O/C

adani

Date: 24th May, 2017

To,
Scientist "F'
Western Regional Office,
Ministry of Environment, Forest & Climate Change
E-5, Arera colony, Link Road-3,
Ravishankar Nagar, Bhopal-462016 (M.P.)
E-mail: rowz.bpl-mef@nic.in

Kind Attn: Dr.B. B.Berman

Dear Sir,

Sub : Half yearly Compliance report of Environment and CRZ clearance for the period from **October 2016 to March 2017.**

Ref : 1) Environment and CRZ clearance issued to M/s Kandla Port Trust (KPT) vide letter no. 10-10/2008-IA-III dated 1st November, 2011 and transferred to M/s Adani Kandla bulk Terminal Private Limited (AKBTPL) vide letter no. 10-10/2008-IA-III dated 10th November, 2014
2) CRZ Recommendation for creation of Berthing and Allied Facilities off Tekra near Tuna issued by Forest and Environment, Govt. of Gujarat vide letter bearing no. ENV-10-2009-1543-E dated 23rd June, 2010.

Please find enclosed herewith point wise compliance reports (Hard copy as well as in a CD) of conditions stipulated in the above referred letters.

Thank you,
Yours Faithfully,
For **M/s Adani Kandla Bulk Terminal Pvt. Ltd.**

(Col. Parag Srivastava)
Chief Operating Officer

Copy to:

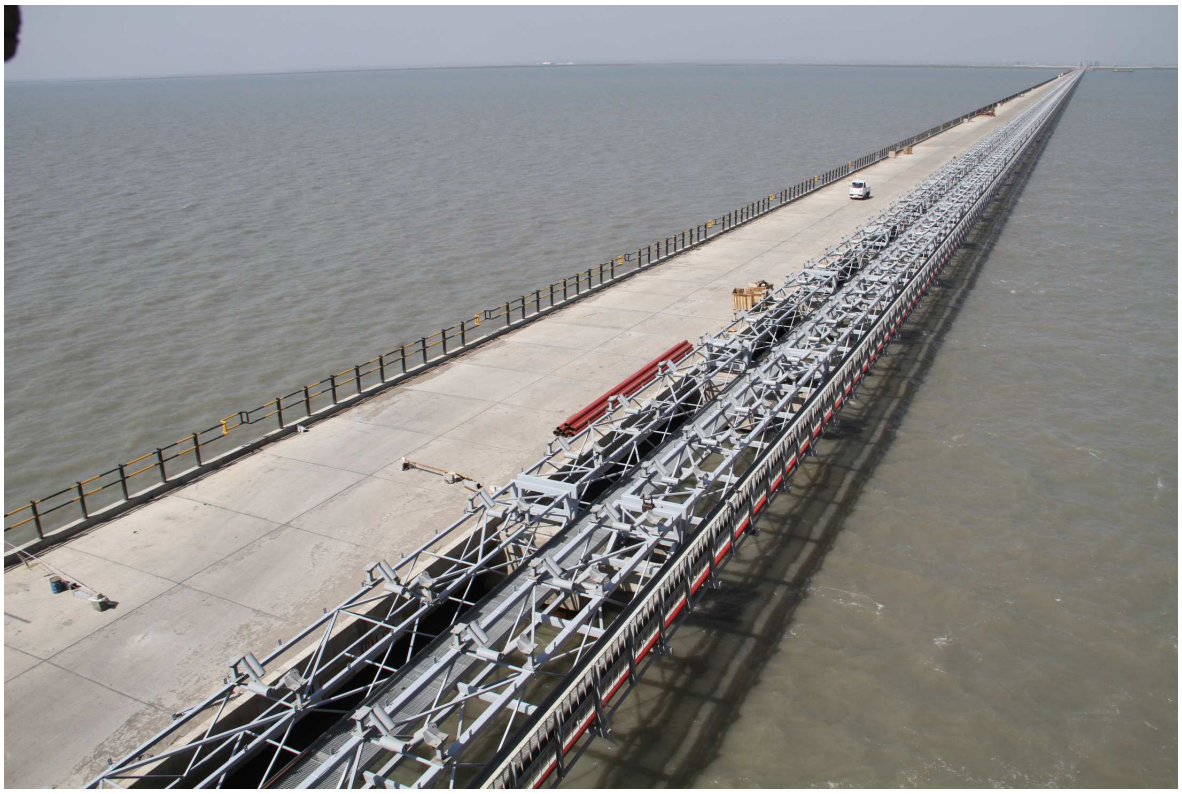
1. The Director (Monitoring –IA Division), Ministry of Environment, Forests & Climate Change, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi-110003
2. The Director, Forests & Environment Department, Block - 14, 8th floor, Sachivalaya, Gandhi Nagar, Gujarat - 382 010
3. The Zonal Officer, Central Pollution Control Board, Zonal Office Vadodra, Parivesh Bhawan, Opposite VMC Ward office No. 10, Subhanpura, Vadodra-390023
4. The Chairman, Gujarat Pollution Control Board, Parvayaran Bhawan, Sector 10A, Gandhinagar-382010(Guj.)
5. The Regional Officer, Regional Office, GPCB - Kutch East, Room No.215-216, KPT administrative Building, Gandhidham, 370201
6. The Chief Engineer, Administrative Building, Kandla Port Trust, Gandhidham 370201

Adani Kandla Bulk Terminal Pvt Ltd
Adani House
Nr Mithakhali Circle, Navrangpura
Ahmedabad 380 009
Gujarat, India
CIN: U63090GJ2012PTC069305

Tel +91 79 2656 5801
Fax +91 79 2555 6490
info@adani.com
www.adani.com

Environmental and CRZ Clearance Compliance Report

Of



Construction of berthing & allied facilities off Tekra near Tuna, Gujarat

Of

Adani Kandla Bulk Terminal Pvt. Ltd.

For Period:

October – 2016 to March– 2017

Environmental and CRZ Clearance Letter issued by MoEF&CC

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

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

Dated: 1 November 2011

To,
The Deputy Chairman,
M/s Kandla Port Trust,
Administrative Office Building,
Post Box No. 50, Gandhidham (Kutch),
Gujarat – 370 201.

Subject: Environmental and CRZ clearance for construction of berthing & allied facilities off Tekra near Tuna, Gujarat by M/s Kandla Port Trust –Reg.

This has reference to letter No: ENV-10-2009-1543-E dated 23.06.2010 from Director and Additional Secretary, Forests & Environment Department, Govt. of Gujarat and your subsequent letter dated 13.03.2011, 29.07.2011 seeking prior Environmental and CRZ Clearance for the above project under the EIA Notification – 2006 and Coastal Regulation Zone (CRZ) Notification, 1991/ 2011. The proposal has been appraised as per prescribed procedure in the light of provisions under the EIA Notification – 2006 and Coastal Regulation Zone Notification, 1991/2011 on the basis of the mandatory documents enclosed with the application viz., the Questionnaire, recommendation of State Coastal Zone Management Authority, EIA, EMP 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 18th – 20th January, 2011 and 21st – 23rd September, 2011.

2. It is interalia, noted that the proposal is for construction of berthing & allied facilities Off Tekra near Tuna, Gujarat. The Kandla Port is located on the West Coast of India, in the Gulf of kutch and along the West Bank of Kandla creek at 70 00' 13"E longitude and 23 00'01"N Latitude. At present Port has 10 berths for handling Dry cargo, 2 berths for handling containers, Six Oil Jetties for handling POL products of liquid cargo traffic at Kandla within Kandla Creek and 3 SBMs at Vadinar for handling Crude oil. Kandla Port is already developed up to the Shore Line i.e. having infrastructural facility like berthing facilities, Tank Farms, Roads, Railways, Strom water Drains, Warehouses & all other amenities. The total traffic handled by the Port has increased from 24.50 Million Tonnes in 1993-94 to 79.5 Million tones of cargo in 2009-10. The present handling capacity of existing ten dry cargo berths, as assessed is only 15.00 Million Tonnes. As against this, these berths have handled 24.58 MMT, which has resulted in berth occupancy of over 90% resulting in high waiting time for

ships.The Port is also in the process of constructing additional four berths on BOT basis (13th to 16th berths) based on the environmental and CRZ clearance already obtained, with a programme to commission the facilities by 2012–With commissioning of these berths by 2012, the existing dry cargo handling capacity will increase by 8 MMTPA and the total capacity will be around 23 MMTPA. Still, there will be a shortfall between demand and supply to the extent of about 06.94 MMTPA, 08.58 MMTPA and 09.74 MMTPA by the year 2011-12, 2012 -13 and 2013-14 respectively.

3. Further, topography of Kandla Creek has its own limitations and it may not be possible to go in for further developments beyond the construction of the 17th berth in the Kandla Creek. Hence, in order to meet the requirements of the trade and to overcome the draft restrictions at Kandla Creek, it is proposed to an off-shore Berthing Facility at Tekra near Tuna in the form of 'T' Shape. Dimensions of the Jetty system: 600m X 60m (Latitude 22 53'18"N & 70 06'20"E). The berthing facility shall be connected by 2000mX18m piled approach & 1700mX18m rubble mound approach (Total 3.7 km) to back up area. The backup area proposed shall be 80 hectares. The Dredged material will be dumped in area earmarked near back up area. The back up area shall be connected to Tuna Port by road of 5.0 km length and also with railway line along the road of 5.0 km length. The quantity of Dredging worked out by CWPRS shall be 784000 m^3. The Terminal will be capable of handling four vessels at a time viz. two vessels, each of 1,00,000 DWT & 15 m draught on front and two vessels, each of 75,000 DWT & 14 m draught on rear side of Jetty head. The proposed Terminal (project) will handle all type of dry bulk cargo like coal, fertilizer, its raw material, salt, wheat, iron etc. The handling capacity of the terminal is worked out to 14 MMTPA. Total capital cost of the project is estimated at Rs.1060 crores (BOT operator: 818 crores + KPT:240 crores) and the implementation period is reckoned as 24 months.

4. 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 Environmental and CRZ Clearance for the project. Accordingly, the Ministry hereby accord necessary Environmental Clearance for the above project as per the provisions of Environmental Impact Assessment Notification – 2006 and Coastal Regulation Zone Notification, 2011, subject to strict compliance of the terms and conditions as follows:

5. **SPECIFIC CONDITIONS :**

(i) "Consent for Establishment" shall be obtained from State 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.

(ii) Scientific studies shall be carried out by some expert & reputed organization like BNHS focusing among other things the marine environment in general and the preservation of mangroves in

particular against any possible adverse impact due to creation of the proposed facilities.

(iii) Proponent shall explore the possibilities of plantation of mangroves in the entire mud flat areas and submit the action plan to the Ministry prior to the commencement of the activity.

(iv) The dredge material shall be reused for low level rising wherever possible and excess shall be dumped into sea at the designated dumping areas identified based on mathematical model studies.

(v) Though the project proponent has carried out EIA for individual components and it were examined by the Committee before the issue of clearances , it is suggested that proponent shall update and submit a comprehensive EMP for the whole project and submit to the Ministry and Regional Office of the Ministry at Bhopal prior to commencement of the activity.

(vi) The project proponent shall set up separate environmental management cell for effective implementation of the stipulated environmental safeguards under the supervision of a Senior Executive.

(vii) The funds earmarked for environment management plan shall be included in the budget and this shall not be diverted for any other purposes.

6. GENERAL CONDITIONS:

(i) Appropriate measures must be taken while undertaking digging activities to avoid any likely degradation of water quality.

(ii) Full support shall be extended to the officers of this Ministry/Regional Office at Bhopal by the project proponent during inspection of the project for monitoring purposes by furnishing full details and action plan including action taken reports in respect of mitigation measures and other environmental protection activities.

(iii) A six-Monthly monitoring report shall need to be submitted by the project proponents to the Regional Office of this Ministry at Bhopal regarding the implementation of the stipulated conditions.

(iv) Ministry of Environment & Forests or any other competent authority may stipulate any additional conditions or modify the existing ones, if necessary in the interest of environment and the same shall be complied with.

(v) The Ministry reserves the right to revoke this clearance if any of the conditions stipulated are not complied with the satisfaction of the Ministry.

(vi) In the event of a change in project profile or change in the implementation agency, a fresh reference shall be made to the Ministry of Environment and Forests.

(vii) The project proponents shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of start of land development work.

(viii) A copy of the clearance letter shall be marked to concerned Panchayat/local NGO, if any, from whom any suggestion/ representation has been made received while processing the proposal.

(ix) State Pollution Control Board shall display a copy of the clearance letter at the Regional Office, District Industries Center and Collector's Office/Tehsildar's office for 30 days.

7. 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 1994, including the amendments and rules made thereafter.

8. 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.

9. The project proponent shall 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 Environmental Clearance and copies of clearance letters are available with the State 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

10. Environmental 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.

11. Status of compliance to the various stipulated environmental conditions and environmental safeguards will be uploaded by the project proponent in its website.

12. 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.

13. 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.

14. 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.

(E. Thirunavukkarasu)
Deputy 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.

(E. Thirunavukkarasu)
Deputy Director (IA-III)

F. No. 10-10/2008-IA.III
Government of India
Ministry of Environment, Forests and Climate Change

Indira Paryavaran Bhawan,
Jorbagh,
New Delhi – 110 003
Dated: 10th November, 2014

To

M/s Adani Kandla Bulk Terminal Pvt Ltd.
Adani House,
Near Mithakhali Six Roads,
Navarangpura,
Ahmedabad,
Gujarat- 380 009

Subject: Change of name/transfer of EC/CRZ granted for the project "Creation of berthing and allied facilities of Tekra near Tuna (Outside Kandla creek) – Reg.

Sir,

This has reference to your letter dated 21.06.2014 regarding the subject mentioned above.

2. The request of transfer of EC/CRZ clearance dated 01.11.2011 granted to M/s Kandla Port Trust has been examined in the Ministry alongwith the MoU, Board resolution, NOC from KPT etc. The EC/CRZ clearance dated 01.11.2011 is hereby transferred to M/s Adani Kandla Bulk Terminal Pvt. Ltd. with the following conditions:

Though M/s Adani Kandla Bulk Terminal Pvt Ltd *is the concessionaire for implementation of the project, the responsibility/ accountability to comply with conditions stipulated in the EC shall remain with both M/s* Adani Kandla Bulk Terminal Pvt Ltd *& M/s Kandla Port Trust. The Ministry of Environment, Forests and Climate Change shall hold both M/s* Adani Kandla Bulk Terminal Pvt Ltd *& M/s Kandla Port Trust accountable for non- compliance of EC/ CRZ conditions.*

Yours faithfully,

10 Nov 2014

(Dr. Manoranjan Hota)
Director

Read
21/11/14

adani	Adani Kandla Bulk Terminal Pvt. Ltd.	From : October 2016 To : March 2017

Compliance to Environmental and CRZ Clearance Letter issued by MoEF&CC

Environmental and CRZ clearance was obtained by KPT vide MoEF&CC letter dated 01.11.2011. AKBTPL and KPT entered in to concession agreement for development of the dry bulk terminal at Tuna on BOOT basis. Said clearance was then transferred to AKBTPL vide MoEFF&CC letter dated 10.11.2014

Half yearly Compliance report of Environment and CRZ Clearance issued by MoEF dated 1st November, 2011 bearing F. No. 10-10/2008-IA-III for Construction of berthing & allied facilities off Tekra near Tuna, Gujarat		
Sr. No	**Condition**	**Compliance status**
5.	**Specific Condition**	
(i)	"Consent for Establishment" shall be obtained from State Pollution Control Board under Air and Water Act and a copy shall be submitted to the Ministry before start of any construction work at site.	• Complied. Consent to establishment is obtained by KPT vide GPCB letter no. PC/CTE/CCA-Kutch-179(3)/GPCB ID-17907/16480 dated 28th July 2009 which was extended for the validity vide letter no. PC/CCA-Kutch-179(3)/GPCB ID-1790/203285 Dated 05th February, 2014. Consent To Establishment is transferred to AKBTPL vide GPCB letter no. PC/CCA-Kutch-179(4) /GPCB ID-17907/234899 dated 31st December, 2014. Consent to operate is obtained by AKBTPL vide consent order no. AWH-68051 dated 03/02/2015 valid up to 02/12/2019. Copies of the stated permissions are already submitted (as a part of half yearly compliance report (Oct-14 to March-15) to MoEF & CC vide letter dated 11.05.2015 and there is no further change.
(ii)	Scientific studies shall be carried out by some expert and reputed organization like BNHS focusing among other things the marine environment in general and preservation of mangroves in particular against any possible adverse impact due to creation of the proposed facilities.	• Complied. M/s. Gujarat Institute of Desert Ecology, Bhuj (similar to BNHS) has conducted scientific studies for preservation and management of mangroves in May 2012. Details related to the same are already submitted (as a part of half yearly compliance report (Oct-14 to March-15) to MoEF & CC vide letter dated 11.05.2015 and there is no further change. Further, a study to ascertain tidal flushing in mangroves around the project area of the dry bulk terminal at Tuna was carried through M/s. GUIDE,

Half yearly Compliance report of Environment and CRZ Clearance issued by MoEF dated 1st November, 2011 bearing F. No. 10-10/2008-IA-III for Construction of berthing & allied facilities off Tekra near Tuna, Gujarat		
Sr. No	**Condition**	**Compliance status**
		Bhuj in April, 2014 when construction activities were ongoing. Copy of the same is attached as **Annexure – 1**. Further, in order to understand the impacts of the existing project activity on marine ecology, a study was carried out through M/s. GUIDE. Copy of the same is attached as **Annexure – 2**. Outcome of the study is mentioned here in brief. ✓ In general, impact on planktonic biota due to different port activities and vessel movement will be highly localized and is not expected to cause major environmental changes. It is most unlikely that vessel traffic will increase sedimentation rates in the intertidal belts of mangrove lined creeks. It is also to be noted that capital and maintenance dredging carried out earlier by KPT / AKBTPL has not shown any sign of impact so far. ✓ In the present study, marine ecology of AKBTPL port waters were characterised by analysing marine chemical, physical and biological components in a radius of 15 km around the port. Analysis of coastal water health through examination of 15 water quality parameters indicated that all the parameters are well within the prescribed limits and no gross contamination could be discerned showing that the coastal water in and around the Jetty is clean and unpolluted.

Half yearly Compliance report of Environment and CRZ Clearance issued by MoEF dated 1st November, 2011 bearing F. No. 10-10/2008-IA-III for Construction of berthing & allied facilities off Tekra near Tuna, Gujarat

Sr. No	Condition	Compliance status
		It may be noted that GUIDE is one of the authorized agencies of Dept. of Forest & Env. Govt. of Gujrat.
(iii)	Proponent shall explore the possibilities of plantation of mangrove in the entire mud flat areas and submit the action plan to the Ministry prior to the commencement of the activity.	• Complied. Based on the scientific studies for preservation and management of mangroves in May 2012 carried out by M/s. GUIDE it was suggested to KPT to carry out mangrove plantation in 500 ha. area. As agreed, AKBTPL has already completed Mangrove plantation in 250 ha area at Sat Saida bet. Balance 250 ha. Mangrove plantation shall be carried out by KPT. Monitoring report prepared by M/s. GUIDE for mangrove plantation in 250 ha carried out at Sat Saida bet is submitted as part of half yearly compliance report (Oct-14 to March-15) to MoEF & CC vide letter dated 11.05.2015.
(iv)	The dredged material shall be reused for low level rising whenever possible and excess shall be dumped into sea at the designated dumping areas identified based on mathematical model studies.	• Complied. Capital dredging was completed by KPT during the construction phase and the dredge material was disposed by KPT at a location identified by M/s. CWPRS, Pune in their study report. Project is now in operation phase and no dredging activity is carried out during Oct'16 to Mar'17.
(v)	Though the project proponent has carried out EIA for individual components and it were examined by the committee before the issue of clearance, it is suggested that proponent shall update and submit a comprehensive EMP for the whole project	• Complied. EMP was updated by AKBTPL and submitted to KPT. KPT has submitted the same vide letter dated 03.12.2013 to MoEF&CC as part of compliance report.

Half yearly Compliance report of Environment and CRZ Clearance issued by MoEF dated 1st November, 2011 bearing F. No. 10-10/2008-IA-III for Construction of berthing & allied facilities off Tekra near Tuna, Gujarat		
Sr. No	**Condition**	**Compliance status**
	and submit to the Ministry and Regional Office of the Ministry at Bhopal prior to commencement of the activity.	Further, said EMP was also submitted by AKBTPL (as part of half yearly compliance report (Oct-14 to March-15) to MoEF & CC vide letter dated 11.05.2015 and there is no further change.
(vi)	The project proponent shall set up environmental management cell for effective implementation of the stipulated environmental safeguards under the supervision of a Senior Executive.	• Complied AKBTPL has environment management cell with qualified manpower for implementation of environmental safeguards and management. The site environment team directly reports to the site CEO. Further, the site environment cell continuously remains in loop with Corporate Environment Cell. Please refer **Annexure – 3** for further details.
(vii)	The funds earmarked for environmental management plan shall be included in the budget and this shall not be diverted for any other purpose.	• Complied. Environmental Management Plan is in place and the funds earmarked (budgeted separately for the each financial year) are being utilized for effective implementation of environmental safeguards and environment monitoring. All the expenses related to environment management plan are recorded in advanced accounting system of the organization. Expenditure on environmental safeguards including horticulture expenses is approx. INR 180.02 Lac. Please refer **Annexure – 4** for further details.
6	**General Condition**	
(i)	Appropriate measures must be taken while undertaking digging activities to avoid any likely degradation of water quality.	• Complied. Construction activities of the project are completed in March, 2015.

Half yearly Compliance report of Environment and CRZ Clearance issued by MoEF dated 1st November, 2011 bearing F. No. 10-10/2008-IA-III for Construction of berthing & allied facilities off Tekra near Tuna, Gujarat		
Sr. No	**Condition**	**Compliance status**
		The project is now in operation phase and no digging activities are carried out during Oct'16 to Mar'17.
(ii)	Full support shall be extended to the officers of this Ministry/Regional Office at Bhopal by the project proponent during inspection of the project for monitoring purposes by furnishing full details and action plan including action taken reports in respect of mitigation measures and other environmental protection activities.	• Complied AKBTPL is always extending full support to the regulatory authorities during their visit to the project site. Last visit of Scientist 'D', MoEF&CC, from Regional Office, Bhopal, was done on 07.10.2016 for compliance certification. In addition to the documents submitted during the site visit as per the request, AKBTPL has also submitted the additional information sought vide our letters/e-mails dated 12.10.2016, 22.11.2016, 28.11.2016 and 11.01.2017. Last visit of Vigilance Officer, GPCB, Rajkot was done on 19.12.2016. AKBTPL has submitted the reply to the site visit report vide letter dated 05.01.2017 incorporating details of action taken with respect to the observations of site visit.
(iii)	A six monthly monitoring report shall need to be submitted by the project proponent to the Regional Office of this Ministry at Bhopal regarding the implementation of the stipulated conditions.	• Complied Six monthly compliance reports regarding the implementation of the stipulated conditions are regularly submitted to Regional Office of MoEF &CC, Bhopal and other concerned authorities. Last compliance report for Apr'16 to Sep'16 period was submitted by AKBTPL vide letter dated 24.11.2016

Half yearly Compliance report of Environment and CRZ Clearance issued by MoEF dated 1st November, 2011 bearing F. No. 10-10/2008-IA-III for Construction of berthing & allied facilities off Tekra near Tuna, Gujarat

Sr. No	Condition	Compliance status
(iv)	Ministry of Environment & Forests or any other competent authority may stipulate any additional conditions or modify the existing ones, if necessary in the interest of environment and the same shall be complied with.	• Point Noted. All applicable conditions in the interest of environment will be complied.
(v)	The Ministry reserves the right to revoke this clearance if any of the conditions stipulated are not complied with the satisfaction of the Ministry.	• Point Noted. During the last compliance verification visit as mentioned in the sr. no ii of General Conditions above, there was no major non-compliance observed.
(vi)	In the event of a change in the project profile or change in the implementation agency, a fresh reference shall be made to the Ministry of Environment and Forests.	• Complied. Details related to transfer of EC/CRZ clearance in the name of AKBTPL are submitted as part of half yearly compliance report (Oct-14 to March-15) to MoEF & CC vide letter dated 11.05.2015 and there is no further change
(vii)	The project proponent shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and date of start of land development work.	• Complied. KPT has informed about the Financial closure vide their letter no. EG/WK/4604(EC)/562 dated 26th December, 2012. There is no further change.
(viii)	A copy of the clearance letter shall be marked to concern Panchayat /local NGO, if any, from whom any suggestion /representation have been made, received while processing the proposal.	• Condition is not applicable to AKBTPL
(ix)	State Pollution Control Board shall display a copy of the clearance letter at the Regional Office, District Industries Centre and Collector's Office/ Tehsildar's office for 30 days.	• Condition is not applicable to AKBTPL
7	These stipulations would be enforced among others under the provisions of Water (Prevention and Control of Pollution) Act 1974, the Air (Prevention	• Complied. Permissions under the applicable rules and acts mentioned are already obtained. Please refer point no. I of

Half yearly Compliance report of Environment and CRZ Clearance issued by MoEF dated 1st November, 2011 bearing F. No. 10-10/2008-IA-III for Construction of berthing & allied facilities off Tekra near Tuna, Gujarat		
Sr. No	**Condition**	**Compliance status**
	and Control of Pollution) Act 1981, the Environment (Protection) Act, 1986, the Public Liability (Insurance) Act, 1991 and EIA Notification, 1994 including the amendments and rules made thereafter.	specific conditions for further details.
8	All other statutory clearances such as the approvals for the storage of diesel from Chief Controller of Explosives, Fire Department, Civil Aviation Department, Forest Conservation Act, 1980, Wildlife (Protection) Act, 1972 etc shall be obtained as applicable by the project proponents from the respective competent authorities.	• Not Applicable The permissions from the authorities mentioned in the condition are not applicable to this project.
9	The project proponent shall 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 Env. Clearance and copies of clearances letters are available with the State 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 RO of this Ministry at Bhopal.	• Complied. KPT has published advertisement regarding accordance of the Environmental and CRZ clearance to the project activity in two local newspapers (Aaj Kal and Divya Bhaskar) and copy of the same is submitted to the Regional office, MoEF&CC Bhopal by KPT vide letter no. EG/WK/4604(EC)/1036 dated 25th November, 2011.
10	Environmental 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.	• Noted and same will be complied based on further directions given by concerned authorities in this regard.
11	Status of compliance to the various stipulated environmental conditions and environmental safeguards will be uploaded by the project proponent in its website.	• Complied. The documents are being uploaded regularly on our website: http://www.adaniports.com/ports-

Half yearly Compliance report of Environment and CRZ Clearance issued by MoEF dated 1st November, 2011 bearing F. No. 10-10/2008-IA-III for Construction of berthing & allied facilities off Tekra near Tuna, Gujarat		
Sr. No	**Condition**	**Compliance status**
		downloads
12	A copy of clearance letter shall be sent by the proponent to concerned Panchayat, Zila 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.	• Complied. Clearance letter is uploaded on our website of Adani Ports: http://www.adaniports.com/ports-downloads
13	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. Compliance report for period (Apr'16 to Sep'16) was submitted to respective authorities mentioned in the condition vide our letter dated 24.11.2016. The said report is also uploaded on our website http://www.adaniports.com/ports-downloads.
14	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 e-mail.	• Complied. Environment Statement for FY 2016 – 17 has already been submitted to GPCB vide letter No. AKBTPL /ENVSTATEMENT/2016-17 dated 25.04.2017. Copy of the same is attached as **Annexure – 5**.

adani	Adani Kandla Bulk Terminal Pvt. Ltd.	From : October 2016 To : March 2017

Compliance to CRZ Recommendation Letter issued by Forest and Environment Department, Govt. of Gujarat

Half yearly Compliance report of CRZ Recommendation for creation of Berthing and Allied Facilities off Tekra near Tuna issued by Forest and Environment, Govt. of Gujarat vide letter bearing no. ENV-10-2009-1543-E dated 23rd June, 2010		
Sr. No	**Condition**	**Compliance**
1	The provisions of the CRZ notification of 1991 and subsequent amendments issued from time to time shall be strictly adhered to by the KPT. No activity in contradiction to the provisions of the CRZ Notification shall be carried out by the KPT.	• Complied. All activities are in line with the CRZ Notification 1991 and its subsequent amendment.
2	No dredging reclamation or any other project related activities shall be carried out in the CRZ area categorized as CRZ I (i) and it shall have to be ensured that the mangroves habitats and other ecologically important and significant areas, if any, in the region are not affected due to any of the project activities.	• Complied. Construction of the project is completed in March, 2015. All construction activities are carried out as per the environmental and CRZ clearance granted vide MoEF&CC letter dated 01.11.2011. All necessary precautions such as allowing free flow of water in the mangrove areas, waste management per the applicable laws, treatment of sewage, dust suppression measures etc. are taken to ensure that the mangroves habitats and other ecologically important and significant areas in the region are not affected due to any of the project activities.
3	The KPT shall participate financially for installing and operating the Vessel Traffic Management System in the Gulf of Kutch and shall also take lead in preparing and operational sing the Regional Oil Spill Contingency plan in the Gulf of Kutch.	• Complied. M/s Kandla port trust contributed an amount of INR 41.25 Cr for installing and operating VTMS in Gulf of Kutch. Information is submitted to MoEF&CC New Delhi vide compliance letter dated 13th November, 2014. There is no further change.
4	The KPT shall strictly ensure that no creeks or rivers are blocked due to any activity at Kandla.	• Complied. No rivers are present at the project site. 3 Bridges and 6 culverts have been provided for free flow of water through creeks.

Half yearly Compliance report of CRZ Recommendation for creation of Berthing and Allied Facilities off Tekra near Tuna issued by Forest and Environment, Govt. of Gujarat vide letter bearing no. ENV-10-2009-1543-E dated 23rd June, 2010		
Sr. No	**Condition**	**Compliance**
		Further, a study to ascertain tidal flushing in mangroves around the project area of the dry bulk terminal at Tuna was carried through M/s. GUIDE, Bhuj in April, 2014 when construction activities were ongoing. Copy of the same is attached as **Annexure – 1**. The conditions as mentioned in the report are maintained.
5	Mangrove plantation in an area of 1000 ha. Shall be carried out by the KPT within 5 years in a time bound manner on Gujarat coastline either within or outside the Kandla Port Trust area and six monthly compliance reports along with the satellite images shall be submitted to Ministry of Environment and Forests as well as to this department without fail.	• Complied. After receiving the Environmental and CRZ clearance, M/s. KPT engaged M/s. Gujarat Institute of Desert Ecology, Bhuj to carry out scientific studies for preservation and management of mangroves. The study was concluded in May, 2012. Based on the said study, M/s. GUIDE has suggested KPT to carry out mangrove plantation in 500 ha. Area. Further AKBTPL being BOOT operator, KPT requested AKBTPL to carry out mangrove plantation in 250 ha area. As agreed, AKBTPL has completed Mangrove plantation in 250 ha area at Sat Saida bet. Balance 250 ha. Mangrove plantation to be carried out by KPT. Monitoring report prepared by M/s. GUIDE for mangrove plantation in 250 ha carried out at Sat Saida bet is submitted as part of half yearly compliance report (Oct-14 to March-15) to MoEF & CC vide letter dated 11.05.2015.
6	No activities other than those permitted by the competent authority under the CRZ Notification shall be carried out.	• Complied. All activities are being carried out as per the environmental and CRZ

Half yearly Compliance report of CRZ Recommendation for creation of Berthing and Allied Facilities off Tekra near Tuna issued by Forest and Environment, Govt. of Gujarat vide letter bearing no. ENV-10-2009-1543-E dated 23rd June, 2010

Sr. No	Condition	Compliance
		clearance granted vide MoEF&CC letter dated 01.11.2011.
7	No ground water shall be tapped for any purpose during the proposed expansion/modernization activities.	• Complied. Ground water is not being used. Present water consumption is 640 KLD. Source of water is Narmada (sourced through Gujarat Water Infrastructure Limited).
8	All necessary permission from different Government Departments/ agencies shall be obtained by the KPT before commencing the expansion activities.	• Not applicable at present All construction activities are completed in March, 2015. No expansion activities are carried out. All necessary permissions will be obtained in future before commencing the expansion activities.
9	No effluent or sewage shall be discharged into the sea/creek or in the CRZ area and it shall be treated to conform to the norms prescribed by the Gujarat Pollution Control Board and would be reused/recycled within the plant premises.	• Complied. No effluent is generated at the project site. Approx.10-12KLD of sewage generated is treated in 25 KLD capacity STP based on FAB technology and treated water is used for horticulture purpose within plant premise. 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	Max	Min	Perm. Limit[$]
Residual Chlorine	ppm	1.0	0.5	> 0.5
TSS	mg/L	26	12	30
BOD (3 Days @ 27 °C)	mg/L	20	6	20

[$] as per CC&A granted by GPCB
BDL – Below Detection Limit

Half yearly Compliance report of CRZ Recommendation for creation of Berthing and Allied Facilities off Tekra near Tuna issued by Forest and Environment, Govt. of Gujarat vide letter bearing no. ENV-10-2009-1543-E dated 23rd June, 2010		
Sr. No	**Condition**	**Compliance**
		Please refer **Annexure – 6** for detailed analysis reports. Approx. INR 10.50 Lakh is spent for all environmental monitoring activities during the F.Y. 2016-17 periods.
10	All the recommendations and suggestions given by the NIOT in their Comprehensive Environment Impact Assessment report for conservation /protection and betterment of environment shall be implemented strictly by the KPT.	• Complied. The EMP prepared by NIOT in the EIA report was updated by AKBTPL (based on the condition mentioned in the EC and CRZ clearance) and submitted to KPT. KPT has submitted the same vide letter dated 03.12.2013 to MoEF&CC as part of compliance report. All the measures mentioned in the updated EMP prepared by AKBTPL are implemented for environment protection.
11	The construction and operation activities shall be carried out in such a way that there is no negative impact on mangroves and other coastal/marine habitats. The construction activities and dredging shall be carried out only under the constant supervision and guidelines of the NIOT.	• Complied. All construction and operation activities are carried out meticulously to ensure that there is no negative impact on mangroves and other coastal / marine habitats. Please refer to Sr. no. ii and iii of the specific conditions of the EC and CRZ clearance above for further details. Construction activities have been completed in March, 2015 based on the NIOT recommendations. During construction phase capital dredging was carried out by KPT and the dredge material was disposed at a location identified by M/s. CWPRS, Pune in their study report. No maintenance dredging activity is carried out from Oct-16 to Mar-17.
12	The KPT shall contribute financially for any common study or project that may be	• Noted and same will be complied on receipt of such recommendations from

Half yearly Compliance report of CRZ Recommendation for creation of Berthing and Allied Facilities off Tekra near Tuna issued by Forest and Environment, Govt. of Gujarat vide letter bearing no. ENV-10-2009-1543-E dated 23rd June, 2010		
Sr. No	**Condition**	**Compliance**
	proposed by this Department for environmental management/ conservation / improvement for the Gulf of Kutch.	concerned authorities
13	The construction debris and/or any other type of waste shall not be disposed-off into the sea, creek or in the CRZ areas. The debris shall be removed from the construction site immediately after construction is over.	• Complied. Construction of the project is completed in March, 2015. All construction debris and other solid wastes are removed from the construction sites.
14	The construction camps shall be located outside the CRZ area and the construction labour 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. Construction of the project is completed in March, 2015.
15	The KPT shall regularly update its Local Oil Spill Contingency and Disaster Management Plan in consonance with the National Oil Spill and Disaster Contingency Plan and shall submit the same to the MoEF, GOI and this Department after having it vetted through the Indian Coast Guard.	• Complied. KPT is already having updated Disaster Management Plan as well as Oil Spill Contingency Plan. KPT has also executed MoU with oil companies i.e. IOCL, HPCL, BPCL etc. for setting up of their Tier I facility for combating Oil Spill at Kandla. Necessary action will be taken by AKBTPL in consultation with KPT to combat with emergency situations.
16	The KPT shall bear the cost of the external agency that may be appointed by this Department for supervision/ monitoring of proposed activities and the environmental impacts of proposed activities.	• Noted and same will be complied on receipt of such recommendations from concerned authorities
17	The KPT shall take up massive greenbelt development activities in and around Kandla and also within the KPT limits.	• Complied. Plantation activity is an on-going process. As part of the same, greenbelt

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Sr. No	**Condition**	**Compliance**
		within and along the periphery of the back-up area is being developed on regular basis. Approx. 11.83 hectare area developed so far. Types of trees; Neem (AZARDICA INDICA), Ficus Panda Topiary, Delonix regia, Washingtonia f.f, Almanda Dwarf, IXORA RED, Lilly (HYMENOCALLIS SPECIOSA), Euphorbia Milli, Eucalyptus spp, Boungainvellia Red, Cycus, Clerodendron Inerme, Flat lawn, Casurina Spp, Neem (AZARDICA INDICA), Peltophorum, Nerrium, Inermi, Coconut, Sloppy lawn, Casurina Spp Total expenditures of the horticulture dept. for the period F.Y. 2016-17 are INR 54.13 lakh.
18	The KPT shall have to contribute financially for taking up the socio-economic upliftment activities in this region in consultation with the Forest and Environment Department and the District Collector/District Development Officer.	• Complied. The CSR Activities are planned out at Tuna by Adani Foundation. AF works in the following four main areas: 1 Education 2 Community Health 3 Sustainable livelihood 4 Rural Infrastructure Development Various activities related to above mentioned areas are being carried out on regular basis for socio-economic upliftment of surrounding villages by Adani Foundation. Details of the activities carried out are shared with FOKIA (Federation of Kutch Industries Association) chaired by District Collector quarterly. Total expenditures of the CSR activities for the period F.Y.

Half yearly Compliance report of CRZ Recommendation for creation of Berthing and Allied Facilities off Tekra near Tuna issued by Forest and Environment, Govt. of Gujarat vide letter bearing no. ENV-10-2009-1543-E dated 23rd June, 2010		
Sr. No	**Condition**	**Compliance**
		2016-17 are INR 35.20 lakh. Please refer **Annexure – 7** for further details.
19	A separate budget shall be earmarked for environmental management and socio-economic activities and details thereof shall be furnished to this Department as well as the MoEF, GoI. The details with respect to the expenditure from this budget head shall also be furnished.	• Complied. Main constituents of the environmental management plan are environmental monitoring; greenbelt development; mangrove plantation; maintaining bridges/ culverts for protection of creeks; treatment and disposal of wastes; mechanization of operations etc. Approximately INR 180.02 Lakh is spent for various activities mentioned here. Please refer to **Annexure – 4** for details related to environmental expenditures and **Annexure – 7** for expenditures related to CSR activities.
20	A separate environmental management cell with qualified personnel shall be created for environmental monitoring and management during construction and operational phases of the project.	• Complied AKBTPL has environment management cell with qualified manpower for implementation of environmental safeguards and management. The Environment Cell continuously remains in loop with Corporate Environment Cell. Please refer **Annexure – 3** for further details.
21	An Environmental report indicating the changes, if any, with respect to the baseline environment quality in the coastal and marine environment shall be submitted every year by the KPT to this Department as well as to the MoEF, GoI.	• Complied Ambient Air Quality (twice in a week), Noise (once in a month) and marine water and sediment (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.

Half yearly Compliance report of CRZ Recommendation for creation of Berthing and Allied Facilities off Tekra near Tuna issued by Forest and Environment, Govt. of Gujarat vide letter bearing no. ENV-10-2009-1543-E dated 23rd June, 2010

Sr. No	Condition	Compliance
		Total Sampling Locations: 4 Nos. **Parameter / Unit / Max / Min / Perm. Limit$** PM_{10} / $\mu g/m^3$ / 97.58 / 43.87 / 100 $PM_{2.5}$ / $\mu g/m^3$ / 58.52 / 15.47 / 60 SO_2 / $\mu g/m^3$ / 30.34 / 5.38 / 80 NO_2 / $\mu g/m^3$ / 51.20 / 15.57 / 80 **Noise / Unit / / / Perm. Limit** Day Time / dB(A) / 74.8 / 48.6 / 75 Night Time / dB(A) / 70.1 / 42.3 / 70 $ as per NAAQ standards, 2009 **Total Sampling Locations: 2 Nos.** **Parameter / Unit / Surface (Max, Min) / Bottom (Max, Min)** pH / -- / 7.9 / 8.1 / 7.03 / 7.5 TDS / mg/L / 48200 / 49880 / 43110 / 43960 TSS / mg/L / 66 / 72 / 32 / 36 BOD (3 Days @ 27 °C) / mg/L / 10 / 8 / 3 / 2 DO / mg/L / 5.8 / 4.8 / 5.2 / 4.4 Salinity / ppt / 42.6 / 43.2 / 38.6 / 39.7 COD / mg/L / 28 / 22 / 16 / 14 Please refer **Annexure – 6** for detailed analysis reports. Approx. INR 10.50 Lakh is spent for all environmental monitoring activities during the F.Y. 2016-17 periods.
22	The KPT shall have to contribute financially to support the National Green Corps Scheme being implemented in the Gujarat by GEER Foundation, Gandhinagar, in consultation with Forest and Environment Department.	• Complied National Green corps Scheme is being implemented by GEER foundation. AKBTPL requested GEER foundation to provide details of the program and financial assistance required so that necessary support may be provided. Further to the communication from GEER foundation, various activities were carried out on 21 March, international Day of Forests in 2014, at a school in Rampar, under National Green Corps.

Half yearly Compliance report of CRZ Recommendation for creation of Berthing and Allied Facilities off Tekra near Tuna issued by Forest and Environment, Govt. of Gujarat vide letter bearing no. ENV-10-2009-1543-E dated 23rd June, 2010

Sr. No	Condition	Compliance
		Support will be extended to GEER foundation for any such activities in future
23	A six monthly report on compliance of the conditions mentioned in this letter shall have to be furnished by the KPT on a regular basis to this Department/MoEF, GOI.	• Complied. Six monthly compliance reports regarding the implementation of the stipulated conditions are regularly submitted to all concerned authorities. Last compliance report for Apr'16 to Sep'16 period was submitted by AKBTPL vide letter dated 24.11.2016
24	The KPT before commencing any activity, at the location under the consideration, shall have the latest CRZ map prepared through one of the authorized agencies and the map shall have land use features within the area of 5 km radius from the location along with the HTL and LTL and CRZ boundary and inland if any or mangroves area shall be used for the proposed development.	• Complied. CRZ map including land features prepared by institute of Remote sensing, Anna University, Chennai is already submitted by KPT to MoEF&CC vide letter no. EG/WK/4604 (EC)/146 dated 14.02.2012.
25	The entire jetty and approach shall be constructed on piles to ensure the free flow of water and that no creeks are blocked in any way.	• Complied. As per the Environmental/ CRZ clearance obtained from MoEF&CC approach road of 2 km is constructed on rubble mound and 1.7 km approach road below low water line is constructed on piles. Entire jetty is constructed on piles. Bridges are constructed at three creeks and box/piped culverts are placed at various locations to allow free flow of water. Photographs of the same are already submitted as part of half yearly compliance report (Oct-14 to March-15) to MoEF & CC vide letter dated

Half yearly Compliance report of CRZ Recommendation for creation of Berthing and Allied Facilities off Tekra near Tuna issued by Forest and Environment, Govt. of Gujarat vide letter bearing no. ENV-10-2009-1543-E dated 23rd June, 2010		
Sr. No	**Condition**	**Compliance**
		11.05.2015 and there is no further change.
26	The KPT shall create a full-fledged and environmental cell for implementation of the Environment Management Programme and monitoring of the environmental parameters/post project monitoring.	• Complied. AKBTPL has environment management cell with qualified manpower for implementation of environmental safeguards and management. The Environment Cell continuously remains in loop with Corporate Environment Cell. Please refer **Annexure – 3** for further details.
27	The KPT shall have to take up in-situ biodiversity conservation project for mangroves at least in 5 ha. of area in addition to plantation of mangrove in 1000 ha.	• Complied 5 ha in-situ biodiversity conservation project for mangroves is being carried out at sat saida bet (location identified by KPT). M/s GUIDE has prepared a first progress report of the same. Please refer **Annexure – 8** for further details.
	General conditions	
28	A separate budget shall be earmarked for environmental management and socio-economic activities and details thereof shall be furnished to this Department as well as the MoEF, GoI. The details with respect to the expenditure from this budget head shall also be furnished.	• Complied. Please refer point no. 19 above for the reply to this condition.
29	Any other condition that may be stipulated by this Department from time to time for environment protection /management purpose shall also have to be complied with by the KPT.	• Agreed.

Annexure – 1

Dr. G.A. Thivakaran
Senior Principal Scientist

Gujarat Institute of Desert Ecology

8.04.2014

To
Shri. Hiral Patel
Asst. Manager (Environment)
Adani Ports and Special Economic Zone Limited
1st floor, APSEZL house, Nr. Adani House,
Nr. Mithakhali Circle , Navrangpura
Ahmedabad- 380 009, Gujarat

Dear Shri Hiral Patel,

Kindly find enclosed the final report of the study carried out on 3.04.2014 to ascertain tidal flushing to mangroves in the project domain of Adani Kandla Bulk Terminal Private Ltd., at Tuna, Kandla, Kachchh.

In case any clarification is required kindly contact me.

Thanking you,

Sincerely yours,

(G.A. Thivakaran)

P. O. Box No. # 83, Opp. Changleshwar Temple, Mundra Road, Bhuj (Kachchh) - 370001, Gujarat (India)
Tel : 91-2832-329408, 235025 Tele / Fax : 235027
Web: www.gujaratdesertecology.com, E-mail : desert_ecology@yahoo.com

REPORT ON MAINTAINING AND RESTORING ADEQUATE TIDAL FLUSHING IN ADANI KANDLA BULK TERMINALPRIVATE LTD., AT TUNA TEKRA, KANDLA, KACHCHH, GUJARAT

Introduction

Kandla Port Trust (KPT) has decided to develop berthing facilities for handling dry bulk cargo at Tuna region, off Tekra, at south of Nakti creek. Adani Kandla Bulk Terminal Pvt. Ltd. (AKBTPL) is constructing a dry bulk terminal at Tuna near Kandla by entering into an agreement with KPT. This berthing facility coming up off Tekra (outside Kandla Creek) is being developed on Public Private Partnership (PPP) model on Built, Operate, Transfer (BOT) mode and will be operated by AKBTPL. Various infrastructure developments for this terminal are under way and expected to be completed shortly. AKBTPL has already completed the approach road to the terminal and the activities for the railway line connecting the terminal with the main rail road are going on parallel to the approach road. It may be noted that the jetty and the backup area are covered under the concession agreement while the approach road from existing road (reaching up to barge jetty of KPT) to backup area is being developed by AKBTPL but its ownership lies with KPT.

The project proponent (AKBTPL) is interested to ensure that the ongoing infrastructure development do not alter the existing tidal flushing regime to the mangrove formations within the project domain on either side of the approach road and parallel rail road. It is further intended that the existing mangrove formation (within their project domain) remains in its earlier natural and pristine state without any degradation. Gujarat Institute of Desert Ecology (GUIDE), Bhuj was assigned the task of conducting field studies to ascertain whether normal tidal flooding regime exists similar to its earlier condition post construction period and whether any blockage, alteration of creek water course is impeding tidal flushing in the immediate project vicinity. With this aim, a field study was carried out on 03.04.2014 by a team of mangrove scientists from Gujarat Institute of Desert Ecology (GUIDE), Bhuj along with representatives from APSEZL.

The study team endeavoured to inspect the whole of feeder (approach) road from beginning to end and in order to ensure that mangrove formations are normally flooded at different locations along the approach road and to suggest remedial measures including physical amendments to restore, and if possible enhance natural tidal flushing to the earlier state railroad which cross different creek systems in its course. This report presents location wise observations along the approach road.

Method

The entire stretch of feeder/approach road of the bulk terminal berth was traversed by vehicle and on foot by the team and the locations where the approach road crosses the creek systems were thoroughly studied in order to ensure that the tidal regime is normal and not disturbed. In total, three major bridges and six culverts where the approach road crosses the natural creeks were identified as major locations where any alteration would lead to mangrove degradation. At these nine sites, specific tidal flushing to the natural mangroves and in the creeks was thoroughly checked. The study was carried out during high tide in order to make certain that the mangroves in project domain are adequately flooded and there is no restriction caused due to developmental activities. The proceeding account gives details of site wise observation. Plates 1 to 9 depict the present scenarios at 3 bridge sites and 6 culverts.

Bridge 1 (Plate 1)

In this site, it is observed that tidal water is flowing freely beneath the bridge. Tidal water runs in the mudflats on either sides of the bridge by overflowing from the creek banks. Mudflat on the western extension harbours stunted and sparse mangroves; however, fairly dense mangroves are present along the creek banks downstream. It was further ascertained that no bottleneck under the bridge restricts the tidal flow to the mudflat and the existing mangrove stand.

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Special attention was paid whether the earthen bund usually made for material transport in such activities is thoroughly cleared that will otherwise obstruct the tidal flow. Similarly, it was further confirmed that the basin morphology underneath the bridge on immediate upstream and downstream location is uniform which will ensure unobstructed tidal flow.

Bridge 2 (Plate 2)

At this site, railroad construction runs parallel to the approach road. This site is marked by extensive mangrove formations down the creek on both sides. Tidal water easily reaches to these mangrove areas due to clear openings and no obstructions. The creek basin under the bridge exhibits a natural state. Restoration of creek width and creek basin after completion of the bridge construction was verified on both sides of the creek and underneath the bridge.

Bridge 3 (Plate 3)

At this site, extensive mangrove formations could be seen on both downstream and upstream mudflats. There is no obstruction along the creek bank of the railroad bridge and a normal tidal flow could be seen. Since the creek at this site is fairly larger than other creek systems, tidal flow is adequate already. Some additional measures such as broadening the creek width on both side of the railroad, ensuring proper creek basin morphology by deepening could be witnessed at this site.

It was also verified that all soil dumps and stone boulders under the bridge were removed after completion of the bridge construction to maintain uniform creek basin morphology on both sides of the creek. Creek basin has further been deepened a little down the creek on the left side to enhance free flow of water to mangrove areas.

Culverts 1 to 6 (Plate 4 to 9)

Six culverts of different sizes crossing the creek systems further down the approach road were inspected. All these six culverts are narrow and tidal flow was enabled by pipe openings under the approach road / railroad construction. Mangrove formations that are fed by the creek systems range from scrubby mangroves to fairly dense and extensive once.These mangroves depend on creek water inundation. In all the culvert sites vast mudflats with good potential for mangrove regeneration could be seen in the background, underlining the need for maintaining natural tidal flushing. Normal tidal regime has been observed as attested by tidal water inundation at the mangroves in the immediate vicinity of the culverts. Railroad and approach road are located almost parallel to each other at this site. No alteration in the basin morphology of the natural creek on both sides of the culverts could be noticed and a proper tidal flushing during high tidal condition was observed.

Over all Observation

Along the whole approach and railroad, three bridge sites and six culvert sites were identified as important for tidal flushing in the surrounding mangrove areas. At present all the openings are clear of any obstruction allowing tidal flushing in the mangrove areas. The same shall be maintained throughout the life cycle of the project activity through periodic monitoring and maintenance dredging (if required) to ensure that there is no degradation of mangroves in the surrounding areas due to the project activity. The overall objective of maintaining the earlier status of tidal flooding is achieved at all 9 locations.

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Plate 1 – Present Situation at Bridge 1

Plate 2 – Present Situation at Bridge 2

Plate 3 – Present Situation at Bridge 3

Plate 4 – Present Situation at Culvert 1

Plate 5 – Present Situation at Culvert 2

Plate 6 – Present Situation at Culvert 3

Plate 7 – Present Situation at Culvert 4

Plate 8 – Present Situation at Culvert 5

Plate 9 – Present Situation at Culvert 6

Annexure – 2

STATUS OF MARINE ECOLOGY AND IMPACT ASSESSMENT FOR ADANI KANDLA BULT TERMINAL PRIVATE LTD., TUNA, KANDLA

Project Proponent

Adani Kandla Bulk Terminal Private Ltd., Tuna

Submitted by

Gujarat Institute of Desert Ecology
Mundra Road
Bhuj-370 001, Kachchh

December 2016

CONTENTS

STATUS OF MARINE ECOLOGYAND IMPACT ASSESSMENT FOR ADANI KANDLA BULK TERMINAL PRIVATE LIMITED (AKBTPL), TUNA, KACHCHH

1) Introduction:

Adani Kandla Bulk Terminal Private Ltd., (AKBTPL) is located at Tuna region, off Tekra, South of Nakti creek of Kandla. AKBTPL facility at Tuna, Kachchh is a subsidiary of the Adani Ports and Special Economic Zone Limited (APSEZL) which is India's largest port and integrated SEZ. AKBTPL jetty facility was commissioned during February 2015 and is capable of handling ships of 1,00,000 DWT having drafts of 15.0 m at its outer berth which require an approach channel width of 200 m and depth of 12.3 m. The first vessel *MV Sheng Ming* was berthed on 09th February 2015 with a draft of 14.0 m making it the deepest draft bulk cargo vessel to be directly berthed at a KPT facility. The dry bulk terminal project consists of various components including: 80 ha back up area, 5 km log approach road and railway connectivity from the main land to the backup area, 3.7 km long approach from the back up area to the jetty (1.7 km rubble mound from back up area and 2 km piled approach), "T" shape jetty (600 m x 60 m) and other ancilliary facilities required for operation.

In order to assess the marine environmental quality in its port vicinity and as per the directives of MoEF&CC, AKBTPL instituted a study on the marine ecological characters which will throw light on the present condition of the marine environment of its port and possible impact due to ongoing port activities. This study intends to assess different marine ecological components in the port environment and predict the impact of the ongoing port activities in general. Gujarat Institute of Desert Ecology (GUIDE), Bhuj has been assigned this task of marine ecological assessment study. The scope of the study includes Chemical and physical characterization of surface water, Physical and chemical characterization of benthic sediments, characterizing phyto and zooplankton biota and visualization of impact on these pelagic entities within radius of 15 km of the port. Density, diversity and other structural characteristics of mangroves, population structure, biomass and diversity of benthic macro and meiofaunal communities and quantification

of impact on these communities due to present port activities, fishery potential of the study area including fish species available is also included in this study. Present study was carried out during the Post-monsoon month of November 2016.

2) Baseline Studies

2.1) Intertidal environment

Intertidal faunal composition, density and diversity were studied at four sampling locations in the vicinity of the project site. Four major groups of intertidal macrofauna represented by 16 genera have been recorded. Their numbers varied from 13 to 16. Crustaceans and gastropods were dominant groups followed by gastropods and polychaetes. An overall average density of 493.7/m^2 was recorded. Shannon's diversity values ranged from 1.96 to 2.24 and evenness values ranged from 0.51 to 0.69. In general, density of intertidal fauna at Tuna region is comparatively lesser than other intertidal belts of Kachchh.

Study on subtidal macrobenthos recorded four major groups namely polychaetes, molluscs, crustaceans and "others" in 15 sampling locations within 15 km radius of the port. Altogether, 29 genera of macrofauna were recorded. Of these, molluscs and polychaetes constituted the dominant groups with 11 genera each followed by crustaceans and "others". Population density varied from 19to 34 no/$m^2$with molluscan group density far exceeding other groups. Polychaetes with a richness of 11 genera showed a cumulative total density of 115 and the total density of crustaceans with a richness of 6 genera was 72/m^2 only. Subtidal macrobenthic diversity values ranged from 2.15 to 2.58 and evenness values ranged from 0.8 to 0.94 showing that the subtidal habitat is mostly evenly distributed with the available species.

In the present study, as many as 46 species belonging to foraminiferans, nematodes, ostracodes and harpacticoids were recorded for meio-benthic fauna in 15 different sampling locations. Of these, foraminiferans topped the list with 21 species. Shannon diversity values varied from 3.12 to 3.59 and Pielou's evenness varied from 0.81 to 0.91. Similar trend was recorded at disposal site for sub tidal meiobenthos with 46 species with the dominance of foraminiferans and with density variation of 144 to 259 no/$10cm^{-2}$. Shannon diversity indices of subtidal meiofauna ranged from 3.22to 3.63.

2.2) Biological Environment

Productivity in terms of chlorophyll '*b*' at the 15 sampling locations ranged from 0.023 mg/m^3 to 0.127 mg/m^3 with an average value of 0.06 mg/m^3. The recorded value of productivity is rather low indicating low productivity in the water column. Phytoplankton composition and distribution was dominated by three groups namely Pennate and Centric diatoms and dianoflagellates. A total of 26 genera have been recorded with the dominance of diatoms. Phytoplankton density values ranged between 15,100 cells/l to 35,500 cells/l with an average density of 24,900 cells/l. Shannon diversity indices (H') values for phytoplankton ranged from 2.13 to 2.75. In general, phytoplanktonic composition, density and diversity in the port vicinity was normal and no abnormality could be observed.

Zooplankton biomass (ml/100 m^3) in the dredging site ranged 5.3 to 9.4 ml/100 m^3 with an average value of 7.66 ml/100 m^3. Composition of zooplankton was diverse and mainly contributed by copepods, decopods, polychaetes, molluscan larval forms, harpacticoids, cladocerans and fish larvae in different proportions. A total of 28 groups were recorded. Zooplankton density ranged from 216/m^3 to 781/m^3 with an average value of 408/m^3. Shannon diversity indices (H') values for zooplankton ranged from 1.87 to 3.14. Similar to phytoplankton, zooplankton density, diversity and composition was comparable with any healthy coastal waters though recorded diversity and biomass values were rather low attributable to environmental parameters prevailing in these waters.

2.3) Mangrove environment

Mangrove vegetation in and around the AKBTPL project domain constitutes about 1,266 ha with dense and sparse patches accounting for 530.55 and 736.25 ha, respectively. Tuna mangroves are constituted by a single species of *A. marina*. Six transects, each containing 3 quadrates of 10x10 meters were studied. Pooled data of mangrove tree density ranged from 5,500/ha to 11,250/ha. Tree height in all the six transects showed significant variation and ranged from 1 m to 6.1 m with an overall average of 3.71 m. Overall mean tree girth (GBH) of 16 cm with a range of 7 to 28 cm was recorded.

Density of plants in the regeneration class (seedlings less than 30 cm) ranged between a minimum of 17,900/ha and a maximum of 1,30,000/ha. Density of recruitment class plants ranged between 5,680/ha to 12,200/ha. Coral and Seaweed ecosystems are absent in the study area.

2.4) Fishery Resources

Tuna coastal regions earmarked for the proposed development is a highly industrialized as port activity and vessel movement has rendered the network of the creek systems. Both in Kandla and Tuna regions, there are about 6 prominent fishing villages with a sizable fishing community totalling 1,450. There are about 465 motorized and 62 non-motorized fishing vessels in these 6 villages. Almost 99% of the fishermen and fishing vessels are active far from Kandla – Tuna complex since fishery resources at the tail end of Gulf of Kachchh is sparse that might be due to a combination of human induced and natural factors. A major chunk of fishermen and vessels go for shrimp fishery at Surajbari and Navlakhi area. At Tuna fish landing centre no landing takes place since 2012. Fish catch during five year period 2011-12 to 2015-16 at Kandla varied between 363.5 tonnes to 4,654.5 tonnes and highest catch was recorded during 2011-12. The catch is mostly dominated by small Sciaenids, Clupeids, Bombay duck, Cat fish, Ribbon fish, Crabs, Coilia, Jew fish, Mullets, Shrimps and Silver bar. Landing peak mostly occurs during November and December months. During 2015-16 highest landing occurred during the month of December and lowest landing during June and July months. Fishes like Shrimp, Bombay duck and Coilia dominated the catch.

2.5) Water Environment

Surface water quality (Sea) in 15 sampling locations in a radius of 15 km in and around the port facility was assessed in order to document the present water quality. Standard method was followed to assess 15 different water quality parameters. Water salinity values did not fluctuate much among the sampling sites and varied from 39.0 to 45.0 ppt with an overall mean of 41.95 ppt. A decreasing trend in salinity values could be observed from the port location towards inner gulf which might be due to the shallowness of the water column and reduced water circulation pattern.

Fluctuation in pH value among sampling location was marginal and a consistent uniformity was found in all the 15 sampling sites. Hydrogen Ion Concentration is influenced by a combination of factors. Suspended solid values ranged from a minimum of 145 mg/l and maximum of 276 mg/l with an overall mean of 200.1 mg/l. Generally in the gulf, as tidal currents play a major role in TSS levels, it is higher in shallower regions and creek systems. Higher suspended solids value at some sampling locations might be due to its local geo-morphological features like creek basin and vessel movements. Turbidity values in terms of nephelometric turbidity units ranged from 8 NTU to 50 NTU with an average of 27.8 NTU. These lower values could be due to less wind velocity and turbulence that characterize early part of the winter season during the month of November. In the present study, average DO level was 5.94 mg/l and it varied from 4.4 mg/l to 7.6 mg/l. DO values recorded presently were comparatively good since sampling was done during early winter period as the water temperature and salinity in the water column was moderate.

Biological Oxygen Demand (BOD) as an index of the biodegradable organics varied from 0.4 – 4.8 mg/l with an average value of 2.14 mg/l. Variation in the Phenolic compounds of the sea water samples was from 0.2 to 0.75 µg/l recorded with an average value of 0.44 µg/l. Phenolic levels registered a decreasing trend from the proximity of the port towards inner gulf showing its origin from port related activities. Nutrients like nitrate and phosphate recorded in the present study appears to originate from port

handling of related materials like fertilizers. Among nutrients, Nitrate ranged from 0.19 µg/l to 1.98 µg/l with a mean of 0.087 µg/l whereas nitrite values were between 0.024 µg/l to 0.113 µg/l with a mean of 0.052µg/l. With a range of 3.68 µg/l to 6.3 µg/l and a mean of 4.69 µg/l, Petroleum hydrocarbons (PHC) was normal and did not indicate any gross contamination when viewed in comparison with the concentrations in unpolluted waters. Four heavy metals namely Lead, Mercury, Cadmium and Total Chromium were investigated in the water. Levels of these heavy metals were well within the limits and did not show any gross contamination. Analysis of physical and chemical parameters of surface waters in the port environ indicated that the water quality is pristine and important parameters like nutrients (phosphate and nitrate), heavy metals (Mercury, Cadmium, Lead and Chromium) are either comparable with the other port waters or are within the limits which do not pose major threat to the water quality or biota.

2.6) Sediment Environment

In the bottom sediment, concentration of total phosphorus showed wide fluctuation and ranged from 0.9 -2.9 mg/kg with an average value of 1.727 mg/kg. Total Organic Carbon ranged from 0.53% to 1.05% with an average value of 0.83%. In marine environment, terrestrial run-off and organisms residing in aquatic bodies are the source of organic carbon. Calcium Carbonate values in terms of percentage dry weight ranged from 35.8% to 45.6% with an average value of 40.55%. Phenolic Compounds in sediment has a tendency to couple with nitrogenous compounds and make them less available for biological processes. In the present study, phenolic compounds ranged from 0.45 mg/kg to 1.69 mg/kg with an average value of 0.91 mg/kg. Levels of petroleum hydrocarbon (PHC) varied between 2.1 µg/g to 3.97 µg/g with an average value of 3.33 µg/g. However, these levels do not indicate any gross contamination of sediment by PHC.Concentration of four crucial heavy metals in the subtidal sediment collected from 15 sampling locations were studied. Cadmium in the sediment samples registered below detectable concentrations whereas levels of lead ranged from 1.372 mg/kg to 1.757 mg/kg with an average value of 1.48 mg/kg. Mercury levels ranged from of 0.79 mg/kg

to 2.41 mg/kg. Concentration of total chromium in the sediment samples was registered in below detectable concentrations (BDL). The metal concentration in sediment is dependent on the nature, adsorption and retention capacity of the substratum. Presence of mangroves possibly acts as a sink for these heavy metals countering contamination of creek waters and open seas since sediment bound metals are immobilized by physical and biogeochemical processes. The levels encountered in the present study however seem to have originated from terrestrial and anthropogenic sources over the years.

3) Impact of the Port Activity on Marine Ecology at AKBTPL Jetty

Present port activity involves maintenance dredging and disposal of these dredged spoil in nearby open waters (at location identified by modeling studies and approved by MoEF & CC) as per the requirement. For dredging activities, Trailer Suction Hopper Dredger (TSHD) is deployed which, in one haul carry 5000 m^3 of slurry. Dredging the bottom will churn up the bottom sediment and disperse fine particulate matter in the water column resulting suspended load increase in the water column and formation of turbidity plumes in and around the dredging site. It is estimated that the average turbidity and TSS levels of 15.07 NTU and 90.5 mg/l respectively were observed, however, zone of this high suspended load is confined to a small area and the ambient concentration level was found to be reached within 24 hours of stopping the dredging.

Foremost effect of dredging will be increased TSS with reduction in light penetration and the concomitant impact on productivity of the water column though in a small area. Churning up of organic content will result in removal of dissolved oxygen in a zone of 100 meters beyond the boundary of the dredging site. Temperature of the water column is likely to experience a minor shift due to retention of heat by the suspended sediment. Similarly, shift in pH level is possible. Corresponding impact on the biota will be confined only to the dredging site and impact will be very much attenuated beyond 100 meters.

Clay and silt bound organic matter and nutrients such as NO_3 locked in the sediment may be released into the water column enriching the water and leading to algal proliferation in and around dredging site. Changes in water circulation pattern will be minimal as changes in seabed level are predicted to be small. This will reduce light penetration and consequently photosynthetic efficiency and primary productivity in the water column. High TSS level in the water column within the dredging site is likely to deplete dissolved oxygen and expose biota to undesirable levels of pollutants. Other crucial water quality parameters like pH, salinity and BOD are also likely to be affected during dredging. Strong tidal currents prevailing in this part of gulf enable good mixing in the water

column. Hence, different impact on water column is expected to reach background levels within 100 m beyond the boundary of the dredging site.

Harmful substances, including heavy metals, oil, TBT, PCBs and pesticides locked in the seabed sediments will be released due to bottom churning and their impact depends on to what extent the sediment is contaminated. Remobilisation of the sediment locked pollutants and their availability to pelagic and benthic biota within the area of dredging is expected. However, their impact will be totally absent in the sediments beyond 200 meters of the dredging site.

During dredging operation, dumped material mostly is spread upstream and downstream and no hump is allowed to be formed. It is estimated that the maximum rise in bed level will be only few cm at the dumping site which will be very less since the sediment plume is spread widely. The resultant sediment plume is limited to a small area and the background ambient suspended load is reached quickly beyond the disposal site. Major impact on sediment quality at the disposal site will be due to cascading effect of the falling sediments from the dredge bucket. Re-suspended heavy metal contaminants are likely to be added to the already existing contaminants at the bottom sediment of the disposal site increasing its concentration.

Macrobenthic communities and meiobenthic communities may get dislocated and affected due to ongoing dredging and other port activities. In general, macro-benthic and meiobenthic biota may get affected due to dredging activity. Similarly, benthic biomass of 3.58 $g/m^2$is affected at the dredging site though similar effects are not visualized beyond dredging site. The impact mostly will be due to sucking and dislocation while blanketing, smothering and burial leading to biomass elimination will be totally absent at the dredging site. Meiobenthic communities to the tune of 220/10 cm^2 is likely to suffer since they are mostly interstitial and are acclimatized to live among sand particles. This whole density is likely to be affected by the disposal of sediments by smothering and blanketing effect. Chances for re-colonization and rehabilitation are likely once dredging is completed.

Impact on planktonic biota due to port activity is mostly due to increase in nutrient load and heavy metal concentration and their possible uptake by phyto and zooplankton. At the disposal location, suspended sediment load will increase to 40,000-60,000 mg/l affecting the planktonic communities significantly. However, this zone of high suspended load will be confined to 3.5 sq.km and beyond this zone planktonic community largely will remain unaffected or least affected. In general, impact on planktonic biota due to different port activities and vessel movement will be highly localized and is not expected to cause major environmental changes.

Changes in the local geomorphology in the intertidal belt are not visualized. Changes, if any, will be local and negligible. The nearest intertidal expanse from the dredging and disposal activity is about 3 km while the farthest extent is about 12 km. It is unlikely that dredging and disposal activities at this distance will cause major impact in the intertidal fauna or geomorphology or sediment deposition pattern given the prevailing current pattern in this part of the gulf.

Mangrove formations are present in close proximity to AKBTPL jetty. Increased sedimentation is not visualized in the mangrove proper due to port activities and vessel movements. Impacts on mangroves close to the project site will be almost negligible given the current pattern and direction. Impacts, if any, are mostly associated with vessel traffic and continued human activity in and around the port terminal. It is most unlikely that vessel traffic will increase sedimentation rates in the intertidal belts of mangrove lined creeks. Mangrove ecosystem generally requires sedimentation rate of around 1mm/year in order to ward off sea level rise. In many instances it is capital and subsequent maintenance dredging that will enhance sedimentation rate in mangrove ecosystem. It is unlikely that other terminal related activities will have a serious impact on the mangroves in the vicinity. It is also to be noted that capital and maintenance dredging carried out earlier by KPT / AKBTPL has not shown any sign of impact so far. Generally, mangrove ecosystem tide over minor disturbances due to its in-built resilience and recovers its original equilibrium and no drastic alteration in the mangrove vegetation

cover would happen. In the event of major changes occurring in mangroves, the proponent will have to draw an elaborate mangrove management plan which will ward-off potential negative impact on mangrove ecosystem by appropriate management plan.An exhaustive management plan with respect to mangroves has been suggested to KPT / AKBTPL in earlier report.

4) Conclusion

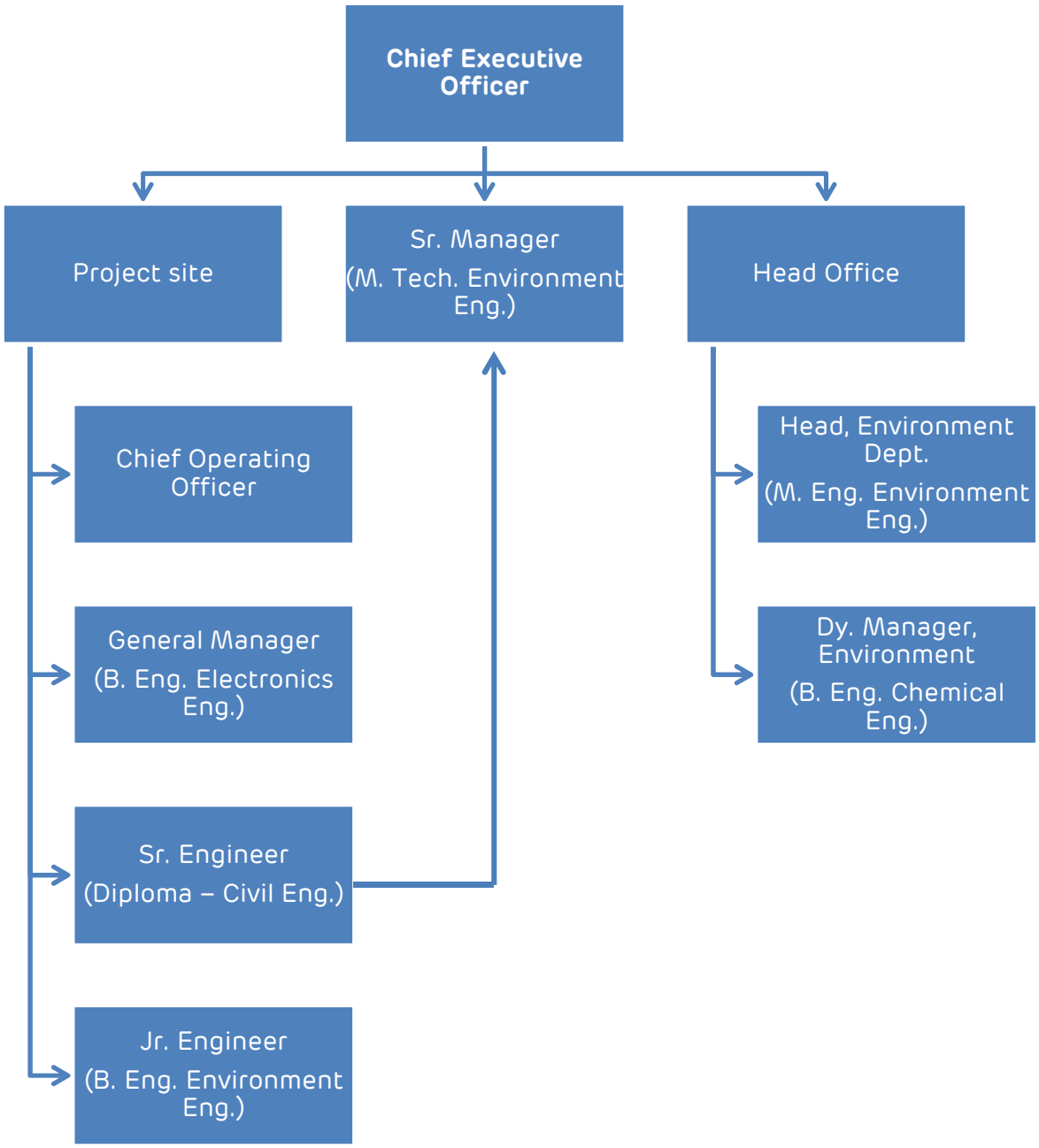
In the present study, marine ecology of AKBTPL port waters were characterised by analysing marine chemical, physical and biological components in a radius of 15 km around the port. Analysis of coastal water health through examination of 15 water quality parameters indicated that all the parameters are well within the prescribed limits and no gross contamination could be discerned showing that the coastal water in and around the Jetty is clean and unpolluted. Important parameters like dissolved oxygen, BOD, COD, PHc and Phenol are either comparable with the other unpolluted coastal waters or are within the prescribed limits which do not pose threat to the marine biota. Elevated levels of salinity observed presently are due to the inherent nature of Gulf of Kachchh waters induced by negative water balance, high rate of evapo-transpiration and poor rainfall and terrestrial run-off.

Three sediment quality parameters namely sediment texture, Total Organic Carbon (TOC) and Petroleum Hydrocarbons (PHc) were analyzed and their levels in general were comparable with other unpolluted coastal sediments.

All the observed spatial variations in zooplankton density, composition and distribution were normal and similar to any other pristine coastal waters and no events negatively influencing the zooplankton community was noticed during this study. Given the ambient environmental conditions such as high salinity, TDS and temperature the observed values of density, composition, chlorophyll ‘a’ and Phaeophytin and their spatial variation was normal and comparable with any unpolluted coastal waters. Similarly, the recorded abundance, biomass and group distribution in the vicinity of AKBTPL jetty did not indicate any stressful condition of the benthic environment and represents a normal benthic faunal community.

Annexure – 3

Annexure – 3: Environmental Management Cell



Annexure – 4

adani	Adani Kandla Bulk Terminal Pvt. Ltd.	From : October 2016 To : March 2017

Annexure 4: Expenditure Details on Environmental Safeguards

(Oct'16 to Mar'17)

Sr. no.	Activity	Budget F.Y.2016-17 (INR in Lakh)	Cost incurred (INR in Lakh)
1	Environmental Monitoring (yearly).	20.00	10.50
2	Greenbelt development [Area: 11.83 Hectare]	54.13	54.13
3	Mangrove plantation (including biodiversity mangrove plantation).	15.00	15.00
4	Disposal of wastes (including STP operation).	9.00	5.39
5	Firefighting Equipment.	163.15	75.00
6	Dust Suppression.		
7	Maintenance of conveyor belt.	88.21	20.00
	Total	**349.49**	**180.02**

Annexure – 5

Environment Statement for 2016-17 for M/s Adani Kandla Bulk Terminal Pvt Ltd

O/C

adani

Ref No. AKBTPL/ENVSTATEMENT/2016-17 Date: 25th April, 2017

To,
Member Secretary
Gujarat Pollution Control Board
Paryavaran Bhavan,
Sector-10-A, Gandhinagar-382010

Dear Sir,

Sub: Environmental Statement for the financial year ending 31st March, 2017 for M/s **Adani Kandla Bulk Terminal Pvt Ltd (AKBTPL)**

Ref: **PCB ID: - 46110, Consent Order No. AWH – 68051**

With reference to the above mentioned subject and reference, please find enclosed Environmental Statement in Form V prescribed under Rule 14 of the Environment (Protection) Rules 1986, for M/s **Adani Kandla Bulk Terminal Pvt Ltd, Ta. Anjar** for the financial year ending 31st March 2017.

Thank you,

Yours faithfully,
For **Adani Kandla Bulk Terminal Pvt Ltd**

Col. Parag Srivastava
(Head – AKBTPL)

Encl: As above.

Received
Gujarat Pollution Control Board
Regional Office
Kutch (East)
25/4/17

Copy to:

1. The Regional Officer, Gujarat Pollution Control Board, Gandhidham.

Adani Kandla Bulk Terminal Pvt Ltd
Adani House
Nr Mithakhali Circle, Navrangpura
Ahmedabad 380 009
Gujarat, India
CIN: U63090GJ2012PTC069305

Tel +91 79 2656 5801
Fax +91 79 2555 6490
info@adani.com
www.adani.com

Registered Office: Adani House, Nr Mithakhali Circle, Navrangpura, Ahmedabad 380 009, Gujarat, India

Environment Statement for 2016-17 for M/s Adani Kandla Bulk Terminal Pvt Ltd

FORM V
(See Rule 14)

Environmental Statement for the Financial Year ending 31st March 2017

PART – A

(i)	Name and address of the Owner/ Occupier of the Industry Operation or Process	:	Col. Parag Srivastava Head – AKBTPL Adani Kandla Bulk Terminal Pvt Ltd. Tuna Tekra, Taluka - Anjar Dist. Kutch (Gujarat)
(ii)	Industry Category Primary (STC Code) Secondary (STC Code)	:	Red – Large NA NA
(iii)	Production Capacity	:	Dry Bulk Cargo Handling – 12 MMTPA
(iv)	Year of Establishment	:	2011 – 12 (As per certification of incorporation date of company)
(v)	Date of last Environment Statement submitted	:	01.08.2016

Environment Statement for 2016-17 for M/s Adani Kandla Bulk Terminal Pvt Ltd

PART – B

Water and Raw Material Consumption

(i) Water Consumption

Water Consumption Cu.Mtr./Day	
Process	Nil
Cooling (Used in sprinkling / gardening / dust suppression)	630.328 m^3/day*
Domestic	9.297 m^3/day*

Name of Products	**Process Water Consumption per unit of Product Output**	
	During the previous financial year (2015 – 16)	**During the current financial year (2016 – 17)**
Handling and Storage of dry bulk cargo*	3.727 MMT	4.456 MMT

(ii) Raw Material Consumption

Name of Raw Material	**Name of Products**	**Consumption of Raw Material per Unit of output**	
		During the previous financial year (2015 – 16)	**During the current financial year (2016 – 17)**
NIL*	Not Applicable	Nil	Nil

Note: AKBTPL is involved logistic business, hence there no raw material being used.

Environment Statement for 2016-17 for M/s Adani Kandla Bulk Terminal Pvt Ltd

PART – C

Pollutants discharged to Environment/Unit of Output
(Parameters as specified in consent issued)

Pollutants	Quantity of pollutants discharged (Mass/day)	Concentrations of pollutants in discharges (mass/volume)	Percentage of variation from prescribed standards with reasons
(a) Water	AKBTPL is involved in logistic business; hence there is no process effluent discharge.		
(b) Air	• DG sets are provided as standby power source and used during power failure. • All the ambient air parameters are within standards. • Refer Annexure 3 [Ambient Air Monitoring Reports]		

Environment Statement for 2016-17 for M/s Adani Kandla Bulk Terminal Pvt Ltd

PART – D

Hazardous Wastes
(As specified under Hazardous Wastes Management and Handling Rules 1989)

Hazardous Wastes	Total Quantity (Kg)	
	During the previous financial year (2015-16)	During the current financial year (2016-17)
(a) From Process Used Oil	Generation – 8.29 KL Reuse – 1.16 KL (Used in Railway siding and MBU machine as a lubricant)	Generation – 3.61 KL Reuse – 1.643 KL (Used in Railway siding and MBU machine as a lubricant)
*(b) From Pollution Control facilities	Nil	Nil

A

AKBTPL is involved in logistic business; hence there is no process waste

PART – E

Solid Waste

Solid Waste	Total Quantity Generated (MT/Annum)	
	During the previous financial year (2015-16)	During the current financial year (2016-17)
(a) From Process (Ash)	Nil	Nil
(b) From Pollution Control facilities	Nil	Nil
(C-1)Quantity recycled or reutilized within the unit	--	--
(C-2) Sold	--	--
(C-3) Disposed	--	--

Environment Statement for 2016-17 for M/s Adani Kandla Bulk Terminal Pvt Ltd

PART - F

Please specify the characterization (in terms of Composition and quantum) of Hazardous as well as solid wastes and indicate disposal practice adopted for both these categories of wastes:

Used oil is being used as a lubricant

for maintenance purpose.

PART – G

Impact of the pollution abatement measures taken on conservation of natural resources and on the cost of production.

Unit has installed Sewage Treatment Plant and for treatment of the Sewage water being generated at site. AKBTPL has planted mangroves in 250 ha area near Satsaida Bet (Kandla), Kutch sea cost. Unit has formed dedicated Horticulture department & developing green belt within port premises.

During the project, the total cost incurred on environmental protection measures is enclosed as Annexure 1 and the green belt developed so far enclosed as Annexure 2.

PART – H

Additional measures /investment/ proposal for environmental protection including abatement of pollution, prevention of pollution.

- Unit is doing Regular Environmental Monitoring of Port & surrounding area through reputed NABL certified Laboratory. All the required environmental parameters are well within specified limit & the details are being submitted regularly to GPCB, CPCB, MOEF & concerned authorities.
- Unit has installed STP for treatment of the Sewage water being generated at site. Unit has also provided dump pond & conveyance channel for collection of runoff generated from Coal Yard.
- Unit has provided DSS at coal yard & conveyer system and carrying out regular water spreading to control the dust exposure.
- Unit is developing green belt within port and outside continually with help of Horticulture dept.
- Continually taking new initiatives for protection of environment with respect to air-water-soil.

PART – I

Any other particulars for improving the quality of environment:

- Environmental awareness programs have been conducted for workmen.
- Integrated housekeeping and waste management being maintained regularly.

Environment Statement for 2016-17 for M/s Adani Kandla Bulk Terminal Pvt Ltd

Date : 25.04.2017

(Signature of a person carrying out an industry, operation or process)
Name : Col. Parag Srivastava
Designation : Head – AKBTPL
Address : Adani Kandla Bulk Terminal Pvt Ltd,
Tuna Tekra, Taluka Anjar. District Kutch (Gujarat)

Environment Statement for 2016-17 for M/s Adani Kandla Bulk Terminal Pvt Ltd

Annexure 1: Expenditure Details on Environmental Safeguards during FY 2016– 17

Sr. no.	Activity	Cost incurred (INR in Lakh)
1	Environmental Monitoring	10.50
2	Greenbelt development [Area: 7.15 Hectare]	54.13
3	Mangrove plantation	15.00
4	Disposal of wastes	4.00
5	Firefighting Equipment	75.00
	Total	**158.63**

Environment Statement for 2016-17 for M/s Adani Kandla Bulk Terminal Pvt Ltd

Annexure – 2 Green developments for Year 2016 -17

Sr. No.	Green Zone Nos.	Location	Area (Ha)	Tree (No.)	Name of Species/Plant	Shrubs (SQM)	Green Carpet (SQM)	Palm (No.)
1	71a	SITE OFFICE BUILDING AND POB BUILDING AREA, SS-1 BUILDING	0.004	5	Neem (AZARDICA INDICA),			
			0.20	2000	CASURINA PLANT			
			0.01	25	Ficus Panda Topiary			
			0.00	0	Delonix regia			
			0.03	0	Washingtonia f.f.			87
			0.003	0	Almanda Dwarf.	25		
			0.00	0	IXORA RED	15		
			0.03	0	Lilly (HYMENOCALLIS SPECIOSA)	275		
			0.0015	0	Euphorbia Milli	15		
			0.60	1500	Eucalyptus spp			
			0.00	0	Boungainvellia Red	25		
			0.02	0	Cycus			48
			0.03	0	Clerodendron Inerme.	260		
			0.15	0	Flat lawn		1480	
2	71b	GREEN BELT AREA	2.31	5779	Casurina Spp.			
			0.334	417	Neem (AZARDICA INDICA),			
			0.334	417	Peltophorum			
					Nerrium	100		
3	71c	5KM. ROAD	0.40	0	Washingtonia F.F			1000
4	71d	SS-2 BUILDING AREA	0.00	0	Washingtonia F.F			
			0.08	815.00	Casurina Spp.			
			0.00		Lilly (HYMENOCALLIS SPECIOSA)			
			0.00		Inermi			
			0.50	1251.00	Coconut			
			0.00		Sloppy lawn			
4	71e	INTERNAL ROAD, RAILWAY BUILDING	0.10		Washingtonia F.F			250.00
			0.70	7000.00	Casurina Spp.			
			0.114	143	Neem (AZARDICA INDICA),			
			0.114	143	Peltophorum			
			1.08	2700	Eucalyptus spp			
			0.01	0	Flat lawn		60.78	
			0.00	0	Clerodendron Inerme.	100		

Annexure – 6

POLLUCON LABORATORIES PVT. LTD.
Environmental Auditors, Consultants & Analysts.
Cleaner Production / Waste Minimization Facilitator
Recognised by MoEF, New Delhi Under Sec. 12 of Environmental (Protection) Act-1986

"ENVIRONMENTAL MONITORING REPORT"

For

ADANI KANDLA BULK TERMINAL PRIVATE LIMITED.
KANDLA, KUTCH.

OCTOBER 2016 TO MARCH 2017

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

Dr. Arun Bajpai
Lab Manager (Q)

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

EQUIPMENTS USED FOR SAMPLING AND ANALYSIS

SR. NO.	Monitoring Details	Equipments Used	Sampling and Analysis Method
1	Ambient Air Quality Monitoring	RDS,FDS, Impinger	CPCB Guideline/IS 5182
2	Noise Monitoring	Noise Meter	IS 11702
3	Sea Water Monitoring	Depth Sampler	IS:3025/APHA/USEPA/ASTM
4	Sea Sediment Monitoring	Grab Sampler	CPCB Guideline/ IS/APHA/USEPA/ASTM
5	Drinking Water Analysis	Sealed & Sterile Bottle	IS:10500:2012
6	Sewage water Analysis	Sealed & Sterile Bottle	APHA/IS:3025
7	Stack Monitoring	Stack Kit	IS:11255
8	Dump Pond Discharge	Sealed & Sterile Bottle	APHA/IS:3025

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

Dr. Arun Bajpai
Lab Manager (Q)

National Ambient Air Quality Standards Dated 16th Nov.2009, CPCB New Delhi.

SR. NO.	TEST PARAMETER	UNIT	Concentration in ambient air	Method Of Measurement
1	Particulate Matter (PM_{10})	$\mu g/m^3$	100	IS:5182(Part 23):Gravimetric CPCB - Method (Vol.I,May-2011)
2	Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	60	Gravimetric- CPCB - Method (Vol.I,May-2011)
3	Sulphur Dioxide (SO_2)	$\mu g/m^3$	80	IS:5182(Part 2): Improved West and Gaeke
4	Oxides of Nitrogen (NO_2)	$\mu g/m^3$	80	IS:5182(Part 6):Modified Jacob & Hochheiser (Na-Arsenite)

NS#: Not Specified, ** National Ambient Air Quality Standards Dated: 18/11/2009 as per Central Pollution Control Board, New Delhi.

Date of Sampling	:	**As Per Table**	Sampling Location	:	**As Per Table**
Sampling By	:	**Pollucon Laboratories Pvt. Ltd.**	Protocol (purpose)	:	**Ambient Air Quality Monitoring**

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

Dr. Arun Bajpai
Lab Manager (Q)

POLLUCON LABORATORIES PVT. LTD.
Environmental Auditors, Consultants & Analysts.
Cleaner Production / Waste Minimization Facilitator
Recognised by MoEF, New Delhi Under Sec. 12 of Environmental (Protection) Act-1986

Table No. 1 Results of AAQM for LC Gate No.2 [October 2016 - March 2017]

Sr No.	Date of Sampling	Particulate Matter (PM10) ($\mu g/m^3$)	Particulate Matter (PM2.5) ($\mu g/m^3$)	Sulphur Dioxide (SO_2) ($\mu g/m^3$)	Oxides of Nitrogen (NO_2) ($\mu g/m^3$)
1	03/10/2016	62.12	30.35	9.55	26.44
2	06/10/2016	79.11	41.57	18.42	36.28
3	10/10/2016	93.11	53.21	9.63	45.24
4	13/10/2016	85.26	42.82	19.26	41.37
5	17/10/2016	58.12	39.16	12.98	32.63
6	20/10/2016	72.25	37.49	8.79	30.20
7	24/10/2016	58.96	22.50	10.47	37.83
8	27/10/2016	87.96	44.16	10.05	37.39
9	31/10/2016	74.52	36.17	19.09	36.95
10	03/11/2016	64.55	35.34	19.04	29.62
11	07/11/2016	70.24	37.00	20.46	36.66
12	10/11/2016	88.26	46.98	10.02	40.19
13	14/11/2016	92.56	53.21	21.29	49.22
14	17/11/2016	65.22	34.16	14.19	36.77
15	21/11/2016	72.23	41.24	9.60	24.22
16	24/11/2016	56.99	29.58	12.11	35.23
17	28/11/2016	81.18	48.74	15.45	38.21
18	01/12/2016	67.28	28.68	12.46	28.47
19	05/12/2016	82.54	40.32	17.29	36.29
20	08/12/2016	71.39	32.84	14.76	25.11
21	12/12/2016	87.52	46.56	22.25	32.64
22	15/12/2016	96.30	52.80	18.55	39.14
23	19/12/2016	74.40	37.83	13.07	26.43
24	22/12/2016	84.42	33.67	24.48	34.49
25	26/12/2016	90.56	45.31	16.44	38.16
26	29/12/2016	78.30	39.91	11.38	30.48
27	02/01/2017	86.94	46.56	25.90	39.62
28	16/01/2017	91.58	52.38	13.11	33.22
29	19/01/2017	78.56	42.40	19.46	46.84
30	23/01/2017	89.64	49.05	15.18	31.44
31	26/01/2017	94.50	54.04	18.61	42.19
32	30/01/2017	75.50	40.74	21.58	32.78
33	02/02/2017	62.31	21.62	17.48	29.30
34	06/02/2017	86.40	47.39	14.36	32.82
35	09/02/2017	76.30	34.50	20.61	37.56
36	13/02/2017	88.21	43.65	24.42	35.46
37	16/02/2017	78.42	36.74	19.53	27.64
38	20/02/2017	83.50	46.56	22.36	31.39
39	23/02/2017	52.41	26.61	10.49	36.23
40	27/02/2017	81.49	44.48	12.35	26.85
41	02/03/2017	73.58	39.49	24.55	30.30
42	06/03/2017	82.60	49.47	20.43	34.50
43	09/03/2017	48.91	28.68	9.75	39.84
44	13/03/2017	76.72	46.98	12.54	29.25
45	16/03/2017	68.03	38.41	14.54	40.28
46	20/03/2017	80.42	50.30	17.41	36.28
47	23/03/2017	57.58	23.28	23.61	32.30
48	27/03/2017	71.71	34.50	19.52	41.58
49	30/03/2017	83.02	46.98	15.48	37.50

BDL*: Below Detection Limit, Minimum Detection Limit, Lead as Pb ($\mu g/m^3$):0.5, Benzo (a) Pyrene (BaP) - particulate phase only (ng/m^3): 0.5, Nickel as Ni (ng/m^3):10, Arsenic as As (ng/m^3):2, Benzene as C_6H_6 ($\mu g/m^3$): 2

H. T. Shah
Lab Manager

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Lab Manager (Q)

Table No. 2 Results of AAQM for Starting of pile approach [October 2016 - March 2017]

Sr No.	Date of Sampling	Particulate Matter (PM10) ($\mu g/m^3$)	Particulate Matter (PM2.5) ($\mu g/m^3$)	Sulphur Dioxide (SO_2) ($\mu g/m^3$)	Oxides of Nitrogen (NO_2) ($\mu g/m^3$)
1	03/10/2016	51.12	21.37	10.34	16.39
2	06/10/2016	71.12	32.47	20.26	41.13
3	10/10/2016	64.22	29.59	17.78	29.25
4	13/10/2016	76.52	38.64	21.09	39.59
5	17/10/2016	80.12	43.32	18.19	36.95
6	20/10/2016	78.51	31.24	21.50	24.52
7	24/10/2016	67.15	28.33	15.30	31.12
8	27/10/2016	54.11	33.33	7.44	25.40
9	31/10/2016	87.77	42.75	21.30	41.17
10	03/11/2016	56.11	28.36	7.91	20.14
11	07/11/2016	88.36	40.69	24.15	42.14
12	10/11/2016	60.11	31.24	22.49	34.15
13	14/11/2016	79.36	41.10	24.15	44.11
14	17/11/2016	75.25	49.57	19.99	38.97
15	21/11/2016	80.12	44.16	24.57	30.65
16	24/11/2016	70.52	37.08	19.57	35.25
17	28/11/2016	91.36	50.41	9.16	29.99
18	01/12/2016	53.52	25.48	10.40	23.68
19	05/12/2016	74.48	32.47	21.35	31.20
20	08/12/2016	62.59	28.77	17.65	20.32
21	12/12/2016	68.38	35.76	12.57	27.43
22	15/12/2016	84.59	43.57	22.53	36.22
23	19/12/2016	91.41	49.74	16.83	21.76
24	22/12/2016	75.37	36.58	19.71	28.21
25	26/12/2016	87.66	41.51	13.43	33.64
26	29/12/2016	60.22	29.59	24.63	22.54
27	02/01/2017	79.37	39.46	20.44	32.67
28	05/01/2017	59.40	27.13	14.42	28.59
29	09/01/2017	72.30	33.70	17.30	38.24
30	12/01/2017	88.40	47.27	24.35	44.27
31	16/01/2017	81.44	40.28	16.09	29.59
32	19/01/2017	67.82	31.65	21.42	35.32
33	23/01/2017	78.10	36.58	13.59	25.79
34	26/01/2017	83.20	43.98	25.22	39.18
35	30/01/2017	87.60	48.50	18.54	27.36
36	02/02/2017	56.63	24.66	12.42	24.61
37	06/02/2017	80.60	44.39	20.33	32.61
38	09/02/2017	65.71	30.42	14.78	39.26
39	13/02/2017	73.19	37.40	17.42	30.26
40	16/02/2017	82.60	42.75	15.43	23.55
41	20/02/2017	95.42	48.50	13.57	25.54
42	23/02/2017	85.28	39.46	21.63	33.55
43	27/02/2017	90.27	52.61	11.53	22.86
44	02/03/2017	77.41	45.21	16.58	25.58
45	06/03/2017	89.28	51.38	12.74	29.50
46	09/03/2017	78.52	41.93	19.49	36.51
47	13/03/2017	84.52	55.90	10.36	23.55
48	16/03/2017	58.68	30.42	8.61	32.59
49	20/03/2017	74.87	47.27	15.73	39.25
50	23/03/2017	49.52	26.72	20.68	27.84
51	27/03/2017	59.60	31.65	13.42	21.65

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52	30/03/2017	67.58	39.87	11.41	33.43

BDL*: Below Detection Limit, Minimum Detection Limit, Lead as Pb (µg/m^3):0.5, Benzo (a) Pyrene (BaP) - particulate phase only (ng/m^3): 0.5, Nickel as Ni (ng/m^3):10, Arsenic as As (ng/m^3):2, Benzene as C_6H_6 (µg/m^3): 2

Table No. 3 Results of AAQM for South West Corner at Pump House [October 2016 - March 2017]

Sr No.	Date of Sampling	Particulate Matter (PM10) (µg/m^3)	Particulate Matter (PM2.5) (µg/m^3)	Sulphur Dioxide (SO_2) (µg/m^3)	Oxides of Nitrogen (NO_2) (µg/m^3)
1	03/10/2016	44.25	18.79	6.30	17.25
2	06/10/2016	59.16	28.40	14.69	31.07
3	10/10/2016	72.15	34.66	11.75	35.27
4	13/10/2016	69.33	30.07	10.49	24.10
5	17/10/2016	74.60	29.58	7.56	21.23
6	20/10/2016	59.63	25.41	13.43	33.50
7	24/10/2016	82.11	39.16	11.33	26.42
8	27/10/2016	67.18	26.24	15.95	29.41
9	31/10/2016	54.15	28.40	9.62	18.79
10	03/11/2016	48.96	20.04	8.37	21.13
11	07/11/2016	62.22	24.22	14.23	34.11
12	10/11/2016	79.63	38.84	11.72	38.95
13	14/11/2016	71.52	32.57	16.74	26.85
14	17/11/2016	83.26	31.66	9.63	24.54
15	21/11/2016	55.15	29.16	15.49	35.21
16	24/11/2016	89.99	41.24	10.05	30.15
17	28/11/2016	64.16	29.58	17.58	35.21
18	01/12/2016	59.67	22.13	8.43	18.30
19	05/12/2016	67.90	28.40	15.12	27.41
20	08/12/2016	78.43	36.33	12.64	16.77
21	12/12/2016	61.36	30.48	9.69	21.70
22	15/12/2016	54.56	34.24	14.68	29.38
23	19/12/2016	68.52	22.97	10.11	17.42
24	22/12/2016	62.62	27.56	16.85	23.45
25	26/12/2016	73.69	32.57	18.68	28.34
26	29/12/2016	52.39	24.64	13.79	19.66
27	02/01/2017	66.30	30.48	16.07	28.44
28	05/01/2017	51.20	22.13	10.26	23.60
29	09/01/2017	61.60	27.56	13.53	32.53
30	12/01/2017	68.94	33.41	12.26	27.44
31	16/01/2017	75.45	37.58	9.82	21.26
32	19/01/2017	59.60	25.47	14.80	29.21
33	23/01/2017	71.40	29.65	10.99	20.36
34	26/01/2017	62.70	34.24	8.48	33.64
35	30/01/2017	57.40	32.99	15.17	22.43
36	02/02/2017	47.61	19.34	15.60	20.80
37	06/02/2017	63.81	20.45	5.38	24.51
38	09/02/2017	55.55	25.67	18.39	30.21
39	13/02/2017	80.38	27.68	14.63	15.57
40	16/02/2017	73.58	31.45	6.72	19.40
41	20/02/2017	65.61	34.38	11.69	33.24
42	23/02/2017	57.27	30.46	7.59	28.62
43	27/02/2017	71.18	26.54	9.36	17.61
44	02/03/2017	48.32	15.47	5.48	21.24
45	06/03/2017	61.78	36.98	18.44	36.86
46	09/03/2017	53.58	33.07	14.39	31.25
47	13/03/2017	66.85	28.52	8.52	19.35
48	16/03/2017	50.26	24.32	11.76	27.47
49	20/03/2017	62.52	21.91	9.59	24.65
50	23/03/2017	43.87	20.88	16.68	22.30
51	27/03/2017	52.11	27.41	12.53	32.75
52	30/03/2017	75.23	29.65	7.52	17.46

BDL*: Below Detection Limit, Minimum Detection Limit, Lead as Pb (µg/m^3):0.5, Benzo (a) Pyrene (BaP) - particulate phase only (ng/m^3): 0.5, Nickel as Ni (ng/m^3):10, Arsenic as As (ng/m^3):2, Benzene as C_6H_6 (µg/m^3): 2

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Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

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Lab Manager (Q)

Table No. 4 Results of AAQM for North East corner of back up area [October 2016 - March 2017]

Sr No.	Date of Sampling	Particulate Matter (PM10) ($\mu g/m^3$)	Particulate Matter (PM2.5) ($\mu g/m^3$)	Sulphur Dioxide (SO_2) ($\mu g/m^3$)	Oxides of Nitrogen (NO_2) ($\mu g/m^3$)
1	03/10/2016	70.12	35.38	15.39	23.64
2	06/10/2016	65.23	30.38	24.63	36.92
3	10/10/2016	81.12	49.53	22.50	41.09
4	13/10/2016	96.27	48.28	19.96	30.05
5	17/10/2016	61.42	26.24	12.39	28.70
6	20/10/2016	90.21	54.16	24.28	40.18
7	24/10/2016	88.96	40.41	20.02	35.23
8	27/10/2016	57.85	34.16	19.66	30.05
9	31/10/2016	80.63	51.19	15.76	41.20
10	03/11/2016	78.25	39.12	19.18	28.91
11	07/11/2016	69.36	31.22	29.83	40.11
12	10/11/2016	74.22	43.70	30.26	37.20
13	14/11/2016	94.15	54.94	24.29	51.20
14	17/11/2016	67.85	29.58	18.75	29.13
15	21/11/2016	86.22	37.91	28.98	35.74
16	24/11/2016	92.48	44.57	27.28	44.59
17	28/11/2016	59.36	36.66	20.03	36.97
18	01/12/2016	72.44	34.55	14.94	34.63
19	05/12/2016	86.57	43.70	23.60	40.17
20	08/12/2016	93.87	50.78	19.73	29.34
21	12/12/2016	74.62	39.54	15.85	37.45
22	15/12/2016	89.61	48.28	26.17	46.30
23	19/12/2016	97.58	56.60	22.31	30.57
24	22/12/2016	90.35	41.62	30.34	39.10
25	26/12/2016	84.67	38.29	21.45	41.84
26	29/12/2016	95.29	53.69	16.30	32.69
27	02/01/2017	91.32	53.69	28.63	45.19
28	05/01/2017	73.64	39.54	22.38	39.55
29	09/01/2017	88.60	44.12	25.40	48.11
30	12/01/2017	78.60	37.04	20.45	34.85
31	16/01/2017	96.60	56.60	18.51	42.82
32	19/01/2017	83.60	48.70	23.68	49.35
33	23/01/2017	65.30	39.96	26.35	37.46
34	26/01/2017	74.20	46.20	21.52	46.31
35	30/01/2017	92.34	51.19	24.54	40.22
36	02/02/2017	67.81	31.63	20.35	33.06
37	06/02/2017	71.33	32.60	16.66	29.36
38	09/02/2017	81.58	40.37	23.44	42.25
39	13/02/2017	94.18	52.44	19.45	38.45
40	16/02/2017	86.50	46.62	21.67	34.42
41	20/02/2017	76.18	38.71	15.33	36.65
42	23/02/2017	68.18	34.69	18.36	24.61
43	27/02/2017	96.30	55.36	25.41	32.53
44	02/03/2017	81.23	50.36	19.56	37.65
45	06/03/2017	76.31	41.80	14.55	40.16
46	09/03/2017	64.40	37.04	16.69	27.63
47	13/03/2017	89.50	59.52	22.56	35.62
48	16/03/2017	73.38	47.03	9.47	19.59
49	20/03/2017	67.03	35.38	12.78	32.38
50	23/03/2017	63.84	33.86	24.69	36.80
51	27/03/2017	76.07	43.70	20.53	29.55
52	30/03/2017	88.64	55.77	17.69	26.61

BDL*: Below Detection Limit, Minimum Detection Limit, Lead as Pb ($\mu g/m^3$):0.5, Benzo (a) Pyrene (BaP) - particulate phase only (ng/m^3): 0.5, Nickel as Ni (ng/m^3):10, Arsenic as As (ng/m^3):2, Benzene as C_6H_6 ($\mu g/m^3$): 2

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

Dr. Arun Bajpai
Lab Manager (Q)

RESULTS OF NOISE LEVEL MONITORING

Sampling Date	:	**As Per Table**
Test Method	:	**IS 11702**
Sampling Location	:	**As Per Table**
Sampling By	:	**Pollucon Laboratories Pvt. Ltd.**
Protocol (purpose)	:	**Environmental Monitoring**

Table No. 5 Results of Day Time Noise level monitoring [October 2016 to March 2017]

Noise Level Day Time dB (A)Leq*									
Sr. No.	Name of Location	LC Gate No.2		Starting Of Pile Approach		South West Corner at Pump House		North East Corner of Back up Area	
	Month	Max	Min	Max	Min	Max	Min	Max	Min
1.	October	70.2	50.0	74.5	54.3	71.1	52.8	71.1	53.0
2.	November	73.4	68.8	74.8	68.4	70.1	65.3	65.6	61.9
3.	December	68.8	51.0	74.5	55.6	72.8	53.1	71.4	56.0
4.	January	66.1	51.8	74.1	62.2	72.8	53.1	72.5	53.8
5.	February	68.5	48.6	71.3	56.3	73.6	52.5	74.6	59.6
6.	March	67.9	52.4	71.5	53.6	72.2	51.6	74.6	53.8

Table No. 6 Results of Night Time Noise level monitoring [October 2016 to March 2017]

Noise Level Night Time dB (A)Leq*									
Sr. No.	Name of Location	LC Gate No.2		Starting Of Pile Approach		South West Corner at Pump House		North East Corner of Back up Area	
	Month	Max	Min	Max	Min	Max	Min	Max	Min
1.	October	64.6	46.8	66.8	53.0	70.1	51.3	68.0	45.4
2.	November	69.8	51.6	69.4	65.8	66.9	64.8	67.4	61.6
3.	December	64.4	47.2	67.9	53.2	69.1	50.1	68.1	45.7
4.	January	62.5	46.8	66.2	50.6	64.2	48.3	68.2	45.1
5.	February	56.2	48.2	60.4	44.0	64.8	49.2	62.6	42.3
6.	March	64.3	48.3	66.3	48.1	69.5	49.2	66.4	52.6

Ambient Air Quality Standards for Noise Specified by CPCB

Area Code	Category of Area/Zone	Limits in dB (A) Leq#	
		Day time	Night time
A	Industrial area	75	70
Notes:			
1. Day time shall mean from 6.00 a.m. to 10.00 p.m.			
2. Night time shall mean from 10.00 p.m. to 06.00 a.m.			
#dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing			

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

Dr. Arun Bajpai
Lab Manager (Q)

Ambient Air Quality Monitoring & Noise quality Monitoring Locations

Sr. No	Name of Location	GPS Coordinate
1.	LC Gate No.2	N 22°58' 14.29' E 70°05 51.07'
2.	Starting Of Pile Approach	N 22°54' 27.47' E 70°06 15.63'
3.	South West Corner at Pump House	N 22°55' 22.98' E 70°06 7.37'
4.	North East Corner Of Back Up Area	N 22°55' 48.37' E 70°06 28.10'

Figure No. 1 Google earth image of Ambient Air Quality Monitoring & Noise quality monitoring location

H. T. Shah
Lab Manager

Dr. Arun Bajpai
Lab Manager (Q)

RESULTS OF SEA WATER MONITORING

Table No. 7 Results of Sea water [October 2016 to December 2016]

Description of Sample	:	**Sea Water Samples**	Quantity/No. of Samples	:	**10 Lit/Two**
Sampling By	:	**Pollucon Laboratories Pvt. Ltd.**	Sampling Procedure	:	**Grab**
Packing/Seal	:	**Sealed**	Protocol (purpose)	:	**Env. Monitoring**
Test Method	:	**IS 3025 & APHA (22nd Edi.) 2008**	Test Parameters	:	**As per Table**

SR. NO.	TEST PARAMETERS	UNIT	Near Mouth of Creek (M1) October-16 22/10/2016		Near Jetty (M2) November-16 18/11/2016		Near Mouth of Creek (M1) December -16 20/12/2016	
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM
1	pH	--	7.47	7.52	7.90	8.10	7.83	8.03
2	Temperature	°C	29	28	29	28	29	28
3	Total Suspended Solids	mg/L	56	62	42	51	32	36
4	BOD (3 Days@27°C)	mg/L	6	4	3	2	7	5
5	Dissolved Oxygen	mg/L	5.6	4.8	5.6	4.4	5.4	4.6
6	Salinity	ppt	38.9	39.7	40.7	41.7	42.6	43.2
7	Oil & Grease	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*
8	Nitrate as NO_3	mg/L	0.530	0.680	0.612	0.704	0.284	0.663
9	Nitrite as NO_2	mg/L	0.071	0.077	0.109	0.079	0.040	0.034
10	Ammonical Nitrogen as NH_3	mg/L	0.560	0.820	0.205	0.355	0.009	0.103
11	Phosphates as PO_4	mg/L	1.03	1.89	0.18	0.24	0.12	1.08
12	Total Nitrogen	mg/L	1.160	1.580	0.926	1.138	0.885	0.800
13	Petroleum Hydrocarbon	µg/L	11	BDL*	12	BDL*	BDL*	BDL*
14	Total Dissolved Solids	mg/L	43110	43980	48200	48800	46020	47330
15	COD	mg/L	22	16	28	20	16	22
16	Oxidisable Particular Organic Carbon	%	0.60	0.40	0.41	0.32	0.33	0.44
A	**Flora and Fauna**							
17.1	Primary Productivity	mgC/L /day	1.230	0.248	2.020	0.337	1.010	0.135
B	**Phytoplankton**							
18.1	Chlorophyll	mg/m^3	1.280	0.454	1.335	0.240	2.130	0.375
18.2	Phaeophytin	mg/m^3	0.980	1.430	0.627	1.816	0.130	1.570
18.3	Cell Count	Unit x 10^3/L	210	28	215	58	196	14
18.4	Name of Group Number and name of group species of each group	--	Bacillariophyceae Asterionella sp. Biddulphia sp. Coscinodiscus sp. Skeletonema sp. Rhizosolenia sp. Nitzschia sp. Cyclotella sp. Dianoflogellates Ceratizesn sp.	Bacillariophyceae Melosira sp. Fragillaria sp. Navicula sp. -- -- -- -- -- --	Bacillariophyceae Achnanthes sp. Amphora sp. Coscinodiscus sp. Cymbella sp. Melosira sp. Synedra sp. Navicula sp. Rhizosolenia sp. Thallasionema sp.	Bacillariophyceae Melosira sp. Fragillaria sp. Navicula sp. -- -- -- -- -- --	Bacillariophyceae Nitzschia sp. Biddulphia sp. Navicula sp. Rhizosolenia sp. Melosira sp. Fragillaria sp. Gyrosigma sp. Skeletonema sp. Coscinodiscus sp.	Bacillariophyceae Fragillaria sp. Navicula sp. Synedra sp. Melosira sp. -- -- -- -- --
C	**Zooplanktons**							
19.1	Abundance (Population)	no/m^2	220	90	260	20	200	67
19.2	Name of Group Number and name of group	--	Decapods Mysids Isopods Gastropods	Mysids Gastropods -- --	Gastropods Nematodes Copepods Isopodes	Gastropods -- -- --	Copepods Decapods Bivalves	Nematodes -- --

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	species of each group				Crustaceans Polychaete worms	-- --		
19.3	Total Biomass	ml/100 m^3	156.00	32.10	163.00	2.54	112.00	1.85
D	**Microbiological Parameters**							
20.1	Total Bacterial Count	CFU/ml	1750	1390	1830	1420	1480	1240
20.2	Total Coliform	/ml	Absent	Absent	Absent	Absent	Absent	Absent
20.3	E.coli	/ml	Absent	Absent	Absent	Absent	Absent	Absent
20.4	Enterococcus species	/ml	Absent	Absent	Absent	Absent	Absent	Absent
20.5	Salmonella species	/ml	Absent	Absent	Absent	Absent	Absent	Absent
20.6	Shigella species	/ml	Absent	Absent	Absent	Absent	Absent	Absent
20.7	Vibrio species	/ml	Absent	Absent	Absent	Absent	Absent	Absent

Note: BDL*: Below Detection Limit, Minimum Detection Limit, BOD: 10 mg/L, Oil & Grease: 1.0 mg/L, Phaeophytin: 0.1 mg/m^3, Petroleum Hydrocarbon: 10 µg/L

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Table No. 8 Results of Sea water [January 2017 to March 2017]

SR. NO.	TEST PARAMETERS	UNIT	Near Jetty (M2) January-17 23/01/2017		Near Mouth of Creek (M1) February-17 21/02/2017		Near Jetty (M2) March-17 23/03/2017	
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM
1	pH	--	7.03	7.67	7.46	7.54	7.53	7.87
2	Temperature	°C	29	28	30	26	31	30
3	Total Suspended Solids	mg/L	34	36	54	64	66	72
4	BOD (3 Days @27°C)	mg/L	6	4	8	6	10	8
5	Dissolved Oxygen	mg/L	5.4	4.4	5.8	4.6	5.2	4.8
6	Salinity	ppt	40.6	42.1	38.6	39.8	39.6	40.8
7	Oil & Grease	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*
8	Nitrate as NO_3	mg/L	0.574	0.695	0.540	0.660	0.930	0.820
9	Nitrite as NO_2	mg/L	0.072	0.056	0.074	0.077	0.087	0.080
10	Ammonical Nitrogen as NH_3	mg/L	0.440	0.500	0.540	0.840	0.610	0.730
11	Phosphates as PO_4	mg/L	0.18	0.20	1.04	1.88	0.92	1.02
12	Total Nitrogen	mg/L	1.086	1.251	1.154	1.580	1.627	1.830
13	Petroleum Hydrocarbon	µg/L	11.6	BDL*	14	BDL*	14	BDL*
14	Total Dissolved Solids	mg/L	48030	49880	43120	43960	44020	45880
15	COD	mg/L	20	14	24	18	26	18
16	Oxidisable Particular Organic Carbon	%	0.64	0.55	0.80	0.60	0.73	0.67
A	**Flora and Fauna**							
17.1	Primary Productivity	mgC/L /day	1.010	0.135	1.390	0.113	1.305	0.225
B	**Phytoplankton**							
18.1	Chlorophyll	mg/m^3	2.130	0.374	1.810	0.214	1.549	0.294
18.2	Phaeophytin	mg/m^3	0.130	1.510	0.070	1.670	0.340	1.590
18.3	Cell Count	Unit x $10^3/L$	196	14	88	6	87	7
18.4	Name of Group Number and name of group species of each group	--	Bacillariophyceae Biddulphia sp. Navicula sp. Nitzschia sp. Rhizosolenia sp. Skeletonema sp. Thallasiosira sp. Coscinodiscus sp. Melosira sp.	Bacillariophyceae Melosira sp. Gyrosigma sp. Navicula sp. -- -- -- -- --	Bacillariophyceae Biddulphia sp. Melosira sp. Gyrosigma sp. Rhizosolenia sp. Pinnularia sp. Thallasiosira sp. Cyclotella sp. Pleurosigma sp. Skeletonema sp.	Bacillariophyceae Melosira sp. Nitzschia sp. Navicula sp. -- -- -- -- -- --	Bacillariophyceae Coscinodiscus sp. Fragillaria sp. Navicula sp. Synedra sp. Pleurosigma sp. Green Algae Chlorella sp. Ulothrix sp. Cyanophyceae Lyngbya sp. Spirulina sp. Nostoc sp.	Bacillariophyceae Melosira sp. Cyclotella sp. Gyrosigma sp. Synedra sp. -- -- -- -- -- -- -- -- --
C	**Zooplanktons**							
19.1	Abundance (Population)	no/m^2	200	67	120	40	140	60
19.2	Name of Group Number and name of group species of each group	--	Gastropods Nematodes Foraminiferans Decapods	Molluscans Polychaete worms -- --	Bivalves Crustaceans Decapods Nematodes Ostracods	Crustaceans -- -- -- --	Copepods Bivalves Ctenophores Decapods	Bivalves Copepods -- --
19.3	Total Biomass	ml/100 m^3	112.00	1.85	143.00	2.68	145.60	3.15
D	**Microbiological Parameters**							
20.1	Total Bacterial Count	CFU/ml	1180	1210	1760	1380	1630	1560
20.2	Total Coliform	/ml	Absent	Absent	Absent	Absent	Absent	Absent
20.3	E.coli	/ml	Absent	Absent	Absent	Absent	Absent	Absent

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20.4	Enterococcus species	/ml	Absent	Absent	Absent	Absent	Absent	Absent
20.5	Salmonella species	/ml	Absent	Absent	Absent	Absent	Absent	Absent
20.6	Shigella species	/ml	Absent	Absent	Absent	Absent	Absent	Absent
20.7	Vibrio species	/ml	Absent	Absent	Absent	Absent	Absent	Absent

Note: BDL*: Below Detection Limit, Minimum Detection Limit, BOD: 10 mg/L, Oil & Grease: 1.0 mg/L, Phaeophytin: 0.1 mg/m^3, Petroleum Hydrocarbon: 10 µg/L

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RESULTS OF SEA SEDIMENT MONITORING

Table No. 9 Results of Sea Sediment [October 2016 to March 2017]

Description of Sample	: **Sea Sediment Sample**	Quantity/No. of Samples	: **10 Kg/Two**
Sampling By	: **Pollucon Laboratories Pvt. Ltd.**	Sampling Procedure	: **Grab**
Packing/Seal	: **Sealed**	Protocol (purpose)	: **QC**
Test Method	: **IS/ASTM/CPCB Guidelines**	Test Parameters	: **As per Table**

SR. NO.	TEST PARAMETERS	UNIT	Near Mouth of Creek (M1)	Near Jetty (M2)	Near Mouth of Creek (M1)	Near Jetty (M2)	Near Mouth of Creek (M1)	Near Jetty (M2)
			Oct-16	Nov-16	Dec -16	Jan-17	Feb-17	March-17
			22/10/2016	18/11/2016	20/12/2016	23/01/2017	21/02/2017	23/03/2017
1	Organic Matter	%	0.690	0.425	0.575	0.625	0.660	0.560
2	Phosphorus as P	mg/kg	178	289	364	388	176	278
3	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy
4	Petroleum Hydrocarbon	mg/kg	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*
5	**Heavy Metals**							
5.1	Aluminum as Al	%	5.13	5.59	6.14	6.18	5.14	5.62
5.2	Total Chromium as Cr+3	mg/kg	0.439	47.98	144	144	0.438	124
5.3	Manganese as Mn	mg/kg	715	839	682	750	716	740
5.4	Iron as Fe	%	1.97	2.39	2.76	2.96	1.94	2.40
5.5	Nickel as Ni	mg/kg	31.31	31.36	42.63	42.22	31.32	35.76
5.6	Copper as Cu	mg/kg	50.62	61.77	102	118	50.64	76.6
5.7	Zinc as Zn	mg/kg	64.38	109	186	170	64.36	118.7
5.8	Lead as Pb	mg/kg	0.999	1.00	2.17	1.98	0.996	2.78
5.9	Mercury as Hg	mg/kg	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*
6	**Benthic Organisms**							
6.1	Macrobenthos (No and name of groups present, No and name of species of each group present)	--	Bivalves Decapods	Polychaete worms Isopods	Polychaete worms Bivalves	Polychaete worms Isopods	Bivalves Echinoderms	Polychaete worms Bivalves Corals Turbellaria
6.2	MeioBenthos (No and name of groups present, No and name of species of each group present)	--	Copepods Nematodes	Bryozoans Nematodes	Nematodes Foraminiferans	Copepods Nematodes	Nematodes	Nematodes Foraminiferans Ostracods
6.3	Population	no/m2	337	314	337	337	252	314

Note: BDL*: Below Detection Limit, Minimum Detection Limit, Mercury as Hg: 0.00025 mg/L, Petroleum Hydrocarbon: 5 mg/kg

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Sea Water & Sea Sediment Locations

Sr. No	Name of Location	GPS Coordinate
1.	NEAR MOUTH OF CREEK(M1)	N 22°54' 4.68" E 70° 6'16.56"
2.	NEAR JETTY(M2)	N 22°53 15.99'" E 70° 6' 15.60"

Figure No. 2 Google earth image of sea water and sediment location

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RESULTS OF DRINKING WATER ANALYSIS

Standard Methods & Permissible limit for Drinking water

SR. NO.	PARAMETERS	UNIT	DESIRABLE LIMIT AS PER IS:10500:2012	TEST METHOD
	Chemical Parameters			
1	Odour	--	Agreeable	IS3025(P-5)83Re.02
2	Colour	Hazen	Max 5	IS3025(P-4)83Re.02
3	Taste	--	Agreeable	IS3025(P-8)84Re.02
4	pH Value	--	6.5 to 8.5	IS3025(P-11)83Re.02
5	Turbidity	NTU	Max 1	APHA 2130-B
6	Total Dissolved Solids	mg/L	Max 500	IS3025(P16)84Re.02
7	Total Hardness as $CaCO_3$	mg/L	Max 200	IS3025(P-21) 84EDTARe.02
8	Alkalinity	mg/L	Max 200	IS 3025(P-23)
9	Residual Free Chlorine	mg/L	Min 0.2	APHA(22nd Edi)4500 Cl
10	Chloride as Cl	mg/L	Max 250	IS3025(P-32) 88Re.99Argentometric method
11	Calcium as Ca	mg/L	Max 75	IS3025(P40)91Re.03EDTA
12	Magnesium as Mg	mg/L	Max 30	IS3025(P46)94Re.99EDTA
13	Oil & Grease	mg/L	Max 0.5	IS3025(P-39)
14	Phenolic compounds as C_6H_5OH	mg/L	Max 0.001	IS3025(P43)92Re.03
15	Hexavalent Chromium as Cr^{+6}	mg/L	Max 0.05	APHA (22nd Edi) 3500 Cr B
16	Cadmium as Cd	mg/L	Max 0.003	AAS-APHA(22nd Edi) 3111 B
17	Copper as Cu	mg/L	Max 0.05	AAS-APHA(22nd Edi) 3111 B
18	Zinc as Zn	mg/L	Max 5	AAS-APHA(22nd Edi) 3111 B
19	Iron as Fe	mg/L	Max 0.3	AAS-APHA(22nd Edi) 3111 B
20	Lead as Pb	mg/L	Max 0.01	AAS-APHA(22nd Edi) 3111 B
21	Mercury as Hg	mg/L	Max 0.001	AAS-APHA 3112 B
22	Selenium as Se	mg/L	Max 0.01	AAS-APHA 3114 B
23	Aluminum as Al	mg/L	Max 0.03	AAS-APHA(22nd Edi) 3111 B
24	Manganese as Mn	mg/L	Max 0.1	AAS-APHA(22nd Edi) 3111 B
25	Arsenic as As	mg/L	Max 0.01	AAS-APHA(22nd Edi) 3114 B
26	Sulphate as SO_4	mg/L	Max 200	IS 3025(P-24)
27	Cyanide as CN	mg/L	Max 0.05	APHA(22nd Edi)4500CN E
28	Boron as B	mg/L	Max 0.5	APHA(22nd Edi)4500 B
29	Fluoride as F	mg/L	Max 1.0	APHA(22nd Edi) 4500 F D SPANDS
30	Nitrate Nitrogen as NO_3	mg/L	Max 45	IS3025(P34)88
31	Anionic Detergents as MBAS	mg/L	Max 0.2	14542/Methylene Blue extraction method
32	Pesticides	mg/L	Absent	GCMS
33	Coliform	/100 ml	Absent	APHA (22nd Edi. Method) 9221-D
34	E-Coli	/100 ml	Absent	IS: 1622:1981 Edi. 2.4 (2003-05)

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Table No.10 Results of Drinking Water [October 2016 to March 2017]

Results of Drinking Water [Full Parameter in March -2017]

SR. NO.	PARAMETERS	UNIT	March -2017 23/03/2017 Near Fertilizer Godown
Chemical Parameters			
1	Colour	Hazen	< 1.0
2	Odour	--	Agreeable
3	Taste	--	Agreeable
4	Turbidity	NTU	0.68
5	pH Value	--	7.87
6	Total Hardness as CaCO3	mg/L	169
7	Iron as Fe	mg/L	0.026
8	Chloride as Cl	mg/L	187
9	Residual Free Chlorine	mg/L	< 0.1
10	Fluoride as F	mg/L	BDL*
11	Total Dissolved Solids	mg/L	396
12	Calcium as Ca	mg/L	40.56
13	Magnesium as Mg	mg/L	16.22
14	Copper as Cu	mg/L	BDL*
15	Manganese as Mn	mg/L	BDL*
16	Sulphate as SO4	mg/L	37.6
17	Nitrate Nitrogen as NO3	mg/L	BDL*
18	Phenolic compounds as C6H5OH	mg/L	BDL*
19	Mercury as Hg	mg/L	BDL*
20	Cadmium as Cd	mg/L	BDL*
21	Selenium as Se	mg/L	BDL*
22	Arsenic as As	mg/L	BDL*
23	Cyanide as CN	mg/L	BDL*
24	Lead as Pb	mg/L	BDL*
25	Zinc as Zn	mg/L	0.022
26	Anionic Detergents as MBAS	mg/L	BDL*
27	Chromium as Cr+6	mg/L	BDL*
28	Mineral Oil	mg/L	BDL*
29	Alkalinity	mg/L	110
30	Aluminum as Al	mg/L	BDL*
31	Boron as B	mg/L	BDL*
32	Pesticides	mg/L	BDL*
Microbiological Parameters			
33	Coliform	/100 ml	Absent
34	E-Coli	/100 ml	Absent

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Results of Drinking Water [Essential parameter in October 2016 – March 2017]

SR. NO.	TEST PARAMETERS	UNIT	November 2016		January 2017
			18/11/2016	18/11/2016	23/01/2017
			Narmada Water Pump House	Canteen RO Water	Narmada Water Pump House
1	Odour	--	Agreeable	Agreeable	Agreeable
2	Colour	Hazen	< 1.0	< 1.0	< 1.0
3	Taste	--	Agreeable	Agreeable	Agreeable
4	pH	--	7.78	8.16	7.97
5	Turbidity	NTU	0.94	0.53	0.73
6	Total Dissolved Solids	mg/L	470	181	326
7	Total Hardness as CaCO3	mg/L	210	46	128
8	Residual Free Chlorine	mg/L	< 0.1	< 0.1	< 0.1
9	Chloride as Cl	mg/L	226	72.97	149
10	Fluoride as F	mg/L	0.6	0.4	0.5
11	Iron as Fe	mg/L	0.028	0.012	0.022
12	Coliform	/100 ml	Present	Present	Present
13	E-Coli	/100 ml	Absent	Absent	Absent

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Table No.11 Results of Sewage Water [October 2016 to March 2017]

SR. NO.	PARAMETERS	UNIT	TEST METHOD
1	pH	--	IS3025(P11)83Re.02
2	Total Suspended Solids	mg/L	IS3025(P17)84Re.02
3	Residual Chlorine	mg/L	APHA(22ndEdi)4500 Cl
4	BOD (3 Days @ 27 oC)	mg/L	IS 3025 (P44)1993 Re.03Edition2.1

RESULTS OF SEWAGE WATER ANALYSIS

DATE OF SAMPLING			21/10/2016	
SR. NO.	PARAMETERS	UNIT	STP Inlet	STP Outlet
1	pH	--	6.87	7.07
2	Total Suspended Solids	mg/L	124	22
3	Residual Chlorine	mg/L	< 0.1	0.5
4	BOD (3 Days @ 27 oC)	mg/L	64	20

DATE OF SAMPLING			21/11/2016	
SR. NO.	PARAMETERS	UNIT	STP Inlet	STP Outlet
1	pH	--	6.79	7.15
2	Total Suspended Solids	mg/L	92	12
3	Residual Chlorine	mg/L	<0.1	0.8
4	BOD (3 Days @ 27 °C)	mg/L	80	10

DATE OF SAMPLING			19/01/2017	
SR. NO.	PARAMETERS	UNIT	STP Inlet	STP Outlet
1	pH	--	6.97	7.96
2	Total Suspended Solids	mg/L	268	24
3	Residual Chlorine	mg/L	< 0.1	1
4	BOD (3 Days @ 27 °C)	mg/L	44	8

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DATE OF SAMPLING			21/02/2017	
SR. NO.	**PARAMETERS**	**UNIT**	**STP Inlet**	**STP Outlet**
1	pH	--	7.03	7.57
2	Total Suspended Solids	mg/L	176	26
3	Residual Chlorine	mg/L	< 0.1	0.8
4	BOD (3 Days @ 27 °C)	mg/L	52	6

DATE OF SAMPLING			23/03/2017	
SR. NO.	**PARAMETERS**	**UNIT**	**STP Inlet**	**STP Outlet**
1	pH	--	6.96	7.49
2	Total Suspended Solids	mg/L	208	24
3	Residual Chlorine	mg/L	< 0.1	0.5
4	BOD (3 Days @ 27 °C)	mg/L	56	8

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Table No.12 Results Of Stack Monitoring

Permissible limit for stack monitoring

SR. NO.	TEST PARAMETER	UNIT	GPCB LIMIT**	TEST/SAMPLING METHOD
1	Particulate Matter	mg/Nm3	150	IS:11255 (Part-1) : 1985
2	Sulfur Dioxide as SO2	ppm	100	IS:11255 (Part-2) : 1985
3	Oxides of Nitrogen as NOX	ppm	50	IS: 11255 (Part-7) : 2005

RESULTS OF STACK MONITORING

Date of Monitoring			06/12/2016		
Sampling Location			SS-1 DG Set -1 (125 KVA)	SS-2 DG Set -2 (125 KVA)	SS-3 DG Set -3 (125 KVA)
SR. NO.	TEST PARAMETER	UNIT	RESULTS		
1	Particulate Matter	mg/Nm3	18.40	26.26	23.97
2	Sulfur Dioxide as SO2	ppm	5.28	4.79	6.92
3	Oxides of Nitrogen as NOX	ppm	27.55	18.16	36.68

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Table No.13 Results Of Dump Pond Discharge

RESULTS OF DUMP POND DISCHARGE

Standard Methods & Permissible limit for Dump Pond Discharge

SR NO	TEST PARAMETER	UNIT	TEST/SAMPLING METHOD
1	pH	--	IS3025(P11)83Re.02
2	Total Dissolved Solids	mg/L	IS3025(P16)84Re.02
3	Total Suspended Solids	mg/L	IS3025(P17)84Re.02
4	Turbidity	NTU	APHA 2130-B
5	BOD (3 Days @ 27 oC)	mg/L	IS 3025 (P44)1993 Re.03Edition2.1
6	Dissolved Oxygen	mg/L	IS3025(P38)89Re.99
7	COD	mg/L	APHA(22ndEdi) 5520-D Open Reflux
8	Salinity	ppt	APHA 2550 B
9	Oil & Grease	mg/L	APHA(22ndEdi)5520D
10	Total Hardness as CaCO3	mg/L	IS3025(P-21) 84EDTARe.02
11	Fluoride as F	mg/L	APHA(22ndEdi) 4500 F D SPANDS
12	Chloride as Cl	mg/L	IS3025(P-32) 88Re.99Argentometric method
13	Zinc as Zn	mg/L	AAS- APHA (22ndEdition) 3111 B
14	Cadmium as Cd	mg/L	AAS- APHA (22nd Edition) 3111 B
15	Lead as Pb	mg/L	AAS- APHA (22nd Edition) 3111 B
16	Mercury as Hg	mg/L	AAS-APHA (22nd Edition) 3112 B

Results of Dump Pond Discharge

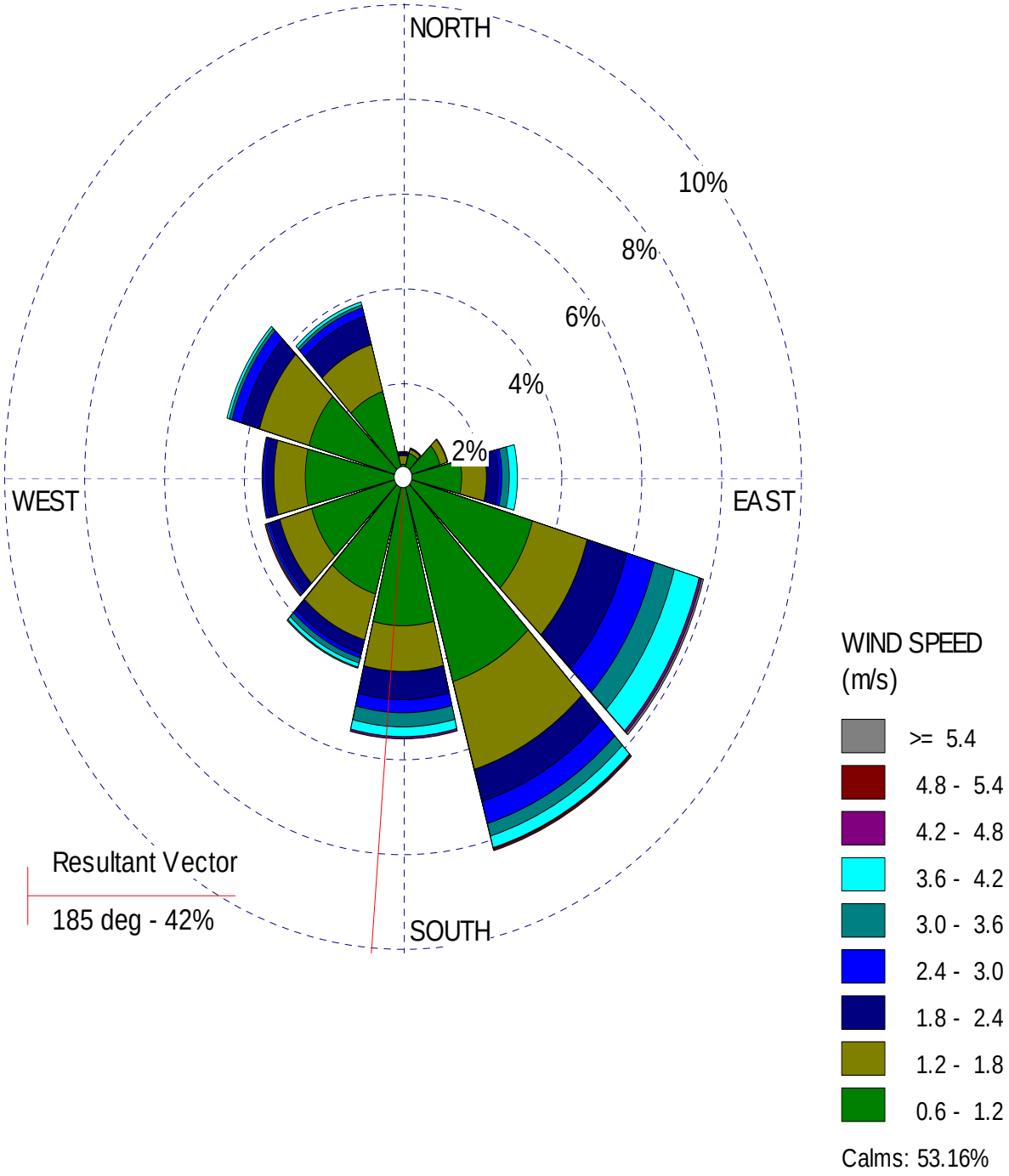
	Sampling Location		Dump Pond near TT:4
	Date of Sampling		18/10/2016
SR NO	TEST PARAMETER	UNIT	RESULTS
1	pH	--	7.51
2	Total Dissolved Solids	mg/L	14805
3	Total Suspended Solids	mg/L	28
4	Turbidity	NTU	3.21
5	BOD (3 Days @ 27 oC)	mg/L	165
6	Dissolved Oxygen	mg/L	5.6
7	COD	mg/L	687
8	Salinity	ppt	7.71
9	Oil & Grease	mg/L	BDL*
10	Total Hardness as CaCO3	mg/L	4668
11	Fluoride as F	mg/L	0.975
12	Chloride as Cl	mg/L	4198
13	Zinc as Zn	mg/L	0.063
14	Cadmium as Cd	mg/L	BDL*
15	Lead as Pb	mg/L	0.075
16	Mercury as Hg	mg/L	BDL*

H. T. Shah
Lab Manager

POLLUCON LABORATORIES PVT. LTD. SURAT-3

Dr. Arun Bajpai
Lab Manager (Q)

Figure No.3 Wind Rose Diagram [October 2016 – March 2017]



H. T. Shah
Lab Manager

Dr. Arun Bajpai
Lab Manager (Q)

Annexure – 7

adani	Adani Kandla Bulk Terminal Pvt. Ltd.	From : October 2016 To : March 2017

Annexure – 7: Details of CSR activities carried out by Adani Foundation

S. no.	Village	CSR activity done	Expenses (INR in Lakh)
1		**Rural Infrastructure Development**	
	Wandi	Community hall	16.17
	Tuna	boundary wall around fodder shed	7.95
	Rampar	Under Ground Tank-100 KL	7.15
	Veera fisherman	construction of water tank-3 Nos (total :15KL capacity)	0.84
2		**Health Projects**	
	Mobile Van	Rampar, Tuna, Wandi	0.80
	Senior Citizen	Rampar, Tuna, Wandi	0.68
	Medical Support	Rampar, Wandi	0.08
3		**Education Projects**	
1	Drawing competition at Tuna	Tuna	0.20
2	Scholarship Support	Wandi	0.80
3	Computer Support	Wandi	0.35
		Total	**35.20**

Discussion for portable water at Veera Bander.

Community hall at Wandi village

adani	Adani Kandla Bulk Terminal Pvt. Ltd.	From : October 2016 To : March 2017

Community hall at Wandi village

Community hall at Wandi village

Annexure – 8

MULTI-SPECIES MANGROVE PLANTATION AT SAT SAIDA BET-KANDLA

FIRST PROGRESS REPORT

Report Submitted to

Adani Kandla Bulk Terminal Pvt. Ltd.

Tuna-Kandla

Report Submitted by

T. Jayanthi Thivakar

Technical Assistance

Dr. G.A. Thivakaran
Marine Biologist
Gujarat Institute of Desert Ecology
Bhuj

2016 – 2017

MULTI-SPECIES MANGROVE PLANTATION AT SAT SAIDA BET-KANDLA

FIRST PROGRESS REPORT

1 Introduction

Kachchh coast is the home for largest mangroves of the Indian west coast with an extent of 789 sq.km. But mangrove formation of Kachchh is predominantly constituted by a single species, *Avicennia marina* with very sporadic distribution of *Rhizophora mucronata* and *Ceriops tagal* only in few locations such as Mundra and Kandla. Inherent hyper-salinity, poor precipitation and other geomorphological factors significantly contribute to this mono-species dominance. In addition to this, ongoing massive mangrove plantation efforts mostly choose *A.marina* as the candidate species due to its tolerance to high salinity. In this background, Adani Kandla Bulk Terminal Pvt. Ltd., desired to carry out a plantation with more than one mangrove species as per Ministry of Environment, Forests and Climate Change (MoEFCC) mandate. This multi-species plantation will also enable propagation of other species in this area. The site chosen for this multispecies mangrove plantation is Sat Saida Bet, opposite to Kandla Port at Gandhidham taluka of Kachchh district. This preliminary report narrates the progress made in this multi-species mangrove plantation effort in an area of five hectares.

2. Objectives

Major objective of this multi-species mangrove plantation is to promote diversity among Kachchh mangroves. Accordingly, the following three candidate species other than Avicennia marina have been chosen for plantation.

1. *Rhizophora mucronata*
2. *Ceriops tagal*
3. *Aegiceras corniculatum*

These three candidate species have been chosen based on their occurrence in Kachchh coast and their tolerance to high salinity next to *Avicennia marina*.

3 Plantation Site

The chosen plantation site for the present multi-species plantation is Sat Saida Bet opposite to Kandla Port at Gandhidham taluka. Availability of vast mudflat with good tidal inundation, proven suitability of the site as observed in the earlier plantation results and availability of

skilled and trained laborers for plantation activity are the positive factors for choosing this site. Though the site has some accessibility issues due to its proximity to port premises, other positive factors negate this issue. It is planned to carry out plantation in an area of five ha with a density of 6800 seedlings per hectare and a total of 34000 seedlings will be dibbled in five hectares. Since the chosen species requires continuous water inundation, it was decided to carry out plantation through propagule dibbling in a linear fashion along minor creek banks which will get inundated almost daily. In total, 34000 propagules of the three chosen species each with 12000 propagules are planned to be dibbled along minor creek banks which will be equivalent to a total area of 5 hectares.

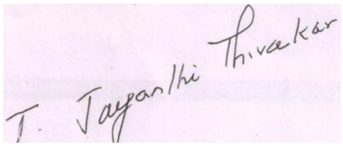
4 Progress So Far

Ceriops tagal was chosen as one of the candidate species as it has been reported in pockets of Kachchh waters, especially in Mundra and Kandla. Since this species is known to grow and propagate naturally in Kachchh waters, this species is likely to yield better results in plantation. *Ceriops tagal* propagules of 12500 have been dibbled along minor creeks with a gap of 1 meter during October, 2016. Propagules of *Ceriops tagal* were procured from Jamnagar mangrove forests and they were soaked for a day in freshwater in order to enable fast germination. The soaked propagules were transported to the site and dibbled along the creek banks with a distance of 1 meter. Many adjacent minor creek systems were chosen to dibble the propagules. The propagules have started germinating during early part of November 2016 after a period of one month as water salinity was around 39 to 40 ppt. A survivals rate of 80% has been estimated with around 10000 propagules germinating. This survival rate is expected to drop further during summer months of April to July, 2017 as water and soil salinity increases. However, it is expected to attain a survival of around 60% with further propagule dibbling in the gaps.

During February 2017, plantation through seed dibbling for the next species, *Rhizophora mucronata* was initiated. Initially 10000 propagules were collected from Mundra mangrove forest and after freshwater soaking treatment for one day they were dibbled along the banks of the minor creek systems in a linear fashion similar to *C. tagal*. Here also a gap of 1 meter was followed. Initial germination results with these propagules collected from Mundra was not satisfactory as they were not fully ripe. Hence, another 15000 propagules of *R. mucronata* was procured from Jamnagar mangrove forest and dibbled during the end of February 2017 along

minor creek banks. In total around 25000 propagules of *R.mucronata* were dibbled which will produce a survival results of at least 12000 saplings in the final count. As germination was slow due to higher water salinity in the range of 39-40 ppt, first leaf in the dibbled propagules was recorded only during the beginning March 2017. In total a germination percentage of 73% has been recorded which is expected to decline further in the advancing summer months. It is planned to carry out gap filling if the survival percentage declines below 50%. A final survival percentage will be collected once plantation of all three species is completed.

During end of April 2017 plantation of the third species, *Aegiceras corniculatum* is planned. Since flowering and fruiting season of this species is during April-September and propagules of this species is not easily available in Gujarat due to its sporadic distribution, plantation through seed dibbling is planned during May 2017. It is planned to procure propagules from Ratnagiri coast of Maharashtra where large population of this species is present. This species is chosen for the multi-species plantation since very few individuals of this species was observed in Sat Saida bet itself in the vicinity of the present plantation site.



T. Jayanthi Thivakar, Contractor

G.A.Thivakaran, Technical Consultant

Propagules of *Ceriops* sp during 19.10.2016

Rhizophora mucronata propagules dibbled on 19.10.2017