, license, transfer or grant rights in the said Land to the entrepreneurs for setting up of units in the Electronic Manufacturing Cluster in accordance with the Electronic Manufacturing Cluster Scheme (EMC). However, it will not be entitled to assign, sub-lease, sublet, license, transfer or grant rights to any person for any other purpose except with prior written approval of Lessor.

4.26 to co-operate with the Lessor and provide such information of its business as may be required by the Lessor for obtaining permission from the Government and/or for submitting information to Government or Government agencies in respect of the Mundra SEZ or any part thereof;

4.27 to comply with the design of the boundary wall facing the road as approved by the Lessor;

4.28 to obtain prior written permission from the Lessor and also from the Development Commissioner, if so required, before effecting any change in the activities at its Facility at the Land. Subject to