

adani

Ports and  
Logistics

APSEZL/EnvCell/2021-22/023

Date: 18.05.2021

To

Deputy Director General of Forest (Central),  
Ministry of Environment, Forest and Climate Change,  
Regional Office (WZ), E-5, Kendriya  
Paryavaran Bhawan, Arera Colony,  
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**Sub** : Half yearly Compliance report of Environment Clearance under CRZ notification for "Port expansion project including dry/break bulk cargo container terminal, railway link and related ancillary and back-up facilities at Mundra Port, Dist. Kutch in Gujarat by M/s. Adani Ports & SEZ Limited."

**Ref** : Environment clearance under CRZ notification granted to M/s Adani Ports & SEZ Limited vide letter dated 20<sup>th</sup> September, 2000 bearing no. J-16011/40/99-IA.III

Dear Sir,

Please refer to the above cited reference for the said subject matter. In connection to the same, it is to state that copy of the compliance report for the Environmental and CRZ Clearance for the period of October-2020 to March-2021 is being submitted through soft copy (e-mail communication).

Kindly consider above submission and acknowledge.

Thank you,

Yours Faithfully,

For, M/s Adani Ports and Special Economic Zone Limited



Douglas Charles Smith  
Chief Executive Officer  
Mundra & Tuna Port

CO attested

Encl: As above

Copy to:

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

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एकीकृत क्षेत्रीय कार्यालय  
Integrated Regional Office  
पर्यावरण, वन एवं जलवायु परिवर्तन विभाग  
Ministry of Environment, Forest & Climate Change  
भारत सरकार, भोपाल/Govt. of India, Bhopal

18/05/2021

# Environmental Clearance Compliance Report



Port Expansion Project including Dry/Break Bulk Cargo Container Terminal, Railway Link and related Ancillary and Back-up facilities at Mundra Port, Dist. Kutch, Gujarat

**Adani Ports and SEZ Limited**

For the Period of:  
October – 2020 to March – 2021

	<b>Adani Ports and Special Economic Zone Limited, Mundra.</b>	<b>From : Oct'20 To : Mar'21</b>
<b>Status of the conditions stipulated in Environment Clearance under CRZ notification</b>		

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**EC & CRZ  
Clearance  
Compliance  
Report**

	<b>Adani Ports and Special Economic Zone Limited, Mundra.</b>	<b>From : Oct'20 To : Mar'21</b>
<b>Status of the conditions stipulated in Environment Clearance under CRZ notification</b>		

- The name of the company was changed from **“Gujarat Adani Port Limited”** to **“Mundra Port and Special Economic Zone Limited”** on 7<sup>th</sup> July, 2006.
- Further the name of the company was changed from **“Mundra Port and Special Economic Zone Limited”** to **“Adani Ports and Special Economic Zone Limited”** on 6<sup>th</sup> January, 2012.

	<b>Adani Ports and Special Economic Zone Limited, Mundra</b>	<b>From : Oct'20 To : Mar'21</b>
<b>Status of the conditions stipulated in Environment Clearance under CRZ notification</b>		

- Half yearly Compliance report of Environment Clearance under CRZ notification for “Port expansion project including dry/break bulk cargo container terminal, railway link and related ancillary and back-up facilities at Mundra Port, Dist. Kutch in Gujarat vide letter no. J-160 11/40/99-IA.III dated 20<sup>th</sup> September, 2000’

Sr. No.	Conditions	Compliance Status as on 31-03-2021																																			
A. Specific Condition																																					
i	All the conditions stipulated by the Gujarat Pollution Control Board vide their NOC No. PC/NOC/Kutch/391/18424 dated 10.6.99 and No. PC/NOC/Kutch/222(2)16880 dated 1.5.99 shall be strictly implemented.	<p>Complied.</p> <p>Consent to operate (CC&amp;A) has been renewed from GPCB vide consent no. AWH-88317 valid till 20<sup>th</sup> November, 2021. The same was submitted along with compliance submission for the period of Oct'16 to Mar'17.</p> <p>Consent to Establish (CtE) and Consent to Operate (CtO) are obtained from GPCB and renewed/amended from time to time as per the progress of the project activity. The present in-force CtE / CtO are mentioned below.</p> <table><tr><th>Sr. No.</th><th>Permission</th><th>Project</th><th>Ref. No. / Order No.</th><th>Valid till</th></tr><tr><td>1</td><td>CtO – Renewal</td><td>Mundra Port Terminal</td><td>AWH-83561</td><td>20.11.2021</td></tr><tr><td>2</td><td>CtO - Amendment</td><td>Mundra Port Terminal</td><td>WH-88317</td><td>20.11.2021</td></tr><tr><td>3</td><td>CtO - Amendment</td><td>Mundra Port Terminal</td><td>GPCB/CCA-Kutch -39(5)/ ID-17739/473575</td><td>20.11.2021</td></tr><tr><td>4</td><td>CtO - Amendment</td><td>Mundra Port Terminal</td><td>H-98086</td><td>20.11.2021</td></tr><tr><td>5</td><td>CtO - Amendment</td><td>Mundra Port Terminal</td><td>H-105708</td><td>20.11.2021</td></tr><tr><td>6</td><td>CtE – Amendment</td><td>WFDP</td><td>17739 / 15618</td><td>18.05.2027</td></tr></table> <p>The permissions mentioned above were submitted along with earlier compliance report submission. And there is no further change.</p>	Sr. No.	Permission	Project	Ref. No. / Order No.	Valid till	1	CtO – Renewal	Mundra Port Terminal	AWH-83561	20.11.2021	2	CtO - Amendment	Mundra Port Terminal	WH-88317	20.11.2021	3	CtO - Amendment	Mundra Port Terminal	GPCB/CCA-Kutch -39(5)/ ID-17739/473575	20.11.2021	4	CtO - Amendment	Mundra Port Terminal	H-98086	20.11.2021	5	CtO - Amendment	Mundra Port Terminal	H-105708	20.11.2021	6	CtE – Amendment	WFDP	17739 / 15618	18.05.2027
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ii	The conditions stipulated in the letter No ENV-1098-6477-PI dated October 28, 1999 and No. ENV-1099-2702-PI dated 27.12.99 of shall be strictly	<p>Complied.</p> <p>Point wise compliance report of CRZ recommendations issued vide letter No ENV-1098-6477-PI dated October 28, 1999 and No. ENV-1099-2702-PI dated 27.12.99 is enclosed as <b>Annexure- A</b>.</p>																																			

	<b>Adani Ports and Special Economic Zone Limited, Mundra</b>	<b>From : Oct'20 To : Mar'21</b>
<b>Status of the conditions stipulated in Environment Clearance under CRZ notification</b>		

Sr. No.	Conditions	Compliance Status as on 31-03-2021
	implemented.	
iii	The turning circle should be increased from 550 m to 600 m.	Complied. Construction activities are completed and project is in operation phase.
iv	A girdle canal with settlement tanks shall be provided around the coal storage area.	Not applicable at present. Coal handling is not practiced at project site.
v	All efforts shall be made for water conservation and rain water harvesting. Arrangements shall be made for roof top rain water harvesting from various structures.	<p>Complied.</p> <p>Under the Water Conservation and Optimization Drive at APSEZ, various initiatives were taken for conservation of water such as,</p> <ol style="list-style-type: none"> <li>1. 100% utilization of treated water for horticultural purpose.</li> <li>2. Total 128 Water-free urinals are installed and in operation within APSEZ.</li> <li>3. Recirculation of water from fixed firefighting system to reservoir through flexible pipe during testing of firefighting system.</li> <li>4. Conservation of Condensate from Air Conditioner and use for gardening.</li> <li>5. Water flow reducers (total 8740 nos.) are provided in taps of Adani House, Tug Berth, CT2, CT3 &amp; CT4 buildings to reduce the water consumption and are in use.</li> <li>6. Water Maker machine is installed near Tug Berth jetty which generates drinking water from atmospheric moisture. The capacity of this machine is 250 liters per day.</li> <li>7. Attending leakages and damages of water lines at various locations of APSEZ.</li> <li>8. Process optimization</li> </ol> <p>Above initiative have saved substantial amount of water consumption.</p> <p>Groundwater recharge cannot be done at the project site since the entire project is in the intertidal / sub tidal areas. Rain water within project area is managed through storm water drainage.</p>

	<b>Adani Ports and Special Economic Zone Limited, Mundra</b>	<b>From : Oct'20 To : Mar'21</b>
<b>Status of the conditions stipulated in Environment Clearance under CRZ notification</b>		

Sr. No.	Conditions	Compliance Status as on 31-03-2021
		<p>We have installed Rain water recharge bore well (4 Nos.) within our township to recharge ground water. Details of the same were submitted along with half yearly EC compliance report for the period Apr'19 to Sep'19. During last monsoon Approx. 6.5 ML of rain water has been recharged to increase the ground water table.</p> <p>We have also connected roof top rain water duct of operational building (Tug berth building within MPT) with u/g water tank for utilization of collected rain water for gardening / horticulture purpose. Details of the same were submitted along with EC Compliance report for the period Oct'18 to Mar'19.</p> <p>However, Adani Foundation – CSR arm of Adani Group has carried out rainwater harvesting activities in the nearby villages for benefit of the locals.</p> <p>Water conservation Projects i.e. Roof Top Rain Water Harvesting, Desilting of Check dams, Bore Well Recharge and Pond deepening were taken up in past years, review and monitoring of all water harvesting structures had been taken up. Including this a big recharge operation by bunding was taken up for Zarpara village as rainfall was very good last FY 2020-21.</p> <p>To make connections between human actions and the level of biological diversity found within a habitat and/or ecosystem, this year Adani Foundation launch project “Sanrakshan” in coordination with GUIDE and Sahjeevan.</p> <p>Since 10 years considerable Water Conservation Work carried out in Mundra Taluka. Due to satisfactory rain in current year 1.11 mtr ground water table increased as per Government Figures.</p> <p><b>Our water conservation work is as below.</b></p> <ul style="list-style-type: none"> <li>• A large number of water harvesting structure (18 Nos. of check dams in coordination with salinity department)</li> <li>• Ground recharge activities (pond deepening work for</li> </ul>

	<b>Adani Ports and Special Economic Zone Limited, Mundra</b>	<b>From : Oct'20 To : Mar'21</b>
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		<p>more than 52 ponds) individually and 26 ponds under Sujlam Suflam Jal Abhiyan were built leading to a significant increase in water table and higher returns to the farmers</p> <ul style="list-style-type: none"> <li>• Roof Top Rain Water Harvesting 54 Nos. which is having 10,000 liter storage which is sufficient for one year drinking water purpose for 5 people family.</li> <li>• Recharge Bore well 75 Nos which is best ever option to</li> <li>• Bund construction on way of Nagmati River could save more than 575 MCFT water quantity which recharged in ground due to which bore well depth decreased by 50-100 Ft in Zarpara, Bhujpur and Navinal Vadi Vistar.</li> <li>• AF has covered 295 farmers and 1422 acre drip irrigation area in last two years which is remarkable for water conservation in first phase—in this phase we have covered 66 farmers and 360 Acre land for the same. Total 968 Farmers and 5626 Acre Drip since 20 11-12 to 2020-21.</li> </ul> <p>With the objective of to preserve the rain water to reduce the impact of salinity and recharge the ground water (the main source of water) to facilitate the Agricultural activities as well as for drinking water.</p> <p>Please refer <b>Annexure – 1</b> for full details of CSR activities carried out by Adani Foundation in the Kutch region. Budget for CSR Activity for the FY 2020-21 is to the tune of INR 1429.33 lakh. Out of which, Approx. INR 1117.45 lakh are spent during the year FY 2020-21.</p>
vi	To obviate the problem of coastal erosion due to dredging, the setback distance of at least 50 m from the Chart Datum line of Bocha island would be maintained.	<p>Complied.</p> <p>During Maintenance dredging in this area, it is ensured that at least 50 m distance is maintained.</p>
vii	The dredged material shall be disposed of only in the identified locations outside the CRZ area. While dumping the dredged material, sufficient distance should be ensured from the existing mangroves so that there is	<p>Complied.</p> <p>Capital dredging is completed and only maintenance dredging is being carried out, if required which is being ensured that there no damage of marine ecology.</p> <p>In order to ensure no damage to marine ecology Marine water &amp; sediment monitoring is being carried out once in a month by NABL and MoEF&amp;CC accredited agency</p>

	<b>Adani Ports and Special Economic Zone Limited, Mundra</b>	<b>From : Oct'20 To : Mar'21</b>
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Sr. No.	Conditions	Compliance Status as on 31-03-2021																																														
	no damage to the ecology. During dumping of dredged material the mitigative measures as suggested by NIO shall be implemented. It shall be ensured that there is no dumping of dredged material in the CRZ.	<p>namely M/s. Pollucon Laboratories Pvt. Ltd. Summary of the same for duration from Oct'20 to Mar'21 is mentioned below.</p> <p><b>Total Sampling Locations: 09 Nos.</b></p> <table><tr><th rowspan="2">Parameter</th><th rowspan="2">Unit</th><th colspan="2">Surface</th><th colspan="2">Bottom</th></tr><tr><th>Max</th><th>Min</th><th>Max</th><th>Min</th></tr><tr><td>pH</td><td>--</td><td>8.31</td><td>8.15</td><td>8.27</td><td>8.13</td></tr><tr><td>TSS</td><td>mg/L</td><td>197</td><td>104</td><td>235</td><td>104</td></tr><tr><td>BOD (3 Days @ 27 °C)</td><td>mg/L</td><td>3.9</td><td>3.3</td><td>ND*</td><td>ND*</td></tr><tr><td>DO</td><td>mg/L</td><td>6.1</td><td>5.8</td><td>5.9</td><td>5.5</td></tr><tr><td>Salinity</td><td>ppt</td><td>36.9</td><td>36.1</td><td>37.3</td><td>36.4</td></tr><tr><td>TDS</td><td>mg/L</td><td>38314</td><td>37294</td><td>38740</td><td>37708</td></tr></table> <p>*ND = Not Detectable</p> <p>Please refer <b>Annexure – 2</b> for detailed analysis reports. Approx. INR 19.17 Lakh is spent for all environmental monitoring activities during the FY 2020-21 for overall APSEZ, Mundra.</p>	Parameter	Unit	Surface		Bottom		Max	Min	Max	Min	pH	--	8.31	8.15	8.27	8.13	TSS	mg/L	197	104	235	104	BOD (3 Days @ 27 °C)	mg/L	3.9	3.3	ND*	ND*	DO	mg/L	6.1	5.8	5.9	5.5	Salinity	ppt	36.9	36.1	37.3	36.4	TDS	mg/L	38314	37294	38740	37708
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viii	The mangrove afforestation shall be undertaken at the identified sites and the progress report in this regard shall be submitted to this Ministry regularly. All the recommendations suggested in the NIO report for restoration of the coastal habitat by mangrove afforestation at Navinal island shall be strictly implemented.	<p>Complied.</p> <p>All construction activities are completed and project is in operation phase since long time. 24 hectare of mangrove afforestation was carried out at identified sites in consultation with Dr Maity, (Mangrove Consultant of India).</p> <p>Green belt was developed 72.67 ha. Total 1,49,792 trees were planted with the density of 2061 trees per hectare within the port area.</p> <p>To enhance the marine biodiversity, till date APSEZ has carried out mangrove afforestation in 2890 ha. area across the coast of Gujarat. Total expenditure for the same till date is INR 832 lakh.</p> <p>Other than this Adani Foundation – CSR Arm of Adani Group at Mundra-Kutch has initiated multi-species plantation of mangroves in Luni village in association with GUIDE, Gujarat. During 2018-2019 (Phase-I) multi-species mangrove plantation was carried out in 10 ha, during Phase-II (2019-2020) it was 02 ha and during Phase III (2020-2021) it is 01 ha. Please refer attached <b>Annexure – 1</b> for CSR activity report carried out by</p>																																														

	<b>Adani Ports and Special Economic Zone Limited, Mundra</b>	<b>From : Oct'20 To : Mar'21</b>
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Sr. No.	Conditions	Compliance Status as on 31-03-2021
		<p>Adani Foundation.</p> <p>So, far APSEZ has developed 476.5 ha. area as greenbelt with plantation of more than 9.3 Lacs saplings within the APSEZ area. Details on mangroves afforestation &amp; Green belt development carried out by APSEZ till date is annexed as <b>Annexure – 3</b>.</p>
ix	No ground water shall be withdrawn for this project.	<p>Complied.</p> <p>Present source of water for various project activities is desalination plant of APSEZ and/or Narmada water through Gujarat Water Infrastructure Limited. Average water consumption for entire APSEZ area is 4.16 MLD during compliance period i.e. Oct'20 to Mar'21.</p>
x	The project proponent shall ensure that the construction workers do not cut the Mangroves for fuel wood etc.	<p>Complied.</p> <p>All construction activities are completed and project is in operation phase since long time.</p>
xi	The project proponent shall ensure that no creeks are blocked and the natural drainage of the area is not affected due to project activities.	<p>Complied.</p> <p>Prominent creek system (main creeks and small branches of creeks) in the study region are: (1) Kotdi (2) Baradimata (3) Navinal (4) Bocha (5) Mundra (Oldest port (Juna Bandar) leading to Bhukhi river)</p> <p>All above creeks are in existence allowing free flow of water and there is no filling or reclamation of any creek area. APSEZ has so far constructed 19 culverts having total length of approx. 1100 m with total cost of INR 20 Crores. Apart from that three RCC Bridges have been constructed over Kotdi creek with total length of 230 m at the cost of INR 10 Crores. Photographs of the same were submitted as part of compliance report for the duration of Apr'17 to Sep'17.</p> <p>As per the bathymetry study carried out by NCSCM in 2017-18, it can be concluded that there are sufficient depths at the creek mouths and all creek mouths are open allowing flushing of water.</p>
xii	The project proponent shall ensure that there will be no disposal of sludge	<p>Complied.</p> <p>Project is in operation phase.</p>

**Status of the conditions stipulated in Environment Clearance under CRZ notification**

Sr. No.	Conditions	Compliance Status as on 31-03-2021																																											
	and sewage generated from construction camps, surface run-off from construction sites, and oil and grease spillage from the construction equipment's in the creeks.	<p>Sewage generated from port is being treated in designated ETP and treated sewage is used for horticulture purposes.</p> <table><tr><th>Location</th><th>Capacity</th><th>Quantity of Wastewater Treated (Avg. from Oct'20 to Mar'21)</th><th>Type of ETP / STP</th></tr><tr><td>LT</td><td>265 KLD</td><td>63 KLD</td><td>Activated Sludge</td></tr></table> <p>There was some minor modification work was going on in ETP for biological treatment, during that time entire wastewater from port premises was being sent to CETP operated by MPSEZ Utilities Ltd. (Co-developer of APSEZ) for treatment and final disposal on land for horticulture purpose within APSEZ premises. The same was intimated to the SPCB and details were submitted along with last half yearly compliance report for the period Apr'20 to Sep'20.</p> <p>However, the ETP was recommissioned since 16<sup>th</sup> Nov, 2020 and the wastewater is being treated in to ETP and treated water is being discharged on land for horticulture purpose within port premises after achieving prescribed permissible limit. The same has already been informed to the state pollution control board. The details of the same is attached as <b>Annexure – 4</b>.</p> <p>Summary of ETP treated water analysis results during compliance period as mentioned below.</p> <table><tr><th>Parameter</th><th>Unit</th><th>Min</th><th>Max</th><th>Perm. Limit<sup>§</sup></th></tr><tr><td>pH</td><td>--</td><td>7.13</td><td>7.56</td><td>6.5 – 8.5</td></tr><tr><td>SS</td><td>mg/L</td><td>25</td><td>43</td><td>100</td></tr><tr><td>TDS</td><td>mg/L</td><td>1703</td><td>2070</td><td>2100</td></tr><tr><td>COD</td><td>mg/L</td><td>61</td><td>78</td><td>100</td></tr><tr><td>BOD</td><td>mg/L</td><td>11</td><td>15</td><td>30</td></tr><tr><td>Ammonical Nitrogen as NH<sub>3</sub>-N</td><td>mg/L</td><td>2.78</td><td>3.69</td><td>50</td></tr></table> <p><sup>§</sup> as per CC&amp;A granted by GPCB</p>	Location	Capacity	Quantity of Wastewater Treated (Avg. from Oct'20 to Mar'21)	Type of ETP / STP	LT	265 KLD	63 KLD	Activated Sludge	Parameter	Unit	Min	Max	Perm. Limit <sup>§</sup>	pH	--	7.13	7.56	6.5 – 8.5	SS	mg/L	25	43	100	TDS	mg/L	1703	2070	2100	COD	mg/L	61	78	100	BOD	mg/L	11	15	30	Ammonical Nitrogen as NH <sub>3</sub> -N	mg/L	2.78	3.69	50
Location	Capacity	Quantity of Wastewater Treated (Avg. from Oct'20 to Mar'21)	Type of ETP / STP																																										
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Ammonical Nitrogen as NH <sub>3</sub> -N	mg/L	2.78	3.69	50																																									
xiii	The project proponent shall stick to the time	Complied.																																											

	<b>Adani Ports and Special Economic Zone Limited, Mundra</b>	<b>From : Oct'20 To : Mar'21</b>
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Sr. No.	Conditions	Compliance Status as on 31-03-2021
	bound program submitted to the Department of Environment, Government of Gujarat for the proposed activities including installation of desalination plant for meeting the entire water requirement. They shall coordinate their construction/operations schedule with the installation schedule of desalination plant.	Desalination plant has already been installed as per time bound program for overall APSEZ area and is in use. Details regarding water consumption are mentioned in Sr. no. ix above.
xiv	The project proponent shall ensure that the commercial fisheries are not hampered due to presence of barges, vessels and other activities in the region. Necessary plan in this regard shall be prepared in consultation with the NIO and submitted within 3 months.	<p>Complied.</p> <p>No commercial fisheries are prevailing in this area except Pagadia and fishermen with small boats. Unhindered access is provided to the fishing boats.</p> <p>During project proposal, APSEZ proposed to provide four (4) dedicated accesses at Juna Bandar, Luni, Bavdi Bandar and Zarpara for the fishermen to approach the sea for fishing activity. However, during construction as well as operation, through fishermen consultative process, APSEZ has provided seven (7) access roads. Total length of all the approach roads is approx. 23 Kms and expenditure involved was Rs. 637 Lacs. There is no hindrance to the movement of fisherman boats. Details of the same were submitted along with EC Compliance report for the period Apr'18 to Sep'18.</p>
xv	The project proponent shall bear the cost of the external agency that may be appointed by the Department of Environment, Government of Gujarat for carrying out the supervision and/or the monitoring of the construction activities.	<p>Complied.</p> <p>Construction activities are completed and project is in operation phase.</p> <p>As part of the directions given by MoEF&amp;CC vides order dated 18<sup>th</sup> Sep, 2015, following studies were conducted.</p> <ol style="list-style-type: none"> <li>1. NCSCM (MoEF&amp;CC promoted Government Agency) study on comprehensive and integrated plan for preservation and conservation of mangroves and associated creeks in and around APSEZ in year 2016-17. The cost of said study was 3.15 Cr, which was incurred by APSEZ.</li> </ol>

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Sr. No.	Conditions	Compliance Status as on 31-03-2021
		<p>As a part of mangrove conservation plan, APSEZ has done following activities.</p> <ol style="list-style-type: none"> <li>Monitoring of mangrove distribution in creeks in and around APSEZ and shoreline changes in Bocha island through NCSCM, Chennai. The cost of the said study was INR 23.56 Lacs incurred by APSEZ.</li> <li>A Regional Impact Assessment study through Chola MS, Chennai (NABET accredited consultant) to identify impacts of all the existing as well as proposed project activities in Mundra region inline to ToR issued by GCZMA. The cost of said study was 1.3 Cr, which was incurred by APSEZ.</li> </ol>
xvi	<p>The project proponent shall carry out the post-project monitoring of various environmental parameters in consultation with the Department of Environment, Government of Gujarat and Gujarat Pollution Control Board.</p>	<p>Complied.</p> <p>Monitoring of various environmental parameters for Ambient Air, Noise, Wastewater, ground water, marine water and sediments along with the parameters mentioned in the consent order issued by GPCB is being carried out by NABL and MoEF&amp;CC accredited agency namely M/s. Pollucon Laboratory Pvt. Ltd. Monitoring reports for the period from Oct'20 to Mar'21 are enclosed as <b>Annexure – 2</b>.</p>
xvii	<p>The project proponent shall prepare the detailed traffic control management plan for the port and shall participate in the VTMS to be developed for the Gulf of Kachchh.</p>	<p>Complied.</p> <p>APSEZ is practicing well defined traffic control procedure.</p> <p>A VTMS service for Gulf of Kutch is operated by Directorate General of Lighthouses and Lightships (DGLL), Govt. of India.</p> <p>APSEZ is practicing well defined traffic control procedure. Marine Control of APSEZ provides traffic update to vessels in Mundra Port Limit on VHF Channel-77. Arrival and departure information in Gulf of Kutch is provided to VTMS information cell through an agent or directly by sending an e-mail to <a href="mailto:vtsgok@yahoo.com">vtsgok@yahoo.com</a> and <a href="mailto:vtsgok@yahoo.com">vtsgok@yahoo.com</a>.</p> <p>Mundra port has subscribed and taking VTMS feed from Kandla from link <a href="http://www.vts.gov.in">www.vts.gov.in</a>.</p>

**Status of the conditions stipulated in Environment Clearance under CRZ notification**

Sr. No.	Conditions	Compliance Status as on 31-03-2021
xviii	Action plan shall be prepared by the project proponents to prevent damage to marine life and also to the coastline in case of any oil spillage and the same shall be strictly implemented. Regular mock drills shall be carried out to ensure fitness of the equipment in place.	<p>Complied.</p> <p>Oil spill contingency response plan is being updated on regular basis and the same was last updated on 01.10.2020 is in place and implemented. Updated OSCRP is attached as <b>Annexure – 5</b>.</p> <p>For responding to oil spill, the Indian Coast Guard has developed the National Oil Spill Disaster Contingency Plan NOSDCP which has the approval of the Committee of Secretaries and has been in operation since 1996. Oil Spill Contingency Response Plan (OSCRP) prepared by APSEZ is in accordance with the NOSDCP.</p> <p>Regional Level Pollution Response exercise “<b>SWACHCHH SAMUDRA-NW 2019</b>” was carried out by Indian Coast Guard on 18<sup>th</sup> Dec, 2019. All participants from various Oil Handling Agencies and Stakeholders (ICG, GMB Port, DPT Vadinar, IOCL, RIL, NAYARA Energy, BORL, ESBTL Salaya, APSEZL, HMEL, GSFC, PCB, Forest Dept., Customs, Fisheries &amp; DPT Kandla) were participated in this exercise.</p> <p>Mock drills are conducted regularly by APSEZ. Mock drill was conducted on 08.10.2020 &amp; 24.03.2020 during compliance period. Details of mock drills are attached as <b>Annexure – 6</b>.</p>
xix	The project proponents shall work out the maximum quantity of spilled material, which can find its way into the coastal waters, under different accident scenarios, and their impact on aquatic life shall be studied after clearly demarcating the impact zones. On the basis of such studies, the necessary action plan to mitigate the likely impacts shall be prepared before	<p>Complied.</p> <p>Oil spill contingency plan is in place to handle Tier 1 level oil spills considering different accident scenarios, and the vulnerable areas are identified and mitigation plan is prepared.</p> <p>Based on the oil spill modeling study, it has been observed that crude oil spill of 700 tons (Tier-I) will spread over an area having radius of around 400 m within 4hr. APSEZ already has facilities for combating a Tier-1 spill.</p> <p>Recommendations of Marine EIA by NIO with respect to pollution emergency contingency plan for Multipurpose Terminal, Container, Dry &amp; Break Bulk Terminal as well</p>

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Sr. No.	Conditions	Compliance Status as on 31-03-2021																																								
	commencement of the operations. Action taken report in this regard shall be submitted to the Ministry.	as associated facilities are addressed in Oil Spill Response Plan.  This action plan prepared by APSEZ to combat the oil spill (LOS-DCP) is in accordance with the NOS DCP, International Petroleum Industry Environmental Conservation Association (IPIECA). Please refer Point No. xviii.																																								
B. General Condition																																										
i	Construction of the proposed structures should be undertaken meticulously conforming to the existing Central / local rules and regulations. All the construction designs / drawings relating to the proposed construction activities must have approvals of the concerned State Government Departments / Agencies.	Already complied. Not applicable at present.  All construction activities are carried out confirming to the existing rules and regulation and as per the CRZ notification.  Approval under the preview of GMB, PESO and Factories act were taken prior to start of construction.																																								
ii	The proponent shall ensure that as a result of the proposed constructions ingress of the saline water into the ground water does not take place. Piezometers shall be installed for regular monitoring for this purpose at appropriate locations on the project site.	Complied.  To monitor the ground water quality, bore wells are provided at various location in the port and SEZ areas. Third party analysis of the ground water is being carried out twice a year by NABL and MoEF&CC accredited agency namely M/s. Pollucon Laboratories Pvt. Ltd. Summary of the same for duration from Oct'20 to Mar'21 is mentioned below. Monitoring Reports are attached as <b>Annexure – 2</b> for the same.  <b>Number of Sampling Locations: 5</b> <table><tr><th>Parameter</th><th>Unit</th><th>Minimum</th><th>Maximum</th></tr><tr><td>pH</td><td>-</td><td>7.84</td><td>8.32</td></tr><tr><td>Salinity</td><td>ppt</td><td>1.44</td><td>11.6</td></tr><tr><td>Oil &amp; Grease</td><td>mg/L</td><td>2.6</td><td>2.6</td></tr><tr><td>Hydrocarbon</td><td>mg/L</td><td>ND*</td><td>ND*</td></tr><tr><td>Lead as Pb</td><td>mg/L</td><td>0.037</td><td>0.28</td></tr><tr><td>Arsenic as As</td><td>mg/L</td><td>ND*</td><td>ND*</td></tr><tr><td>Nickel as Ni</td><td>mg/L</td><td>ND*</td><td>ND*</td></tr><tr><td>Total Chromium as Cr</td><td>mg/L</td><td>0.029</td><td>0.033</td></tr><tr><td>Cadmium as Cd</td><td>mg/L</td><td>ND*</td><td>ND*</td></tr></table>	Parameter	Unit	Minimum	Maximum	pH	-	7.84	8.32	Salinity	ppt	1.44	11.6	Oil & Grease	mg/L	2.6	2.6	Hydrocarbon	mg/L	ND*	ND*	Lead as Pb	mg/L	0.037	0.28	Arsenic as As	mg/L	ND*	ND*	Nickel as Ni	mg/L	ND*	ND*	Total Chromium as Cr	mg/L	0.029	0.033	Cadmium as Cd	mg/L	ND*	ND*
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	<b>Adani Ports and Special Economic Zone Limited, Mundra</b>	<b>From : Oct'20 To : Mar'21</b>
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Sr. No.	Conditions	Compliance Status as on 31-03-2021																									
		Mercury as Hg	mg/L	ND*	ND*																						
		Zinc as Zn	mg/L	0.15	0.71																						
		Copper as Cu	mg/L	ND*	ND*																						
		Iron as Fe	mg/L	0.28	4.2																						
		Insecticides/Pesticides	--	Absent	Absent																						
		Depth of Water Level from GL	meter	1.65	2.08																						
*ND = Not Detectable																											
		Approx. INR 19.17 Lakh is spent for all environmental monitoring activities during the FY 2020-21 for overall APSEZ, Mundra.																									
iii	A comprehensive contingency plan in collaboration with the concerned authorities must be formulated to contain in case of any oil spills. Appropriate devices such as oil skimmer, oil monitor, oil water separator must be acquired for strengthening the contingency plan. All the service vessels that required for oil spill operations must be equipped with booms and dispersants. The personal onboard of these vessels must be properly trained in operation of these booms and dispersants.	<p>Complied.</p> <p>Oil spill contingency response plan is being updated on regular basis and the same was last updated on 01.10.2020 is in place and implemented. Updated OSCRP is attached as <b>Annexure – 5</b>.</p> <p>Shoreline Resources available with APSEZ, for deployment during shoreline cleanup/ emergent situation:</p> <table><tr><th>Item</th><th>Quantity</th></tr><tr><td>Oil Spill Dispersants</td><td>5000 ltr.</td></tr><tr><td>Absorbent pads</td><td>2000 Nos.</td></tr><tr><td>Portable dispersant storage tank: 1000 ltr. Capacity</td><td>1 no.</td></tr><tr><td>Portable pumps</td><td>2 nos.</td></tr><tr><td>Oil Containment Boom-Length 2000 metres, Height -1500 mm, Draft-900mm, Free Board-600mm</td><td>2000 m</td></tr><tr><td>Skimmer-KOMARA 15 Duplex Skimmer System with floating IMP 6 Pump.</td><td>4 Nos.</td></tr><tr><td>12.5T Flexible Floating Storage Tank (PUA).</td><td>3 Nos.</td></tr><tr><td>Lamor Minimax 12 m³ skimmer</td><td>2 sets</td></tr><tr><td>Lamor Side Collector system (Recovery Capacity 123 m³/ hr)</td><td>2 Nos.</td></tr><tr><td>Canadyne Fence Boom (Reel model 7296/8496 with Power Pack, Towing bridles and Tow lines - 235 meter</td><td>1 No.</td></tr></table> <p>10 Dolphin tugs are fitted with Oil Spill Dispersant boom and proportionate pump to mix OSD and Sea water as</p>				Item	Quantity	Oil Spill Dispersants	5000 ltr.	Absorbent pads	2000 Nos.	Portable dispersant storage tank: 1000 ltr. Capacity	1 no.	Portable pumps	2 nos.	Oil Containment Boom-Length 2000 metres, Height -1500 mm, Draft-900mm, Free Board-600mm	2000 m	Skimmer-KOMARA 15 Duplex Skimmer System with floating IMP 6 Pump.	4 Nos.	12.5T Flexible Floating Storage Tank (PUA).	3 Nos.	Lamor Minimax 12 m³ skimmer	2 sets	Lamor Side Collector system (Recovery Capacity 123 m³/ hr)	2 Nos.	Canadyne Fence Boom (Reel model 7296/8496 with Power Pack, Towing bridles and Tow lines - 235 meter	1 No.
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	<b>Adani Ports and Special Economic Zone Limited, Mundra</b>	<b>From : Oct'20 To : Mar'21</b>
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Sr. No.	Conditions	Compliance Status as on 31-03-2021															
		<p>required; out of them 9 Dolphin Tugs are fitted with a fire curtain and remote controlled fire monitors.</p> <p>IMO module course organized by Maritime Training Institute is conducted &amp; 36 personnel have achieved IMO level 1 &amp; 4 personnel have achieved IMO Level 2 Different training modules as Oil Spill, Oil Spill Equipment, Notification exercise, Incident are conducted at different frequency.</p> <p>Detail of resource available at APSEZL is provided in annexure 3 of Oil Spill Contingency Response Plan.</p>															
iv	The operation plan for responding to an oil spill must include clear procedures for notification of a spill, response decision, cleanup operations, communications, and termination of cleanup operations, cleanup cost, oil pollution, damage control and disaster management plan.	<p>Complied.</p> <p>Oil spill contingency plan is in place to handle Tier 1 level oil spills considering different accident scenarios, and the vulnerable areas are identified and mitigation plan is prepared. Oil spill contingency response plan is being updated on regular basis and the same was last updated on 01.10.2020 is in place and implemented. Updated OSCRP is attached as <b>Annexure – 5</b>.</p> <p>Oil Spill Contingency Plan includes procedures for notification of a spill as point no 7.1, response strategy as Point no. 3.0, cleanup operations, Cleanup cost and termination of cleanup in point no. 3.5, communications in point no. 6.0.</p>															
v	A well-equipped laboratory with suitable instruments to monitor the quality of air and water shall be set up so as to ensure that the quality of ambient air and water conforms to the prescribed standards. The laboratory will also be equipped with qualified manpower including a marine biologist so that the marine water quality is regularly monitored in order to ensure that the marine life is not adversely	<p>Being complied</p> <p>Site is provided with environment monitoring equipment with sufficient &amp; competent staff of Third Party laboratory accredited by NABL &amp; MoEF&amp;CC.</p> <p>Ambient Air Quality (twice in a week) and Noise (once in a month) monitoring are being carried out by NABL and MoEF&amp;CC accredited agency namely M/s. Pollucon Laboratories Pvt. Ltd. Summary of the same for duration from Oct'20 to Mar'21 is mentioned below.</p> <p><b>Total Ambient Air &amp; Noise Sampling Locations: 4 Nos.</b></p> <table><tr><th>Parameter</th><th>Unit</th><th>Max</th><th>Min</th><th>Perm. Limit<sup>\$</sup></th></tr><tr><td colspan="5"><b>AAQM</b></td></tr><tr><td>PM<sub>10</sub></td><td>µg/m<sup>3</sup></td><td>96.75</td><td>38.42</td><td>100</td></tr></table>	Parameter	Unit	Max	Min	Perm. Limit <sup>\$</sup>	<b>AAQM</b>					PM <sub>10</sub>	µg/m <sup>3</sup>	96.75	38.42	100
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Sr. No.	Conditions	Compliance Status as on 31-03-2021				
		PM <sub>2.5</sub>	µg/m <sup>3</sup>	56.35	18.58	60
		SO <sub>2</sub>	µg/m <sup>3</sup>	25.41	6.56	80
		NO <sub>2</sub>	µg/m <sup>3</sup>	44.53	14.22	80
		Noise	Unit	Leq Max	Leq Min	Leq Perm. Limit*
		Day Time	dB(A)	72.8	42.7	75
		Night Time	dB(A)	69.7	41.2	70
	<p>affected as a result of implementation of the said project. The quality of ambient air and water shall be monitored periodically in all the seasons and the results should be properly maintained for inspection of the concerned pollution Control agencies.</p> <p>The periodic monitoring reports at least once in 6 months must be sent to this Ministry as well as its Regional Office at Bhopal.</p>	<p>§ as per NAAQ standards, 2009 * as per CC&amp;A granted by GPCB Values recorded confirms to the stipulated standards.</p> <p>Sewage generated from port is being treated in designated ETP / STPs and treated sewage is used for horticulture purposes.</p> <p>Please refer Specific Condition No. xii for further details.</p> <p><b>Marine Monitoring:</b> Summary of the marine water monitoring for duration from Oct'20 to Mar'21 is provided above in point No. vii (specific conditions).</p> <p>Adani group has appointed a marine biologist Mr. Shivanagouda Sanagoudra to monitor marine water quality. Also the third party monitoring of the Marine water is being carried out once in a month by NABL and MoEF&amp;CC accredited agency namely M/s. Pollucon Laboratories Pvt. Ltd. who has marine biologist to ensure that the marine water quality do not adversely affects the marine life. Monitoring Reports are attached as <b>Annexure – 2</b> for the same.</p> <p>Approx. INR 19.17 Lakh is spent for all environmental monitoring activities during the FY 2020-21 for overall APSEZ, Mundra.</p> <p>Compliance report of EC conditions is uploaded regularly. Last compliance report including results of monitoring data for the period of Apr'20 to Sep'20 was submitted to Regional Office of MoEF&amp;CC @ Bhopal, Zonal Office of CPCB @ Baroda, GPCB @ Gandhinagar &amp; Gandhidham and Dept. of Forests &amp; Env., Gandhinagar vide our letter dated 25.11.2020. Copy of the same is also available on our web site</p>				

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Sr. No.	Conditions	Compliance Status as on 31-03-2021																					
		<p><a href="https://www.adaniports.com/ports-downloads">https://www.adaniports.com/ports-downloads</a>. A soft copy of the same was also submitted through e-mail on 25.11.2020 to all the concern authorities. Please refer below for the details regarding past six compliance submissions.</p> <table> <tr> <th>Sr. No.</th><th>Compliance period</th><th>Date of submission</th></tr> <tr> <td>1</td><td>Oct'17 to Mar'18</td><td>29.05.2018</td></tr> <tr> <td>2</td><td>Apr'18 to Sep'18</td><td>30.11.2018</td></tr> <tr> <td>3</td><td>Oct'18 to Mar'19</td><td>31.05.2019</td></tr> <tr> <td>4</td><td>Apr'19 to Sep'19</td><td>28.11.2019</td></tr> <tr> <td>5</td><td>Oct'19 to Mar'20</td><td>20.05.2020</td></tr> <tr> <td>6</td><td>Apr'20 to Sep'20</td><td>26.11.2020</td></tr> </table>	Sr. No.	Compliance period	Date of submission	1	Oct'17 to Mar'18	29.05.2018	2	Apr'18 to Sep'18	30.11.2018	3	Oct'18 to Mar'19	31.05.2019	4	Apr'19 to Sep'19	28.11.2019	5	Oct'19 to Mar'20	20.05.2020	6	Apr'20 to Sep'20	26.11.2020
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5	Oct'19 to Mar'20	20.05.2020																					
6	Apr'20 to Sep'20	26.11.2020																					
vi	<p>Adequate provision for infrastructure facilities such as water supply, fuel for cooking, sanitation etc. must be provided for the laborers during the construction period in order to avoid damage to the environment. Colonies for the laborers should not be located in the CRZ area. It should also be ensured that the construction workers do not cut trees including mangroves for fuel wood purpose.</p>	<p>Already complied. Not Applicable at present.</p> <p>Construction Activity is already completed. Adequate infrastructure facilities as mentioned in the condition were provided during construction phase.</p> <p>The facility for drinking water, toilet and rest shelter are provided for the dignity of operation labours.</p> <p>Photographs of the same were provided along with the compliance submission for the duration of Oct'16 to Mar'17.</p>																					

**Status of the conditions stipulated in Environment Clearance under CRZ notification**

Sr. No.	Conditions	Compliance Status as on 31-03-2021																				
vii	To prevent discharge of sewage and other liquid wastes in to the water bodies, adequate system for collection and treatment of the wastes must be provided. No sewage and other liquid wastes without treatment should be allowed to enter into the water bodies. The quality of treated effluents, emissions, solid wastes and noise levels must confirm to the standards laid down by the competent authority including the Central/State Pollution Control Board.	<p>Complied.</p> <p>Adequate pipelines are provided to ensure the collection and treatment of effluent. Raw sewage is collected from 30 different collection pits at APSEZ locations through dedicated browsers and is transferred to ETP for treatment.</p> <p>Sewage generated from port is being treated in designated ETP and treated sewage is used for horticulture purposes. No treated water is discharged into the water bodies. Please refer Specific Condition No. xii for further details.</p> <p>Third party analysis of the treated water, Flue Gas, Ambient Air and Noise is being carried out regularly by NABL and MoEF&amp;CC accredited agency namely M/s. Pollucon Laboratories Pvt. Ltd.</p> <p>Summary of six monthly monitoring of Flue gas emission is provided below.</p> <p><b>Total Nos. of Stacks: 16 Nos.</b></p> <table><tr><th>Parameters</th><th>Unit</th><th>Max</th><th>Min</th><th>Permissible Limit<sup>§</sup></th></tr><tr><td>PM</td><td>mg/Nm<sup>3</sup></td><td>37.62</td><td>17.53</td><td>150</td></tr><tr><td>SO<sub>2</sub></td><td>ppm</td><td>7.76</td><td>3.59</td><td>100</td></tr><tr><td>NOx</td><td>ppm</td><td>38.62</td><td>25.37</td><td>50</td></tr></table> <p><sup>§</sup> as per CC&amp;A granted by GPCB</p> <p>Six monthly reports of flue gas emissions for duration from Oct'20 to Mar'21 are attached as <b>Annexure – 2</b>.</p> <p>Summary of Ambient Air and Noise for duration from Oct'20 to Mar'21 is provided in general condition No. v above.</p> <p><b>Waste Management</b> – APSEZ has adopted 5R concept for environmentally sound management of different types of solid &amp; liquid wastes. Please refer below details about management of each type of waste.</p> <p><b>Solid Waste:</b> A well-established system for segregation of dry &amp; wet waste is in place. All wet waste (Organic</p>	Parameters	Unit	Max	Min	Permissible Limit <sup>§</sup>	PM	mg/Nm <sup>3</sup>	37.62	17.53	150	SO <sub>2</sub>	ppm	7.76	3.59	100	NOx	ppm	38.62	25.37	50
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	<b>Adani Ports and Special Economic Zone Limited, Mundra</b>	<b>From : Oct'20 To : Mar'21</b>
<b>Status of the conditions stipulated in Environment Clearance under CRZ notification</b>		

Sr. No.	Conditions	Compliance Status as on 31-03-2021
		<p>waste) is being segregated &amp; utilized for compost manufacturing and/or biogas generation for cooking purpose. The compost is further used by in house horticulture team for greenbelt development. Whereas dry recyclable waste is being sorted in various categories. Presently manual sorting is being done for sorting of different types of solid waste. Segregated recyclable materials such as Paper, Plastic, Cardboard, PET Bottles, and Glasses, etc. are then sent to respective recycling units, whereas remaining non-recyclable waste is bailed and sent to cement plant (M/s. Ambuja Cement Ltd., Kodinar) for Co-processing as RDF (Refused Derived Fuel).</p> <p><b><u>Hazardous &amp; Other Waste:</u></b></p> <ul style="list-style-type: none"> <li>• Bio medical waste generated from OHCs and Adani Hospital is being disposed at Common Bio Medical Waste Treatment Facility namely M/s. Distromed Kutch Services Pvt. Ltd., Bhuj.</li> <li>• E – Waste &amp; Used Batteries are being sold to GPCB registered recyclers namely M/s. e-Processing House and Sabnam Enterprise respectively.</li> <li>• Solid Hazardous Waste is being disposed through co-processing / incineration through common facility i.e. M/s. Saurashtra Enviro Projects Pvt. Ltd., Bhachau and/or cement industries of Ambuja Cement Ltd., Kodinar. Used/Waste Oil is being sold to GPCB authorized recyclers / re-processors namely M/s. Aroma Petrochem, Bhavnagar &amp; Aviation Corporation, Kutch. It is also being reused within organization for lubrication purpose.</li> <li>• Discarded drums / barrels are being sold to authorized decontamination facility i.e. M/s. Aroma Petrochem, Bhavnagar and Jawrawala Petroleum, Ahmedabad. It is also being reused within organization for filling hazardous waste.</li> <li>• Solid hazardous waste i.e. Tank bottom sludge is being sold to authorized recycler namely M/s. Mundra Oil Pvt. Ltd., Mundra for recycling.</li> <li>• Downgrade chemicals generated from cleaning of storage tanks / pipelines are being sold to authorized solvent recovery facilities namely M/s. Acquire Chemicals, Ankleshwar however during the</li> </ul>

**Status of the conditions stipulated in Environment Clearance under CRZ notification**

Sr. No.	Conditions	Compliance Status as on 31-03-2021																																																			
		<p>compliance period, there was no disposal of downgrade chemicals.</p> <ul style="list-style-type: none"> <li>Slop Oil received from vessels is treated to separate water and oil particles in Oil Water Separator system. Separated oil from the same is being sold to authorized recycler / reprocessor namely M/s. Aroma Petrochem, Bhavnagar &amp; Aviation Corporation, Kutch and water is sent to ETP for further treatment. However during the compliance period, there was no received or disposal of Slope Oil.</li> </ul> <p>Details of permissions / agreements of hazardous waste authorized vendors were submitted along with half yearly EC Compliance Report for the period Apr'18 to Sep'18. Renewed / Updated details (authorization / agreement) of hazardous / Non-hazardous handling approved agencies are attached as <b>Annexure – 7</b>.</p> <p>The following table summarizes the waste management practice (from Oct'20 to Mar'21) for different types of wastes at APSEZ:</p> <table> <tr> <th>Type of Waste</th><th>Quantity in MT</th><th>Disposal method</th></tr> <tr> <td colspan="3"><b>Hazardous Waste</b></td></tr> <tr> <td>Pig Waste</td><td>5.87</td><td rowspan="3">Co-processing at cement industries</td></tr> <tr> <td>Oily Cotton waste</td><td>54.02</td></tr> <tr> <td>ETP Sludge</td><td>8.48</td></tr> <tr> <td>Tank Bottom Sludge</td><td>34.62</td><td>Sell to registered recycler</td></tr> <tr> <td rowspan="2">Used / Spent Oil</td><td>270.35</td><td>Sell to registered recycler</td></tr> <tr> <td>0.7</td><td>Reuse within premises</td></tr> <tr> <td rowspan="2">Discarded Containers</td><td>19.49</td><td>Sell to registered recycler</td></tr> <tr> <td>1.9</td><td>Reuse within premises</td></tr> <tr> <td>Expired Paints</td><td>13.34</td><td>Incineration at CHWIF Site</td></tr> <tr> <td colspan="3"><b>Other Waste</b></td></tr> <tr> <td>Battery Waste</td><td>12</td><td>Sell to registered recycler</td></tr> <tr> <td>Bio Medical Waste</td><td>2.45</td><td>To approved CBWTF Site</td></tr> <tr> <td colspan="3"><b>Non-Hazardous Waste</b></td></tr> <tr> <td rowspan="2">Recyclables Dry Waste</td><td>1797.52</td><td rowspan="2">After recovery sent for recycling / Reuse within premises</td></tr> <tr> <td>4 Nos. (Scrap Vehicle)</td></tr> <tr> <td>Non-Recyclable Dry Waste (RDF)</td><td>204.47</td><td>Co-processing at Cement Industries</td></tr> <tr> <td>Wet Waste (Food waste + Organic)</td><td>448.97</td><td>Converted to Manure for Horticulture use / Biogas</td></tr> </table>	Type of Waste	Quantity in MT	Disposal method	<b>Hazardous Waste</b>			Pig Waste	5.87	Co-processing at cement industries	Oily Cotton waste	54.02	ETP Sludge	8.48	Tank Bottom Sludge	34.62	Sell to registered recycler	Used / Spent Oil	270.35	Sell to registered recycler	0.7	Reuse within premises	Discarded Containers	19.49	Sell to registered recycler	1.9	Reuse within premises	Expired Paints	13.34	Incineration at CHWIF Site	<b>Other Waste</b>			Battery Waste	12	Sell to registered recycler	Bio Medical Waste	2.45	To approved CBWTF Site	<b>Non-Hazardous Waste</b>			Recyclables Dry Waste	1797.52	After recovery sent for recycling / Reuse within premises	4 Nos. (Scrap Vehicle)	Non-Recyclable Dry Waste (RDF)	204.47	Co-processing at Cement Industries	Wet Waste (Food waste + Organic)	448.97	Converted to Manure for Horticulture use / Biogas
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	<b>Adani Ports and Special Economic Zone Limited, Mundra</b>	<b>From : Oct'20 To : Mar'21</b>
<b>Status of the conditions stipulated in Environment Clearance under CRZ notification</b>		

Sr. No.	Conditions	Compliance Status as on 31-03-2021		
		waste)		for cooking purpose
		STP Sludge	15	Used as a Manure for horticulture purpose
viii	Appropriate facility should be created for the collection of solid and liquid wastes generated by the barges/vessels and their safe treatment and disposal should be ensured to avoid possible contamination of the water bodies.	<p>Complied.</p> <ul style="list-style-type: none"> <li>Ships berthing at Mundra Port comply with MARPOL / DG Shipping regulations.</li> <li>The port is registered with DG Shipping PAN India portal "Swatch Sagar" for providing reception facility. All vessels wish to deliver waste at Mundra Port, raises request in Swatch Sagar Portal. The Port arranges waste collection from vessels and uploads Waste Delivery Receipt in Swatch Sagar Portal against vessel's request. The waste disposal is being done as per regulation. The PRF is also annually audited by DG Shipping.</li> <li>The reception facility for all category of waste except Annex VI as per IMO and DG Shipping requirements is available in the port.</li> <li>From all the waste, waste categorized in Annex – V category is being collected and disposed by port itself i.e. APSEZL Mundra. Port collects Solid waste (i.e. Garbage) categorized in Annex – V from vessels and collected waste is being sent to Material Recovery Facility for segregation &amp; than segregated waste is being disposed in line with 5R principles.</li> <li>Waste categorized in Annex – 1 (Sludge Oil) category is directly collected and disposed by GPCB authorized recyclers.</li> <li>No discharge such as bilge wastes, sewage or any other liquid wastewater is allowed into marine environment inside port limits.</li> <li>As a general practice APSEZ has been authorized under Hazardous Waste Rules – 2016 to provide facility for receiving waste / slop oil from vessels through hose connection with oil tankers. These tankers divert waste / slop oil to Oil water separator system where water and oil particles are separated. Separated oil is being sold to authorized recycler /re-processor. However, no waste / slope oil was received during the compliance period.</li> </ul>		
ix	Necessary navigational aids such as channel	<p>Complied.</p> <p>Navigational aids such as buoys and leading lights have</p>		

	<b>Adani Ports and Special Economic Zone Limited, Mundra</b>	<b>From : Oct'20 To : Mar'21</b>
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Sr. No.	Conditions	Compliance Status as on 31-03-2021
	<p>markers should be provided to prevent accidents. Internationally recognized safety standards shall be applied in case of barge /vessel movements.</p>	<p>been provided. The rules and regulation of the port contributes to the safe, efficient and environmentally responsible handling of shipping traffic. The international rules of IMO, such as SOLAS convention and its amendments and national regulations are in force at APSEZ, Mundra.</p> <p><b>APPLICABLE REGULATION</b></p> <ul style="list-style-type: none"> <li>➤ Port Security Law (ISPS)</li> <li>➤ Indian Port Act</li> <li>➤ Gujrat Maritime Board Act 1981</li> <li>➤ Navigational Safety Port Committee (NSPC)</li> <li>➤ All relevant international rules and regulations on MARPOL, Load lines etc.</li> </ul>
x	<p>During operation phase proper precautions should be taken to avoid any oil spills and no oily wastes shall be discharged into the water bodies.</p>	<p>Complied.</p> <p>Proper precautions are taken to avoid any oil spills during operation such as pressure checks of oil transfer lines and manual watch during oil cargo transfer.</p> <p>Available mechanisms to avoid oil spills are identified as below</p> <p><u>At liquid terminal:</u></p> <ul style="list-style-type: none"> <li>• Immediate shut off valve from vessel and shore.</li> <li>• Periodical testing of lines</li> <li>• Immediate suction of material by pump.</li> <li>• Emergency operation shut down.</li> </ul> <p><u>At Marine Operations:</u></p> <ul style="list-style-type: none"> <li>• Scupper plug, dip tray, absorbent pad, saw dust is provided to address confined spillage/leakage.</li> </ul> <p><u>At Container Terminals:</u></p> <ul style="list-style-type: none"> <li>• Leak cart is available for collect spilled chemical.</li> <li>• Spill control materials in place.</li> <li>• Oil drums are stored in covered shed where pellets are used. Tray provided to collection of spillage/leakage if occurred.</li> </ul> <p>No oily waste is discharged to water bodies. Oily waste or oil contaminated waste is being disposed as mentioned in General Condition no. vii above.</p>

	<b>Adani Ports and Special Economic Zone Limited, Mundra</b>	<b>From : Oct'20 To : Mar'21</b>
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Sr. No.	Conditions	Compliance Status as on 31-03-2021						
xi	The project authorities should take appropriate community development and welfare measures for the villagers in the vicinity of the project site, including drinking water facilities. A separate fund should be allocated for this purpose.	<p>Complied.</p> <p>APSEZ is actively working with local community around the project area and provides required support for their livelihood and other concerns through the CSR arm – Adani Foundation. Adani Foundation is working in main four persuasions as below.</p> <ul style="list-style-type: none"><li>➤ Education</li><li>➤ Community Health</li><li>➤ Rural Infrastructure</li><li>➤ Sustainability Livelihood</li></ul> <p>Brief information about activities in the main four persuasions is mentioned below. Other than this, Adani Foundation has also worked for fight against COVID – 19 pandemic situation during this compliance period Activities carried out for the same are summarized as below.</p> <table><tr><th>Area</th><th>Activity</th></tr><tr><td>Fight Against COVID-19</td><td><ul style="list-style-type: none"><li>• <b>24 villages</b> of Mundra block Sanitized.</li><li>• <b>5500</b> - Ration kit support to needy people (Specially Fisherman, daily wedge workers, widows and senior citizen).</li><li>• <b>1900</b> - Daily Food Facility (Breakfast, Lunch, Diner) for 1900 Labour per day</li><li>• <b>105000</b> - Mask prepared by women SHG for Government officers / staff of SDM, ICDS, TDO, Custom, THO, Police Dept. etc.</li><li>• <b>158</b> - Taken care of Senior citizens at old age home.</li><li>• <b>35000</b> - 'AwazDe' a voice message campaign in local Kutchi language.</li><li>• Total <b>3368</b> Covid patients got treatment from overall Ktuch with satisfaction in General hospital, Bhuj.</li><li>• Awareness drives by SuPoshan Sanginies.</li><li>• Mobile health care unit provides Primary treatment at door stap.</li><li>• We have started Ayurvedic Kwadh Distribution at Various Public spot, Our Port Entry &amp; Exit gate and APL, AKBTP, Tuna with spreading awareness to mitigate rapid transition to combat against Covid - 19. More than 6500 people had benefitted with Ukadoand Vitamin –C tablet from Mundra, Baroi, Shantivan &amp; Samudra Township.</li></ul></td></tr><tr><td>Community Health</td><td><p><b>Community Health – Mundra</b></p><p>Community Health All Project Patient Details</p></td></tr></table>	Area	Activity	Fight Against COVID-19	<ul style="list-style-type: none"><li>• <b>24 villages</b> of Mundra block Sanitized.</li><li>• <b>5500</b> - Ration kit support to needy people (Specially Fisherman, daily wedge workers, widows and senior citizen).</li><li>• <b>1900</b> - Daily Food Facility (Breakfast, Lunch, Diner) for 1900 Labour per day</li><li>• <b>105000</b> - Mask prepared by women SHG for Government officers / staff of SDM, ICDS, TDO, Custom, THO, Police Dept. etc.</li><li>• <b>158</b> - Taken care of Senior citizens at old age home.</li><li>• <b>35000</b> - 'AwazDe' a voice message campaign in local Kutchi language.</li><li>• Total <b>3368</b> Covid patients got treatment from overall Ktuch with satisfaction in General hospital, Bhuj.</li><li>• Awareness drives by SuPoshan Sanginies.</li><li>• Mobile health care unit provides Primary treatment at door stap.</li><li>• We have started Ayurvedic Kwadh Distribution at Various Public spot, Our Port Entry &amp; Exit gate and APL, AKBTP, Tuna with spreading awareness to mitigate rapid transition to combat against Covid - 19. More than 6500 people had benefitted with Ukadoand Vitamin –C tablet from Mundra, Baroi, Shantivan &amp; Samudra Township.</li></ul>	Community Health	<p><b>Community Health – Mundra</b></p> <p>Community Health All Project Patient Details</p>
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**Status of the conditions stipulated in Environment Clearance under CRZ notification**

Sr. No.	Conditions	Compliance Status as on 31-03-2021			
		Project	Direct Beneficiary	In-Direct Beneficiary	No. of Villages
		Medical Mobile van	16611	66476	33
		Rural Clinic	15797	63192	11
		Medical Supports	1008	5040	63
		Dialysis Supports	474	2370	63
		Senior citizen	5836	17508	63
		Health camp	19461	58383	11
		<b>TOTAL</b>	<b>59187</b>	<b>212979</b>	
		<ul style="list-style-type: none"> <li>The mobile health care unit cover <b>25 villages and 07 fishermen settlements</b>. Around 90 types of general life saving medicines are available in these units.</li> <li>Rural Dispensaries are established where there is a gap in the healthcare services. The Adani Foundation operates Rural Dispensaries in 7 villages of <b>Mundra block, 03 villages of Anjar block and 1 clinics in Mandvi Block</b>. Mobile dispensary and rural clinics provide health services with token charge of <b>10/- rupees per patient</b> daily by a doctor and a volunteer.</li> <li>During the year 2020-21, total <b>5836</b> transactions were done by <b>8711 card holders of 68 villages</b> of Mundra Taluka. They received cash less medical services under Health Card to Senior Citizen project.</li> <li>In the year of 2020-21 total <b>97 people</b> had been benefitted by various kind of speciality camp and needy and screened patients are treated in Adani Hospital.</li> <li>Total <b>20959 patients</b> benefitted in year 2020-21 from 55 different villages in Adani Hospital, Mundra.</li> <li>The TDO, THO, Flywing Foundation, Ayurved Dept. has support in UKADO and Vitamin-C tablets distribution activities. Total <b>18240 people</b> had get benefits of UKADO and Vitamin-C tablets.</li> </ul> <p><b>Community Health – Bhuj</b></p> <ul style="list-style-type: none"> <li>Adani Foundation Team has initiated coordination with GKGH hospital since 2014 and established a reception area for the smooth patient coordination and preparation for the social networking program.</li> <li>GKGH Hospital is COVID Care Hospital since 22<sup>nd</sup> March 2020. Adani Foundation staff members supported in patient counselling, coordinating and supporting for dead body COVID care van.</li> <li>Total <b>3368</b> Covid patients got treatment from overall Kutch with satisfaction in General hospital, Bhuj.</li> <li>Total <b>809</b> dead bodies privileged till now to different locations in Kutch including Covid Patients through Dead body medical van.</li> <li>Mahiti Setu is linkages between various Government Schemes and beneficiaries. Through Mahiti Setu sourcing of <b>2378 beneficiaries</b> and linkages with more than <b>780 cards</b> of MAA Yojna and Ayushman</li> </ul>			

**Status of the conditions stipulated in Environment Clearance under CRZ notification**

Sr. No.	Conditions	Compliance Status as on 31-03-2021	
			Yojna.
		Sustainable Livelihood – Fisher folk & Agriculture	<ul style="list-style-type: none"> <li>• Average <b>75</b> KL of water was supplied to <b>676</b> households at <b>5 fisherman vasahat</b> on a daily basis under Machhimar Shudhh Jal Yojana and other <b>4 fisherman vasahat</b> has linkaged with Narmada water through GWIL and Mundra Gram Panachayat from which <b>355 households</b> get benefited.</li> <li>• Beneficiaries of fisherman communities till date               <ol style="list-style-type: none"> <li>a) 444 Book Support</li> <li>b) 733 Vehicle transportation from Bandar to AVMB</li> <li>c) 86 Cycle Support</li> <li>d) 481 Scholarship Support</li> <li>e) 280 15 Potable water provision</li> <li>f) 370 Youth Employment</li> <li>g) 2561 Fishing Net &amp; Equipment Support</li> <li>h) 195 Linkages with Fisheries Scheme</li> <li>i) 3504 Ramaotsav Community Engagement</li> <li>j) 17 Fisherman Sea Weed Culture.</li> <li>k) 46878 Man-days Mangroves Plantation</li> </ol> </li> <li>• Girl child is supported with 100% scholarship to girls &amp; 80 % support to Male Students. Total <b>59 students</b> were facilitated with scholarship current year.</li> <li>• <b>4830 Man-days</b> work was provided over <b>236 Fishermen family</b> during current year.</li> <li>• Avail easy and safe transportation service for the Fisher folk child of Various Vasahat to make them Regular and Synchronized with School atmosphere. Total <b>37 students</b> from 6 to 10 standard are benefitted.</li> <li>• <b>07 Fishermen</b> are supported for Net and Equipment <b>10 Fishermen</b> Linkage with Fisheries Department Scheme and Fishermen credit card for bankable loan.</li> <li>• Total <b>70</b> Fishermen youth are selected and working in various company current year.</li> <li>• Under Gram Utthan Project, Adani Foundation is supporting home biogas to farmers to Uthhan Villages phase wise. Current year supported <b>117 home biogas</b> in Dhrub, Zarpara and Navinal Villages. Till date 117 farmers are utilizing it with satisfaction and considerable outcome by saving avg. <b>Rs. 23,400</b> for gas and fertilizer as well.</li> <li>• Dragon fruit is a tropical fruit that has become increasingly popular in recent years. Five Dragon fruit farm have been developed with pole and Wire fencing support for <b>2 acre land and 1000 dragon fruit plants</b> each. Adani Foundation had given 40% contribution in this Project. Fruiting will start from June 2021.</li> <li>• <b>850 tissue culture plants</b> have been distributed to 34 farmers. 25plants/Farmers. Tissue plant cost is INR3000/per plant with 50%famer Contribution.</li> <li>• In <b>20 villages</b> of Mundra and Anjar Block. <b>6.70 lacs kg Dry Fodder and 11.60 lacs kg Green fodder</b> has been supported.</li> </ul>
		Education	<ul style="list-style-type: none"> <li>• In COVID19 Pandemic, when the schools were completely closed, education went on mobile</li> </ul>

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			<p>platform and students are still dependent on mobile internet for their education.</p> <ul style="list-style-type: none"> <li>• Total <b>2098 students</b> educated through virtual platform during year 2020-21.</li> <li>• During pandemic various capacity building program and competition organized virtually.</li> </ul> <p><b><u>Impact of the Utthan Program:</u></b></p> <ul style="list-style-type: none"> <li>• Beneficiary of Online classes - 17 Utthan Sahayaks, 17 Gov. Primary Schools, 2098 total students</li> <li>• Weekly Content of IT and Physical Education - 106 Gov. Pri. School &amp; 35000+ students</li> <li>• Virtual Mothers meet - 500+ Mothers attended meeting on Google meet</li> <li>• Capacity Building Program - 70+ Webinar attended by Utthan Sahayak, 10 Seminar/ Workshop</li> <li>• Competition/Celebration - 248 Students took part virtually</li> </ul> <p>Adani Vidya Mandir Bhadreswar Gujrat Board Standard 10<sup>th</sup> Examination Result is 82.60% (19 students have passed the examination out of 23). Adani Foundation will take all responsibility of further study of students with respect to their interest.</p>
		Rural Infrastructure & Environmental Sustainability	<p>Adani foundation designed and build various structure and provide service in the Health, Education, agriculture and sustainable livelihood area.</p> <p><b><u>WORK COMPLETED</u></b></p> <ul style="list-style-type: none"> <li>• Approach Road Restoration at all Fisher folk vasahat.</li> <li>• Garden Development at Primary School Rampar village</li> <li>• Shed Development at Shukhpurvah Mundra</li> <li>• Bund strengthening work at Zarpara</li> </ul> <p><b><u>Bio Diversity Park – Mundra</u></b></p> <ul style="list-style-type: none"> <li>• Adani Foundation, Mundra-Kutchh proposed a biodiversity park at 5 acres Nandi Sarovar area and approached to Sahjeevan, Bhuj for technical support for same.</li> <li>• Sahjeevan team visited this proposed site for development of greenbelt to support biodiversity and enhancement of overall ecological food web existing in and around the landscape in first phase.</li> </ul> <p><b><u>Coastal Bio Diversity Park – Luni</u></b></p> <ul style="list-style-type: none"> <li>• Adani Foundation at Mundra-Kachchh has initiated multi-species plantation of mangroves in Kachchh in association with GUIDE. During 2018-2019 (Phase-I) multi-species mangrove plantation was carried out in 10 ha, during Phase-II (2019-2020) it was 02 ha and during Phase III (2020-2021) it is 01 ha.</li> <li>• Sea Weed Culture - A pilot cultivation facility (5 KL tanks in 6 nos) for the farming of different economically important seaweeds in the tanks on the onshore has been established and commenced the cultivation trials with red sea weeds</li> </ul>

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Sr. No.	Conditions	Compliance Status as on 31-03-2021	
		<div></div> <div>Skill Development</div>	<p>Kappaphycus alvarezii, Gracilaria dura and green sea weed Ulva. The initial trials have given very promising results and harvested 6-7 times the seeded material in a 40-45 days cultivation period.</p> <ul style="list-style-type: none"> <li>Over the last few years, Adani Skill Development Center has assessed various aspects of the technical, leadership and soft skills gaps that organizations, in general, face and accordingly focuses on imparting required training in those areas in partnership with various colleges and institutes.</li> <li>ASDC imparted various soft skilled and technical training to make Atma Nirbhar India. Total <b>47</b> youth have been placed in various company and <b>37</b> youth are been self-employed.</li> <li>During this year Total <b>606</b> people trained in various trainings to enhance socio economic development.</li> <li>During COVID-19 pandemic, we have started virtually training on various trades like General Duty Assistant, Digital Literacy, GST with Tally, Basic Functional English etc. On Saksham Day we started E-learning training of Digital Literacy &amp; Basic Functional English on free bases.</li> <li>Till date we admitted <b>221 candidates in domain courses and 263 candidates in non-domain courses</b>. Now we started offline training with following all Covid-19 related guidelines.</li> <li>Arranged interview of DDU-GKY GDA students at Sterling Hospital –Gandhidham, GAIMS (Sodexo), Chanakya College, Accord Hospital, Fire Academy. 39 students get placement in GAIMS (sodexo), Alilance Hospital, Shreeji Hospital, Bhuj Fire Academy, Divine Hospital etc.</li> <li>Online mud work training has been organized by ASDC Mundra, after training <b>28 students</b> became self-employed.</li> <li>Soft Skill Training: 330 Nos.</li> <li>Technical Training: 276 Nos.</li> </ul>
xii	The quarrying material required for the construction purpose shall be obtained only from the approved quarries / borrow areas. Adequate safeguard measures shall be taken to	<p>Please refer <b>Annexure – 1</b> for full details of CSR activities carried out by Adani Foundation in the Mundra region. Budget for CSR Activity for the FY 2020-21 is to the tune of INR 1429.33 lakh. Out of which, Approx. INR 1117.45 lakh are spent during the year FY 2020-21.</p> <p>Not applicable at present.</p> <p>Construction activities are completed. No such activity is carried out during the compliance period of Oct'20 to Mar'21.</p>	

	<b>Adani Ports and Special Economic Zone Limited, Mundra</b>	<b>From : Oct'20 To : Mar'21</b>
<b>Status of the conditions stipulated in Environment Clearance under CRZ notification</b>		

Sr. No.	Conditions	Compliance Status as on 31-03-2021
	ensure that the overburden and rocks at the quarry site does not find their way into water bodies.	
xiii	The dredging operations, if any, to be undertaken with the prior approval of this Ministry, shall be executed with appropriate safeguard measures to prevent turbidity conditions in consultation with the expert agencies such as CWPRS / NIO.	<p>Complied</p> <p>Capital dredging is completed and only maintenance dredging is being carried out, if required.</p>
xiv	For employing unskilled, semi-skilled and skilled workers for the project, preference shall be given to local people.	<p>Complied</p> <p>Adani Foundation – CSR Arm of Adani Group is doing following activities as a part of Skill Development in surrounding communities in Kutch area.</p> <ul style="list-style-type: none"> <li>• Adani Skill Development Center (ASDC), Mundra &amp; Bhuj is providing skill development training to the locals for Soft Skill, Technical Training and Career Guidance &amp; knowledge based training.</li> <li>• Adani Skill Development Centre (ASDC) is playing a pivotal role in implementing sustainable development in the state. ASDC is envisioned to be playing a major role in elevating the socio-economic status of the people belonging to the lowest strata of the society by empowering them with various skill development training for employability and livelihood.</li> <li>• Over the last few years, ASDC has assessed various aspects of the technical, leadership and soft skills gaps that organizations, in general, face and accordingly focuses on imparting required training in those areas in partnership with various colleges and institutes.</li> <li>• ASDC imparted various soft skilled and technical training to make Atma Nirbhar India. Total 47 youth have been placed in various company and 37 youth are been self-employed.</li> <li>• During this year Total 606 people trained in various trainings to enhance socio economic development.</li> <li>• During COVID-19 pandemic, we have started virtually</li> </ul>

	<b>Adani Ports and Special Economic Zone Limited, Mundra</b>	<b>From : Oct'20 To : Mar'21</b>
<b>Status of the conditions stipulated in Environment Clearance under CRZ notification</b>		

Sr. No.	Conditions	Compliance Status as on 31-03-2021
		<p>training on various trades like General Duty Assistant, Digital Literacy, GST with Tally, Basic Functional English etc. On Saksham Day we started E-learning training of Digital Literacy &amp; Basic Functional English on free bases.</p> <ul style="list-style-type: none"> <li>• Till date we admitted 221 candidates in domain courses and 263 candidates in non-domain courses. Now we started offline training with following all Covid-19 related guidelines.</li> <li>• Arranged interview of DDU-GKY GDA students at Sterling Hospital –Gandhidham, GAIMS (Sodexo), Chanakya College, Accord Hospital, Fire Academy. 39 students get placement in GAIMS (sodexo), Alilance Hospital, Shreeji Hospital, Bhuj Fire Academy, Divine Hospital etc.</li> <li>• Online mud work training has been organized by ASDC Mundra, after training 28 students became self-employed.</li> <li>• Preference is given to local people for employment based on their qualification and experience.</li> <li>• All Mangrove plantations are done in consultation with GUIDE and Local forest dept.</li> <li>• 24 hectare of mangrove afforestation at Mundra was done through active participation of local fishermen at the cost of INR 25.0 Lac.</li> <li>• 4830 Man-days work was provided over 236 Fishermen family during this year. The Foundation has also supported Pagadiya fishermen as painting laborers by providing them with employment and job in various field.</li> </ul> <p>Details on skill development training imparted during financial year of 2020-21 by Adani Foundation are enclosed as <b>Annexure – 1</b>.</p>
xv	To meet any emergency situation, appropriate firefighting system and water pipelines should be installed. Appropriate arrangements for uninterrupted power supply to the environment protection equipment and	<p>Complied.</p> <p>Tug (Dolphin-11) has firefighting system of 1200 m<sup>3</sup>/hr. along with 20 ton lifting “A” frame and diving support facility for support at offshore.</p> <p>With respect to onshore facilities valve station, pumping station and transportation pipeline, foam base fire tender, fire water network is available. Fire-fighting</p>

**Status of the conditions stipulated in Environment Clearance under CRZ notification**

Sr. No.	Conditions	Compliance Status as on 31-03-2021																		
	continuous water supply for the firefighting system should be made.	system has been installed and maintained to meet emergency situations. Additionally for emergency, DG Set is provided for fire water pumps to ensure continuous water supply for firefighting purpose. Detail information on firefighting facility available at APSEZ was submitted as a part of compliance report for the duration of Apr'17 to Sep'17.																		
xvi	Regular drills should be conducted to check the effectiveness of the on-site Disaster Management Plan.	<p>Complied.</p> <p>Regular drills are being conducted for effectiveness of the system. There were five drills conducted for various scenarios during compliance period (Oct'20 to Mar'21) as mentioned below.</p> <table border="1"> <thead> <tr> <th>Location</th><th>Date</th><th>Scenario</th></tr> </thead> <tbody> <tr> <td>QC-05, AICTPL</td><td>13.10.2020</td><td>Assuming that QC Operator was unconscious in QC-05 while operation.</td></tr> <tr> <td>Liquid Terminal – Office Building</td><td>24.10.2020</td><td>Fire in Liquid Building Battery Room</td></tr> <tr> <td>Terminal -03, B - 10 (Liebherr crane no .08)</td><td>20.11.2020</td><td>Technician (dummy) got electric shock and unconscious while maintenance of electrical PLC Room in Liebherr crane no .08</td></tr> <tr> <td>Steel Yard (Goliath no - 1, Track 1A Line)</td><td>12.02.2021</td><td>By road Trailer hit with Person and got Injured</td></tr> <tr> <td>South Base New Railway Building</td><td>19.02.2021</td><td>Smoke observed from electrical Panel at 1st floor of Railway Building</td></tr> </tbody> </table> <p>Mock drill report (latest report) conducted during the compliance period is enclosed as <b>Annexure – 8</b>.</p>	Location	Date	Scenario	QC-05, AICTPL	13.10.2020	Assuming that QC Operator was unconscious in QC-05 while operation.	Liquid Terminal – Office Building	24.10.2020	Fire in Liquid Building Battery Room	Terminal -03, B - 10 (Liebherr crane no .08)	20.11.2020	Technician (dummy) got electric shock and unconscious while maintenance of electrical PLC Room in Liebherr crane no .08	Steel Yard (Goliath no - 1, Track 1A Line)	12.02.2021	By road Trailer hit with Person and got Injured	South Base New Railway Building	19.02.2021	Smoke observed from electrical Panel at 1st floor of Railway Building
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	<b>Adani Ports and Special Economic Zone Limited, Mundra</b>	<b>From : Oct'20 To : Mar'21</b>
<b>Status of the conditions stipulated in Environment Clearance under CRZ notification</b>		

Sr. No.	Conditions	Compliance Status as on 31-03-2021	
xvii	The recommendations made in the Environmental Plan and Disaster Management Plan, as contained in the EIA and Risk Analysis Reports of the project, shall be effectively implemented.	<p>Complied All the recommendations are being implemented.</p> <p><b>Few Marine EIA recommendations:</b></p>	
		<p>Operational protocols and safety procedure should be printed and freely available to concerned staff. The employees must be adequately trained to inculcate a high level of competence not only in day to day operations but also during emergency situations. Periodic refresher courses must also be organized to maintain the level of their competence.</p>	<p>The company has written the operational protocols and safety procedures as a part of ISO 14001:2015, ISO 45001:2018 and ISO 9001:2015 certifications. APSEZ has established training department to impart training to its employees.</p> <p>IMO module course organized by Maritime Training Institute is conducted &amp; 36 personnel have achieved IMO level 1 &amp; 4 personnel have achieved IMO Level 2. Different training modules as Oil Spill, Oil Spill Equipment, Notification exercise, Incident are conducted at different frequency.</p>
		<p>Periodic monitoring should be undertaken at the designated sites after the terminals become operational and the results of each monitoring should be carefully evaluated to identify changes if any and to take corrective measures, if warranted.</p>	<p>Monitoring of various environmental parameters for Ambient Air, Noise, Wastewater, ground water, marine water and sediments is being carried out by NABL and MoEF&amp;CC accredited agency namely M/s. Pollucon Laboratories Pvt. Ltd. Monitoring reports for the period from Oct'20 to Mar'21 are enclosed as <b>Annexure – 2</b>.</p>
		<p>Adequate vigilance is required to adherence of ships to Marpol protocol and related regulations.</p>	<p>During the vessel declaration compliances with respect to Air Pollution and Oil are monitored by the Port Authority. The ships are certified with international certification bodies only after complying with the Marpol protocol.</p>
		<p>Manual Listing Procedure for conducting ship movement operations in the port area must be available to the concerned staff.</p>	<p>Berthing Policy &amp; Tariff Structure is made available for conducting ship movement to the concerned staff and made available on web link <a href="http://www.adaniports.com/pdfs/PIB_06122013.pdf">www.adaniports.com/pdfs/PIB_06122013.pdf</a> Port Information Booklet is also made available on web link <a href="http://www.adaniports.com/Port_Operations_Port_Tariffs.aspx">www.adaniports.com/Port_Operations_Port_Tariffs.aspx</a></p>

	<b>Adani Ports and Special Economic Zone Limited, Mundra</b>	<b>From : Oct'20 To : Mar'21</b>
<b>Status of the conditions stipulated in Environment Clearance under CRZ notification</b>		

Sr. No.	Conditions	Compliance Status as on 31-03-2021	
		<b>Few Risk Assessment Recommendations of EIA of Multipurpose Terminal carried out in 1995:</b>	
		There should be a provision for activating a fire alarm at the fire control room from various strategic/hazard prone areas in the factory. In areas where there is high level of Noise, It may be necessary to install more than one audible alarm transmitter or flashing lights.	Provision of activating a fire alarm is available at Control Room. Employees are provided with communication system with which they can communicate about any emergency to Control Room. Emergency alarm systems are installed which is audible from any port location. Alarm testing is carried out at a frequency of once in a month.
		Wind sleeves with adequate lightings around them should be provided at various places to guide personnel to escape in a direction perpendicular to the prevailing wind direction.	Wind sleeves with adequate various lighting system around them are available at various places of Port locations to guide personnel to escape in a direction perpendicular to the prevailing wind direction.
		Succession or second line Coordinators should be named for assuming responsibilities in case disaster occurs in the absence of principal coordinators.	Disaster Management Plan for APSEZ is in place and that includes second line coordinators to assume responsibilities in absence of principal coordinators.
xviii	A separate Environment Management Cell with suitably qualified staff to carry out various environment related functions should be set up under the charge of a Senior Executive who will report directly to the Chief Executive of the company.	Complied.  APSEZL has a well structured Environment Management Cell, staffed with qualified manpower for implementation of the Environment Management Plan at site. Site team report to Sr. Manager (Environment) at Corporate, who heads the Environment Management Cell who directly reports to the top management.  Environment Management Cell Organogram is attached as <b>Annexure – 9</b> .	
xix	The project affected people, if any, should be properly compensated and rehabilitated.	Not applicable.  The project was conceptualized in such a way that there are no impacts on the local settlements due to the project proposal. However, the project is already implemented and is in operation phase.	
xx	The funds earmarked for environment protection measures should be maintained in a separate	Complied  Separate budget for the Environment protection measures is earmarked every year. All environment and	

	<b>Adani Ports and Special Economic Zone Limited, Mundra</b>	<b>From : Oct'20 To : Mar'21</b>
<b>Status of the conditions stipulated in Environment Clearance under CRZ notification</b>		

Sr. No.	Conditions	Compliance Status as on 31-03-2021
	account and there should be no diversion of these funds for any other purpose. A year wise expenditure on environmental safeguards should be reported to this Ministry.	<p>horticulture activities are considered at corporate level and budget allocation is done accordingly. No separate bank account is maintained for the same however, all the expenses are recorded in advanced accounting system of the organization.</p> <p>Budget for environmental management measures (including horticulture) for the FY 2020-21 is to the tune of INR 1257 lakh. Out of which, Approx. INR 1086 lakh are spent during the year 2020-21. Detailed breakup of the expenditures for the past 3 years is attached as <b>Annexure – 10</b>.</p>
xxi	Full support should be extended to the officers of this Ministry's Regional office at Bhopal and the officers of the Central and State Pollution Control Boards by the project proponents during their inspection for monitoring purposes, by furnishing full details and action plans including the action taken reports in respect of mitigative measures and other environmental protection activities.	<p>Complied</p> <p>APSEZL is always extending full support to the regulatory authorities during their visit to the project site.</p> <p>Last visit of Regional Office, GPCB was done on 17.03.2021 for Main port and there was no any non-compliance observed during site visit. The GPCB inspection letter is attached as <b>Annexure – 11</b>.</p> <p>Inline to the compliance certification process of Environment Clearance condition of Waterfront Development Plan, RO, MoEF&amp;CC Bhopal had visited the site on 27<sup>th</sup> &amp; 28<sup>th</sup> January, 2020 for compliance verification. APSEZ provided all requisite information and documents required by the Regional Officer MoEF&amp;CC). During the said compliance verification visit and as per the compliance certification received, there was no major non-compliance observed.</p>
xxii	In case of deviation or alteration in the project including the implementing agency, a fresh reference should be made to this Ministry for modification in the clearance conditions or imposition of new ones for ensuring environmental protection. The project proponents should be	Point Noted.

	<b>Adani Ports and Special Economic Zone Limited, Mundra</b>	<b>From : Oct'20 To : Mar'21</b>
<b>Status of the conditions stipulated in Environment Clearance under CRZ notification</b>		

Sr. No.	Conditions	Compliance Status as on 31-03-2021
	responsible for implementing the suggested safeguard measures.	
xxiii	This Ministry reserves the right to revoke this clearance, if any of the conditions stipulated are not complied with to the satisfaction of this Ministry.	Point Noted.
xxiv	This Ministry or any other competent authority may stipulate any other additional conditions subsequently, if deemed necessary, for environmental protection, which shall be complied with.	Point Noted.
xxv	A copy of the clearance letter will be marked to concerned Panchayat / local NGO. If any, from whom any suggestion / representation has been received while processing the proposal.	Not applicable at present
xxvi	State Pollution Control Board should display a copy of the clearance letter at the Regional Office, District Industries centre and Collector's Office/Tehsildar's Office for 30 days	Applicable for State Pollution Control Board.
xxvii	The project proponent should advertise at least in two local newspapers widely circulated in the region around the project, one of which shall be in the vernacular language of	Already Complied.

	<b>Adani Ports and Special Economic Zone Limited, Mundra</b>	<b>From : Oct'20 To : Mar'21</b>
<b>Status of the conditions stipulated in Environment Clearance under CRZ notification</b>		


Sr. No.	Conditions	Compliance Status as on 31-03-2021
	the locality concerned 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 at Website of the Ministry of Environment and Forests at <a href="http://www.envfor.nic.in/">http://www.envfor.nic.in/</a> .	
xxvii i	The Project Proponents should 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.	Already Complied.
xxix	The Project Proponent should make specific arrangements for rainwater harvesting in the project design and the rainwater so harvested should be optimally utilized.	<p>Complied</p> <p>Groundwater recharge cannot be done at the project site since the entire project is in the intertidal / sub tidal areas. Rain water within project area is managed through storm water drainage.</p> <p>Please refer specific condition no. v for further details upon ground water recharging and rain water harvesting is being done by Adani Foundation as a part of CSR activity.</p>

# **Compliance Report of CRZ Recommendations**

	<b>Adani Ports and Special Economic Zone Limited, Mundra.</b>	<b>From : Oct'20 To : Mar'21</b>
<b>Status of the conditions stipulated under CRZ Recommendation</b>		

**Half yearly Compliance report of CRZ recommendation for “Port expansion project including dry/break bulk cargo container terminal, railway link and related ancillary and back-up facilities at Mundra Port, Dist. Kutch in Gujarat vide DoEF, GOG letter no. ENV-1098-6477-p1 dated 28<sup>th</sup> October 1999.**


Sr. No.	Conditions	CRZ Compliance Status as on 31-03-2021
A. Specific Condition		
1	The company shall submit comprehensive Environmental Impact Assessment Report and Risk Assessment Report containing worst case scenario and detailed oil spill control management plan before carrying out the construction activities and shall implement all the mitigative measures/suggestions/recommendations given in the report of NIO and Tata AIG Risk Management Services.	<p>Already Complied. Not applicable at present</p> <p>Environmental Clearance was granted based on the submission of said documents. Rapid EIA was submitted on Feb 29, 2000 &amp; Risk Assessment Report containing worst case scenario and detailed oil spill control management plan was submitted on Dec 28, 1999.</p> <p>For more details, please refer to general condition no xvii of the compliance of EC and CRZ clearance.</p>
2	The company in no case tap ground water.	<p>Complied.</p> <p>Please refer to Specific Condition no. ix of the compliance of EC and CRZ clearance above for details.</p>
3	The company shall not cut mangroves for the project activities except for stray mangrove seeding required for the railway line only after detailed assessment through NIO and 25 acre of land shall be planted with mangroves in consultation with NIO.	<p>Already Complied. Not applicable at present</p> <p>The company has not cut any mangroves. APSEZ has carried out 24 hectare of mangrove plantation near Navinal creek.</p> <p>To enhance the marine biodiversity, till date APSEZ has carried out mangrove afforestation in 2890 ha. area across the coast of Gujarat. Total expenditure for the same till date is INR 832 lakh.</p>
4	The company shall carry out the mangroves plantation programme in	<p>Other than this Adani Foundation – CSR Arm of Adani Group at Mundra-Kutch has initiated multi-species plantation of mangroves in Luni village in association with GUIDE, Gujarat. During 2018-2019 (Phase-I) multi-species mangrove</p>

	<b>Adani Ports and Special Economic Zone Limited, Mundra.</b>	<b>From : Oct'20 To : Mar'21</b>
<b>Status of the conditions stipulated under CRZ Recommendation</b>		

Sr. No.	Conditions	CRZ Compliance Status as on 31-03-2021
	<p>addition to 25-acre mangrove plantation to be done with the help of the NIO, in consultation with the forest department.</p>	<p>plantation was carried out in 10 ha, during Phase-II (2019-2020) it was 02 ha and during Phase III (2020-2021) it is 01 ha. Please refer attached <b>Annexure – 1</b> for CSR activity report carried out by Adani Foundation.</p> <p>So, far APSEZ has developed 476.5 ha. area as greenbelt with plantation of more than 9.32 Lacs saplings within the APSEZ area. Details on mangroves afforestation &amp; Green belt development carried out by APSEZ till date is annexed as <b>Annexure – 3</b>.</p> <p>EIA report was prepared by NIO in which all impacts on mangroves and coastal ecology of the region for the proposed design were studied in detail.</p> <p>Please refer to Specific Condition no. viii of the compliance of EC and CRZ clearance above for details.</p> <p><u>Conservation of mangroves:</u></p> <ul style="list-style-type: none"> <li>• In and around APSEZ, approx. 1800 ha. Mangrove area was identified by NIO in an EIA report prepared in the year 1998.</li> <li>• Out of this 1800 ha area, 1254 ha area was further demarcated as potential mangrove conservation by NIO in the year 2008 (as part of the EIA report of WFDP).</li> <li>• It may be noted that the entire area of 1254 ha is not covered with mangroves.</li> <li>• Entire area is being conserved and there is no disturbance to the mangroves in this area. Measures such as restricted entry and regular surveillance have resulted in overall growth of mangroves within this area.</li> <li>• As per MoEF&amp;CC directive, APSEZ entrusted NCSCM to demarcate mangroves in and around APSEZ area. As per their study, presently, mangrove cover in and around APSEZ is over 2340 ha. The analysis of the comparison between 2011 and 2016-17 has shown an overall growth of 246 ha.</li> </ul> <p>NCSCM final report on comprehensive and integrated plan for preservation and conservation of mangroves and associated creeks in and around was submitted along with half yearly EC Compliance report for the period Apr'19 to Sep'19. The same was further submitted to GCZMA and MoEF&amp;CC for their</p>

	<b>Adani Ports and Special Economic Zone Limited, Mundra.</b>	<b>From : Oct'20 To : Mar'21</b>
<b>Status of the conditions stipulated under CRZ Recommendation</b>		


Sr. No.	Conditions	CRZ Compliance Status as on 31-03-2021										
		<p>examination and recommendation vide (with a copy to MoEF&amp;CC vide letter dated 04.06.2018 &amp; reminder letter vide dated 4<sup>th</sup> Jan, 2019). Presentation on the findings of the report was made to GCZMA committee on 4<sup>th</sup> October 2019 and the recommendation for the same has been received vide email dtd 22<sup>nd</sup> Sept, 2020 with conditions. The copy of the same is attached as <b>Annexure – 12</b>.</p> <p>As a part of GCZMA recommendations and NCSCM mangrove conservation action plan, APSEZ has undertaken following activities.</p> <table><tr><th>Sr. No.</th><th>Recommendations</th><th>Compliance</th></tr><tr><td>1.</td><td>Mangrove mapping and monitoring in and around APSEZ</td><td><ul style="list-style-type: none"><li>APSEZ entrusted NCSCM, Chennai to carry out Monitoring of mangrove distribution in creeks in and around APSEZ and shoreline changes in Bocha island.</li><li>As a part of this study, overall growth of mangroves in the creeks in and around APSEZ was assessed comparing Google earth images of 2017 &amp; 2019 and it is observed that there was increase in mangrove cover between March 2017 and September 2019 to the extent of 256 Ha, which is about 10.7%</li><li>This suggests that the mangroves and the tidal system in the creeks remain undisturbed over this period. Analysis of data between categories indicated that there was an increase in dense mangroves and also conversion of scattered to sparse which also shows that the growth of mangroves in a progressive direction.</li><li>NCSCM Report of the same is attached as <b>Annexure – 13</b>.</li><li>The cost of the said study was INR 23.56 Lacs incurred by APSEZ.</li></ul></td></tr><tr><td>2.</td><td>Tidal observation in creeks in and around APSEZ</td><td><ul style="list-style-type: none"><li>APSEZ carried out the tidal observations at locations similar to 2017 in Kotdi, Baradimata, Navinal, Bocha and Khari creeks under the guidance of NCSCM.</li><li>The observed tidal ranges indicate that the creeks experience normal tidal ranges, adequate for the growth of mangroves.</li></ul></td></tr></table>		Sr. No.	Recommendations	Compliance	1.	Mangrove mapping and monitoring in and around APSEZ	<ul style="list-style-type: none"><li>APSEZ entrusted NCSCM, Chennai to carry out Monitoring of mangrove distribution in creeks in and around APSEZ and shoreline changes in Bocha island.</li><li>As a part of this study, overall growth of mangroves in the creeks in and around APSEZ was assessed comparing Google earth images of 2017 &amp; 2019 and it is observed that there was increase in mangrove cover between March 2017 and September 2019 to the extent of 256 Ha, which is about 10.7%</li><li>This suggests that the mangroves and the tidal system in the creeks remain undisturbed over this period. Analysis of data between categories indicated that there was an increase in dense mangroves and also conversion of scattered to sparse which also shows that the growth of mangroves in a progressive direction.</li><li>NCSCM Report of the same is attached as <b>Annexure – 13</b>.</li><li>The cost of the said study was INR 23.56 Lacs incurred by APSEZ.</li></ul>	2.	Tidal observation in creeks in and around APSEZ	<ul style="list-style-type: none"><li>APSEZ carried out the tidal observations at locations similar to 2017 in Kotdi, Baradimata, Navinal, Bocha and Khari creeks under the guidance of NCSCM.</li><li>The observed tidal ranges indicate that the creeks experience normal tidal ranges, adequate for the growth of mangroves.</li></ul>
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	<b>Adani Ports and Special Economic Zone Limited, Mundra.</b>	<b>From : Oct'20 To : Mar'21</b>
<b>Status of the conditions stipulated under CRZ Recommendation</b>		

Sr. No.	Conditions	CRZ Compliance Status as on 31-03-2021		
				<ul style="list-style-type: none"> <li>Report of the same is incorporated in NCSCM report attached as <b>Annexure – 13</b>.</li> <li>The cost of the said activity was INR 1.0 Lacs.</li> </ul>
		3.	Removal of Algal and Prosopis growth from mangrove areas	<ul style="list-style-type: none"> <li>Algal and Prosopis growth monitoring was done in and around mangrove area and algal encrustation was found in some of the mangrove areas, which has been removed manually.</li> <li>Report of the same is attached as <b>Annexure – 14</b>.</li> <li>The cost of the said activity was INR 1.2 Lacs.</li> </ul>
		4.	Awareness of mangroves importance in surrounding communities	<ul style="list-style-type: none"> <li>Adani Foundation – CSR Arm of Adani group has done awareness camps/activities created in the community regarding importance of mangroves during the year 2020-21.</li> <li>Adani Foundation has also provided 6.7 lacs kg Dry Fodder and 11.6 lacs kg Green fodder in 20 villages of Mundra and Anjar Block to support the resource dependent villagers, to avoid their dependency on mangroves. The expenditure for fodder supporting activities was approx. 120.86 Lacs during last FY 2020-21.</li> <li>Village Gauchar land development for the fodder cultivation to made fodder sustain village &amp; Avail green fodder in scarcity phase. With the support of Gauchar Seva Samiti Grassland development in Siracha – 85 Acre &amp; Zarpara – 25 Acre done which resulted in total production of 82 ton.</li> <li>The brief details of the said activities are incorporated in attached CSR Report for the FY 2020-21 attached as <b>Annexure – 1</b>.</li> <li>Other than this dedicated security guard with gate system deployed by APSEZ across the coastal area and no any unauthorized persons allowed within coastal as well as mangrove areas.</li> </ul>
		<ul style="list-style-type: none"> <li>The overall cost incurred by APSEZ is INR 146.62 Lacs as a part of mangrove conservation plan.</li> </ul>		
5	The company shall ensure that the construction labors do	Already Complied. Not applicable at present  Construction activity is already completed.		

	<b>Adani Ports and Special Economic Zone Limited, Mundra.</b>	<b>From : Oct'20 To : Mar'21</b>
<b>Status of the conditions stipulated under CRZ Recommendation</b>		

Sr. No.	Conditions	CRZ Compliance Status as on 31-03-2021
	not cut mangroves for fuel, etc.	Most of the construction labours were residing in the nearby villages where all basic facilities are easily available. However, for those residing near the construction site, infrastructure facilities such as water supply, fuel, sanitation, first aid, ambulance etc. were provided by APSEZ.
6	The company shall ensure that no creek are blocked due to the project activities,	Complied.  Please refer to Specific Condition no. xi of the compliance of EC and CRZ clearance above for details.
7	The company shall ensure that there will be no disposal of sullage and sewage generated from construction camps, surface run-off from construction sites, and oil and grease spillage from construction equipment in the creeks.	Already complied. Not applicable at present.  Please refer condition no. xii of EC Compliance report.  Project is in operation phase. Sewage and effluent generated from port is being treated in designated ETP and treated water is used for horticulture purposes.  Third party analysis of the treated water is being carried out twice in a month by NABL and MoEF&CC accredited agency namely M/s. Pollucon Laboratory Pvt. Ltd. The results of the same are attached as <b>Annexure – 2</b> .
8	The company shall stick to the time bound programme submitted to this department for the proposed activities including installation of desalination plant for meeting the entire water requirement.	Already complied. Not applicable at present.  Construction work was completed on time and project is in operation phase. Desalination plant with the capacity of 47 MLD is installed to meet the water requirement for overall APSEZ, Mundra.  For detail on present source of water and quantity of water consumption, Please refer to Specific Condition no. ix of the compliance of EC and CRZ clearance above.
9	The company shall ensure that the commercial fisheries are not hampered due to the presence of barges, vessels and other activities in the region. Necessary plan in this regards shall be prepared in consultation with the NIO.	Complied. Communication mechanisms have been developed for the smooth movement of fishing boats vis-à-vis shipping activities.  Please refer to Specific Condition no. xiv of the compliance of EC and CRZ clearance above for details.

	<b>Adani Ports and Special Economic Zone Limited, Mundra.</b>	<b>From : Oct'20 To : Mar'21</b>
<b>Status of the conditions stipulated under CRZ Recommendation</b>		

Sr. No.	Conditions	CRZ Compliance Status as on 31-03-2021
10	The company shall bear the cost of the external agency that may appointed by this department for carrying out the supervision and/or the monitoring of the construction activities.	<p>Complied.</p> <p>Construction activities are completed and project is in operation phase. If at all any study is suggested by Govt. of Gujarat, we will give full co-operation.</p> <p>Please refer to Specific Condition no. xv of the compliance of EC and CRZ clearance above for details.</p>
11	The company shall carry out the post project monitoring of various environmental parameters in consultation with this department and Gujarat Pollution Control Board.	<p>Being complied.</p> <p>Post project monitoring of various environmental parameters is being carried out regularly.</p> <p>Please refer to Specific Condition no. xvi of the compliance of EC and CRZ clearance above for details.</p>
12	The company shall prepare the detailed traffic control management plan for the port and shall participate in the VTMS to be developed for the Gulf of Kachchh.	<p>Complied.</p> <p>APSEZ has participated in VTMS.</p> <p>Please refer to Specific Condition no. xvii of the compliance of EC and CRZ clearance above for details.</p>
13	In order to eliminate adverse impact on the mangroves of Bocha Island and coastal ecology of the region, the company shall carry out construction activities only after the construction design and methodology is approved by NIO.	<p>Already complied. Not applicable at present.</p> <p>Construction activity is already completed.</p> <p>EIA report was prepared by NIO in which all impacts on mangroves and coastal ecology of the region for the proposed design were studied in detail.</p>
14	Any other conditions may be stipulated by this department from time to time.	Point noted.

# **Annexure – 1**



# C S R K U T C H

# 2020-21

## Adani Foundation

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



# Our journey

The year 2020-21 has passed off with great experience and new challenges for Adani Foundation due to Covid 19 Pandemic. Adani Foundation team has started working just after one week of lockdown to keep commitment towards the community. As a part of dignity of workforce team has done remarkable work for fresh food and ration kit supply to retain them at workplace with safe and comfortable environment. Regular visit to senior citizen home and running MHCU by medical officers was not less challenging. Our women SHG has prepared more than 1 lac mask for Taluka Health office, Anganwadi Staff, Police Staff, Custom and coastguard and Education staff. Adani Hospital – Non Covid Hospital and GKGH Bhuj Hospital – Covid Care Hospital remained opened 24x7 throughout the year which is matter of great proud.

Current year Sea weed culture and Natural Farming Promotion were the new concepts which will be planned with five years vision. Mangroves costal biodiversity, water harvesting structures and Tissue culture will have sharp turn with proper documentation and demarcation. Adani Vidya Mandir has proven best in education by reaching to unreached through digital technology, happy to see the fisherman students studying sincerely sitting in fisherfolk settlements by operating tablets. New Era touched upon Framers too who are a part of discussion about natural farming on Zoom application. "Vadil Swasthaya Yojna" and "Suposhan" were in last execution year as a Project but both project will be with us by sourcing and moral support by linkages with different Government Scheme.

Happy to share – under guidance of seniors proper frame work was developed for supporting community as a bridge between various Government schemes and needy people by "Community Resource Centre" its true need and real sustainable way. Fisherman and women employment sourcing created very positive impact as a regular source of income for them.

Adani skill Development center entered into MOU with KSKV Kutchh University for various skill development trainings. The ASDC is committed to the cause of the deprived and underprivileged to generate employment through enhancing skills. It has been working relentlessly which resulted in rapport building with District Administration Kachchh also.

Success is due to present of torch barer and mentor in life who is Respected Dr. Priti Adani. If you have mentor like her in life, she can turn a Mess into message. A Test into a Testimony, A Victim into Victory! We heartly thanks our Rakshit bhai, Respected Gadhvi sir and Respected PNR sir for guidance and motivation.

We wish all the very best to whole Adani Foundation Parivar !

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## Education (SDG - 4/4.a)



The future of India depends upon the quality of education imparted to our children. We believe that it is the joint responsibility of the Government and citizens to improve school education. With an aim to enhance the quality of primary education in Kutch District, Adani Foundation proposed to adopt 17 government schools located at Mundra Taluka under the project '*Utthan*' as a pilot project. By this intervention, Adani Foundation seeks to facilitate; Focus on 'Priya' students and celebrate their progress, Make learning joyful, provides adequate resources and facilities, strengthen the curricula to provide basic skills, especially in the areas of literacy, numeracy and skills for life and focus on Teachers' capacity building. **(SDG - 4/4.a)**



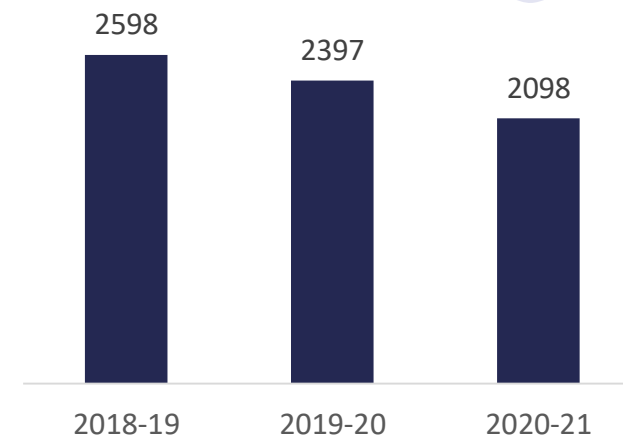
# Utthan

## How Utthan Sahayaks overcame/overcoming the Pandemic

In COVID 19 Pandemic, when the schools were completely closed, education went on mobile platform and students are still dependent on mobile internet for their education.

- ✓ During the initial phase of lockdown Utthan Sahayaks reached Priya Vidyarthi through series of curated SMS and WhatsApp messages, they share text/video/audio content focused on hands-on learning activities.
- ✓ Initial approach realized us that we need to find another way to touch our audience Utthan Sahayaks convert this challenge into opportunity. They make themselves tech savvy by learning how to conduct classes on various platform especially on Google classroom.

Year	No. of school	No. of village	No. of Girls	No. of Boys	Total
2018-19	17	7	1318	1280	2598
2019-20	17	7	1227	1170	2397
2020-21	17	7	1069	1029	2098



### Our out reach for Utthan project

- ✓ In pandemic times ,Priya Vidyarthi's' meet were scheduled on Google meet platform. Primarily Utthan Sahayaks faced the challenges that students are unable to meet them virtually due to the single smart phone availability in the family.
- ✓ Here with us a only solution to make them study available at their door step by following all the guidelines suggested by government to maintain social distances.
- ✓ From October onwards Utthan sahayks approached their students by taking physical classes at their respective residence.

## Utthan – during pandemic

Pandemic situation has challenged the functioning of various activities of the project but team Utthan and Adani Foundation adapted to the transitions required to continue with its outreach. With the travel restrictions, team Utthan has adopted all the protocols assigned by the Adani Foundation and the health authorities and has continued both its offline activities while adopting online methods to carryout its activities especially to reach out our students.



### Capacity Building Program

- Usage of Google meet and Google classroom
- Art of living
- Individual learning
- Digital Bookmarks
- Vedic maths
- Gandhian Education Philosophy

### Competition

- Essay writing
- Ganpati idol making
- Doha recitation
- Garba decoration
- Christmas celebration
- Makarsankranti celebration



## Utthan Additional achievements

Solar panel has been installed in 17 schools of Utthan – so now the schools will be using renewable energy. Support of teachers and Principal during installation was substantial. This is changing and challenging step for Utthan Project to convert whole school running on renewable energy. In coordination with Mundra Solar Panel manufacturing unit – systems installed with inverters.



Utthan is not only deals with Education – but the main strength of the Project is Sahayak. Sahayaks remain in touch with parents and make them understand the value of education. Apart from it, Utthan Sahayaks motivated more than 700 parents of girl students to open "Sukanya Samriddhi Bank Account" for their bright future

# Utthan – Capacity Building Programmes



## Staff Training - Adani Schools

Date: Saturday, February 20, 2021

10:00 hrs to 12:30 hrs

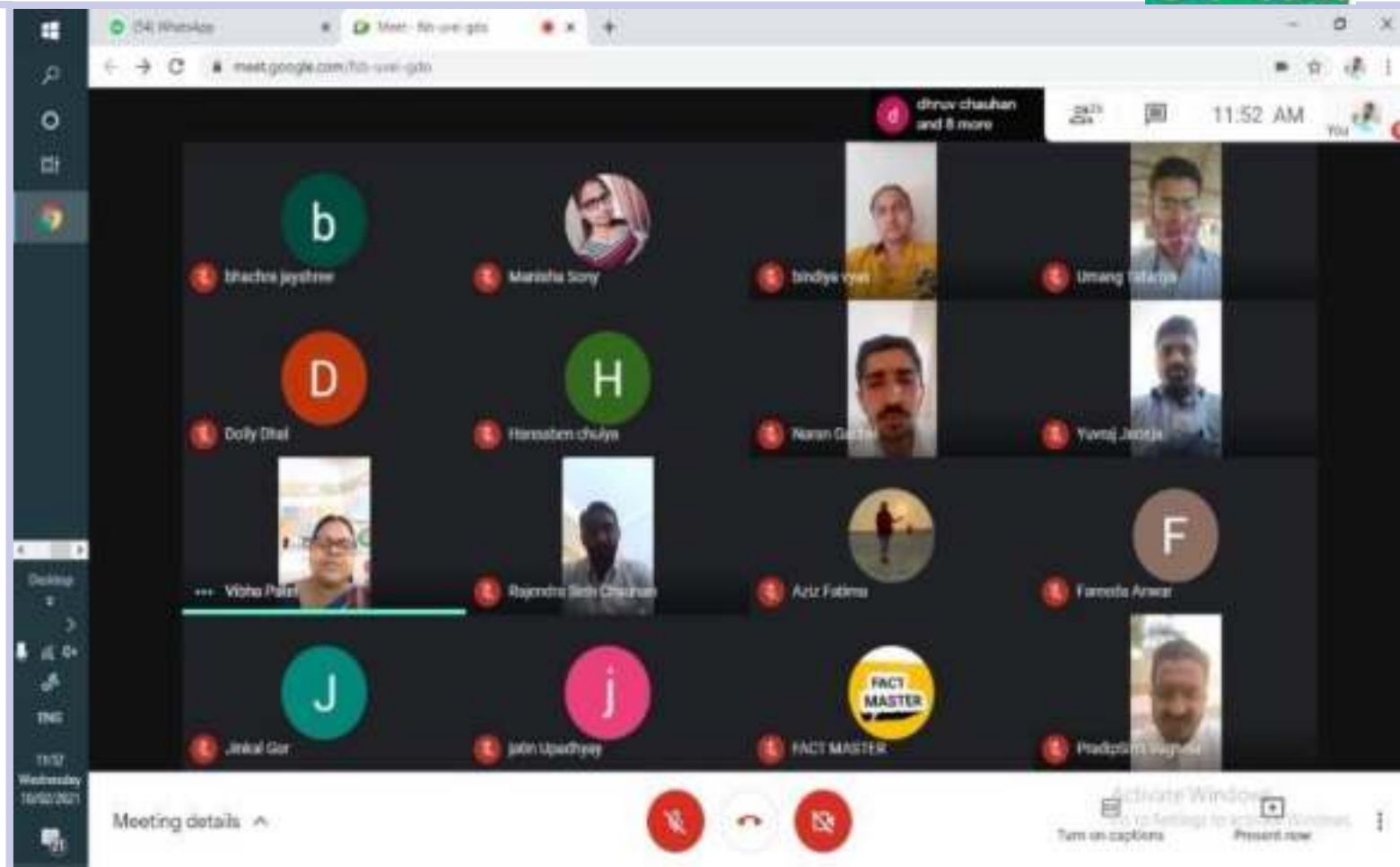
Platform: ZOOM

Topic: A Blissful Journey: From Entropy to Stillness

Resource Person: **Mr Saurabh Beniwal**

15+ years of Corporate and Educational Training Experience during association with various organizations like New Education Learning, Arise, Inspiree RMF India. He has been associated with Indira's Learning Pvt. Ltd. as National Head - Teacher Preparation Initiatives, conducted more than 100 highly energetic Workshops, Seminars and counselling sessions for Teachers, Masters, Principals and Parents on various topics listed in profile below. Served more than 1,00,000 teachers, students and Parents across India.

Timings	Discussion Point	Material/Activity
10:00 to 10:30 hrs	Presence of Mind, Comfort Zone	PPT presentation, Discussion
10:30 to 11 hrs	Types of learners and how to deal with them, 3 C's of Life	PPT, Discussion and Activity
11 to 11:30 hrs	Human Exponential Model, Effective Communication with blocks to listening, Power of positive thinking	PPT, Story, Discussion
11:30 to 12 Noon	Goal Setting for teachers, communication Gap, Outer world Vs Inner World	PPT, Video, Story, Discussion
12:00 Noon to 12:30 hrs	Mental Vs Spiritual Knowledge, Meditation	PPT, Guided musical meditation for 15 minutes



## Utthan - Impact



### IMPACT OF THE PROGRAM

#### Beneficiary of Online classes

- 17 Utthan Sahayaks
- 17 Gov. Primary Schools
- 2098 total students

#### Weekly Content of IT and Physical Education

- 106 Gov. Pri. School
- 35000+ students

#### Virtual Mothers meet

- 500+ Mothers attended meeting on Google meet

#### Capacity Building Program

- 70+ Webinar attended by Utthan Sahayak
- 10 Seminar/Workshop

#### Competition /Celebration

- 248 Students took part virtually

# Uthhan – Testimonials

## Confessions



'Solar Panel installation in Uthhan Schools is biggest step towards best usage of renewable energy. Now our students can study comfortably during absence of electricity and not only this – student can understand value of solar energy too"

Principal,

Mundra, Kutch, Gujarat



'Utthan Sahayaks with the help of customized curriculum and structured time table meet huge success to achieve the main objective of the program

In corona pandemic Uthhan Sahayak acted as a main force for students to remain active during lockdown through home visits, various competitions and E-events.

In future, Utthan will be sound support system for Government Schools of Mundra

I wish all the best to Team Uthhan

Haresh Patel

Taluka Primary Education Officer

Kachchh- Bhuj

# Uthhan – Testimonials

## Confessions



'During this pandemic period Utthan Sahayaks are doing very commendable job. We will receive an encouraging feedback from Parents too. Project Utthan has made a positive impact on our students as well as in school too.

Mahendrasingh Solanki  
Principal,  
Zarpara Shaala no. 3  
Mundra, Kutch, Gujarat



'Education is what builds a nation generation after generation and the process begins early on; first at homes/communities and then in the schools. With an aim to enhance the quality education in government primary school in Kutch district project Utthan launched by Adani Foundation with the close monitoring by GoG as a pilot project with 17 schools at Mundra.

After the completion of 2 years, project marks a very positive impression not only in school but also in community. Utthan Sahayaks played a vital role to transfer Priya *Vidyarthi* into main stream. School culture and environment has become more advanced and techno based with the up skilling of government teachers through various capacity building program. Attendance of schools has increased due to active Mothers meet and SMC meetings.

I am sure in near future with the active involvement of this project performance level of government primary school shall further improve.

My good wishes and support are always with the team!'

Prabhav Joshi (IAS)  
District Development Officer  
Kachchh- Bhuj

# Adani Vidya Mandir, Bhadreshwar (SDG - 4/4.1)

**EDUCATION: FREE AND COMPULSORY** – WHAT A WAY TO LEARN LOGIC!" The quote mentioned unfolds the distinguished vision of Adani Foundation to provide cost-free education, food, uniform, books to the children of economically challenged families of Mundra Bock. Adani Vidya Mandir, Bhadrashwar was established in June 2012, with aim of uplifting the communities through education. The school is equipped with excellent infrastructure and resources required for all-round development of the student. The child is given admission in class 1 and is molded to be an educated and a good human being by experienced and compassionate teachers. The school follows a curriculum designed by GSEB.



# Adani Vidya Mandir, Bhadreshwar

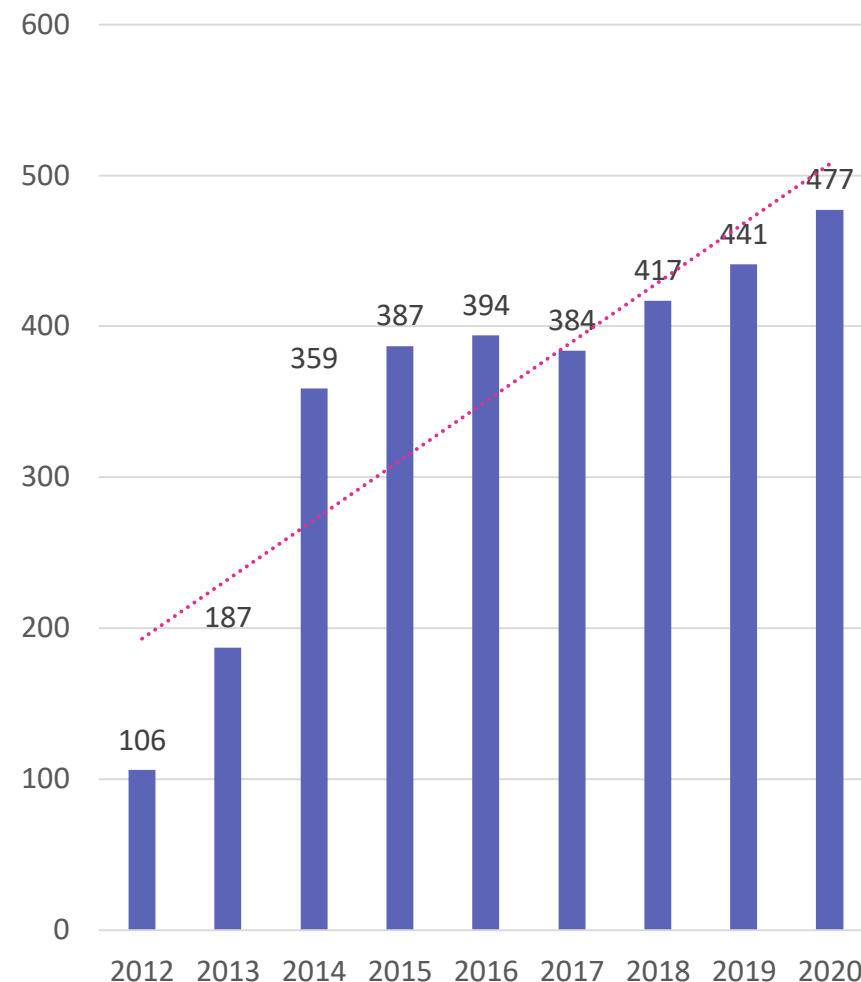
Adani Vidya Mandir Bhadreshwar Gujrat Board Standard 10th Examination Result is 82.60% (19 students have passed the examination out of 23). Adani Foundation will take all responsibility of further study of students with respect to their interest.

The global upsurge of the Covid-19 pandemic and the resultant lockdown has brought all of us to face such unprecedented times and situations. The challenge was rural locality, network unavailability, lack of health awareness, apprehensions for technology and gadgets and financial crunch to spend on mobile / Internet.

But We did not Give-up and reached out to our students to pursuit educational through virtual platform by various initiative.

AVMB STD - 10 SECOND BATCH RESULT		
Year 2020-2021		
SR NO	GRADE	STUDENTS
1	Above 80 %	00
2	Above 70 %	02
3	Above 60 %	05
4	Above 50 %	07
5	Above 40 %	05
6	Fail	04
TOTAL		23

No's of students



## Activities Covered

- Admission process of Std 1 students through draw system.
- Online Class through What Sapp and YouTube video
- DD Girnar Timetable intimation and & Follow-Up
- Regular home visit for homework and lessons with PPE's by Teachers
- Textbook support to students of all classes.
- 10th standard students divided into small Group and Mentoring by AVMB Teachers.
- Unit test conducted as per GSEB circular for the students
- Offline Examination for class 3rd to 10th
- G Suite & Diksha Training for Teachers
- Opened G-Mail Account of Each Child
- **Tablet support to 10th class students for Online Classes by Employees Volunteering Programme**
- Self Learning Material Distribution to 1st to 9th standard students who don't have access for online education.
- Parents Meeting : Regular basis
- Start Remedial Classes at 3 villages with Following all Gov Covid Guide
- reopens Schools class 9th to 10th Standard
- Day Celebration ( Fit India, Children day and Mathematic day & Republic day ) Virtually and Physically to get rid off from the Covid Stigma



# Community Health (SDG - 3/3.8)

*Access to quality healthcare is a  
fundamental right of every individual*

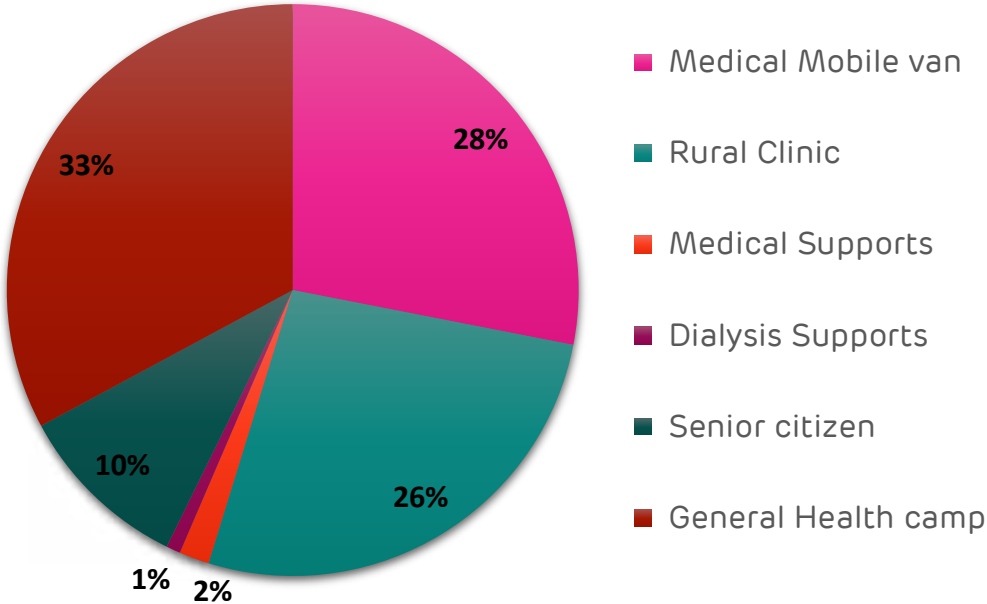


Health plays a crucial role in transforming people's lives. Throughout the year, COVID-19 has taught us the lesson about the importance of health. Access to quality health care gives a fair chance to lead healthy, productive lives. Healthy people can utilize opportunities available to them.

# Community Health

CH All Project Patient Details			
Project	Direct Beneficiary	In-Direct Beneficiary	Remarks
Medical Mobile van	16611	66476	33 Villages
Rural Clinic	15797	63192	11 Villages
Medical Supports	1008	5040	63 Villages
Dialysis Supports	474	2370	63 Villages
Senior citizen	5836	17508	63 Villages
Health camp	19461	58383	11 Villages
Total	59187	212979	

## Direct Beneficiary



**“Healthy mind remain in healthy body which create health community to make healthy Nation.”**

Adani Foundation relentlessly working for same in each health core area through various kind of health activities i.e. Mobile Health Care Unit, Rural Clinics, Special Innovative Projects i.e. Health Card to Senior Citizens, “Project Abhimanyu” and support to dialysis patients projects. Adani Foundation had also organized special medical camps during Corona pandemic

## Rural Clinic & Mobile Health Care unit

Adani Foundation focuses on ensuring good health for better contribution to growth and progress. During this pandemic situation health is the basic need for development of community. Their objective is to live healthier lives by promoting healthcare seeking behavior.

Mobile Health Care Units and Rural Clinic Services are deployed with the objective of providing basic healthcare facilities to remote rural areas as well as poor peoples. The service is being executed by Adani Foundation is to reduce travel time, hardships and expenses.

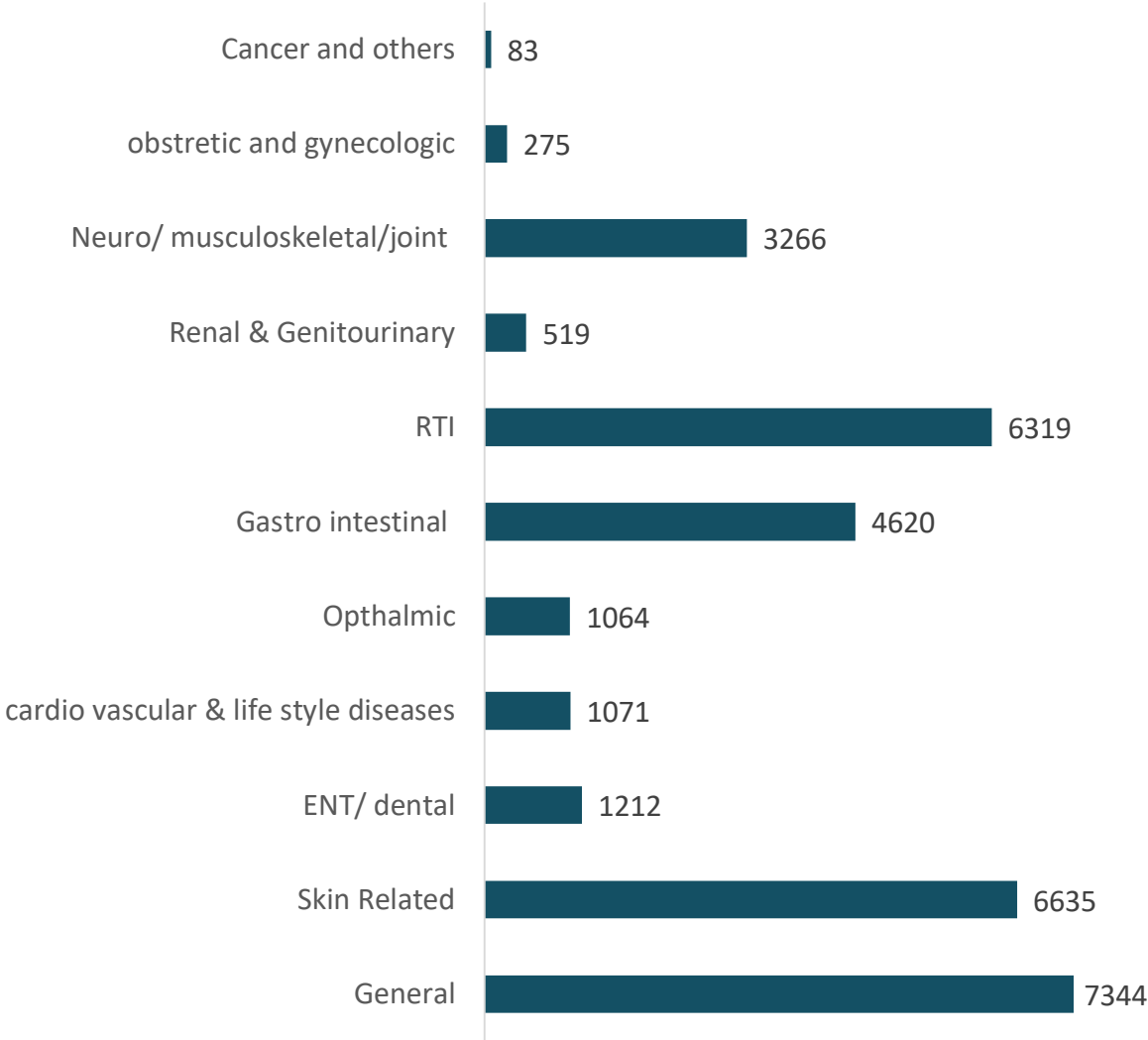
The mobile health care unit covers 25 villages and 07 fishermen settlements. Around 90 types of general life saving medicines are available in these units. This service has become a boon for women, elderly and children as the service is available at their doorstep.

Rural Dispensaries are established where there is a gap in the healthcare services. The Adani Foundation operates Rural Dispensaries in 7 villages of Mundra block, 03 villages of Anjar block and 1 clinic in Mandvi Block. Mobile dispensary and rural clinics provide health services with token charge of 10/- rupees per patient daily by a doctor and a volunteer.

During this year total 16611 beneficiaries 6141 male and 10470 female were benefitted by Mobile van and total 15797 beneficiaries 7128 male and 8669 female were benefitted by Rural clinics.



# Community Health – Disease wise Distribution



## Health Cards to Senior Citizens

Senior citizens often face difficulties in getting treatment for want of financial, social and moral support. In this stage of life is there is need special care for health and warmth hence Adani foundation has started senior citizen project in Mundra Block since 10 years. The main objective is to provide specialized, timely and hassle-free healthcare services according to the needs of senior citizens. The initiative also encourages them to pay attention to their health and promotes preventive healthcare.

During the year 2020-21, total 5836 transactions were done by 8711 card holders of 68 villages of Mundra Taluka. They received cash less medical services under this project.

The limit for the beneficiary has been set Rs.8000/- in exit year. the senior citizens get emergency medical care at Adani Hospital, Mundra and refer to GKGH, Hospital ,Bhuj in Emergency.



## Specialty Camps

General health camps, Pediatric Camp, breast and cervical cancer screening camp and surgical health camps was organized at frequently to meet the specific requirements of the community and in disease outbreak season with following the guideline of COVID-19.

In the year of 2020 -21 total 97 people had been benefitted by various kind of camp and needy and screened patients are treated in Adani Hospital.



Sr. Citizen status Year-2011 to 2020-21											
Number of Villages	Total Cards	Total Survey	Pending Renew Cards	EXP	Green cards	Blue Cards	BPL Cards	APL Cards	No Ration Cards	RSBY Cards	MA Cards
68	8711	7095	901	715	6328	767	2493	4555	47	77	222

## Medical Support Detail

Adani Foundation provides primary health care and financial assistance to needy poor people for ailments such as kidney related problems, paralysis, cancerous and tumor surgeries, neurological and heart problems, blood pressure, diabetes etc.

Partial Medical Support had been given to 1008 beneficiaries of Mundra, Mandvi and Anjar Block at Adani hospital, Mundra. where as in the Critical cases after stable them we refer them to GKGH, BHUJ for further treatment.

## Dialysis Support

The drinking water of Mundra contains high TDS (Total Dissolved Solids). Hence, the proportion of patients with urinary stones and kidney failure is more. Patients suffering from kidney-related diseases require regular dialysis which is costly and adds to the financial burden of the family.

Hence, the Foundation has undertaken a programme to providing dialysis treatment to help the extremely needy patients to live a healthy life. During this year, 6 patients were supported for regular dialysis (twice a week) with partial support.

## Ukado & Vitamin-C Tablets Distribution

Covid-19 pandemic is at the peak level And there is no any specific treatment But as preventive measure and immunity booster we had started Ayurveda UKADO distribution at various public spot in Mundra.

The TDO, THO, Flywing foundation, Ayurveda Department had support and coordinate in UKADO and Vitamin-C tablets distribution activities. Total **18240 people had get benefits of UKADO and Vitamin-C tablets.**



## Machhimar Shudhh Jal Yojana (SDG 6/6.4)

To reduce water born disease and women drudgery to get water, Potable water is provided to the fishermen communities at different vasahat through water tanker since 8 years.

Sr.	Vasahat	Family	Requirement Per day	Remarks
1	Luni	116	15000	9 Months
2	Bavdi Bandar	107	15000	9 Months
3	Kutdi Bandar	118	15000	9 Months
4	Randh Bandar	245	25000	9 Months
5	Zarapra Vasahat	90	5000	12 Months
6	Vira bandar	80	--	Linkages with GWIL
7	Juna bandar	160	--	Linkage with Mundra GP
8	Ghavarvaro Banada	60	--	Linkages with GWIL
9	Zarapra chacha	55	--	Linkages with Port GWIL
	TOTAL	1031		



# Community Health Bhuj (SDG 3/3.8)

- Adani Foundation Team has initiated coordination with GKGH hospital since 2014 and established a reception area for the smooth patient coordination and preparation for the social networking program.
- GKGH Hospital is Covid Care Hospital since 22<sup>nd</sup> March 2020. Adani Foundation staff members supported in patient counselling, coordinating and supporting for dead body covid care van.
- Total 3368 Covid patients got treatment from overall Kutch with satisfaction.
- Dead body medical van – Dignity to death is one of the noble initiatives taken up by the Adani Foundation. If any death occurs in GKGH, dead bodies are shifted to the native village of the concerned in the Kutch District free of cost. Total 809 dead bodies privileged till now to different locations in Kutch including Covid Patients.
- Mahiti Setu is linkages between various Government Schemes and beneficiaries. Through Mahiti Setu sourcing of 2378 beneficiaries and linkages with more than 780 cards of MAA Yojna and Ayushman Yojna



# Community Health - Impact



## IMPACT OF THE PROGRAM

### Benefits of MHCU and Rural Clinics

- 44 Villages
- 23000 Population Coverage
- Saving of Rs. 150 per day
- Total Revenue saved – Rs. 44.26 Lacs

### Senior Citizen Health Card

- All Senior Citizens of Mundra – 8711 cards
- Unique Project with focus on preventive care
- Revenue generated @ Rs. 63 Lacs

### Corona pandemic Times

- More than 12 camps of Ukala Distribution
- Outreach @ 2,50,000 for awareness and immunity boosting methods

### Potable Water to Fisehrfolk

- Covering 676 Families with 75000 liters per day water for drinking purpose at Vasahat
- 3 Vasahat became self sustain with coordination of Gram Panchayat

### AHMPL

- Total 20959 patients benefited in year 2020-21 from 55 different villages .
- Goodwill created as a only hospital remained 24x7 opened during whole year of pandemic

# Environmental Sustainability

Sustainable development has many important facets/components like social, economic, environmental, etc. these components are closely interrelated and mutually re-enforcing. Under Corporate Environmental responsibility 10 km radius villages from SEZ Boundaries.

Water conservation Projects i.e. Roof Top Rain Water Harvesting, Desilting of Check dams, Bore Well Recharge and Pond deepening were taken up in past years, review and monitoring of all water harvesting structures had been taken up. Including this a big recharge operation by bunding was taken up for Zarpara village as rainfall was very good current year

To make connections between human actions and the level of biological diversity found within a habitat and/or ecosystem, this year we launch project "Sanrakshan" in coordination with GUIDE and Sahjeevan.



## Water Conservation Projects (SDG 6/6.6)

**Since 10 years considerable Water Conservation Work carried out in Mundra Taluka. Due to satisfactory rain in current year 1.11 mtr ground water table increased as per Government Figures. Our water conservation work is as Below.**

- A large number of water harvesting structure ( 18 Nos. of check dams in coordination with salinity department)
- Ground recharge activities (pond deepening work for more than 52 ponds) individually and 26 ponds under Sujlam Suflam Jal Abhiyan were built leading to a significant increase in water table and higher returns to the farmers
- Roof Top Rain Water Harvesting 54 Nos. which is having 10,000 litre storage which is sufficient for one year drinking water purpose for 5 people family.
- Recharge Bore well 75 Nos which is best ever option to
- Drip Irrigation 823 Farmers benefitted in coordination with Gujrat Green Revolution Company
- Bund construction on way of Nagmati River could save more than 575 MCFT water quantity which recharged in ground due to which borewell depth decreased by 50-100 Ft in Zarpara, Bhujpur and Navinal Vadi Vistar.



# Jiv Srishti Saurakshan Yojana (SDG 15/15.9)

## Bio Diversity Park – Mundra

Ecological greenbelt development plan expects to attract and provide habitats for many species of major faunal groups such as amphibians, reptiles, birds (terrestrial and aquatic), butterflies and mammals. Further this developed area can act as recreational, educational and interpretation center for the community of the corporate sector to understand and enhance their knowledge base on local environmental and ecological scenario.

Adani Foundation, Mundra-Kutchh proposed a biodiversity park at 5 acres Nandi Sarovar area and approached to Sahjeevan, Bhuj for technical support for same. Sahjeevan team visited this proposed site for development of greenbelt to support biodiversity and enhancement of overall ecological food web existing in and around the landscape in first phase.

In addition, senior team of Adani Foundation and Sahjeevan also discussed in details for this program and suggested to initiate an interpretation center for awareness to various stakeholders on very unique

biodiversity of Kutchh region in second phase.

Zone wise different habitats identified by technical team, i.e. Outside Plot Area, Along Waterlogged Area, Climber/Twiner Area, New Plantation Area, Entry Gap Filing Area, Gate Area, and Wetland Area within the proposed project area, technical team will develop a list of species that are representative of mature, undisturbed local forests, grasslands and wetlands. The chosen species will be typical of the species composition of local habitats.

Develop a list of plant species that can be chosen on the basis of aesthetic characteristics, in particular for the beauty/abundance of their flowers, eventually of their fruits/foilage.

Define information on different types activities involved under this ecological greenbelt development project (i.e. butterflies areas, medicinal plants areas, birds areas etc.).

Develop a manual that will give guidelines for habitats based on local practices, for short term and long-term management.





# Jiv Srishti Saurakshan Yojana (SDG 15/15.9)

## Coastal Bio Diversity Park – Luni

In the coastal environment mangroves and mudflats are dynamic ecosystems that usually support a large population of floral and faunal life forms. Mangrove forests are highly productive ecosystems, which provide numerous goods and services both to the marine environment and people. Mangroves in India are spread over nine maritime states and three Union Territories. Gujarat has the longest (1,650 km) coastline among the maritime states of the country. With the second largest mangrove cover in India after West Bengal, Gujarat's mangrove area has increased from 1,140 km<sup>2</sup> in 2017 to 1,177 km<sup>2</sup> now.

A major portion of human population of Gujarat is solely dependent on these coastal ecosystems for their livelihood. Thus, several mangrove restoration programmes/ activities are in progress in the state. Mangrove restoration activities in Gujarat are mostly single species stands of *Avicennia marina*. Adani Foundation at Mundra-Kachchh has initiated multi-species plantation of mangroves in Kachchh in association with GUIDE. During 2018-2019 (Phase-I) multi-species mangrove plantation was carried out in 10 ha, during Phase-II (2019-2020) it was 02 ha and during Phase III (2020-2021) it is 01 ha. Due to geological set up of Kachchh where fresh water source is atypical, the survival and growth of mangrove plantation remains poor. Thus, a survival rate of 30% is expected for this multi-species plantation. Mangrove biodiversity park of its kind will help in disseminating knowledge on mangrove ecosystem and simultaneously conserving the species.

Since, some of the mangrove species are not readily available in Kachchh, their seeds/ propagules were procured from other districts of Gujarat and other states. The proposed species of mangroves that have the potential for enhancing mangrove biodiversity in and around APSEZL include *Rhizophora mucronata*, *Ceriops tagal*, *Ceriops decandra*, *Rhizophora apiculata* and *Aegiceros corniculatum*.



## Vision

Enhance the diversity of mangrove and its associated species in suitable coastal region of Kutchh, which in turn increase the faunal diversity and fishery resources of the area by providing suitable habitats and breeding ground. The ultimate aim of the project is to improve overall coastal biodiversity of the region.

## Mission

- Reconnaissance and identification of potential sites for technical suitability for enhancing mangrove biodiversity in Kutchh.
- Examine tidal pattern, availability and duration of fresh water, water regime/inundation, and substratum and water quality, species association at the site (based on secondary literature).
- Development of different plots based on combinations of species and site characteristics.
- Nursery development, transplantation of nursery grown seeds / propagules, monitoring its survival, etc.
- Examine the physico-chemical characteristics of water and sediment in the selected plantation sites.
- To detailed out the diversity, species richness of marine faunal component in the selected plantation sites
- To assess natural (algal encrustation, shift in substrate nature) as well as anthropogenic threats (cattle grazing, lopping) to the plantation site and provide suggestive measures.
- Long term monitoring plan and protection of the developed mangrove patches and coastal biodiversity in the plantation sites.



# Sea Weed Culture

## Primary Information About Sea Weed

Recently, seaweeds have gained substantial traction globally owing to the appreciation of the benefits that they provide in societal, economic and environmental realms. Ever since the economic and ecological benefits of seaweeds recognised, there has been a constant and sustained global effort to further increase their production and utilisation by following innovative practices along the various value chains. Seaweeds are farmed commercially in several Asian countries where their utilisation for food and phycocolloids (agar, carrageenan and alginate) is intense, and their farming has indeed evolved into a social enterprise particularly in some Asian and tropical countries in the world. Seaweed farming has indeed emerged as an economic growth engine in several developing economies in Asia.

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## Utilization in India

In India so far, seaweed resources have been utilized exclusively for the production of typical phycocolloids such as agar and alginates by local processing units (about 30 MSMEs) from the wild harvest, particularly from the coast of Tamil Nadu. Despite developing pioneering technologies in both farming and processing for different economically important seaweeds, seaweed cultivation has not gained momentum and widespread in the country as expected but rather continued to confine to limited geographical regions in the state of Tamil Nadu alone. This could be partly due to different inherent challenges associated with open sea cultivation. The seaweed farming in the open sea is

interrupted by monsoon and hampers the year-round production efforts and sustainability. With this backdrop, and further to give traction to the seaweed industry in the country, a unique consortium of industry partners have come together on a common platform with a unified interest to build a technologically competitive and viable platform for the production and processing of the seaweed feedstock for harnessing the associated economic and ecological (climate reversal and prevention of coastal water eutrophication) benefits to the fullest extent possible while providing livelihoods to the coastal communities, in the spirit of creating and sustaining “Blue Economy” as also “Inclusive Economy/Circular Economy”



# Sea Weed Culture

## Vision

The consortium aims to take a holistic view of transforming seaweed resources as natural capital and use open source knowledge to build an innovative technology platform for harnessing the economic potentials along with the associated ecological benefits thereof. Also, foster a cordial relationship with visionary sponsors and collaborators from India and abroad for sustainable production and utilisation of seaweed resources for the production of innovative products while engaging the coastal communities as direct beneficiaries (human capital) of this unique effort.

## Collabration

Agrocel, Piddilite, Adani Foundation has jointly initited the Pilot Project with a objective transform sew weed into Natual Capital as well as engaging community as a human capital.

## Achievements

A pilot cultivation facility (5 KL tanks in 6 nos) for the farming of different economically important seaweeds in the

tanks on the onshore has been established and commenced the cultivation trials with red seaweeds *Kappaphycus alvarezii*, *Gracilaria dura* and green seaweed *Ulva*. The initial trials have given very promising results and harvested 6-7 times the seeded material in a 40-45 days cultivation period.

The successful completion of pilot cultivation trials of *Kappaphycus* has helped to move forward to set up raceway type tanks of 26 m Length × 6 m Width × 1.1 m Height in 2 nos for large scale cultivation of *Kappaphycus* in Balavadi campus at Juna Bandar, Mundra. The cultivation trials are in progress.



Growth of Kappaphycus



in various durations

# Sea Weed Culture

## Further plan for Adani Foundation Mundra

The initial seaweed cultivation findings have provided enough evidence for upscaling the facility over a one-hectare area in 2021-22 engaging the local fishers who can earn reasonable monthly income by formation of Group of Fisherman.

Fisherman Group is initially consist of 15 members. Adani Foundation will provide off shore and on shore cultivation of sea weed, its further process i.e. cleaning and drying and expolore market opportunities.

In recent times, two outreach programmes were also conducted for fishers living in the Juna Bandar area to ascertain their interest in adopting seaweed cultivation as an alternate profession to fishing which is fastly dwindling. There is a scope for providing an additional income stream through seaweed farming to fishers if we set up model demonstration farms. These farms can be utilised for showcasing the cultivation technology, training purpose and seed supply for those fishers who likely to become seaweed entrepreneurs.



Raceway tank with Kappaphycus seaweed



## Drip Irrigation Project (SDG 2/2.4)

- **Basis of Requirements of Drip Irrigation**

The main source of livelihood being agriculture, the cultivators tend to use more and more underground water for irrigation. Underground waters have gone very highly saline. The use of such water for irrigation has made the soil also saline and the crop yields have dwindled.

- **Process of Drip Support**

Farmer have to applied in the prescribed form of Adani foundation with photograph.

Inspection and verification will be by AF representative.

Ration card, work order of G.G.R.C, 7/12 certificate and all bills must be attached.

Farmer will be informed by telephonic to have form query.

Primary information about farmer land will be received by telephone.

Farm visit within 10 days of after received of application and verified the installation of system as per map and material as per bill will be checked and get farmer feed back.

Verification report submitted to account office.

Payment within 20 days if all document is complete through net banking.

Farmer economic study after our support. – Follow up

- **We have covered 295 farmers and 1422 acre drip irrigation area in last two years which is remarkable for water conservation in first phase – in this phase we have covered 66 farmers and 360 Acre land for the same.**
- **Total 968 Farmers and 5626 Acre Drip since 2011-12 to 2020-21.**



# Sustainable Livelihood Development



In the villages at Mundra Taluka, several communities are economically side-lined and weaker that depend on a sole income source or are unemployed. Sustainable livelihood projects have been launched to cater financial independence through building local partnerships, providing diverse livelihood avenues, inculcate the attitude to establish savings, equipping to earn and updating local skills by making use of existing resources to encourage self-reliant lifestyles. Participation Is encouraged by launching specific projects for fishermen communities, farmers and cattle owners, youth and women.

# Work till date for Fisherman Development

**444 Book Support**

**733 Vehicle transportation from Bandar to AVMB**

**86 Cycle Support**

**481 Scholarship Support**

**28015 Potable water provision**

**370 Youth Employment**

**2561 Fishing Net & Equipment Support**

**195 Linkages with Fisheries Scheme**

**3504 Ramaotsav Community Engagement**

**17 Fisherman Sea Weed Culture.**

**46878 Man days Mangroves Plantation**



## Fisher Folk Education (SDG 4/4.2)

Fisher folk are having less illiteracy level so they are not motivating their ward education, Children are engaged in fishing practices since child hood ,which pushed them in terribly poor scenario in every aspect of life. Hence Adani foundation have started education program in dynamic manner to cover each segment of life from the Balwadi to Higher education study through various Intervention.



**Scholarship Support** Scholarship Support is a programme to motivate fishermen students for High school and secondary education . Girl child is supported with 100% scholarship to girls & 80 % support to Male Students. Total 59 students were facilitated with scholarship current year

**Fishermen Balwadi** Education system were ceased in the covid-era. But with telephonic talk and home visit were continue since May 2020 with child & parents to keep them update for education, lesson revision and Covid awareness.

**Vehicle transportation-** Avail easy and safe transportation service for the Fisherfolk child of Various Vasahat to made them Regular and Synchronized with School atmosphere. Total 37 students from 6 to 10 standard are Benefitted.

## Fisher Folk Education (SDG 4/4.2)



### Book Support-

55 Higher secondary (9 to 12 standards) students were benefited with Books material from Juna Bandar, Zarpara, Luni, Navinal, Bhadreshwar Villages.

### Cycle Support

Cycle support to Juna Bandar 9<sup>TH</sup> standard fisherfolk students to continue their study and Up down who are studying in Mundra Government School. This year 5 students were supported for the same

### Ramaotsav

Ramaotsav Program was held at all fishermen vasahat for child motivation and aware parents for their ward education. This year total 442 students(1 to 10th standard) had participated in various outdoor game. Winner were felicitated with prize and others are appreciated with School bags.



# Machhimar Ajivika Uparjan Yojana (SDG 14/14.B)

Fishermen are too vulnerable and marginalised community. Moreover due to uncertainty of fish catch and Four month Fishing band season they have to face vicious debt cycle. Adani Foundation with Gujrat Fisheries Board are providing Fishing equipment support as per Government Schemes.

Also AF has started various intervention for their alternate Livelihood and Employment.

## Net & Equipment Support

Seven Fishermen are supported for Net and Equipment  
10 Fishermen Linkage with Fisheries Department Scheme and Fishermen credit card for bankable loan

## Mangrove Plantation

It is a win-win situation which provide 4830 Men days employment over 236 fishermen as well as created Environment sustainability as well.

## Soft skilled & Technical training

Survey had been carried out in APSEZ Companies to Know human resource requirement And According that Fisher Youth youth were trained and interviewed for the Placement.

**Total 70 Fishermen youth are selected and working in Various company current year.**



# Natural Farming Promotion

Soil is the key point for successful Agri-farming, it is the Millions of microorganism habitat which keeps an alive media for agricultural purposes, with improving water holding capacity, infiltration rainfall water rate, with improves plants ability to take soil nutrients which reflect on farmers Yield and returns. But the Imprudent & over use of chemical fertilizers & Pesticides deteriorate soil & Plant condition which made the ill effect on consumer health and farmer Livelihood .The permanent and cheapest solution to overcome the dangerous effects of modem agriculture to develop a farming system is to do natural farming which is economically productive and long lasting with various integrated and judicious method and management technique which play important role to maintaining or improving soil , plant health and farmers socio economic status.

## Objectives

- Maximize biological activity in soil and minimize soil erosion.

- Enhance the genetic and biological system and its surroundings.
- Provide livestock with optimal living conditioned for wellbeing and better health.
- Promotion of environmentally friendly use of soil, water and air thus minimizing agricultural pollution.
- To improve the physical and biological properties of soils, self-life and flavor of farm Produce
- To reduce the use of inorganic fertilizers and pesticides.
- To convert Farm waste Biomass into renewable energy & rich Fertilizer. To increase export of farm produce

## Implementation

A village level capacity building programs are organized for the farmers as awareness campaign and farmers are trained to adopt & implement Model farm initiative into their own farm. This Project will be implemented on cluster approach basis mean each cluster will have five to six model which will be used as demonstration and farmer to farmer

training to adopt and replicate in their own farm.





## Model Farming : Parameters

Sr. No	Activity Name	Objective
1	Soil Health Analysis	To Provide require Micro nutrient and improvement of soil quality
2	Cow Urine Collection	To prepare Jeeva Mrut, Gau Krupa Amritam Bacteria and Panchgavya
3	Cow base Farming	To use as liquid fertilizer
4	Home Bio Gas	Source of Renewable from Farm waste
5	RRWHS	To use of natural resource (rain water) to made independent Water sustain family.
6	Kitchen Garden	Ensure inexpensive ,regular and handy supply of fresh and healthy vegetables
7	Herbals crop farming	To avail herbal medicines at Home.
8	NB-21	To create individually fodder sustainability.
9	Farm Banding	To reduce soil erosion and retained moisture in the soil.
10	Bore well & well recharge	Enhance the ground water level.
11	Drip Irrigation	To save ground water & reduce salinity ingress.
12	Fruits Crop farming (seasonal)	To Fetch high yield and returns perennial
13	Compost Fertilizer	To act As conditioning soil with increase the Nutrients and water holding capacity.
14	Wormy Compost	Increase porosity and microbial activity in soil to improve water retention and aeration.
15	Training Otlo (Farmer to Farmer )	To deliver TRAINING IN FORMAL & Informal way.
16	Jiva Mrut	As source of Natural Fertilizer and micro nutrients to healthy crop and yield.
17	Vegetable Fertilizer	To create healthy soil condtion.
18	Mulching	To create microclimate around plants root to create healthy environment for plant growth.
19	Chaft Cutter	To made easy for cattle chewable & digestion.
20	Modern Agri Tools	To have great benefit in production
21	Nursary development	To avail local plants & seed.
22	Intern Crop	To produce greater yield in limited resources.
23	Mix Farming	
24	Government Scheme Linkage	
25	Dates Tissue & Offsuit Plantation	To produce uniform date fruits in the siza shape and taste.
26	Linkage with KRPC	To become share holder and ben

## Promotion of Natural Farming –Home biogas



Home biogas is the Israel based company was founded in 2012 manufactures dynamic biogas unit not only for farm waste but for kitchen waste too. Under Gram Utthan Project, Adani Foundation is supporting home biogas to farmers to Uthhan Villages phase wise. Current year supported 117 home biogas in Dhrub, Zarpara and Navinal Villages.

- Reducing organic waste,
- Transitioning to renewable energy
- Motivation for reduction in use for fertilizer

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And Improving the health and living conditions for the millions of families that are still cooking on charcoal and wood. Adani Foundation is not only supporting but creating awareness to save environment and health of the community who regularly cooking on Chula. It is proven that one hour cooking on Chula is as dangerous as smoking 40 cigrates.

As a Main Process, Bacteria break down organic waste in a naturally occurring process, and Home Biogas stores and harnesses the energy created so that it can be used for gas.

Earlier we had proceeded for capacity 2 cum but after visit and series of meetings with farmer group – we need to take up plant capacity 6 cum

Till date 117 farmers are utilizing it with satisfaction and considerable outcome by saving Average Rs. 23,400 for gas and fertilizer as well.



# Benefits of Home biogas

Plants without bio slurry:



Difference between plant growth



Plants with bio slurry:



Before home biogas



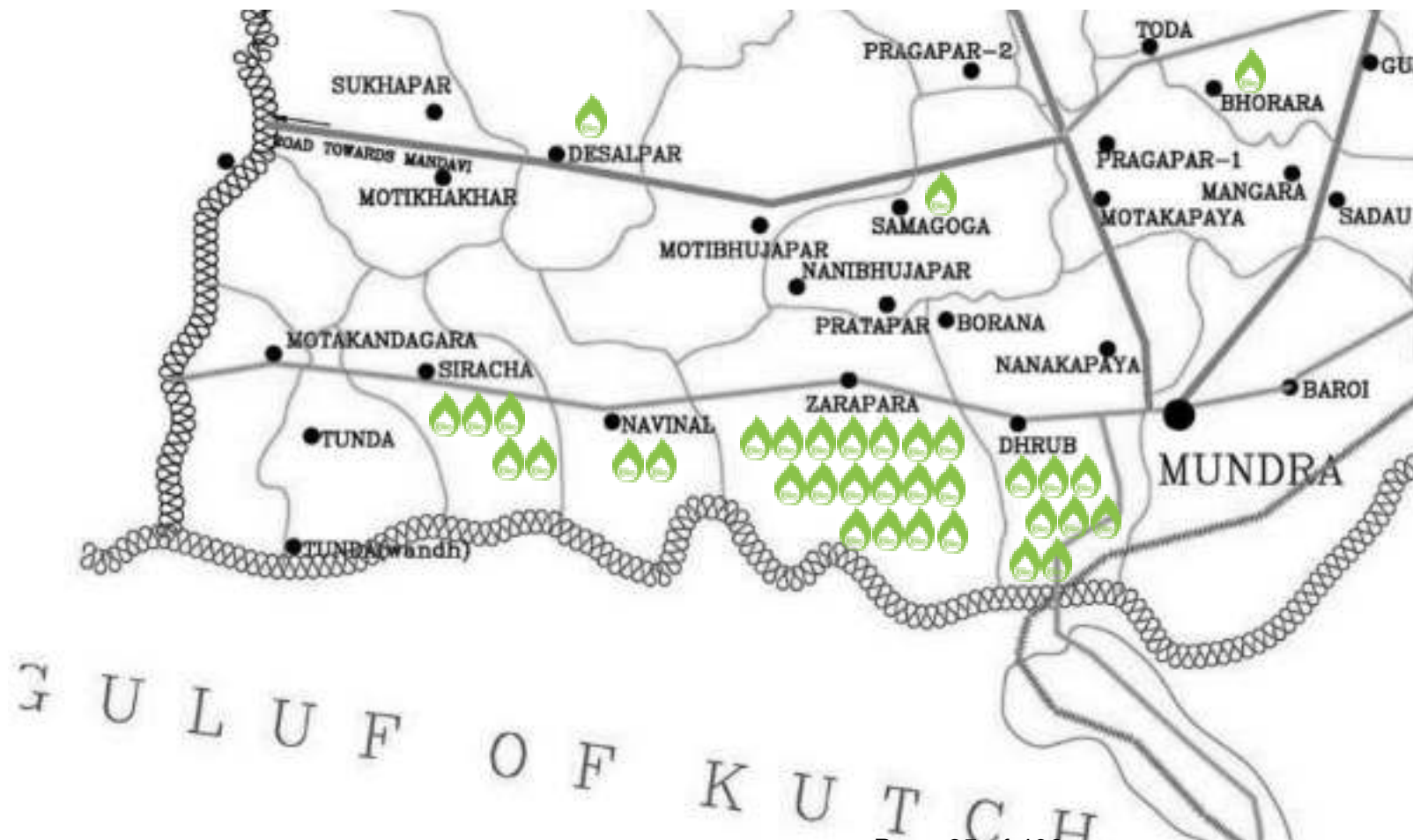
After home biogas



# Usages of biogas in villages of Mundra block

Selection of village by some important parameters i.e. Mobile Van data of lungs related issues, Ambient air quality, cattle population, agriculture land availability, willingness for natural farming

Selection of beneficiary base on willingness of Natural Farming and Number of Cattle. In this Project Primary Stakeholders are also partnering project by financial contribution as well.



	<b>Biogas – 117 Nos</b>
82	- Zarpara
18	- Dhrub
07	- Siracha
03	- Navinal
07	- Other

# Dragon Fruit Farming (SDG 2/2.4)



Dragon fruit is a tropical fruit that has become increasingly popular in recent years. Though people primarily enjoy it for its unique look and taste, evidence suggests it may provide health benefits as well.

Dragon fruit grows on the *Hylocereus* cactus, also known as the Honolulu queen, whose flowers only open at night. The two most common types have bright red skin with green scales that resemble a dragon — hence the name.

The most widely available variety has white pulp with black seeds, though a less common type with red pulp and black seeds exists as well. In Kutchh Red variety is available due to its weather condition and soil type.

Dragon fruit contains small amounts of several nutrients. It's also a decent source of iron, magnesium, and fiber. Dragon fruit contains several types of antioxidants. These are compounds that protect your cells from unstable molecules called free radicals, which are linked to chronic diseases and aging.

Due to all these benefits and suitable weather condition and soil type, Adani Foundation has provided technical support and awareness training to start the dragon fruit farming. Five dragon fruit farms have been developed with pole and wire fencing support for 2-acre land and 1000 dragon fruit plants each. Adani Foundation had given 40% contribution in this project. Fruiting will start from June 2021.



# Tissue Culture (SDG 2/2.4)

Date palm (*Phoenix dactylifera* L.) is one of the oldest trees known to mankind. It is popularly referred as “Kalpavriksh of Kutchh” as it is an important fruit tree of arid and semi-arid regions of the State owing to its high tolerance to environmental stresses especially abiotic.

The biggest constraint faced for the improvement of date palm following conventional breeding approaches includes its long generation cycles. Nonconventional approaches like Marker Assisted Selection is not possible as there is no true breeding population and very trace molecular work has been carried out till date.

Due to its cross-pollinated nature, date seeds are highly heterogeneous and heterozygous which give rise to 50% unproductive male trees and 50% female trees with poor or varying productivity in terms of both yield and quality.

Date palm cultivation is the only means of livelihood for majority of farmers belonging to Kutchh region of the state. Looking to aforesaid limitations in applying traditional and non-traditional approaches, mass multiplication (Tissue Culture) of superior quality date palm is the need of time to increase the socio-economic status of the farmers and date growers

## **Advantage**

Tissue culture plants bearing offshoots are true-to-type in nature and hence, in short duration a uniform population could be developed. Availability of planting material of Barahi genotypes round the year.

Selection of offshoots is carried out which are disease free, higher in yield and having good fruiting characteristics, hence export of fresh dates could be carried out by the farmers. Due to Large scale plantation of Barahi trees can be increased.



Dates is the nectar of the kutchh and Our periphery villages are known to produce exportable dates belt as having appropriate weather condition.

To increase the farmer income and over all production individual farmer We have provide “Barahi Varities Tissue plant” which has good strength and productivity.

850 plants have been distributed to 34 farmers. 25 plants / Farmers.

Tissue plant cost is 3000/ per cost with 50% famer Contribution. As per tracking record more than 97% plants are growing very well as per expectation.

# Agri mall by Kutchh Kalptaru FPO

Kutchh Kalptaru producer company is a registered FPO by central registration center has Started Agro cum Women empowerment Mall at Shantivan complex Nana-kapaya Mundra with support of AF to provide platform for farmers and SHG women to fetch the right value of their products.

The Grand Inauguration of Agri Mall was done on 26<sup>th</sup> October in presence of Mr.K.G Chaudhary (Sub District Magistrate Mundra) and Mr. Joshi Director (District Rural Development Authority, Kutchh) and Mr. Rakshit Shah EDM, APSEZ.

Currently more than 170 types of items i.e. Chemical free Grain, pulses, sugar, Jaggery, oil, masala, Vegetables ,dry Snacks made by women group, handicraft items, Mud Utensils, toys, handmade chocolates and many more are placed for sell.

Under the Umbrella of Kutchh Kalptaru farmers producer company more than 200 Farmers and 112 women been engaged. KKPC Agri –cum Women Empowerment mall Approx. Rs.4.07 lacs turn over till end Feb (for 6 months)



## Animal Husbandry-SLD (SDG 2/2.5)

The less rainfall and high saline ground water kept agriculture practices in threaten situation. Adani foundation have started various intervention for the Holistic development of Agriculture and Animal Husbandry

### Fodder support

In 20 villages of Mundra and Anjar Block. 6.70 lacs kg Dry Fodder and 11.60 lacs kg Green fodder has been supported.

**95 Farmers** benefitted with NB -20 Off suite to bring fodder sustainability.

**125** farmers are supported with 40KG maize per farmer with Micronutrient for **Individual Fodder Cultivation** during winter Season.



Sr. No	Village Name	No of Farmers	Average Production	Average rate	Average Value
1	Zarpara	64	4562.26	2.5	7,29,961
2	Navinal	23	3973.91	2.5	2,28,499
3	Siracha	35	3910.28	2.5	3,42,149
4	Desalpar	3	3733.33	2.5	27,999

### Fodder Cultivation

Village Gauchar land development for the fodder cultivation to made fodder sustain village & Avail green fodder in scarcity phase.

With the support of Gauchar Seva Samiti Grass land development in Siracha-85 Acre & Zarpara -25 Acre done which resulted in total production 82 ton.

## Animal Husbandry-SLD (SDG 2/2.5)

### Bovine brucellosis

Bovine brucellosis is chronic factious cattle disease that causes abortion, dead & weak birth of calves, and infertility which reduced milk production and ill effect on health as well. Cattle and buffaloes are susceptible and persist for many years. It's a zoonotic disease (that can be transmitted from animals to people)

Brucellosis disease Control and management project has been started in our 11 Villages with (**National Dairy Development Board and KFFFDC(Kutch fodder fruit & forest development trust)**) is ongoing with awareness & vaccination to (0 to 3 yrs female cattle).

#### **Total 2132 Cattles have been vaccinated**

Under this project following activities were carried out so far,

- Meeting with Gram Panchyat, Farmers and Livestock Owners
- Development and Distribution of the Awareness Materials among the stakeholders
- Mass Level awareness by pasting the poster and meetings with Village Leaders and Gram Panchyats
- Primary Survey and Sample Collections i.e. Milk Ring Test, Blood Collection and testing
- Brucella Vaccination and Ear Tagging etc.
- Expense per Animal = Rs. 177 / Cattle – including awareness and vaccination



# Women Empowerment (SDG 5/5.4)

Today entire world is nothing against the corona pandemic ...not only India but all the nations world wide are striving hard to fight against this and come out of it at earliest . The situation lies in invisibility and severity of the causative agent . It is generally observed that the newly discover diseases are such which could be avoided by being more cautions.

Adani foundation works hard for upliftment of women, it has noteworthy history of completing and executing projects addressing issues like educations, health and empowerment from grass root level in Kutch district many project are done for females by various organizations but there are certain issue specially pertaining to women 's health which are still remaining unaddressed due to the social stigma and hesitations issues' like usage and importance of sanitary pad during menstrual cycle to protect oneself from fatal disease . This simple precautions can also help a female to fight against cervical cancers like

disease as well. Keeping this thought in 8<sup>th</sup> March 2020 Adani foundation held a seminar on awareness during menstrual cycle -Myth and facts . The seminar witnessed 300-400 Participants including women college going girl ,homemakers etc.. This initiatives helped the females to voice out their quarries and problems and to get a solutions for the unusual problems. District Development officer was the part of the seminar.

District development officer of kutch shri Prabhav Joshi was highly impressed with the task been undertaken for women empowerment and the motivated for production of sanitary pads to the women of adani foundation . This task was very planned and executed by the enthusiastic women group – it was a great journey towards success”

Initially the works seemed toughed as the outcome /day was 150-200 pads with minimum profits . Bit real salute this women that they did not lose hope and tirelessly kept working for this

mission . It is rightly said “practice make a men perfect and the graph of producing the pads per day rose from 300 to 350 and further elevated to 400 to 500 by proper distribution of work with strict target . Simultaneously the order started pouring in from District were satisfactorily completed . Today each woman is earning average 2900 Rupees /Month ,expansion of this task is being planned by Marketing it to every small and making it a sustainable model which may be a benchmark in itself.

The spirit hard work and motivations of these women have given a way to increase in demand from district development office ,PHC,CHC office Aganvadi and even out of state orders will be very soon catered to.

This is an example showcasing how women empowering can bring about development of as small scale task to a full- fledged Endeavour.

## Women Empowerment (SDG 5/5.4)

Empowered women and girls contribute to the health and productivity of their families, communities, and countries, creating a ripple effect that benefits everyone.

An initiative under the Sustainable Livelihoods Development Program to encourage women, sense of self-worth, decision-making power, access to opportunities and resources, power and control over her own life ability to be effect change.

11 SGH Group have been engaged with 127 Women



**Saheli Swa Sahay Juth** are trained for Sanitary pad preparation and supported with semi Automatic sanitary pad making unit. In the year of 20-21 total turn over was Rs.3.12 Lacs

## Self Help Groups

**Adhar Saheli Swa Sahay Juth** is engaged making dry nasta preparation got Fssai Certificate in current March which will help to market the products

**Sonal Saheli Swa Sahay Juth** is engaged in Phynale & Washing powder making its Current year turn over was Rs.4.50 Lacs

**Tejasvi Saheli Swa Sahay Juth**- is expert in Stitching practices & made approx. Ninty thousand Three layer mask which had generate Rs.9.45 lacs revenue over 10 Women.



Sr. No.	Name of Group	Village	Skilled	Member	Total saving (In Rs)
1	Sonal Saheli Swa Sahay Juth	Shekhadiya	Phynale & Washing Powder	11	1,32,500
2	Jay Adhar Saheli Swa Sahay Juth	Baroi	Dry Snake	10	84,000
3	Tejasvi Saheli Swa Sahay Juth	Mundra	Stiching,Uniform,Bag	14	84,000
4	Umang Saheli Swa Sahay Juth	Mundra	Soft toyes, Jula,	11	84,000
5	Vishvas Saheli Swa Sahay Juth	Navinal	Tie & Die, Stiching	11	84,000
6	Jay Momay Saheli Swa Sahay Juth	Kandagara	Tie & Die, Stiching	10	84,000
7	Meghadhanush Saheli Swa Sahay Juth	Mudara	Mud Works,	10	84,000
8	Saheli Swa Sahay Juth	Mundara	Sanitary Ped	11	84,000
9	Radhe Saheli Swa Sahay Juth	Zarapara	Dhadaki, Small Godadi	14	84,000
10	Shrddha Saheli Swa Sahay Juth	Mota Kapaya	Snacks,Thepala,Vada Pav	15	84,000
11	Mogal Saheli Swa Sahay Juth	Shekhadiya	Roti,Ladu ( Churama )	10	84,000
Total				127	9,72,500

# Community Infrastructure Development (SDG 9,6)

Community infrastructure development includes both public and privately provided facilities and services required to accommodate and support community services, programs, activities, which is significant to improve their quality of life & Productivity. Adani foundation designed and build various structure and provide service in the Health ,Education, agriculture and sustainable livelihood area.



## Community Infrastructure Development (SDG 9,6)

To store rainfall water and increase water level, Pond Bund strengthening work had been carried out at Zarpara Village apart from this various activity like approach Road Restoration at All Fisherfolk Vasahat, Bus Stand with wall Construction, Open Shed Sukhpurvah Mundra, Shelter at Randh Bandar , Garden Development Primary School Rampar village has been done in this year.



Bund strengthening work at Zarpara



Approach Road Restoration at All Fisher folk Vasahat



Garden Development Primary School Rampar village



Open Shed Sukhpurvah Mundra

# SuPoshan (SDG 3/3.8)

The objective of the Project is to reduce occurrence of malnutrition and anemia. create awareness about malnutrition and anemia and related factors amongst all stakeholders and role they may play in curbing the issue.

To successful implementation of the project, "Sangini – Village Health Volunteer" plays major role in the Project. The purpose of the Project is to reduce occurrence of malnutrition and anemia. create awareness about malnutrition and anemia and related factors amongst all stakeholders and role they may play in curbing the issue.

To successful implementation of the project, "Sangini – Village Health Volunteer" plays major role in the Project.

As per Global Nutrition Report, Children below five years- 23 % Stunted and 8 % are wasted. 69.5 % children 6-59 months old, 55.8% adolescent girls aged 15-18 years, 55.3% women aged 15-49 years have Anaemia. Moreover anaemia prevalence in pregnant women is as high as 58.7 %) Curbing Malnutrition was part of Millennium Development Goals and again focussed through second and third Sustainable Development Goals on Zero hunger and Good Health & Wellbeing respectively.



During the year various activity like, Covid-19 awareness in village & Slum Area, Menstrual Hygiene Day, Breastfeeding Week, National Deworming Day, National Nutrition Month had been celebrated.

With slogan of "RED-ACHHA HAI" - 100 beneficiaries in Menstrual Hygiene Day, 204 beneficiaries in Breastfeeding Week, 320 beneficiaries in National Deworming Day, 20 villages covered in celebration of NATIONAL NUTRITION MONTH and 42 Family counselling had been done.

Community Engagement and other Activities		
Sr.No	Activity	Total
1	No of Sangini	24
2	Total Village Cover	41
3	Total Anganwadi Cover	70
4	SAM to MAM Monitoring Progress	03
5	MAM to Normal Monitoring Progress	15
6	Focus Group Discussion	85
7	Family Based Counselling	42
8	Village level Events	05
9	No of SAM children referred to CMTC	06
10	Total Anthropometric screening	140
11	Total Family Cover through video & Audio Calling	20
12	Total House Hold Family Visit	130
13	No. of Severe Acute Malnourished children (SAM) Telephonic Counselling	08
14	No. of Severe Underweight children (SUW) Telephonic Counselling	03
15	No. of adolescent girls-Telephonic Counselling	190
16	No. of pregnant women-Telephonic Counselling	100
17	No. of lactating mothers-Telephonic Counselling	230
18	No IFA Tablet Distribution to adolescent girls	200
19	Total Family Cover	9178
20	No of Sangini completed online POSHAN Abhiyan E- Learning module	15

## THANKS GIVING PROGRAMME” MUNDRA & BITTA Site

SuPoshan Thanksgiving program was organized. In this webinar DDO, CDPO Mundra and other dignitaries remained present and appreciated the efforts to overcome malnourishment in Mundra and Bitta.



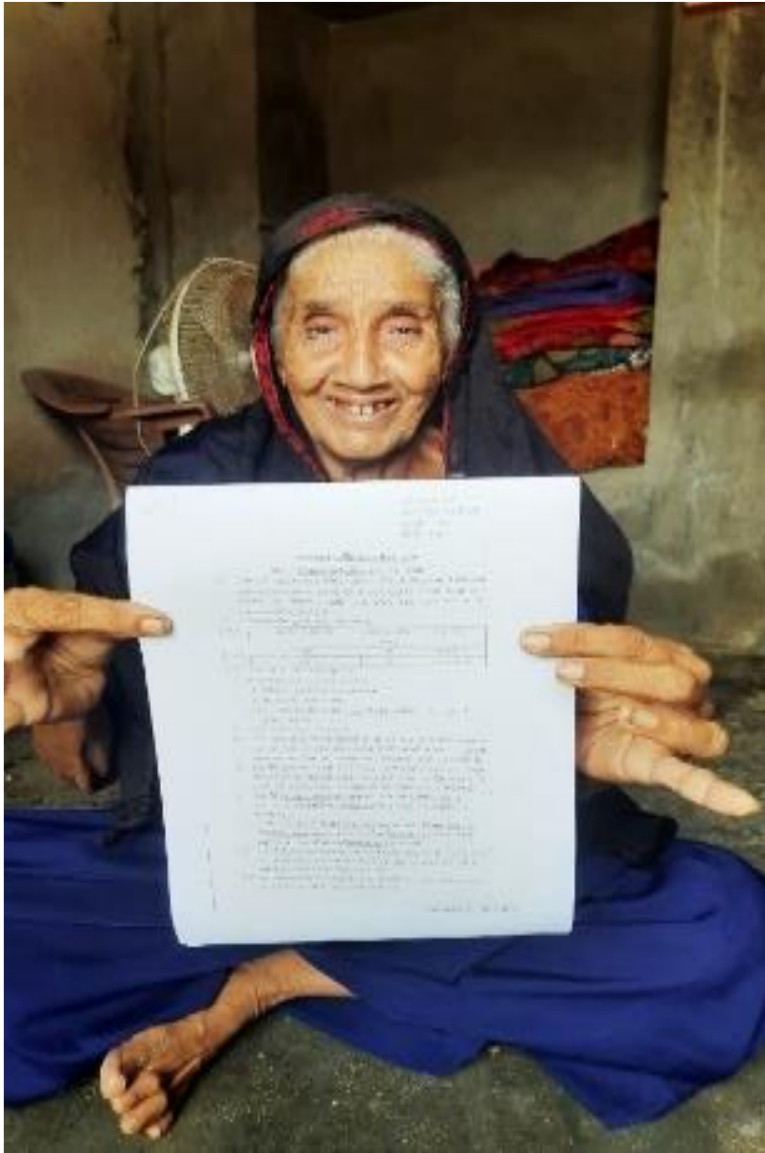
# Community Resource Center (SDG 3)

Community resource center is the bridge between Government Schemes and real Beneficiaries. It is situated at Adani Field Office, Baroi with the motive to be Single window point solution (Online Application & Documentation) to Facilitate Government Schemes leveraged to needy and Eligible people.

- ✓ Listed out the Widow ,Senior Citizens ,Handicapped & Orphan Child from seven Utthan villages and linkages accordingly with the Social Defense Department Scheme,. 276 people are Facilitated in coordination with Bhuj Samaj Suraksha Khata.
- ✓ With a slogan "Beti Bachavo – Beti Padhavo" to ensure better future for Girl child education by Linking 1001 Girl child with Government "Sukanya Samrudhhi Yojna" & Vahali Dikri Yojna.
- ✓ 48 SC Farmers were Linked Kitchen Garden Scheme.
- ✓ To avail Fishermen Government scheme (Fishermen Credit card) one day program was arranged with social distancing and all precaution.
- ✓ 30 KCC form fill-up at Navinal. Created awareness with Telephonic about same



## Project Swavlamban



Project Swavlamban Launched for linkages of differently abled people of Kutchh District to Social Welfare Department. Foundation is playing supporting role to increase awareness and tie up with Government schemes for Divyang people, widows and senior citizens and coordinate them with Social Welfare Department.

The identity cards - UDID are issued for the handicapped in coordination with Bhuj Samaj Suraksha Khata which is beneficial for them to get specific kit for their disability type.

After getting income generation equipment support - Proper training provision is given to make them self-reliant in true sense!!

**Till date Total 1057 beneficiaries have been linked up with various government schemes and 519 beneficiaries have been supported through various schemes of income generation.**

**Total 1576 beneficiaries have been benefited and get support of Rs.24,12,550/- through Government and Adani Foundation.**

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# Adani Skill Development Centre



India has highest population of the youth yet there has always been a major issue of increasing unemployment on one side and non-availability of skilled professionals for industries.

Adani Group has initiated Adani Skill Development Center model with broad and long term vision to enhance employability of youth and getting right people at the right place of skilled requirement.

Adani Skill Development Centre (ASDC) is playing a pivotal role in implementing sustainable development in the state. ASDC is envisioned to be playing a major role in elevating the socio-economic status of the people belonging to the lowest strata of the society by empowering them with various skill development training for employability and livelihood.

Over the last few years, ASDC has assessed various aspects of the technical, leadership, and soft skills gaps that organizations, in general, face and accordingly, focuses on imparting required training in those areas in partnership with various colleges and institutes.

Several miscellaneous industries exist in Kutch district. Adani Skill Development Centre has started a center in Mundra and Bhuj block so that the needs of these industries are fulfilled.

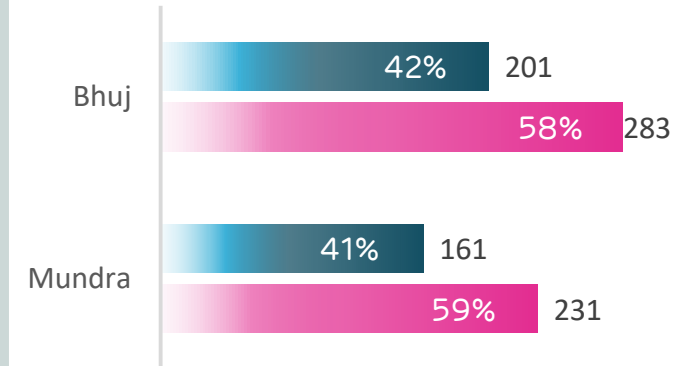
## Admission for the F.Y. of 2020-21

### Bhuj

Free Training Model  
Paid Training Model  
Kachchh University

General Duty Assistant	Basic Functional English	Digital Literacy	Entrepreneurship Skills	Financial Literacy	Mud Work	GST with Tally
0	185	25	0	0	0	40
140	3	47	1	2	4	18
0	0	2	0	5	0	12

Male Female



### Mundra

Free Training Model  
Paid Training Model

Basic Functional English	Basic Home Health Care	Beauty Therapist	Business Training (MS-Office)	Digital Literacy	Financial Literacy	General Duty Assistant	Marketing Skill	Mud Work	Non Domain Skills	GST with Tally	Training Skill
43	12	00	66	57	07	04	11	00	03	00	15
07	00	56	00	20	00	13	00	73	00	05	00

# Placement Details

ASDC imparted various soft skilled and technical training to made Atma Nirbhar India. Total 47 youth have been placed in various company and 37 youth are been self employed.

## Bhuj

Trade	Total Trained
General Duty Assistant	51
Basic Functional English	79
Digital Literacy	61
Entrepreneurship Skills	1
Financial Literacy	2
Mud Work	4
GST with Tally	16
<b>Total</b>	<b>214</b>

## Mundra

Trade	Total Trained
Basic Functional English	50
Basic Home Health Care	12
Beauty Therapist	52
Business Training (MS-Office)	66
Digital Literacy	77
Financial Literacy	7
General Duty Assistant	13
GST with TALLY	9
Marketing Skill	11
Mud Work	73
Non Domain Skills	3
Pedicurist and Manicurist	4
Training Skill	15
<b>TOTAL</b>	<b>392</b>



## E-Learning Training at Bhuj



In this type of pandemic we have started virtually training on various trades like General Duty Assistant, Digital Literacy, GST with Tally, Basic Functional English etc. On Saksham Day we started E-learning training of Digital Literacy & Basic Functional English on free bases.

Till date we admitted 221 candidates in domain courses and 263 candidates in non-domain courses.

Now we started offline training with following all Covid-19 related guidelines.



The students of DDU-GKY (GDA) creating awareness regarding Covid-19 in their own village through various activity



Meeting at Palara Jail and after that meeting we did skill survey of around 150 prisoners.

MoU signing ceremony was arranged by **Krantiguru Shyamji Krishna Verma Kachchh University** on 11<sup>th</sup> January, 2021. In this project we will provide training in 4 courses (General Duty Assistant, Digital Literacy, GST with Tally & Financial Literacy).

MoU signing ceremony was arranged by **The Takshshila Educational & Charitable Trust - Bhuj** on 06<sup>th</sup> March, 2021. In this project we will provide training in 7 courses (Entrepreneurship skills, Non Domain employability skills, Diet & Nutrition, First aid, Digital Literacy, GST with Tally & Financial Literacy).



Arranged interview of DDU-GKY GDA students at Sterling Hospital – Gandhidham, GAIMS (Sodexo), Chanakya College, Accord Hospital, Fire Academy. 39 students get placement in GAIMS (sodexo), Alilance Hospital, Shreeji Hospital, Bhuj Fire Academy, Divine Hospital etc. 3 students are working in COVID-19 Hospital



online beauty therapist course has been conducted by  
ASDC Mundra



Online mudwork training has been organized by ASDC Mundra,  
after training 28 students became self employed.

## Soft skill training for Fishermen youth & Industrial Employer meet



Organized industrial employer meet at Adani House with support by Adani foundation team. And conformed Vacancy details in respective Company. After that ASDC munda team and Adani foundation jointly given 3 days soft skill training for Fisherman youth. The main objective of this training are to provide alternate livelihood to Fisherman community group specially those youth who are 10th -12th, ITI, diploma and graduates.

# CSR Nakhatrana



Adani Green Energy(MP) (AGEMPL) set –up approx. 1250 windmill from Dayapar to Nakhtrana in Kutch (Gujarat). And as the part of our corporate social responsibility adani foundation have started various intervention for the holistic development of community since 2019 in the Ratalita , Amara, Deshalpar ,Jinjay, Dhamay & Ugedi Villages with Community Involvement by means Participatory Rural appraisal (PRA), and VDC (Unnati manch) formation to identified real need and extended our arm to render Education , Health , Livelihood and community infrastructure facilities.

**Water through construction** with 10 KL capacity in the barred land to avail drinking water for domestic cattle and wild animal at Ugedi & Deshkapar Villages.

**Urinary Block Construction** in the Ugedi village to keep Swachh Villages swachh and to provide privacy for women

**Swachh Village** Cleanliness is the beauty of village and to inculcate the habit to keep villages swachh and clean. 100 Dustbin were provided to 8 Villages of Nakhtrana which are been kept at Public places and maintain and monitoring by GP

**Sitting arrangement** with Benches and tree plantation around the cricket ground of Kotda madh villag with tree Guard.

**Uakdo distribution** it is been said that Prevention is the better than care hence to mitigate the ill effect of covid-19 we organized Ayurvedic Kwadh & Immunity booster medicines distribution camp in the Nakhtrana city. And aware to take precautionary care.

Adani Foundation Kutch

Total 500 people were benifitted with the same.

#### **Event**

- **World Environment Day** Celebration on 5<sup>th</sup> June and **Van Mahotsav week celebration** in Ugedi village with awareness and tree planation Program.
- **Women day celebration** on 8th march with Collaboration of ICDS Department in the Ugedi Village . On this occasion Elocution competition were held on the topic of women empowerment and women right among primary students and winner were felicitated with memento prize. More than 60 Women were remain present and motivated and Encouraged .
- **Tree Plantation** have been done in the Ratadiya and Deshalpar villages with tree guard with sensitization about the important of trees and responsibility for watering and caring of trees.

**Lakhpat** : Tree plantation with awareness at Kapurashi & Koriyani village of Lakhpat Taluka. Adani Foundation had also provided 150 cages.



# CSR Nakhatrana

## Setu

we are acting as the bridge between Beneficiaries and Government to facilitate government welfare scheme. due to this effort 82 widow women are getting widow pension of rs.1250 per month which is worth for them.

## Swavlamban

Adani foundation provide tool & Kits support to Physically disable person the main objective of the program is to made them self sustain and "Atma Nirbhar" We are supporting various Tool & Kits to various Villages

Swavlamban Support To Disable Person								
Sr. No	Village Name	Sewing Machine	Cabin Shop	Flour Mill	Wheel chair	Trycycle	Hand Cart	Total
1	Dahmay	1						1
2	Aamara	4		1			1	6
3	Jinjay	2		1	1			4
4	Deshalpar	1	1					2
5	Ugedi	1	3		1	1	1	7
6	Ratadiya		3					3
Total		9	7	2	2	1	2	23

Sr. No	Scheme	Beneficiaries
1	Widow Pension	82
2	Bus pass	5
3	Wheel Cahir	2
4	Panchar Kit	1
Total		91



## CSR Nakhtrana

Semi arid climate with very scanty rain fall does not support extensive and water intensive agriculture in the nakhtrana region .

more ever Farmer are not aware about modern agri technology adani foundation have started some intervention for the integrated agriculture development .

### Kitchen Garden Kit

To promote the horticulture farming practices farmers are provided with Kitchen garden kit with twelve type if Vegetables , fertilizers and plastic carret.

**Promote for Vegetable farming** with structure support i.E Bamboo ,wire and cement Pole support to set up structure for vegetable support and grow.

Sr.	Village Name	Kitchen Garden Farmers	Vela Vala Farming
1	Ugedi	8	3
2	Ratadiya	8	
3	Aamara	7	
4	Deshalpar	10	2
5	Jinjay	7	
<b>Total</b>		<b>40</b>	<b>5</b>

### Organic Farming training

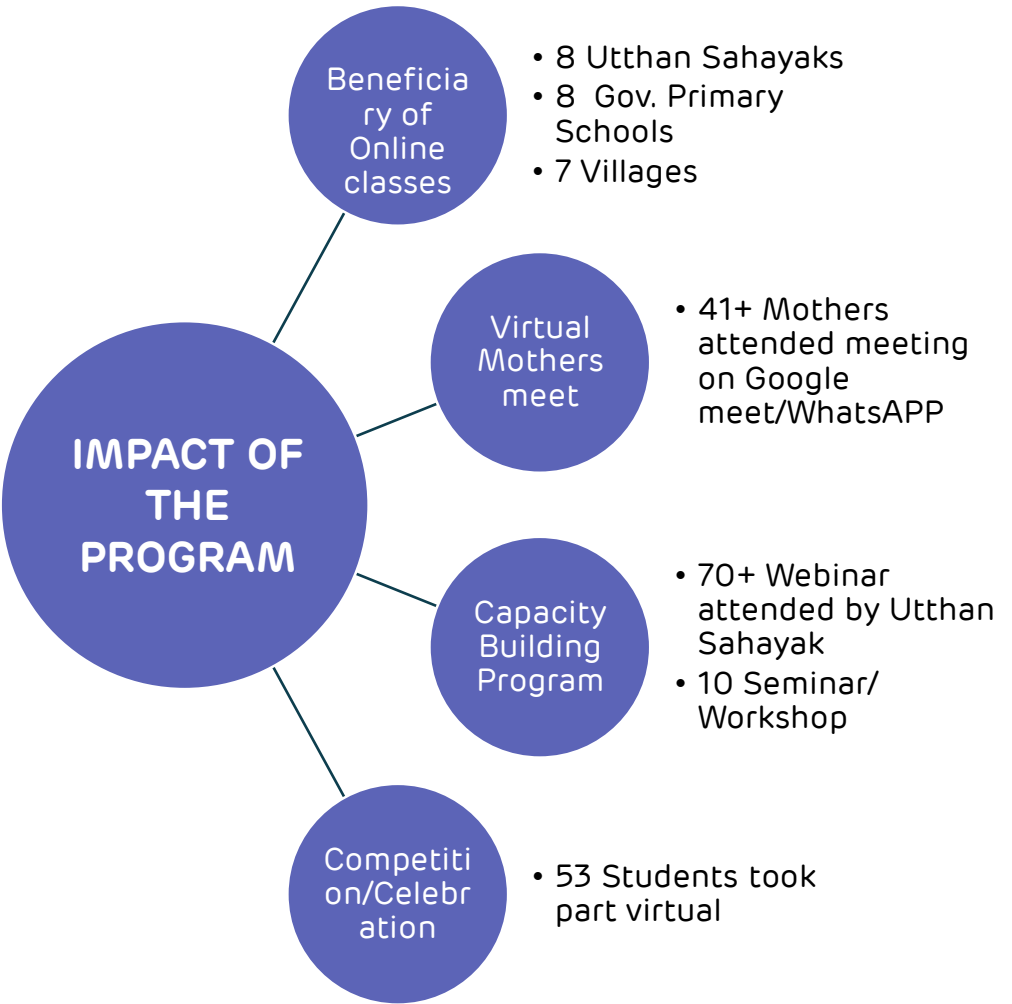
To aware about the ill Effect of pesticides and chemical fertilizer in farming and promote toward organic farming training was organized at Deshalpar with hand on training for Jivamrut preparation.Total 38 Farmers were participated

**Modified Dev-6 wheat seed Distribution** to two farmer of Deshalpar and Ugedi Village as demonstration which resulted that it produce High yield with less irrigation comparatively.



# Utthan Nakhtrana

Large-scale efforts have been made by the government and non-government sectors, especially in rural government primary schools, but coverage and quality of education are still not satisfactory. Adani Foundation leveraging their experience, to intervene in Government Schools. These interventions will aim to enhance the quality of primary education in Government schools. Under Project UTTHAN 8 primary government schools of Nakhtrana Taluka of Kutch district have been adopted to take up various initiatives aimed to improving quality of education these schools. Total 234 priya vidyarthi are benefiting from a meaningful education in these schools. .



Year	No's of School	No's of village	No's of Girl	No's of Boys	Total
2019-20	8	7	560	590	1150
2020-21	8	7	593	570	1163



## CSR Nakhtrana

Environment and bio diversity conservation is always been the prime responsibility of Adani Foundation. With this objective we started such work in Ugedi village near Nakhtrana to develop Ecological green belt to attract major faunal group such as amphibians, reptiles, birds, butterflies and mammals and restoration of native vegetation to improve overall ecological food web of landscape.

This work has been entrusted to Sahajivan, an expert organization for the protection and conservation of biodiversity as part of which following work have been carried out.

- BMC –Bio diversity conservation committee has been formed in Ugedi Village.
- Habitation Improvement by removed "***PROSOPIS JULIFLORA***"- **Ganda Bavar** from 8-10 hectare and native tree seed has been sprinkled As well as in the garden of Ugedi village and in the place of Angalwadi, trees have been planted. Also, in the seam land seam area of Ugedi village, more than 300 native trees have been planted like Desi baval (*Acacia nilotica*), Mithi Jar (*Salvadora oleoides*), Liyar (*Cordia sp.*) and Gugal (*Commiphora wightii*) Pilu, Khejari, have been planted.
- Improvement of Catchment : approx. 750 cubic meter excavation and embankment in sloping ground to increase catchment area of open pond to support existing Vegetation and other Biodiversity
- Three species **1. Bird - Peacock 2. reptile-Spiny tailed lizard 3. mammal-Chinkara** are selected for Conservation
- Started awareness program with pamphlet, Leaflet and IEC Material distribution in the Villages and School to sensitize about their importance to maintain ecosystem and Bio diversity.





## CSR Tuna



Adani Kandla Bulk Terminal Pvt. Ltd. is joint venture of Adani Ports and SEZ Limited as well as Kandla Port. There are three Villages & Two Fishermen Vasahat where Adani Foundation Doing various CSR activities in the Education, Health , SLD and Community Infrastructure area. Adani Foundation are running Rural Clinics in 3 villages on regular basis and supporting the villages in water storage and distribution networks. Current year supported for Drainage network for Tuna and Wandi as per MOU between Pandit Dindayal Trust and Adani Foundation

## Drainage work

As per MOU between Dindayal Port Trust and Adani Foundation – Contribution of Rs. 40 Lacs for Drainage Facility Provision in Tuna and Wandri Village was taken up and work will be completed upto June 2021

## Water facility

To reduce water born disease, we are providing portable drinking water facility at Dhavalvaro bandar and Vira bandar.

## Ration kit support

During covid -19 pandemic & lock down directly and adversely affect over Poor and vulnerable families whose are sustain daily wages work. We Distributed Ration kit to those people with aware to take precautionary measures as well. Total 1100 Ration Kits were distributed to Tuna Rampar and Vandi Villages

## Tree plantation

Tree plantation has been carried out at Tuna, Vandi & Rampar village and

Garden development work has been done at Rampar primary school which would create healthy environment and entertainment over students.

## Fodder support

in Rampar and Tuna village 47950kg dry fodder and 335730kg fodder has been supported during this year.

## Rural Clinics

Rural Clinics 2 hours per day are operated by Adani Foundation to ensure primary health at door step. Total OPD is @ 350 per month.



# CSR Bitta



Under Adani Solar Limited – 40 MW Solar Panel Power Unit is Situated at Bitta Village in Abdasa Taluka. We have done various activity under the CSR work.

As Abdasa is water scared region with list amount of rain Fodder support had been provided to 100 ton fodder to Bitta, Dhruvi and Moti Dhruvi villages.

Cleanliness of village Pond inlet in the Bita Village which lead more storage capacity and Village. Pond bunding construction in Dhufi village.

Cricket ground of bitta village has been upgraded and cricket kit provided to youth.

Panchayat Building construction was carried out by Adani Foundation's support and technical guidance.

Drainage line maintenance and Cleanliness is frequently done in Bita which lead Swachh Village

# EVP

## Employee Volunteering program

Since last few years adani group employees are adopting students of migrant labours. this year also all the 802 students of Vallabh vidhalaya were adopted. All this students are belongs to migrants labour families who are working in various industries in and around of Mundra. The students does not feet any difficulty of language because the vallabh vidhalaya is Hindi medium school.

On 1st may i.e. on the world labour day, all the cheques of rs.16.04 lacs had been handed over to Mr. Dharmendra who is the director of vallabh vidhalaya

Due to COVID-19, the 10th standards students of AVMB felt difficulties in study as they do not have any digital gadget for online learning. Our APSEZ Employee had been voluntary support to provide Lenova tablet to the AVMB Students.



# WORK DURING COVID-19

To fight against the COVID19, Adani foundation has stepped up to guard the health and well-being of rural communities, provide relief material to needy.

Chemical sanitization was carried in various villages of Mundra with the coordination of Fire Department APSEZ. With coordination of Port, Wilmar and Foundation free cost food facility (Breakfast, Lunch and Dinner) in port & SEZ premises and AWL area.

24

Sanitization work in villages

1900

Daily Food Facility (Breakfast, Lunch, Diner) for 1900 Labour per day

5500

ration kit support to needy people (Specially Fisherman, daily wedge workers, widows and senior citizen).

105000

Mask prepared by women SHG for Government officers / staff of SDM, ICDS, TDO, Custom, THO, Police Dept. etc.



Adani Foundation Kutch



## WORK DURING COVID-19

Providing treatment is prime thing in case if any outbreak but making people aware about safety n self quarantine plus to handle the panic situation. Our mobile health care unit had provided primary treatment to community at door step and also created awareness. In this panic situation Adani Hospital Mundra had continue his IPD and OPD services. SuPoshan Sanginis led awareness drives for conveying correct hand washing techniques, importance of sanitization. They also visited pregnant women and counselling regularly. 'Awaz De' a voice message campaign was started in local kutchi language to make the people aware on COVID-19.

158

Taken care of Senior citizens at old age home

-

Awareness drives by SuPoshan Sanginis

-

Mobile health care unit provides Primary treatment at doorstep

35000

'Awaz De' a voice message campaign in local Kutchi language



# Our Change Makers



In critical time of Corona, Medical Officer Dr. Deven Goswami, Dr. Narendra Dodiya and Dr. Mukesh Parmar has performed their duties at GKGH Hospital for 1.5 month period.



## My Mother's dream became true

Name: Mura Keshabhai Dhuva

Place: Khavda, Bhuj, Kutch, Gujarat

Employer: Alliance Hospital (Covid 19 hospital), Mundra, Kutch, Gujarat.

Job: Joined as Nursing Assistant.

Salary: Rs. Up to 9000/- per month with lodging and boarding facilities.

### **Candidate Brief:**

He belongs to rural family. Father is Carpenter and mother is Home maker. Parental household's monthly income prior to his placement was Rs.8, 000. His prior educational qualifications is 12th pass.

### **In his own words:**

My mother's dream is that one of the sons should be in medical field. But due to financial constraint, I couldn't study further. I thought I will never be able to fulfill my mother's dream but fortunately, I got opportunity to get trained under GDA course and soon after its completion, I got placement in hospital. I feel proud to serve Covid19 patients and will continue doing fearlessly.

Thanks to Adani Skill Development Centre to give me opportunity to take training under DDU-GKY scheme and make me capable to take care of my family.



## It helped me to become good team member and work efficiently

Name: Nipul Punjabhai Sanjot

Place: Bidada-Mandvi, Kutch, Gujarat

Training Trade & PIA: Completed a course in General Duty Assistant from Adani Skill Development Centre, Bhuj under DDU-GKY.

Employer: Alliance Hospital (Covid 19 hospital), Mundra, Kutch, Gujarat.

Job: Joined as Nursing Assistant.

Salary: Rs. Up to 9000/- per month with lodging and boarding facilities.

He can be contacted at: 9726242085

### **Candidate Brief:**

His father and mother works as helping staff (housekeepers) in another hospital. Monthly income of family prior to his placement was 10,000/-. His prior educational qualifications is 12<sup>th</sup> pass.

### **In his own words:**

I am youngest in Covid19 hospital here but I know this is the time to act wise. When my friends ask me do you fear working as PCA? I simply laugh and say I am trained in GDA course and fully prepared for this work. My duty is to check patient's temperature, blood pressure and oxygen level and maintain record. We get residential facility nearby hospital. To Treat Covid19 patients, needs a courage and team work and I am blessed I got this wonderful chance.

Thanks to Adani Skill Development Centre to give me opportunity to take training under DDU-GKY scheme and make me capable to take care of my family.



Name: Khoja Sahista Hussenal

Place: Kera, Bhuj, Kutch, Gujarat

Training Trade & PIA: Completed a course in General Duty Assistant from Adani Skill Development Centre, Bhuj under DDU-GKY.

Employer: Om Maternity Home, Bhuj, Kutch, Gujarat.

Job: Joined as Nursing Assistant.

Salary: Rs. Up to 7000/- per month with lodging and boarding facilities.

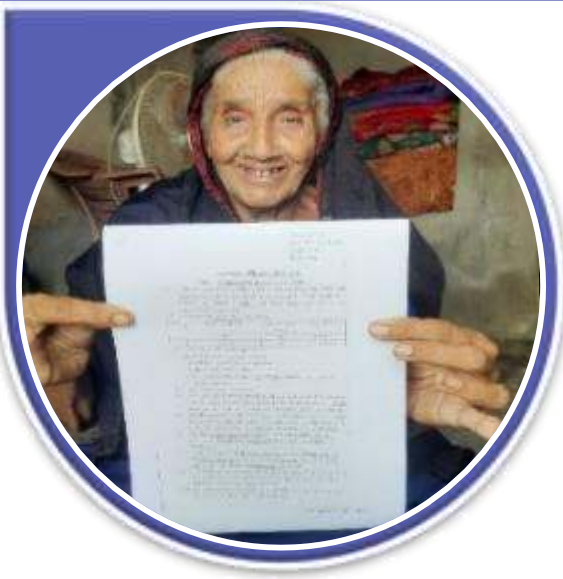
He can be contacted at: 8347304586

**Candidate Brief:**

She is belong to poor family. Her family's monthly income prior to his placement was Rs. 8,000 and source of income is from grocery store. Her prior educational qualifications is 12th pass.

**In her own words:**

My name is Sahista khoja i am living in kera village . My father's dream is that my daughter should be in medical field. But due to my mother's health issue i completed my SSC and HSC external And i thought i will never fulfill my father's dream but fortunately i came to know from my friends about GDA course and i got opportunity to trained under that course. And I started my internship at Om maternity home and on last day of internship i got placement their. I want to thank Adani skill development from the bottom of my heart to give me opportunity to take training under DDU - GKY and make me capable to became a second earner for my family.



## Stick at old ages

Dhanuba a self-esteem lady from Zarpara Village. While I peeped in her life it seems like that her existence is only to bear grief and sadness. Her husband was passed away before 20 Years since that she has been enduring social and economic responsibility of her family by drudgery daily wages. She have two daughter who are married and two sons who are supporting her for daily end meet, day was passed little more good combatively ....Who knows it was for short times .....

Unfortunately one more shock in her life that her elder son get Heart attack and passed away & younger son got mentally ill again she have to drudgery to get them daily bread and butter... Though her daughters called her to lives with them but she denied strongly believed to don't be burden & belongs to daughter. Now she is 70 years old and physically weak and also get ill often.

One day she came to our Rural clinic for medical check-up and was talking with deep sigh & despair about her problem. Fortunately our Employee Mr. Karsanbhai was present at their and promptly talked with her and comprehend the reality. She could not availed benefit of widow pension scheme because of the certain government limitation even after numbers of time applied and Follow-up for the same. He went along with her and Collected the essential document and submitted to the respective department later within two month she received sanction order for the same and further Rs.1250 /- Widow pension has been started which been the great support for daily meet.

She and her daughters expressed great gratitude and said that Adani Foundation is hope For the Poor and needy persons.



## "Vidyadan Mahadan"

Name: Sohil Gafur Manjaliya

Place: Luni ,Mundra

AF intervention:- Education Scholarship Support

Progress & Achievement:- Studied intently and perused Graduation

Degree and process for LLB admission

Salary: Working with Lawyer as a practicenor and earn Rs. 8000/Month

Back Ground : He belongs to Poor Fishermen family and sincere to study since child hood. He belongs to Poor Fishermen family and sincere to study since child hood. His father is used to Pagadiya fishing practice to get the daily end meet.

### In his own words:

In our community most of the youth left study after 8<sup>th</sup> standard and engaged in Fishing practice but when I had interacted with AF staff and persuaded for further study and Scholarship support. I realized that the only education can be the game changer to strengthen my Financial condition. Later I focused to study Intentionally and dreamed to be Lawyer.

Now am working with Advocate as Assistance and do Financially support to my family.

Indeed AF sensitized me and act as catalyst to transform my life than others really I am honored by friends and Society

## Real Support



Name: Harkhumben hirabhai Rabari

Place: Jinjauu, Nakhtrana

AF intervention:- Sewing Machine Support.

Progress & Achievement:- Started Embroidery and sewing work

Income : Rs.2500 to 3000/Month

Back Ground : She is 40 year old lady and disable by polio in childhood. They are five members three Children and Husband wife. Her husband is driver and the only person to earn hence financial problem is always remain host.

However She is illiterate & handicapped but symbol of etiquette and dedication. She always thought to be financial Supporter to her life partner . As belongs to Rabari community stitching & hand work is imbibed in her and she want to purchase Sewing machine for the same but Financial constrain did not allow them for same.

During community interaction she express her willing sewing machine support. we met her and after verification Support accordingly.

In his own words:

It was difficult to me as house wife to maintain budget but since I have started sewing work which added some extra money which can we expence for our children nurturing and education for their bright future.

Thanks to Adani foundation to be supporter to such disable persons



## Sea of Change – I can !!

Manjaliya Jakum Osman is 36 years old Fishermen Youth though he was little dull in study but has insight sense and dedication to work. After completion of primary education he had been engaged in fishing practice with his father. Though he was earning but not enough to sustain his big family with Five Daughters .

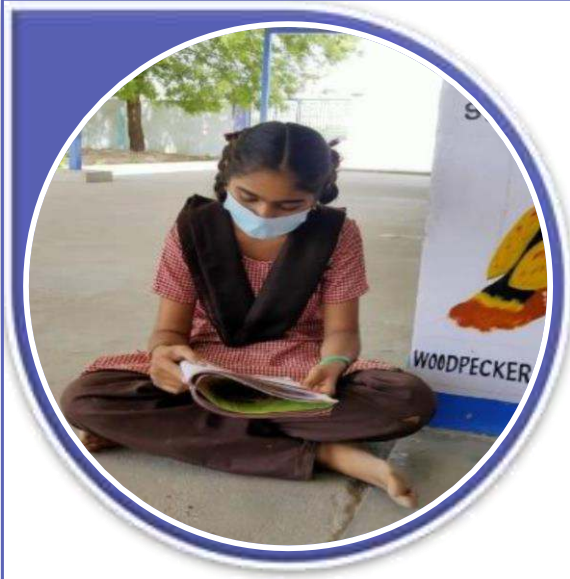
He was always thinking to get hike and asking to provide work according to his skill like drivering ,electrician and painting work.

One day we offer him contract work in our dry cargo department for loading Unloading work. He started enthusiastically with 30 Labors teams and paid 100% Efforts to fetch the targets but.....Unfortunately he had to left contract due to some constrain.

Again he engaged in fishing as routine but destiny define another for him. we had called From APSEZ to need Casual labors and referenced for Jakum as having Good feedback for dedication toward work.

he accepted opportunity even did not know the process. Initially We supported for gate pass and other mandatory formalities. Currently 22 Fishermen youth are working under him. He is saying that I am earning Approx Rs.40000/Month. And massage to Fishermen youth that I am grateful to AF to provide chance to proof my self and sustaining well. now I can Fulfill all basic amenities and invest to my daughter education.

He message to Fishermen Youth that we have great Opportunity as having ADANI port and companies to get employed.



## Fostering for Future

Life without parents is like boat in the mid of the ocean without compass , Krishna was cute and beloved girl of her family. Though her parents was labour but had been grew with lots of love & fulfilled all her wishes. But who knows the destiny ,when she was 8th year old she lost her father due to heart attack. yet she get back from the shocked, her mother got remarried which pushed her in the sorrow of ocean.

she is from Siracha village & studying in 5th standard. However her uncle and aunty are looking after her fostering with all possibility, she is but since they are poor, the financial constrain cant allow them to do much more even they wish. One day when our Employee Mr. Karshanbhai Gadhvi knew about its , he met them and get review from the village leader about the reality ,They are really poor and has been taking care of Krishna with soft intend & Love. Later we informed them about the Government scheme and did all the necessary documentation to linked with Government Orphan Yojna. Now they are being facilitated with Rs.3000 pension /Month which they deposit in Krishna bank Account to invest for their Education and wish to made her Officer now Krishna s future is secured...

# Events

## World Environment Day

World Environment Day was celebrated in Four Talukas by different activities related to conservation of Environment. The events were organized with coordination of Sarpanch, village leader and village committee members and difference type of activity had been carried out in this events.

### Activity

- Mangrove Plantation at Luni sea coast with fisher folk community
- Tree Plantation at Mundra, Nakhtrana, Lakhpat & Tuna block.
- Inauguration of Gauchar land development work in 22 acres at Siracha village
- Tissue culture plant distribution to farmer
- 1500 herbal plants like meshvak, amla, galo, gugal, ardusi, pilu, etc planted at Nandi Sarovar biodiversity park



## World Mangrove day



Web talk show was organized on the occasion of "World Mangrove days On Multi species Mangrove bio diversity with Joint effort of Guide and Adani Foundation, mundra.

Dr.V.Vijayan Kumara (Director of Gujarat institute of Desert ecology) , Mr. C.R.K Reddy (Former chief scientist ,CSIR-CSMCRI CEO) and Respected PNR sir and Gadhvi sir had delivered occasionally speech. As well as Paper presentation by GUIDE and with KSKV Scientist . Total 70 participated had joint this webinar.

## Vanmhotsav



Vanmahotsav week had been celebrated by adani foundation. The main objective of the vanmahotsav is to promote forest conservation the tree plantation.

More than 4100 tree plantation activity had been carried out in Tunda, Siracha, navinal , Zarpara, Dharb, baroi, luni, samgoga, Nani bhujapar, moti bhujapar, Mota bhadiya, Gundiyali , Anjar, tuna, rampar and wandi villages of Mundra & Anjar.

## World ocean day



8th June is celebrated as world ocean day. adani foundation had celebrated the world ocean day by coastal cleaning activity at Juna Bandar, Luni Bandar and Bavadi Bandar.

More than 105 Fisherman took part in this activities with great enthusiasm and zeal. Adani Foundation has scheduled awareness of coastal biodiversity, No fishing in monsoon period and conserving mangroves by allege removal and sweet water usage in initial period.

## National Youth Day



The National youth day was celebrated by motivation the youth who had play significant role during corona period as a warier in various sector and society.

On the occasion Mr.Sharad Sharma –AWL plant head and Mr. Vijay Saxena –HR head MUPL were remain present and delivered speech accordingly.

17 youth (3 utthan sahayak, 4 fishermen youth, 3 corona warriors, 7 women - animal husbandry & gram rakshak dal) were appreciated.

## International Women's day



Adani foundation and Britannia had jointly celebrated women's day on 10th March 2021 in which Guest of honour was Pabiben Rabari Entrepreneur Kutchh. 283 women are working at Britannia and preparing biscuit and rusk. Adani foundation is supporting for sourcing, motivation training for them and on job training Plus convincing of families of women for shift duties also. Pabi ben had given information about her life journey and struggle and congratulated women for their joining the work. Dr Punam has informed about how to stay mentally and physically healthy plus maintain hygiene. Felicitation of 25 women by Medal who become permanent in Britannia company. Five Women shared their journey of life.

## The National girl child day



Women are the epitome of strength, Love, sacrifice and courage. and In the fast growing world women role is more important for the Socio, Economical & political development of Family, Nation and world. The National girl child day was celebrated with ICDC Department with Vahli Dikri Yojna form filling, paediatric health camp and Baby health kit distribution at Mundra. Mrs. Ashaben - CDPO Mundra was remain present in this event. Total 61 forms has received approval letter from GOG and 15 forms filled up on the same day.

## Ayurvedik Ukalo Distribution



Covid-19 pandemic is at the peak level and while don't having Specific treatment and vaccine taking precautionary measure and immunity boosting is the only weapon to keep away our self from Covid-19.

We have started Ayurvedic Kwadh Distribution at Various Public spot, Our Port Entry & Exit gate and APL ,AKBTPT una with spreading awareness to mitigate rapid transition to combat against covid -19. More than 6500 people had benefitted with Ukado and Vitamin –C tablet from Mundra, Baroi Shanti van & Samudr township.

## World Water day



Adani Foundation Mundra & Nakhtrana had Jointly celebrated World water Day with WASMO. Mr. R J Sonkesariya - SE irrigation dept., Ms. Dimpleben Shah - District coordinator WASMO were remain present in this event. Innovative farmer Mr.Vadilal Pokar had shared his experiance and value of drip and borewell recharge activity. more then 125 farmers of Mundra and Nakhtrana block took part in this event. To understan the value of water, drawing competition on the theme of valuing water had been organized for utthan school students.

# World Disability Day

The people who living with disability, face many barriers to inclusion into key aspects of society, God blessed them with some kind of limitations with other kind of skill. Disability brings different ability.

We had celebrated world disability day on 3rd Dec with the aim to empowerment and help them to create real opportunity to make them self sustain.

In Mundra, Bita, Tuna, Anjar, Nakhtrana, Lakhpata, Bhuj & Khavda blocks of Kutch district, total 40 people were benefitted with various Tool and Machine. The District Social Welfare Officer had issued appreciation letter for our efforts. All Divyang of kutchh, have been assured to support for Government online application to facilitate Aid & Equipment well as divvyng certificate and bus pass.



## Awards

Adani Port and Special Economic zone ,Mundra has been awarded with 2nd prize for the National water Award from the Government of India Ministry Of Jal Shakti for the best industry for CSR Activity Category. and got cash Prize of Rs.1.5 lacs.



## Awards

There was state level QCFl Award competition for ( HR and CSR activity) We participated with our Namda work revival project though virtual presentation. we received diamond award.



# Beneficiaries data

No	Core Area	Direct Beneficiaries	Indirect Beneficiaries	Remarks
1	Education	2098	9424	Utthan 17 Schools
2	Adani Vidhya Mandir	472	1888	AVMB ,Students
3	Community Health Mundra	19196	212969	MHCU, Rural Clinic, Senior Citizen, Health camp,
4	Community Health, Bhuj	5870	23480	Medical Support , Mahiti setu, Dead Body , Patients Care & Co-ordination
5	AHMPUL	20959	62877	OPD & IPD Patinets
6	SLD Fishermen	8035	2330	Education, Mangrove, Water and Livelihood
7	SLD –Agriculture	21190	2991	Drip, Fodder, Home Bio Gas, Tissue ,
	SLD- Women Empowerment	127	508	SHG Group Income generation & Training
8	CRC	1079	4316	Sukanya Samrudhi Yojna, Agriculture ,Fishermen,
10	Swavlamban	276	1072	(Widow women & Divyang)
11	Community Infra Structure	111855	162488	Fishermen Amenities & Shelter ,Pond Deepening, Approach
12	Nakhtrana	18528	8168	Health ,SLD, Bio Diversity & CID
13	Tuna	6717	20151	Fodder, Health & portable water
14	Lakhpat	2956	1380	Tree Plantation & Tree Guard
15	Suposhan	20565	0	Child ,Adolescent Girl ,RPA Women
16	ASDC Bhu & Mundra	577	1432	soft skill and DL .GDA & Online Training
<b>Total</b>		<b>240500</b>	<b>515474</b>	

# Financial Overview - Adani Foundation -Mundra

## Executive Summary-Budget Utilization F.Y. 2020-201

(Rs. In Lacs)

Sr. No.	Budget Line Item	Budget 2020-21	Total LE 2020-21	% of Total Utilization
A.	Admin Expense	61.10	56.96	93.28%
B.	Education	94.56	57.87	61.20%
B1	Utthan-Education -Mundra & Anjar	64.11	52.05	81.19%
B2	Utthan : Fisherfolk	30.45	5.82	19.12%
C.	Community Health	420.70	325.12	77.28%
D.	Sustainable Livelihood Development	365.00	336.62	92.23%
E.	Community Infrastructure Development	58.30	60.13	103.14%
F.	EDM Recommended Projects	60.00	60.00	100.00%
G.	COVID 19 Support	100.00	27.05	27.05%
H *	Budget taken against Saving			
1	Wandi – Tuna Drainage Support		45.40	
2	Support to Dhrub Hospital-Dhrub		22.00	
3	Approach Road Construction at Prasla Vadi, Zarpara		16.00	
4	Participation in Gaushala Construction at Goyersama		10.25	
	Total Budget plan against Saving:		93.65	
	Total AF CSR Budget :	1,159.66	1017.41	87.73%
[I]	Adani Vidya Mandir-Bhadreshwar	219.67	104.74	47.68%
[II]	Project Udaan-Mundra	50.00	49.30	98.61%
	GRAND TOTAL Budget F.Y. 2021-22 :	1,429.33	1,171.45	81.96%



**જીવન સાથે જીવનનિર્વાહની સામર્થ્યવાન કામગીરી કરતું: અદ્યાણી ફાઉન્ડેશન**

(મિલિ ટીકિંગ) મુદત: તા. ૧૨  
આર્થિક આણંદી કાર્ડ-નંબર ૧૮  
રાજ્યમાં ૨૨/૧૦૦ ગ્રામીણોને સુધી  
સોડ કમ્પાસ અર્થે કામ કરી રહ્યું છે.  
આણંદી કાર્ડ-નંબર કમ્પાસ કિલ્લામાં  
૧૫૬ સુધી, તાજાં કમ્પાસ કિલ્લા  
સુધી ઉપયોગી કામમાંથી કમ્પાસ  
નંબર ૧૫૬ રહ્યું છે. તેની

અદાણી ફાઉન્ડેશન દ્વારા દેશના ૧૮ રાજ્યમાં ૨,૨૫૦ ગામડાઓમાં કરવામાં આવેલ લોક કલ્યાણના વિવિધ કાર્યો : મુન્દ્રા તાલુકાના ૨૨ ગામોને સેનીટાઈઝ કરવામાં આવ્ય અસરગ્રસ્ત પરિવારોને ૧૦,૦૦૦ જેટલી રાશન કીટનું વિતરણ

આદિતિ ૧૦૦ થી વધુ વિદ્યાર્થીઓને  
નિઃશુલ્ક ઓનલાઈન ફેમિલિ આર્થી  
સેવાના કોલ્ડકલ વર્ષનામાં વધારો  
કરવાના સંકલ્પ ગ્રાહીમાં થઈ રહ્યા છે.  
જુદા જુદા સ્તરીના ૧૦ સ્કોલરશીપ  
પર આદાતી જુવ દ્વારા અમુલ્ય  
પોવરફુલ આપવામાં આવ્યું છે.  
આપકરે સુધીમાં આદાતી જુવ એ

મુદ્રા અદાણી  
ફાઉન્ડેશન દ્વારા ફૂડ  
પેકેટનું વિતરણ

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मुन्ना तालुकामां ताजेतरमां  
पडेला भारे वरसादना पगले



ઉદ્ભવેલી સ્થિતિમાં અદાણી ફાઉન્ડેશન દ્વારા શહેર સમીપના જૂપડપટ્ટી વિસ્તારમાં પુરી, શાકના

**મુંદરા બારોઢ વિસ્તારમાં વિવિધ સંસ્થાઓના સહયોગથી જન જાગૃતિ આરોગ્ય સમાહની ઉજવણી કરવામાં આવી**



મી કમગેરી કરવામાં આવી હતી  
અહાતી ફાઇનેશન તેમજ કલાપ વિન  
ફાઇનેશન સેક્ષન આપટ, સનહાર્દમાં  
આવડા, આજી કમ્પાઈ, મે મુજ  
જોધી, દ્વારા ઉકાતું વિલસક વિવિધ  
વિલસારી માં ક્રેવા માં આવતું હતું  
મંદાવન કમ્પાઈ મી માં મોડે મ

મુન્દ્રા તાલુકાના ૮ ગામોના ૩૪ ખેડૂતોને બારહી ખારેકના ટીસ્યુક્લ્ચર રોપાઓનું વિતરણ કરાયું.

મુન્ના : તાલુકાના જુદા જુદા ટ આમોમાં ખારેક સમાિત મુન્ના અને અદાણી ફાઉન્ડેશનનાં સંયુક્ત પ્રયાસથી ખારેક વાવતા ખેડૂતોને જરૂરી વજતર મળે એ હેતુસર ખારેલી ખારેકના ૮૫૦ ટીલ્યુ કલ્ચર રોપાઓનું ૩૬ ખેડૂતને વિતરણ કરવામાં આવ્યું હતું. તો બીજી તરફ ખેડૂતોના આ પ્રિવાદનની ખજાર વ્યવસ્થા માટે કલ્ચર - કલ્ચર પ્રોડ્યુસર કંપની બનાવવાની કાર્યવાહી શરૂ

1925/26 ई०

ખારિક, દાડમ અને કેરીના ઝોડિંગ, કલીલિંગ અને પેકિંગ માટે ખાસ વ્યવસ્થા ઉભી કરાશે

**મુંદ્રાના ૧૧ ગામોના ખેડૂતોના ઉત્થાન માટે 'કચ્છ કલ્પતરૂ પ્રોડ્યુસર કંપની લિ.' એગ્રોમોલ બનાવશે !**



2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 2681, 2682, 2683, 2684, 2685, 2686, 2687, 2688, 2689, 2690, 2691, 2692, 2693, 2694, 2695, 26

સાથે જોડાયેલા આ બંને સ્થળોએ  
જે સમયે સુરજ સૂર્યના ચહેરાને  
જોઈને સ્થૂંઘળે સ્થૂંઘળે સ્થૂંઘળે  
જે સમયે સુરજ સૂર્યના ચહેરાને

● અદાણી ફાઉન્ડેશનનો સહયોગ અને ડાહ્યા સમન્વય થકી ઇસ્ટીપૂત્રોને કૃષિ ક્ષેત્રે મળે

● ઓક્ટોબરના અંત સુધીમાં ૨૦૦ સભાઓ



કચ્છ ભાસ્કર 30-05-2020

માસિક એ કુદરતી પ્રક્રિયા હોવાથી તેનાથી આભડછેટ ન રાખો

ಕುಲಕರ್ಣಿ ದೇವರಾಯ ಭಟ್ಟರವರವರು ೧೯೫೭ರಲ್ಲಿ ಬರೆದ ಕವಿತೆಗಳ ಸಂಕಲನ

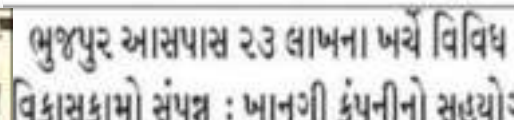
[illegible]

અદાણી ફાઉન્ડેશને મુંદરાના વલ્લભ  
વિદ્યાલયનાં ૮૦૦ બાળકને દત્તક લીધાં

1. Name of the person	2. Address	3. City	4. State	5. Zip
6. Telephone	7. E-mail	8. Fax	9. Mobile	10. Pager
11. Birth date	12. Birth place	13. Marital status	14. Number of children	15. Religion
16. Education	17. Occupation	18. Income	19. Assets	20. Liabilities
21. Health	22. Insurance	23. Social Security	24. Military Service	25. Other



મુણીમાં સમુદ્ર સફાઈ અભિયાન હ

[illegible]

જુલો ૧૯, ૧૯૫૬, શુ. ૧૦-૨૫ ધ. ૧, ૧૦૧ જીલ્લો. ભોલો ધ. ૩, ૧૦૧૦ ૧૦  
૧) ૧૦૧૦ ૧૦૧૦૦ ૧૦ ૧૦ ૧૦ ૧૦૧૦ ૧૦૧૦ ૧૦૧૦ ૧૦ ૧૦૧૦ ૧૦૧૦

[illegible]

A group photo of five people standing outdoors. From left to right: a man in a light blue shirt, a woman in a brown jacket, a woman in a red jacket, a woman in a green jacket, and a man in a dark blue suit.

# કચ્છમાં આંતરરાષ્ટ્રીય દિવ્યાંગ દિવસની ઉજવણી કરાઈ



મુજ, તા. ૧૧ : કચ્છ યુનિ. અને અદાણી સ્કિલ ડેવલોપમેન્ટ દ્વારા કચ્છના યુવાનોનો આર્થિક, સામાજિક વિકાસ સાથે એ માટે કોશલ્ય વિકાસ કાર્યક્રમો આગળ વધારવા પંડિત કથામજી કૃષ્ણ વર્માના ૧૬૩મા જન્મદિન નિમિત્તે યુનિ. ખાતે વર્ચુઅલ બેઠકનું આયોજન કરી અને સરસ્વતી વચ્ચે એમ.એ.યુ. કરવામાં આવ્યો છે. કુલપતિ જયરાજસિંહ જાડેજા તથા અદાણી સ્કિલ ડેવલોપમેન્ટના ડાયરેક્ટર વી. એસ. અગ્રવાલની ઉપસ્થિતિમાં પ્રથમ તબક્કામાં પિંડિતજી

મુજ, તા. ૧૧ : કચ્છ યુનિ. અને અદાણી સ્કિલ ડેવલોપમેન્ટ દ્વારા કચ્છના યુવાનોનો આર્થિક, સામાજિક વિકાસ સાથે એ માટે કોશલ્ય વિકાસ કાર્યક્રમો આગળ વધારવા પંડિત કથામજી કૃષ્ણ વર્માના ૧૬૩મા જન્મદિન નિમિત્તે યુનિ. ખાતે વર્ચુઅલ બેઠકનું આયોજન કરી અને સરસ્વતી વચ્ચે એમ.એ.યુ. કરવામાં આવ્યો છે. કુલપતિ જયરાજસિંહ જાડેજા તથા અદાણી સ્કિલ ડેવલોપમેન્ટના ડાયરેક્ટર વી. એસ. અગ્રવાલની ઉપસ્થિતિમાં પ્રથમ તબક્કામાં પિંડિતજી

# નર્સિંગ કોર્સના ૨૦ તાલીમાર્થીઓને પ્રમાણપત્ર પહેલા જ નોકરી મળી

કચ્છમાં જરૂરિયાત મુજબ નિમજીક અપાવવામાં પ્લેસમેન્ટ ઓફિસર તાલીમ માટે અસ્મિતાબેન જેઠી અને પૂર્વી ગોસ્વામી નિરવ લેઉવા, કિન્નરી ઉમાશીયા સહાયરૂપ થયા હતા. હજુ પણ જરૂરિયાત મુજબ પ્રયત્નો કરવામાં થયા હતા.

અત્રે ઉલ્લેખનીય છે કે, ગયા ઓક્ટોબર-૧૯માં બેચ રાત્રે થઈ હતી. પરંતુ, લોકડાઉન આવી જતા પરીણ લઈ રાકાઈ નહોતી છતાં ફળ મળ્યું છે.

# મુન્દરા તા.ના પ્રાગપર ખાતે ૫ એકરના પ્લોટમાં બાયોડાયવર્સિટી પાર્ક બનશે



નંદી સરોવરમાં એન્કરવાલા અર્ધિશાપામ અને અદાણી કાઉન્ટેશન દ્વારા આયોજન

મુજ : તા.૧૧ના પ્રાગપર ખાતે અદાણી કાઉન્ટેશન

નખત્રાણા શહેરમાં આયુર્વેદિક ઉકાળાનું વિતરણ કરવામાં આવ્યું

by કચ્છ સમાચાર -



# મુંદરા તાલુકાના વિવિધ ગામોમાં ૪ હજારથી વધુ વૃક્ષોનું વાવેતર કરાયું



મુંદરા તા.ના પ્રાગપર ખાતે અદાણી કાઉન્ટેશન દ્વારા ૫ એકરના પ્લોટમાં બાયોડાયવર્સિટી પાર્ક બનશે

મુજ : તા.૧૧ના પ્રાગપર ખાતે અદાણી કાઉન્ટેશન

નખત્રાણા શહેરમાં આયુર્વેદિક ઉકાળાનું વિતરણ કરવામાં આવ્યું

by કચ્છ સમાચાર -

# મુંદરામાં અદાણી કાઉન્ટેશન દ્વારા વિવિધ ક્ષેત્રના તારલાઓનું બહુમાન માઘીમાર સમુદાયના ઉચ્ચ અભ્યાસ કરનારા નવયુવાનોનું સન્માન કરાયું

મુંદરા ખાતે અદાણી સ્કિલ ડેવલોપમેન્ટ દ્વારા સ્વામી વિવેકનંદની જન્મ જયંતી પ્રસંગે રાષ્ટ્રીય વિસ્તારમાં ખેતી પશુપાલન, કૌશલ્ય, શિક્ષણ ટેકનિકલ, ગ્રામ સ્વકલ્પ અને સ્વમાનભરે રોજગારી મેળવવા યુવાનો પારંગત અને તેવો સંદેશો અપાયો

માઘીમાર કુટુંબમાં આગળ અભ્યાસ કરનાર ડિકરીઓ રૂપિયા, સર્વિસ અને કૌશલ્ય, અદાણી સ્કિલ ડેવલોપમેન્ટ સેન્ટરમાં તાલીમ મેળવી આરોગ્ય ભેગે કોરોના વોરિયર્સ તરીકે નમુનેકાર અને કરનાર મુખ્યમંત્રી પદ, કચ્છ સ્વકલ્પ, નિપુણ સંહિત તથા પ્રકૃતિસિંહ વાપેલા, હેતુવચન જેથી, રાષ્ટ્રપિય સ્કિલ ડેવલોપમેન્ટના કરનારો સાથે હતાં. ઉપરાંત ગ્રામ સ્વકલ્પ માટે કૌશલ્ય માટે, કચ્છી વૈજ્ઞાનિક અને ખેતી અને

*Disability brings different ability, it bring hope in different way  
let us pray the God to give confidence and strength to the  
person who are having some kind of limitations with other  
kind of skill*

Thank You...



# **Annexure – 2**

# **"HALF YEARLY ENVIRONMENTAL MONITORING REPORT"**

**FOR**



**ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED  
TAL: MUNDRA, KUTCH, MUNDRA – 370 421**

**MONITORING PERIOD: OCTOBER 2020 TO MARCH 2021**

**PREPARED BY:**



**POLLUCON LABORATORIES PVT.LTD.**

**PLOT NO.5/6 "POLLUCON HOUSE", OPP. BALAJI INDUSTRIAL SOCIETY,  
OLD SHANTINATH SILK MILL LANE, NEAR GAYTRI FARSAN MART,  
NAVJIVAN CIRCLE, UDHANA MAGDALLA ROAD, SURAT-395007.  
PHONE/FAX – (+91 261) 2455 751, 2601 106, 2601 224.  
E-mail: [pollucon@gmail.com](mailto:pollucon@gmail.com) web: [www.polluconlab.com](http://www.polluconlab.com)**

**TC - 5945**

**ISO 9001:2015**

**ISO 14001:2015**

**ISO 45001:2018**

## MARINE WATER MONITORING SUMMARY REPORT

### RESULTS OF MARINE WATER [M1 LEFT SIDE OF BOCHA CREEK - N 22°45'183" E 069°43'241"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2020		NOVEMBER 2020		DECEMBER 2020		JANUARY 2021		FEBRUARY 2021		MARCH 2021		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.24	8.19	8.20	8.18	8.27	8.22	8.23	8.2	8.28	8.25	8.25	8.21	IS3025(P11)83Re.02
2	Temperature	oC	30.3	30.1	30.2	30.1	30.4	30.1	29.7	29.5	30.1	29.8	30.3	30.1	IS3025(P9)84Re.02
3	Total Suspended Solids	mg/L	179	198	163	180	156	138	140	157	132	151	126	110	IS3025(P17)84Re.02
4	BOD (3 Days @ 27 °C)	mg/L	2.8	Not Detected	3	Not Detected	3.6	Not Detected	3.5	Not Detected	3.4	Not Detected	3.5	Not Detected	IS 3025 (P44)1993Re.03Edition.2.1
5	Dissolved Oxygen	mg/L	6.0	5.8	5.9	5.7	5.9	5.6	5.8	5.5	6	5.8	5.9	5.7	IS3025(P38)89Re.99
6	Salinity	ppt	36.4	36.6	36.5	36.8	36.3	36.7	36.1	36.4	36.5	36.9	36.7	37	APHA (22 <sup>nd</sup> Edition) 2550 B
7	Oil & Grease	mg/L	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	APHA(22 <sup>nd</sup> Edition)5520 D
8	Nitrate as NO <sub>3</sub>	μmol/L	3.34	3.1	3.75	3.58	3.36	3.1	3.28	3.46	3.17	2.93	3.56	3.24	IS3025(P34)88
9	Nitrite as NO <sub>2</sub>	μmol/L	0.57	0.39	0.84	0.69	0.68	0.51	0.64	0.7	0.83	0.75	1.4	1.18	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH <sub>3</sub>	μmol/L	2.78	2.51	2.93	2.84	2.51	2.30	2.39	2.68	1.96	1.68	2.37	2.21	IS3025(P34)88Cla.2.3
11	Phosphates as PO <sub>4</sub>	μmol/L	1.96	1.9	2.36	2.15	2.28	2.19	1.75	1.99	2.37	2.13	2.19	1.93	APHA(22 <sup>nd</sup> Edition) 4500 C
12	Total Nitrogen	μmol/L	6.69	6.00	7.52	7.11	6.55	5.91	6.31	6.84	5.96	5.36	7.33	6.63	IS3025(P34)88
13	Petroleum Hydrocarbon	μg/L	13	Not Detected	16	Not Detected	14	Not Detected	17	Not Detected	14.6	Not Detected	12	Not Detected	PLPL-TPH
14	Total Dissolved Solids	mg/L	37450	37698.0	37456	37740	37270	37639	37106	37410	37498	37834	38294	38514	IS3025(P16)84Re.02
15	COD	mg/L	24.6	19.2	23	Not Detected	25	Not Detected	30	21.0	31.4	23	32	25.0	APHA (22 <sup>nd</sup> Edition) 5520-D Open Reflux
<b>A Phytoplankton</b>															
16.1	Chlorophyll	mg/m <sup>3</sup>	2.93	2.72	2.99	2.56	3.2	2.67	2.56	2.45	3.07	2.83	2.75	2.42	APHA (22 <sup>nd</sup> Edition) 10200-H
16.2	Phaeophytin	mg/m <sup>3</sup>	2.0	1.8	1.8	2.1	1.6	2.0	1.25	0.87	0.46	0.50	0.02	0.03	APHA (22 <sup>nd</sup> Edition)



H. T. Shah

Lab Manager




Dr. Arun Bajpai

Lab Manager (Q)

Recognised by MoEF, New Delhi Under Sec. 12 of Environmental (Protection) Act-1986

16.3	Cell Count	No. x 10 <sup>3</sup> /L	142	98	134	94	148	102	164	104	186	118	172	104	10200-H APHA (22 <sup>nd</sup> Edi) 10200-H
16.4	Name of Group Number and name of group species of each group	--	<i>Pinnularia sp. Biddulphi a sp. Coscinodiscus sp. Skeletonema sp.</i>	<i>Fragillaria sp. Gyrodinium sp. Chaetognathes</i>	<i>Coscinodiscus sp. Pleurosigma sp. Fragillaria sp. Surirella sp. Thallasionema sp.</i>	<i>Navicula sp. Melosira sp. Cyclotella sp. Biddulphi a sp. --</i>	<i>Melosira sp. Thallasiosira sp. Rhizosolenia sp. Skeletonema sp. Pleurosigma sp.</i>	<i>Nitzschia sp. Navicula sp. Thallasiosira sp. --</i>	<i>Thallasiosira sp. Nitzschia sp. Coscinodiscus sp. Skeletonema sp. --</i>	<i>Synedra sp. Amphora sp. Navicula sp. Nitzschia sp. --</i>	<i>Triceratium sp. Cymbella sp. Cheatoceros sp. Rhizosolenia sp. Skeletonema sp.</i>	<i>Nitzschia sp. Thallasionema sp. Biddulphi a sp. Cymbella sp. --</i>	<i>Rhizosolenia sp. Synedra sp. Biddulphi a sp. Skeletonema sp.</i>	<i>Nitzschia sp. Navicula sp. Pleurosigma sp. --</i>	APHA (22 <sup>nd</sup> Edi) 10200-H
<b>B Zooplanktons</b>															
17.1	Abundance (Population)	noX10 <sup>3</sup> /100 m <sup>3</sup>	30		26		28		39		35		30		APHA (22 <sup>nd</sup> Edi) 10200-G
17.2	Name of Group Number and name of group species of each group	--	Gastropods Polychaetes Ostracods Mysids		Ostracods Polychaetes Gastropods Isopods		Copepods Polychaetes Decapods Isopods		Copepods Polychaetes Gastropods --		Copepods Polychaetes Decapods Gastropods		Decapods Polychaetes Amphipods Foraminiferans		APHA (22 <sup>nd</sup> Edi) 10200-G
17.3	Total Biomass	ml/100 m <sup>3</sup>	3.45		3.1		3		3.4		3.45		3.25		APHA (22 <sup>nd</sup> Edi) 10200-G
<b>C Microbiological Parameters</b>															
18.1	Total Bacterial Count	CFU/ml	2380		2350		2410		2150		2290		2370		IS 5402:2002
18.2	Total Coliform	/ml	Absent		Absent		Absent		Absent		Absent		Present		APHA(22 <sup>nd</sup> Edi)9221-D
18.3	Ecoli	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:1622:1981Edi.2.4(2003-05)
18.4	Enterococcus	/ml	Absent		Absent		Absent		Absent		Absent		Present		IS : 15186 :2002
18.5	Salmonella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-3)
18.6	Shigella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 1887 (P-7)
18.7	Vibrio	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-5)



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Lab Manager




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## RESULTS OF SEDIMENT ANALYSIS [M1 LEFT SIDE OF BOCHA CREEK - N 22°45'183" E 069°43'241"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2020	NOVEMBER 2020	DECEMBER 2020	JANUARY 2021	FEBRUARY 2021	MARCH 2021	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1	Organic Matter	%	0.96	0.83	0.76	0.63	0.58	0.51	FCO:2007
2	Phosphorus as P	µg/g	412	390	487	514	463	576	APHA(22 <sup>nd</sup> Eti) 4500 C
3	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	--
4	Petroleum Hydrocarbon	µg/g	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	PLPL-TPH
5	<b>Heavy Metals</b>								
5.1	Aluminum as Al	%	4.46	4.38	4.7	5.16	4.92	5.24	AAS APHA 3111 B
5.2	Total Chromium as Cr <sup>+3</sup>	µg/g	150	129	163	173	168	113	AAS 3111B
5.3	Manganese as Mn	µg/g	802	786	706	724	693	758	AAS APHA 3111 B
5.4	Iron as Fe	%	4.76	4.43	4.57	4.68	4.75	4.82	AAS APHA(22 <sup>nd</sup> Eti)3111 B
5.5	Nickel as Ni	µg/g	39	51	63	56	38.9	27	AAS APHA(22 <sup>nd</sup> Eti)3111 B
5.6	Copper as Cu	µg/g	23	36	27	43	58.2	39	AAS APHA(22 <sup>nd</sup> Eti)3111 B
5.7	Zinc as Zn	µg/g	145	128	119	159	135	106	AAS APHA(22 <sup>nd</sup> Eti)3111 B
5.8	Lead as Pb	µg/g	2.6	2.1	1.75	2.13	2.39	3.26	AAS APHA(22 <sup>nd</sup> Eti)3111 B
5.9	Mercury as Hg	µg/g	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	AAS APHA- 3112 B
6	<b>Benthic Organisms</b>								
6.1	Macrobenthos	--	Amphipods Gastropods olychaetes	Polychaete worms Amphipods Gastropods	Polychaete worms Crustaceans Bivalves	Polychaete worms Crustaceans Amphipods	Polychaete worms Crustaceans Gastropods	Polychaetes Gastropods Amphipods Bivalves	APHA (22 <sup>nd</sup> Eti) 10500-C
6.2	MeioBenthos	--	--	Nematodes	Foraminiferans	Nematodes Foraminiferans	Nematodes	--	APHA (22 <sup>nd</sup> Eti) 10500-C
6.3	Population	no/m2	441	439	351	471	529	437	APHA (22 <sup>nd</sup> Eti) 10500-C



**H. T. Shah**  
Lab Manager




**Dr. Arun Bajpai**  
Lab Manager (Q)

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## RESULTS OF MARINE WATER [M2 MOUTH OF BOCHA & NAVINAL CREEK - N 22°44'239" E 069°43'757"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2020		NOVEMBER 2020		DECEMBER 2020		JANUARY 2021		FEBRUARY 2021		MARCH 2021		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.25	8.21	8.23	8.20	8.27	8.24	8.23	8.18	8.17	8.14	8.15	8.13	IS3025(P11)8 3Re.02
2	Temperature	oC	30.0	29.8	30.2	30.0	30.3	30.1	29.9	29.6	30.1	29.9	30.2	30	IS3025(P9)84 Re.02
3	Total Suspended Solids	mg/L	173	187	160	187	146	163	153	139	142	163	135	114	IS3025(P17)8 4Re.02
4	BOD (3 Days @ 27 °C)	mg/L	3.4	Not Detected	3.2	Not Detected	3.4	Not Detected	3.2	Not Detected	3.5	Not Detected	3.4	Not Detected	IS 3025 (P44)1993Re. 03Edition2.1
5	Dissolved Oxygen	mg/L	5.9	5.7	5.9	5.8	5.9	5.7	6	5.8	6.1	5.9	5.9	5.8	IS3025(P38)8 9Re.99
6	Salinity	ppt	36.4	36.6	36.3	36.7	36.5	36.8	36.2	36.5	36.4	36.7	36.6	36.9	APHA (22 <sup>nd</sup> Edition) 2550 B
7	Oil & Grease	mg/L	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	APHA(22 <sup>nd</sup> Edition) 5520D
8	Nitrate as NO <sub>3</sub>	µmol/L	3.27	3.1	3.9	3.6	3.5	3.39	3.34	3.16	3.23	2.94	3.17	2.75	IS3025(P34)8 8
9	Nitrite as NO <sub>2</sub>	µmol/L	0.75	0.63	0.57	0.46	0.68	0.47	0.78	0.67	0.69	0.53	0.93	0.82	IS3025(P34)8 8 NEDA
10	Ammonical Nitrogen as NH <sub>3</sub>	µmol/L	2.56	2.41	2.34	2.10	2.20	2.31	2.16	1.95	1.92	1.79	2.1	2.0	IS3025(P34)8 8Cla.2.3
11	Phosphates as PO <sub>4</sub>	µmol/L	2.17	1.96	1.98	1.74	2.36	2.19	1.98	1.84	2.68	2.4	2.35	2.21	APHA(22 <sup>nd</sup> Edition) 4500 C
12	Total Nitrogen	µmol/L	6.58	6.14	6.78	6.16	6.37	6.17	6.28	5.78	5.84	5.26	6.24	5.54	IS3025(P34)8 8
13	Petroleum Hydrocarbon	µg/L	9.6	Not Detected	12.0	Not Detected	15.0	Not Detected	19	Not Detected	13.2	Not Detected	16	Not Detected	PLPL-TPH
14	Total Dissolved Solids	mg/L	37368	37560	37270	37694	37486	37809	37314	37498	37406	37689	38096	38374	IS3025(P16)8 4Re.02
15	COD	mg/L	25.0	19.0	21.0	Not Detected	23.0	Not Detected	25.0	18.0	28	21	29.0	23.0	APHA(22 <sup>nd</sup> Edition) 5520-D Open Reflux
<b>A Phytoplankton</b>															
16.1	Chlorophyll	mg/m <sup>3</sup>	3.04	2.77	2.93	2.72	3.36	2.61	3.09	2.56	3.28	2.75	2.83	2.67	APHA (22 <sup>nd</sup> Edition) 10200-H
16.2	Phaeophytin	mg/m <sup>3</sup>	1.3	2.2	1.4	2.3	3.0	2.5	0.6	0.69	0.10	0.02	0.9	0.15	APHA (22 <sup>nd</sup> Edition) 10200-H

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16.3	Cell Count	No. x 10 <sup>3</sup> /L	144	102	130	90	158	118	171	90	178	114	166	114	APHA (22 <sup>nd</sup> Edi) 10200-H
16.4	Name of Group Number and name of group species of each group	--	<i>Thallasionema sp.</i> <i>Biddulphia sp.</i> <i>Skeletonema sp.</i> <i>Rhizosolenia sp.</i>	<i>Nitzschia sp.</i> <i>Cyclotella sp.</i> <i>Amphora sp.</i>	<i>Coscinodiscus sp.</i> <i>Surirella sp.</i> <i>Thallasionema sp.</i> <i>Cyclotella sp.</i> <i>Biddulphia sp.</i>	<i>Fragillaria sp.</i> <i>Cyclotella sp.</i> <i>Navicula sp.</i> <i>Nitzschia sp.</i> --	<i>Coscinodiscus sp.</i> <i>Nitzschia sp.</i> <i>Skeletonema sp.</i> <i>Rhizosolenia sp.</i> --	<i>Navicula sp.</i> <i>Thallasionema sp.</i> <i>Fragillaria sp.</i> --	<i>Coscinodiscus sp.</i> <i>Skeletonema sp.</i> <i>Pleurosigma sp.</i> <i>Thallasionema sp.</i> --	<i>Nitzschia sp.</i> <i>Rhizosolenia sp.</i> <i>Fragillaria sp.</i> --	<i>Navicula sp.</i> <i>Rhizosolenia sp.</i> <i>Biddulphia sp.</i> <i>Skeletonema sp.</i> <i>Coscinodiscus sp.</i>	<i>Cymbella sp.</i> <i>Thallasionema sp.</i> <i>Nitzschia sp.</i> <i>Amphiprotera sp.</i> --	<i>Coscinodiscus sp.</i> <i>Cheatoceous sp.</i> <i>Navicula sp.</i> <i>Thallasiosira sp.</i>	<i>Nitzschia sp.</i> <i>Pleurosigma sp.</i> <i>Thallasiosira sp.</i> --	APHA (22 <sup>nd</sup> Edi) 10200-H
<b>B Zooplanktons</b>															
17.1	Abundance (Population)	noX10 <sup>3</sup> / 100 m <sup>3</sup>	35		30		36		42		34		31		APHA (22 <sup>nd</sup> Edi) 10200-G
17.2	Name of Group Number and name of group species of each group	--	Lamellibranches Ostracods Gastropods		Gastropods Bivalves Ostracods Isopods		Gastropods Bivalves Copepods --		Hydrozoans Polychaetes Gastropods --		Polychaetes Gastropods Bivalves		Gastropods Polychaetes Decapods Ostracods		APHA (22 <sup>nd</sup> Edi) 10200-G
17.3	Total Biomass	ml/100 m <sup>3</sup>	3.25		3.05		3.45		3.55		3.15		2.95		APHA (22 <sup>nd</sup> Edi) 10200-G
<b>C Microbiological Parameters</b>															
18.1	Total Bacterial Count	CFU/ml	2140		2220		2290		2380		2150		2360		IS 5402:2002
18.2	Total Coliform	/ml	Absent		Absent		Absent		Absent		Absent		Present		APHA(22 <sup>nd</sup> Edi) 9221-D
18.3	Ecoli	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:1622:1981 Edi.2.4(2003-05)
18.4	Enterococcus	/ml	Absent		Absent		Absent		Absent		Absent		Present		IS : 15186 :2002
18.5	Salmonella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-3)
18.6	Shigella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 1887 (P-7)
18.7	Vibrio	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-5)



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## RESULTS OF SEDIMENT ANALYSIS [M2 MOUTH OF BOCHA & NAVINAL CREEK – N 22°44'239" E 069°43'757"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2020	NOVEMBER 2020	DECEMBER 2020	JANUARY 2021	FEBRUARY 2021	MARCH 2021	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1	Organic Matter	%	0.38	0.7	0.68	--	--	--	FCO:2007
2	Phosphorus as P	µg/g	329	410	524	--	--	--	APHA(22 <sup>nd</sup> Edi) 4500 C
3	Texture	--	Sandy	Sandy	Sandy	--	--	--	--
4	Petroleum Hydrocarbon	µg/g	Not Detected	Not Detected	Not Detected	--	--	--	PLPL-TPH
5	<b>Heavy Metals</b>								
5.1	Aluminum as Al	%	4.5	4.7	4.69	--	--	--	AAS APHA 3111 B
5.2	Total Chromium as Cr+3	µg/g	189	159	170	--	--	--	AAS 3111B
5.3	Manganese as Mn	µg/g	726	810	738	--	--	--	AAS APHA 3111 B
5.4	Iron as Fe	%	4.69	4.53	4.73	--	--	--	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.5	Nickel as Ni	µg/g	32	56	64	--	--	--	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.6	Copper as Cu	µg/g	25	37	43	--	--	--	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.7	Zinc as Zn	µg/g	170	269	190	--	--	--	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.8	Lead as Pb	µg/g	2.34	2.16	1.72	--	--	--	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.9	Mercury as Hg	µg/g	Not Detected	Not Detected	Not Detected	--	--	--	AAS APHA- 3112 B
6	<b>Benthic Organisms</b>								
6.1	Macrobenthos	--	Polychaetes Crustaceans Amphipods	Polychaete worms Crustaceans Bivalves	Polychaetes Crustaceans Gastropods	--	--	--	APHA (22 <sup>nd</sup> Edi) 10500-C
6.2	MeioBenthos	--	Foraminiferans	--	Foraminiferans	--	--	--	APHA (22 <sup>nd</sup> Edi) 10500-C
6.3	Population	no/m <sup>2</sup>	471	412	382	--	--	--	APHA (22 <sup>nd</sup> Edi) 10500-C



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Lab Manager




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## RESULTS OF MARINE WATER [M3 EAST OF BOCHAISLAND - N 22°46'530" E 069°41'690"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2020		NOVEMBER 2020		DECEMBER 2020		JANUARY 2021		FEBRUARY 2021		MARCH 2021		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.27	8.24	8.23	8.20	8.28	8.24	8.21	8.17	8.19	8.23	8.23	8.2	IS3025(P11)83Re.02
2	Temperature	oC	30.1	29.8	30.2	30.0	30.4	30.1	30.1	29.8	30	30.1	30.1	30	IS3025(P9)84Re.02
3	Total Suspended Solids	mg/L	186	203	168	178	148	169	129	143	104	123	133	106	IS3025(P17)84Re.02
4	BOD (3 Days @ 27°C)	mg/L	3.5	Not Detected	3.3	Not Detected	3.4	Not Detected	3.7	Not Detected	3.5	Not Detected	3.4	Not Detected	IS 3025 (P44)1993Re.03 Edition 2.1
5	Dissolved Oxygen	mg/L	5.8	5.6	5.9	5.7	5.9	5.8	5.8	5.7	5.9	5.8	6	5.8	IS3025(P38)89Re.99
6	Salinity	ppt	36.5	36.8	36.4	36.8	36.5	36.8	36.2	36.6	36.5	36.9	36.7	37	APHA (22 <sup>nd</sup> Edi) 2550 B
7	Oil & Grease	mg/L	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	APHA(22 <sup>nd</sup> Edi)552 OD
8	Nitrate as NO <sub>3</sub>	μmol/L	3.14	2.96	3.87	3.61	3.43	3.27	3.26	3.41	3.18	2.9	2.8	2.7	IS3025(P34)88
9	Nitrite as NO <sub>2</sub>	μmol/L	0.63	0.54	0.73	0.53	0.61	0.53	0.75	0.86	0.63	0.56	0.89	0.72	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH <sub>3</sub>	μmol/L	2.37	2.25	2.64	2.46	2.41	2.28	2.27	2.56	2.57	2.35	2.3	2.1	IS3025(P34)88Cla 2.3
11	Phosphates as PO <sub>4</sub>	μmol/L	1.72	1.65	2.1	1.9	2.37	2.24	2.19	2.27	2.39	2.17	1.93	1.75	APHA(22 <sup>nd</sup> Edi) 4500 C
12	Total Nitrogen	μmol/L	6.14	5.8	7.24	6.6	6.45	6.1	6.28	6.63	6.38	5.85	5.92	5.51	IS3025(P34)88
13	Petroleum Hydrocarbon	μg/L	19.4	Not Detected	17.0	Not Detected	21.6	Not Detected	15.6	Not Detected	12	Not Detected	17	Not Detected	PLPL-TPH
14	Total Dissolved Solids	mg/L	37462	37734	37380	37740	37510	37798	37140	37586	37524	37816	38184	38492	IS3025(P16)84Re.02
15	COD	mg/L	23.0	18.6	20.4	Not Detected	23.4	Not Detected	27.0	18.0	29	21.4	27	13.0	APHA(22 <sup>nd</sup> Edi) 5520-D Open Reflux
<b>A Phytoplankton</b>															
16.1	Chlorophyll	mg/m <sup>3</sup>	3.09	2.99	2.88	2.72	3.2	2.93	2.67	2.13	2.79	2.42	2.68	2.42	APHA (22 <sup>nd</sup> Edi) 10200-H
16.2	Phaeophytin	mg/m <sup>3</sup>	2.3	1.4	2.5	1.7	2.2	1.5	1.14	2.1	0.26	0.03	0.44	0.0	APHA (22 <sup>nd</sup> Edi) 10200-H
16.3	Cell Count	No. x 10 <sup>3</sup> /L	128	104	122	96	156	112	164	90	171	106	115	91	APHA (22 <sup>nd</sup> Edi) 10200-H



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16.4	Name of Group Number and name of group species of each group	--	<i>Oscillatoria</i> <i>Pinnularia</i> <i>Biddulphia</i> <i>a</i> sp. <i>Ceratium</i>	<i>Melosira</i> <i>Rhizosolenia</i> sp. <i>Gyrodinium</i> sp. <i>sigma</i> sp.	<i>Biddulphia</i> <i>a</i> sp. <i>Coscinodiscus</i> sp. <i>Fragillaria</i> <i>sp.</i> <i>Surirella</i> <i>sp.</i> <i>Thalassionema</i> sp.	<i>Navicula</i> <i>sp.</i> <i>Nitzschia</i> <i>sp.</i> <i>Melosira</i> <i>sp.</i> <i>Pleurosigma</i> <i>sp.</i> --	<i>Rhizosolenia</i> <i>sp.</i> <i>Thalassionema</i> sp. <i>Skeletonema</i> sp. <i>Chaetognathes</i>  --	<i>Nitzschia</i> <i>sp.</i> <i>Melosira</i> <i>sp.</i> <i>Synedra</i> <i>sp.</i> <i>Gyrosigma</i> <i>a</i> sp. --	<i>Rhizosolenia</i> <i>sp.</i> <i>Pleurosigma</i> sp. <i>Biddulphia</i> <i>a</i> sp. <i>Melosira</i> <i>sp.</i> <i>Thalassionema</i> sp.	<i>Nitzschia</i> <i>sp.</i> <i>Navicula</i> <i>sp.</i> <i>Chatognathes</i> sp. <i>Cyclotella</i> <i>sp.</i> --	<i>Triceratium</i> sp. <i>Cymbella</i> <i>sp.</i> <i>Thalassionema</i> sp. <i>Biddulphia</i> <i>a</i> sp.	<i>Nitzschia</i> <i>sp.</i> <i>Pleurosigma</i> sp. <i>Pinnularia</i> <i>sp.</i> <i>Cyclotella</i> <i>sp.</i>	<i>Coscinodiscus</i> sp. <i>Thalassionema</i> sp. <i>Rhizosolenia</i> sp. <i>Biddulphia</i> <i>a</i> sp. --	<i>Nitzschia</i> <i>sp.</i> <i>Navicula</i> <i>sp.</i> <i>Synedra</i> <i>sp.</i> <i>Pleurosigma</i> <i>sp.</i> --	APHA (22 <sup>nd</sup> Edi) 10200-H	
B	Zooplanktons															
17.1	Abundance (Population)	noX10 <sup>3</sup> / 100 m <sup>3</sup>	21		24		30		43		37		33			APHA (22 <sup>nd</sup> Edi) 10200-G
17.2	Name of Group Number and name of group species of each group	--	Foraminiferans Ctenophores Gastropods Polychaetes		Polychaetes Chaetognathes Gastropods Ostracods		Copepods Gastropods Polychaetes Isopods		Cephalopods Polychaetes Ostracods Mysids		Copepods Polychaetes Amphipods Isopods Gastropods		Polychaetes Gastropods Decapods			APHA (22 <sup>nd</sup> Edi) 10200-G
17.3	Total Biomass	ml/100 m <sup>3</sup>	2.9		2.8		3.25		3.4		3.80		3.1			APHA (22 <sup>nd</sup> Edi) 10200-G
C	Microbiological Parameters															
18.1	Total Bacterial Count	CFU/ml	2190		2230		2310		2280		2250		2140			IS 5402:2002
18.2	Total Coliform	/ml	Absent		Absent		Absent		Absent		Absent		Present			APHA(22 <sup>nd</sup> Edi)922 1-D
18.3	Ecoli	/ml	Absent		Absent		Absent		Absent		Absent		Absent			IS:1622:1981Edi.2 .4(2003-05)
18.4	Enterococcus	/ml	Absent		Absent		Absent		Absent		Absent		Present			IS : 15186 :2002
18.5	Salmonella	/ml	Absent		Absent		Absent		Absent		Absent		Absent			IS : 5887 (P-3)
18.6	Shigella	/ml	Absent		Absent		Absent		Absent		Absent		Absent			IS : 1887 (P-7)
18.7	Vibrio	/ml	Absent		Absent		Absent		Absent		Absent		Absent			IS : 5887 (P-5)



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Lab Manager (Q)

**RESULTS OF SEDIMENT ANALYSIS [M3 RIGHT SIDE OF BOCHA CREEK - N 22°46'530" E 069°41'690"]**

SR NO	TEST PARAMETERS	UNIT	OCTOBER 2020	NOVEMBER 2020	DECEMBER 2020	JANUARY 2021	FEBRUARY 2021	MARCH 2021	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1	Organic Matter	%	0.4	0.63	0.7	0.65	0.61	0.53	FCO:2007
2	Phosphorus as P	µg/g	364	318	498	510	483	519	APHA(22 <sup>nd</sup> Edi) 4500 C
3	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	--
4	Petroleum Hydrocarbon	µg/g	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	PLPL-TPH
5	<b>Heavy Metals</b>								
5.1	Aluminum as Al	%	4.62	4.46	4.74	4.98	4.69	5.12	AAS APHA 3111 B
5.2	Total Chromium as Cr+3	µg/g	174	137	169	170	158	132	AAS 3111B
5.3	Manganese as Mn	µg/g	732	790	734	756	672	740	AAS APHA 3111 B
5.4	Iron as Fe	%	4.42	4.72	4.58	4.76	4.83	4.92	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.5	Nickel as Ni	µg/g	30	59	64	53	64.5	48	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.6	Copper as Cu	µg/g	26	37	41	47	53.2	35	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.7	Zinc as Zn	µg/g	153	206	169	138	146	118	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.8	Lead as Pb	µg/g	2.7	2.13	1.56	2.19	2.95	3.14	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.9	Mercury as Hg	µg/g	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	AAS APHA- 3112 B
6	<b>Benthic Organisms</b>								
6.1	Macrobenthos	--	Crustaceans Gastropods Polychaetes	Polychaete worms Crustaceans Bivalves	Polychaetes Crustaceans Bivalves	Crustaceans Bivalves Amphipods	Polychaetes Gastropods Bivalves	Polychaetes Crustaceans Gastropods Nematodes	APHA (22 <sup>nd</sup> Edi) 10500-C
6.2	MeioBenthos	--	--	--	--	Turbellarians Nematodes	Foraminiferans	--	APHA (22 <sup>nd</sup> Edi) 10500-C
6.3	Population	no/m <sup>2</sup>	497	439	409	460	471	412	APHA (22 <sup>nd</sup> Edi) 10500-C



**H. T. Shah**  
**Lab Manager**




**Dr. Arun Bajpai**  
**Lab Manager (Q)**

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## RESULTS OF MARINE WATER [M4 JUNA BANDAR N 22°47'57" E 069°43'620"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2020		NOVEMBER 2020		DECEMBER 2020		JANUARY 2021		FEBRUARY 2021		MARCH 2021		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.25	8.20	8.23	8.20	8.29	8.24	8.23	8.2	8.17	8.14	8.21	8.19	IS3025(P11)83R e.02
2	Temperature	oC	30.2	30.0	30.1	29.9	30.3	30.1	29.8	29.7	30.2	30	30.3	30.1	IS3025(P9)84Re .02
3	Total Suspended Solids	mg/L	197	216	164	183	138	154	120	108	107	136	125	107	IS3025(P17)84R e.02
4	BOD (3 Days @ 27 °C)	mg/L	3.2	Not Detected	3.5	Not Detected	3.9	Not Detected	3.4	Not Detected	3.5	Not Detected	3.2	Not Detected	IS 3025 (P44)1993Re.03 Edition2.1
5	Dissolved Oxygen	mg/L	5.9	5.8	5.8	5.6	5.8	5.7	5.9	5.7	5.8	5.9	5.9	5.7	IS3025(P38)89R e.99
6	Salinity	ppt	36.5	36.8	36.3	36.7	36.5	36.7	36.3	36.7	36.5	36.8	36.6	36.9	APHA (22 <sup>nd</sup> Edi) 2550 B
7	Oil & Grease	mg/L	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	APHA(22 <sup>nd</sup> Edi)5 520D
8	Nitrate as NO <sub>3</sub>	µmol/L	3.52	3.4	3.98	3.74	3.46	3.38	3.19	3.28	3.36	3.27	3.17	2.96	IS3025(P34)88
9	Nitrite as NO <sub>2</sub>	µmol/L	0.68	0.53	0.87	0.7	0.67	0.51	0.75	0.81	0.58	0.41	0.93	0.85	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH <sub>3</sub>	µmol/L	2.32	2.17	2.59	2.38	2.43	2.30	2.26	2.17	1.87	1.53	2.2	1.9	IS3025(P34)88C la.2.3
11	Phosphates as PO <sub>4</sub>	µmol/L	1.94	1.83	2.27	2.1	2.19	1.96	2.34	2.14	2.18	1.94	1.86	1.72	APHA(22 <sup>nd</sup> Edi) 4500 C
12	Total Nitrogen	µmol/L	6.52	6.10	7.44	6.82	6.56	6.19	6.20	6.26	5.81	5.21	6.27	5.71	IS3025(P34)88
13	Petroleum Hydrocarbon	µg/L	12	Not Detected	16	Not Detected	20	Not Detected	17	Not Detected	15.2	Not Detected	17	Not Detected	PLPL-TPH
14	Total Dissolved Solids	mg/L	37586	37740	37294	37710	37618	37708	37318	37729	37728	37809	38098	38394	IS3025(P16)84R e.02
15	COD	mg/L	23.0	Not Detected	25	Not Detected	29	Not Detected	25.8	17	27.3	19.4	25.2	20.0	APHA(22 <sup>nd</sup> Edi) 5520-D Open Reflux
<b>A Phytoplankton</b>															
16.1	Chlorophyll	mg/m <sup>3</sup>	2.99	2.56	3.09	2.61	3.2	2.88	3.15	2.72	2.75	2.4	2.71	2.38	APHA (22 <sup>nd</sup> Edi) 10200-H
16.2	Phaeophytin	mg/m <sup>3</sup>	2.3	2.4	2.2	2.3	2.1	2.1	1.07	2.32	0.54	0.51	0.61	0.54	APHA (22 <sup>nd</sup> Edi) 10200-H
16.3	Cell Count	No. x 10 <sup>3</sup> /L	150	102	170	103	190	120	169	97	180	109	153	89	APHA (22 <sup>nd</sup> Edi) 10200-H



H. T. Shah

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16.4	Name of Group Number and name of group species of each group	--	<i>Oscillatoria</i> <i>a sp.</i> <i>Pinnularia</i> <i>sp.</i> <i>Ceratium</i> <i>Rhizosolenia</i> <i>sp.</i>	<i>Coscinodiscus</i> <i>sp.</i> <i>Fragillaria</i> <i>sp.</i> <i>Rhizosolenia</i> <i>sp.</i> <i>Navicula</i> <i>sp.</i>	<i>Biddulphia</i> <i>a sp.</i> <i>Coscinodiscus</i> <i>sp.</i> <i>Cyclotella</i> <i>sp.</i> <i>Nitzschia</i> <i>sp.</i> <i>Thalassiosira</i> <i>sp.</i>	<i>Nitzschia</i> <i>sp.</i> <i>Navicula</i> <i>sp.</i> <i>Pleurosigma</i> <i>sp.</i> <i>Surirella</i> <i>sp.</i> --	<i>Coscinodiscus</i> <i>sp.</i> <i>Skeletonema</i> <i>sp.</i> <i>Rhizosolenia</i> <i>sp.</i> <i>Odontella</i> <i>sp.</i>	<i>Nitzschia</i> <i>sp.</i> <i>Thalassionema</i> <i>sp.</i> <i>Synedra</i> <i>sp.</i> <i>Navicula</i> <i>sp.</i>	<i>Amphiprobra</i> <i>sp.</i> <i>Nitzschia</i> <i>sp.</i> <i>Rhizosolenia</i> <i>sp.</i> <i>Biddulphia</i> <i>a sp.</i>	<i>Cyclotella</i> <i>sp.</i> <i>Synedra</i> <i>sp.</i> <i>Skeletonema</i> <i>sp.</i> <i>Thalassionema</i> <i>sp.</i>	<i>Amphiprobra</i> <i>sp.</i> <i>Gyrodinium</i> <i>sp.</i> <i>Cheatoceous</i> <i>sp.</i> <i>Rhizosolenia</i> <i>sp.</i> <i>Triceratium</i> <i>m sp.</i>	<i>Nitzschia</i> <i>sp.</i> <i>Cymbella</i> <i>sp.</i> <i>Surirella</i> <i>sp.</i> <i>Pinnularia</i> <i>sp.</i> --	<i>Rhizosolenia</i> <i>sp.</i> <i>Cheatoceous</i> <i>sp.</i> <i>Nitzschia</i> <i>sp.</i> <i>Biddulphia</i> <i>a sp.</i> <i>Triceratium</i> <i>sp.</i>	<i>Synedra</i> <i>sp.</i> <i>Nitzschia</i> <i>sp.</i> <i>Pleurosigma</i> <i>sp.</i> <i>Stauroneis</i> <i>sp.</i> --	APHA (22 <sup>nd</sup> Edi) 10200-H	
B	Zooplanktons															
17.1	Abundance (Population)	noX10 <sup>3</sup> / 100 m <sup>3</sup>	34		28		32		40		46		35			APHA (22 <sup>nd</sup> Edi) 10200-G
17.2	Name of Group Number and name of group species of each group	--	Chaetognathes Ostracods Gastropods Foraminiferans		Chaetognathes Ostracods Gastropods Polychaetes		Polychaetes Copepods Bivalves Isopods		Polychaetes Decapods Gastropods Mysids		Polychaetes Gastropods Bivalves		Bivalves Polychaetes Ostracods Amphipods			APHA (22 <sup>nd</sup> Edi) 10200-G
17.3	Total Biomass	ml/100 m <sup>3</sup>	3.1		2.95		3.3		3.60		3.95		3.25			APHA (22 <sup>nd</sup> Edi) 10200-G
C	Microbiological Parameters															
18.1	Total Bacterial Count	CFU/ml	2130		2150		2220		2140		2180		2270			IS 5402:2002
18.2	Total Coliform	/ml	Absent		Absent		Absent		Absent		Absent		Present			APHA(22 <sup>nd</sup> Edi)9 221-D
18.3	Ecoli	/ml	Absent		Absent		Absent		Absent		Absent		Absent			IS:1622:1981Edi .2.4(2003-05)
18.4	Enterococcus	/ml	Absent		Absent		Absent		Absent		Absent		Present			IS : 15186 :2002
18.5	Salmonella	/ml	Absent		Absent		Absent		Absent		Absent		Absent			IS : 5887 (P-3)
18.6	Shigella	/ml	Absent		Absent		Absent		Absent		Absent		Absent			IS : 1887 (P-7)
18.7	Vibrio	/ml	Absent		Absent		Absent		Absent		Absent		Absent			IS : 5887 (P-5)



**H. T. Shah**  
Lab Manager




**Dr. Arun Bajpai**  
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## RESULTS OF SEDIMENT ANALYSIS [M4 JUNA BANDAR N 22°47'577" E 069°43'620"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2020	NOVEMBER 2020	DECEMBER 2020	JANUARY 2021	FEBRUARY 2021	MARCH 2021	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1	Organic Matter	%	0.4	0.64	0.73	0.69	0.59	0.5	FCO:2007
2	Phosphorus as P	µg/g	379	410	568	591	532	586	APHA(22 <sup>nd</sup> Edi) 4500 C
3	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	--
4	Petroleum Hydrocarbon	µg/g	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	PLPL-TPH
5	<b>Heavy Metals</b>								
5.1	Aluminum as Al	%	4.58	4.79	4.67	4.93	4.73	4.9	AAS APHA 3111 B
5.2	Total Chromium as Cr <sup>+3</sup>	µg/g	193	206	183	208	168	138	AAS 3111B
5.3	Manganese as Mn	µg/g	756	814	710	729	623	720	AAS APHA 3111 B
5.4	Iron as Fe	%	4.3	4.8	4.59	5.1	4.81	4.97	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.5	Nickel as Ni	µg/g	39	53	65	58	63.2	45	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.6	Copper as Cu	µg/g	27	36	41	45	54.4	38	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.7	Zinc as Zn	µg/g	158	210	169	173	161	119	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.8	Lead as Pb	µg/g	2.19	2.59	1.53	2.26	2.57	2.75	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.9	Mercury as Hg	µg/g	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	AAS APHA- 3112 B
6	<b>Benthic Organisms</b>								
6.1	Macrobenthos	--	Polychaetes Bivalves Gastropods	Polychaete worms Crustaceans Amphipods	Polychaetes Isopods	Polychaete Amphipods Crustaceans	Polychaetes Gastropods Bivalves	Polychaetes Gastropods Amphipods	APHA (22 <sup>nd</sup> Edi) 10500-C
6.2	MeioBenthos	--		Nematodes	Foraminiferans	Nematodes Harpacticoids	Nematodes	Foraminiferans	APHA (22 <sup>nd</sup> Edi) 10500-C
6.3	Population	no/m <sup>2</sup>	499	441	471	559	439	409	APHA (22 <sup>nd</sup> Edi) 10500-C



**H. T. Shah**  
Lab Manager




**Dr. Arun Bajpai**  
Lab Manager (Q)

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## RESULTS OF MARINE WATER [M5 TOWARDS WESTERN SIDE OF EAST PORT – N 22°46'041" E 069°47'296"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2020		NOVEMBER 2020		DECEMBER 2020		JANUARY 2021		FEBRUARY 2021		MARCH 2021		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.25	8.21	8.20	8.17	8.28	8.26	8.22	8.19	8.25	8.21	8.21	8.19	IS3025(P11)83Re.02
2	Temperature	oC	30.2	29.9	30.1	29.9	30.0	29.8	29.9	29.6	30.3	30.1	30.2	30.1	IS3025(P9)84Re.02
3	Total Suspended Solids	mg/L	187	215	164	173	135	149	117	128	105	119	116	104	IS3025(P17)84Re.02
4	BOD (3 Days @ 27 °C)	mg/L	3.3	Not Detected	3.0	Not Detected	3.3	Not Detected	3.5	Not Detected	3.4	Not Detected	3.5	Not Detected	IS 3025 (P44)1993Re.03E dition2.1
5	Dissolved Oxygen	mg/L	5.8	5.6	5.9	5.7	5.9	5.8	5.8	5.6	5.9	5.7	6	5.8	IS3025(P38)89Re.99
6	Salinity	ppt	36.5	36.8	36.3	36.7	36.5	36.7	36.3	36.5	36.6	36.9	36.7	37.1	APHA (22 <sup>nd</sup> Edi) 2550 B
7	Oil & Grease	mg/L	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	APHA(22 <sup>nd</sup> Edi)55 20D
8	Nitrate as NO <sub>3</sub>	μmol/L	3.49	3.12	3.93	3.8	3.71	3.58	3.36	3.27	3.57	3.41	3.18	2.83	IS3025(P34)88
9	Nitrite as NO <sub>2</sub>	μmol/L	0.86	0.73	0.75	0.69	0.69	0.47	0.70	0.64	0.63	0.52	0.74	0.61	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH <sub>3</sub>	μmol/L	2.39	2.14	2.47	2.36	2.34	2.26	2.18	2.36	1.90	1.83	1.68	1.52	IS3025(P34)88CI a.2.3
11	Phosphates as PO <sub>4</sub>	μmol/L	2.13	1.91	2.6	2.41	2.26	2.11	2.39	2.21	2.17	1.95	2.39	2.17	APHA(22 <sup>nd</sup> Edi) 4500 C
12	Total Nitrogen	μmol/L	6.74	5.99	7.15	6.85	6.74	6.31	6.24	6.27	6.10	5.76	5.6	4.96	IS3025(P34)88
13	Petroleum Hydrocarbon	μg/L	12.3	Not Detected	17.0	Not Detected	21.6	Not Detected	18	Not Detected	13.8	Not Detected	11.3	Not Detected	PLPL-TPH
14	Total Dissolved Solids	mg/L	37562	37840	37284	37646	37664	37684	37298	37702	37704	37905	38314	38624	IS3025(P16)84Re.02
15	COD	mg/L	22.0	Not Detected	25.0	Not Detected	27.8	Not Detected	30	18	31.2	23.2	28.0	21.0	APHA(22 <sup>nd</sup> Edi) 5520-D Open Reflux
<b>A Phytoplankton</b>															
16.1	Chlorophyll	mg/m <sup>3</sup>	3.31	2.88	2.93	2.56	3.25	2.93	2.99	2.83	2.91	2.61	2.8	2.67	APHA (22 <sup>nd</sup> Edi) 10200-H
16.2	Phaeophytin	mg/m <sup>3</sup>	2.0	2.1	2.3	2.4	2.0	2.0	2.69	1.58	2.0	1.08	2.17	0.99	APHA (22 <sup>nd</sup> Edi) 10200-H
16.3	Cell Count	No. x 10 <sup>3</sup> /L	164	106	138	90	166	108	158	96	164	104	150	102	APHA (22 <sup>nd</sup> Edi) 10200-H
16.4	Name of Group	--	<i>Navicula</i>	<i>Fragillaria</i>	<i>Biddulphi</i>	<i>Nitzschia</i>	<i>Skeletone</i>	<i>Nitzschia</i>	<i>Microcysti</i>	<i>Biddulphi</i>	<i>Triceratiu</i>	<i>Nitzschia</i>	<i>Melosira</i>	<i>Fragillaria</i>	APHA (22 <sup>nd</sup> Edi) 10200-H

H. T. Shah  
Lab Manager



Dr. ArunBajpai  
Lab Manager (Q)

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	Number and name of group species of each group	<i>sp.</i> <i>Coscinodiscus</i> <i>sp.</i> <i>Oscillatoria</i> <i>sp.</i> <i>Polychaetes</i>	<i>sp.</i> <i>Pinnularia</i> <i>sp.</i> <i>Rhizosolenia</i> <i>sp.</i> <i>Melosira</i> <i>sp.</i>	<i>a sp.</i> <i>Melosira</i> <i>sp.</i> <i>Pleurosigma</i> <i>sp.</i> <i>Fragillaria</i> <i>sp.</i> <i>Cyclotella</i> <i>sp.</i>	<i>sp.</i> <i>Navicula</i> <i>sp.</i> <i>Thallasira</i> <i>sp.</i> -- --	<i>ma sp.</i> <i>Thallasira</i> <i>sp.</i> <i>Coscinodiscus</i> <i>sp.</i> <i>Rhizosolenia</i> <i>sp.</i> <i>Melosira</i> <i>sp.</i>	<i>sp.</i> <i>Synedra</i> <i>sp.</i> <i>Navicula</i> <i>sp.</i> <i>Chaetognathes</i> --	<i>s sp.</i> <i>Cosmarium</i> <i>sp.</i> <i>Thallasira</i> <i>sp.</i> <i>Amphiproteron</i> <i>sp.</i> <i>Navicula</i> <i>sp.</i>	<i>a sp.</i> <i>Rhizosolenia</i> <i>sp.</i> <i>Cyclotella</i> <i>sp.</i> <i>Melosira</i> <i>sp.</i> --	<i>m sp.</i> <i>Skeletonema</i> <i>sp.</i> <i>Biddulphia</i> <i>sp.</i> <i>Rhizosolenia</i> <i>sp.</i> <i>Melosira</i> <i>sp.</i>	<i>sp.</i> <i>Navicula</i> <i>sp.</i> <i>Amphiproteron</i> <i>sp.</i> <i>Cyclotella</i> <i>sp.</i> --	<i>sp.</i> <i>Thallasira</i> <i>sp.</i> <i>Closterium</i> <i>sp.</i> <i>Biddulphia</i> <i>sp.</i> <i>Coscinodiscus</i> <i>sp.</i>	<i>sp.</i> <i>Nitzschia</i> <i>sp.</i> <i>Pleurosigma</i> <i>sp.</i> <i>Synedra</i> <i>sp.</i> --
B	Zooplanktons												
17.1	Abundance (Population)	noX10 <sup>3</sup> /100 m <sup>3</sup>	19	23	29	39	44	32	APHA (22 <sup>nd</sup> Edi) 10200-G				
17.2	Name of Group		Foraminiferans	Gastropods	Hydrozoans	Polychaetes	Polychaetes	Polychaetes	APHA (22 <sup>nd</sup> Edi) 10200-G				
	Number and name of group species of each group	--	Gastropods	Ostracods	Gastropods	Gastropods	Gastropods	Ostracods					
			Polychaetes	Chaetognathes	Decapods	Mysids	Foraminiferans	Fish larvae					
				Polychaetes				Decapods					
17.3	Total Biomass	ml/100 m <sup>3</sup>	2.4	2.65	3.25	3.45	4.0	2.85	APHA (22 <sup>nd</sup> Edi) 10200-G				
C	Microbiological Parameters												
18.1	Total Bacterial Count	CFU/ml	2180	2230	2140	2210	2230	2450	IS 5402:2002				
18.2	Total Coliform	/ml	Absent	Absent	Absent	Absent	Absent	Present	APHA(22 <sup>nd</sup> Edi)92 21-D				
18.3	Ecoli	/ml	Absent	Absent	Absent	Absent	Absent	Absent	IS:1622:1981Edi. 2.4(2003-05)				
18.4	Enterococcus	/ml	Absent	Absent	Absent	Absent	Absent	Present	IS : 15186 :2002				
18.5	Salmonella	/ml	Absent	Absent	Absent	Absent	Absent	Absent	IS : 5887 (P-3)				
18.6	Shigella	/ml	Absent	Absent	Absent	Absent	Absent	Absent	IS : 1887 (P-7)				
18.7	Vibrio	/ml	Absent	Absent	Absent	Absent	Absent	Absent	IS : 5887 (P-5)				



H. T. Shah

Lab Manager




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## RESULTS OF SEDIMENT ANALYSIS [M5 TOWARDS WESTERN SIDE OF EAST PORT – N 22°46'041" E 069°47'296"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2020 SEDIMENT	NOVEMBER 2020 SEDIMENT	DECEMBER 2020 SEDIMENT	JANUARY 2021 SEDIMENT	FEBRUARY 2021 SEDIMENT	MARCH 2021 SEDIMENT	TEST METHOD
1	Organic Matter	%	0.41	0.59	0.68	0.58	0.62	0.52	FCO:2007
2	Phosphorus as P	µg/g	393	403	480	513	472	568	APHA(22 <sup>nd</sup> Edi) 4500 C
3	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	--
4	Petroleum Hydrocarbon	µg/g	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	PLPL-TPH
5	<b>Heavy Metals</b>								
5.1	Aluminum as Al	%	4.68	4.5	4.69	4.95	4.72	5.12	AAS APHA 3111 B
5.2	Total Chromium as Cr <sup>+3</sup>	µg/g	170	213	183	218	168	128	AAS 3111B
5.3	Manganese as Mn	µg/g	759	820	756	734	623	765	AAS APHA 3111 B
5.4	Iron as Fe	%	4.7	4.46	4.79	5.1	4.85	4.92	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.5	Nickel as Ni	µg/g	35	57	68	59	63.7	51	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.6	Copper as Cu	µg/g	26	39	43	64	58.1	29	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.7	Zinc as Zn	µg/g	184	213	169	187	170	138	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.8	Lead as Pb	µg/g	2.37	1.94	1.51	2.3	2.43	2.76	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.9	Mercury as Hg	µg/g	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	AAS APHA- 3112 B
6	<b>Benthic Organisms</b>								
6.1	Macrobenthos	--	Polychaetes Gastropods Bivalves	Polychaete worms Crustaceans Amphipods	Polychaetes Crustaceans Bivalves	Polychaete Amphipods Bivalves	Polychaetes Gastropods Amphipods	Polychaetes Crustaceans Gastropods	APHA (22 <sup>nd</sup> Edi) 10500-C
6.2	MeioBenthos	--	Foraminiferans	Nematodes	--	Nematodes Turbellarians	Nematodes	Nematodes	APHA (22 <sup>nd</sup> Edi) 10500-C
6.3	Population	no/m 2	471	440	412	528	439	380	APHA (22 <sup>nd</sup> Edi) 10500-C



H. T. Shah

Lab Manager




Dr. Arun Bajpai

Lab Manager (Q)

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## RESULTS OF MARINE WATER [M7 EAST PORT N 22°47'120" E 069°47'110"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2020		NOVEMBER 2020		DECEMBER 2020		JANUARY 2021		FEBRUARY 2021		MARCH 2021		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.26	8.23	8.23	8.19	8.27	8.23	8.24	8.20	8.20	8.17	8.23	8.14	IS3025(P11)83Re.02
2	Temperature	oC	30.2	29.9	30.1	30.0	30.2	29.9	29.7	29.6	30	29.8	30.2	30	IS3025(P9)84Re.02
3	Total Suspended Solids	mg/L	183	207	167	184	152	173	128	147	104	123	127	112	IS3025(P17)84Re.02
4	BOD (3 Days @ 27°C)	mg/L	3	Not Detected	3.3	Not Detected	3.5	Not Detected	3.9	Not Detected	3.5	Not Detected	3.4	Not Detected	IS 3025 (P44)1993Re.03 Edition 2.1
5	Dissolved Oxygen	mg/L	5.8	5.6	5.9	5.7	5.9	5.6	5.8	5.6	5.9	5.8	6	5.8	IS3025(P38)89Re.99
6	Salinity	ppt	36.5	36.7	36.4	36.8	36.6	36.9	36.2	36.5	36.6	36.8	36.7	37.2	APHA (22 <sup>nd</sup> Edi) 2550 B
7	Oil & Grease	mg/L	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	APHA(22 <sup>nd</sup> Edi)5520D
8	Nitrate as NO <sub>3</sub>	μmol/L	3.39	3.12	3.64	3.5	3.24	3	3.36	3.59	3.15	2.97	2.97	2.83	IS3025(P34)88
9	Nitrite as NO <sub>2</sub>	μmol/L	0.78	0.53	0.99	0.84	0.73	0.56	0.69	0.73	0.52	0.41	0.68	0.59	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH <sub>3</sub>	μmol/L	2.81	2.69	2.57	2.36	2.30	2.17	2.47	2.60	2.18	2.06	2.37	2.16	IS3025(P34)88Cla 2.3
11	Phosphates as PO <sub>4</sub>	μmol/L	1.76	1.58	2.13	1.94	2.48	2.28	2.39	2.17	2.1	1.93	2.58	2.23	APHA(22 <sup>nd</sup> Edi) 4500 C
12	Total Nitrogen	μmol/L	6.98	6.34	7.20	6.70	6.27	5.73	6.52	6.92	5.85	5.44	6.02	5.58	IS3025(P34)88
13	Petroleum Hydrocarbon	μg/L	15.0	Not Detected	12.0	Not Detected	19.0	Not Detected	15	Not Detected	12.3	Not Detected	15	Not Detected	PLPL-TPH
14	Total Dissolved Solids	mg/L	37613	37662	37362	37740	37680	37906	37208	37593	37708	37850	38192	38702	IS3025(P16)84Re.02
15	COD	mg/L	21.0	Not Detected	24	Not Detected	27	18.3	31	18.7	29.7	21.3	28	23.0	APHA(22 <sup>nd</sup> Edi) 5520-D Open Reflux
A	<b>Phytoplankton</b>														
16.1	Chlorophyll	mg/m <sup>3</sup>	3.2	2.72	2.99	2.61	3.04	2.93	3.20	2.8	2.81	2.7	2.64	2.57	APHA (22 <sup>nd</sup> Edi) 10200-H
16.2	Phaeophytin	mg/m <sup>3</sup>	2.5	2.1	2.7	2.2	2.6	1.9	0.72	1.28	0.10	0.11	0.39	0.27	APHA (22 <sup>nd</sup> Edi) 10200-H
16.3	Cell Count	No. x 10 <sup>3</sup> /L	172	108	163	95	180	113	178	98	168	104	142	98	APHA (22 <sup>nd</sup> Edi) 10200-H
16.4	Name of Group	--	<i>Pinnularia</i>	<i>Cymbella</i>	<i>Biddulphi</i>	<i>Coscinodi</i>	<i>Skeleton</i>	<i>Nitzschia</i>	<i>Rhizosole</i>	<i>Nitzschia</i>	<i>Thalasion</i>	<i>Nitzschia</i>	<i>Thalassiosi</i>	<i>Nitzschia</i>	APHA (22 <sup>nd</sup> Edi) 10200-H

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	Number and name of group species of each group		<i>sp. Ceratium Rhizosolenia sp. Pleurosigma sp. Melosira sp.</i>	<i>sp. Fragillaria sp. Amphora sp. Navicula sp.</i>	<i>a sp. Cyclotella sp. Thallasionema sp. Melosira sp. Peridinium sp.</i>	<i>scus sp. Navicula sp. Nitzschia sp. Fragillaria sp. --</i>	<i>ma sp. Amphiproteron sp. Rhizosolenia sp. --</i>	<i>sp. Fragillaria sp. Synedra sp. Surirella sp.</i>	<i>nia sp. Cosmarium sp. Stauroneis sp. Microcystis sp. Biddulphia sp.</i>	<i>sp. Navicula sp. Ceratium sp. Synedra sp. --</i>	<i>ema sp. Pleurosigma sp. Ceratium sp. Coscinodiscus sp. Biddulphia sp.</i>	<i>sp. Cymbella sp. Fragillaria sp. Navicula sp. --</i>	<i>ra sp. Melosira sp. Navicula sp. Skeletonema sp. --</i>	<i>sp. Pleurosigma sp. Synedra sp. Cyclotella sp. --</i>
B	Zooplanktons													
17.1	Abundance (Population)	noX10 <sup>3</sup> /100 m <sup>3</sup>	29		20		30		35		43		33	APHA (22 <sup>nd</sup> Edi) 10200-G
17.2	Name of Group Number and name of group species of each group	--	Foraminiferans Gastropods Amphipods Decapods		Polychaetes Chaetognathes Ostracods --		Gastropods Bivalves Forminifearns --		Decapods Mysids Polychaetes Bivalves Foraminiferans		Polychaetes Decapods Gastropods Copepods --		Gastropods Polychates Amphipods Copepods	APHA (22 <sup>nd</sup> Edi) 10200-G
17.3	Total Biomass	ml/100 m <sup>3</sup>	3.1		2.15		3.3		3.6		3.55		2.9	APHA (22 <sup>nd</sup> Edi) 10200-G
C	Microbiological Parameters													
18.1	Total Bacterial Count	CFU/ml	2200		2310		2350		2290		2140		2320	IS 5402:2002
18.2	Total Coliform	/ml	Absent		Absent		Absent		Absent		Absent		Present	APHA(22 <sup>nd</sup> Edi)922 1-D
18.3	Ecoli	/ml	Absent		Absent		Absent		Absent		Absent		Absent	IS:1622:1981Edi.2 .4(2003-05)
18.4	Enterococcus	/ml	Absent		Absent		Absent		Absent		Absent		Present	IS : 15186 :2002
18.5	Salmonella	/ml	Absent		Absent		Absent		Absent		Absent		Absent	IS : 5887 (P-3)
18.6	Shigella	/ml	Absent		Absent		Absent		Absent		Absent		Absent	IS : 1887 (P-7)
18.7	Vibrio	/ml	Absent		Absent		Absent		Absent		Absent		Absent	IS : 5887 (P-5)



**H. T. Shah**  
Lab Manager




**Dr. Arun Bajpai**  
Lab Manager (Q)

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**RESULTS OF MARINE WATER [M8 RIGHT SIDE OF BOCHA CREEK N 22°45'987" E 069°43'119"]**

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2020		NOVEMBER 2020		DECEMBER 2020		JANUARY 2021		FEBRUARY 2021		MARCH 2021		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.24	8.19	8.21	8.17	8.29	8.25	8.23	8.19	8.19	8.15	8.24	8.23	IS3025(P11)83Re.02
2	Temperature	oC	30.2	30.0	30.2	30.0	30.1	29.8	29.9	29.6	30.2	30	30.3	30.1	IS3025(P9)84Re.02
3	Total Suspended Solids	mg/L	190	235	175	187	140	162	132	158	112	138	128	114	IS3025(P17)84Re.02
4	BOD (3 Days @ 27 °C)	mg/L	3.1	Not Detected	3.4	Not Detected	3.1	Not Detected	3.4	Not Detected	3.1	Not Detected	3.3	Not Detected	IS 3025 (P44)1993Re.03E dition2.1
5	Dissolved Oxygen	mg/L	5.8	5.6	5.8	5.7	5.9	5.7	5.8	5.7	5.9	5.8	5.9	5.7	IS3025(P38)89Re.99
6	Salinity	ppt	36.2	36.5	36.3	36.6	36.4	36.7	36.2	36.5	36.5	36.9	36.7	37.2	APHA (22 <sup>nd</sup> E di) 2550 B
7	Oil & Grease	mg/L	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	APHA(22 <sup>nd</sup> E di)552 0D
8	Nitrate as NO <sub>3</sub>	μmol/L	3.48	3.19	3.95	3.7	3.48	3.19	3.29	3.48	3.17	2.96	2.73	2.58	IS3025(P34)88
9	Nitrite as NO <sub>2</sub>	μmol/L	0.85	0.63	0.87	0.89	0.67	0.53	0.75	0.69	0.68	0.53	0.81	0.69	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH <sub>3</sub>	μmol/L	2.10	1.95	2.59	2.37	2.39	2.16	2.18	1.93	2.35	2.17	2.27	2.18	IS3025(P34)88Cla 2.3
11	Phosphates as PO <sub>4</sub>	μmol/L	2.39	2.21	2.68	2.436	2.41	2.3	2.3	2.16	2.19	1.99	2	1.83	APHA(22 <sup>nd</sup> E di) 4500 C
12	Total Nitrogen	μmol/L	6.43	5.77	7.41	6.76	6.54	5.88	6.22	6.10	6.20	5.66	5.81	5.45	IS3025(P34)88
13	Petroleum Hydrocarbon	μg/L	15.0	Not Detected	17.0	Not Detected	19.0	Not Detected	15.6	Not Detected	13.6	Not Detected	15.3	Not Detected	PLPL-TPH
14	Total Dissolved Solids	mg/L	37204	37628	37286	37628	37394	37786	37314	37718	37694	37908	38206	38703	IS3025(P16)84Re.02
15	COD	mg/L	20.0	Not Detected	23.0	Not Detected	27.5	17.4	31	19	28.4	17	29	21	APHA(22 <sup>nd</sup> E di) 5520-D Open Reflux
<b>A Phytoplankton</b>															
16.1	Chlorophyll	mg/m <sup>3</sup>	3.25	2.56	2.83	2.4	3.09	2.67	2.93	2.83	2.69	2.49	2.72	2.67	APHA (22 <sup>nd</sup> E di) 10200-H
16.2	Phaeophytin	mg/m <sup>3</sup>	1.3	2.2	2.7	2.3	2.5	2.0	1.3	1.73	0.22	0.42	2.55	1.74	APHA (22 <sup>nd</sup> E di) 10200-H
16.3	Cell Count	No. x 10 <sup>3</sup> /L	178	110	155	118	195	133	163	94	158	96	162	96	APHA (22 <sup>nd</sup> E di) 10200-H



**H. T. Shah**  
**Lab Manager**




**Dr. Arun Bajpai**  
**Lab Manager (Q)**

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16.4	Name of Group Number and name of group species of each group	--	<i>Skeletonema sp.</i> <i>Biddulphia sp.</i> <i>Pinnularia sp.</i> <i>Cyclotella sp.</i>	<i>Nitzschia sp.</i> <i>Gyrosigma sp.</i> <i>Amphora sp.</i> <i>Melosira sp.</i>	<i>Thalassiosira sp.</i> <i>Surirella sp.</i> <i>Coscinodiscus sp.</i> <i>Fragillaria sp.</i> --	<i>Navicula sp.</i> <i>Cyclotella sp.</i> <i>Melosira sp.</i> <i>Nitzschia sp.</i> --	<i>Rhizosolenia sp.</i> <i>Coscinodiscus sp.</i> <i>Biddulphia sp.</i> <i>Ceratium sp.</i> <i>Melosira sp.</i>	<i>Nitzschia sp.</i> <i>Chaetoceros sp.</i> <i>Synedra sp.</i> <i>Pleurosigma sp.</i> --	<i>Skeletonema sp.</i> <i>Biddulphia sp.</i> <i>Thalassiosira sp.</i> <i>Rhizosolenia sp.</i> <i>Cosmarium sp.</i>	<i>Nitzschia sp.</i> <i>Synedra sp.</i> <i>stauroneis sp.</i> <b><i>Fragillaria sp.</i></b> --	<i>Biddulphia sp.</i> <i>Rhizosolenia sp.</i> <i>Thalassioema sp.</i> <i>Gyrosigma sp.</i> <i>Skeletonema sp.</i>	<i>Nitzschia sp.</i> <i>Navicula sp.</i> <i>Amphiprotra sp.</i> <i>Cyclotella sp.</i> --	<i>Rhizosolenia sp.</i> <i>Biddulphia sp.</i> <i>Thalassiosira sp.</i> <i>Closterium sp.</i> --	<i>Nitzschia sp.</i> <i>Navicula sp.</i> <i>Pleurosigma sp.</i> <i>Synedra sp.</i> --	APHA (22 <sup>nd</sup> Edi) 10200-H
B	Zooplanktons														
17.1	Abundance (Population)	noX10 <sup>3</sup> /100 m <sup>3</sup>	23		18		24		35		39		30		APHA (22 <sup>nd</sup> Edi) 10200-G
17.2	Name of Group Number and name of group species of each group	--	Ostracods Chaetognathes Gastropods		Siphonophores Gastropods Polychaetes --		Siphonophores Gastropods Polychaetes --		Gastropods Bivalves Mysids Polychaetes		Gastropods Polychaetes Bivalves Decapods		Polychaetes Gastropods Decapods Fish larvae		APHA (22 <sup>nd</sup> Edi) 10200-G
17.3	Total Biomass	ml/100 m <sup>3</sup>	2.55		2.1		2.55		3.9		3.5		2.95		APHA (22 <sup>nd</sup> Edi) 10200-G
C	Microbiological Parameters														
18.1	Total Bacterial Count	CFU/ml	2290		2210		2180		2230		2180		2250		IS 5402:2002
18.2	Total Coliform	/ml	Absent		Absent		Absent		Absent		Absent		Present		APHA(22 <sup>nd</sup> Edi)922 1-D
18.3	Ecoli	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:1622:1981Edi. 2.4(2003-05)
18.4	Enterococcus	/ml	Absent		Absent		Absent		Absent		Absent		Present		IS : 15186 :2002
18.5	Salmonella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-3)
18.6	Shigella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 1887 (P-7)
18.7	Vibrio	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-5)



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**RESULTS OF SEDIMENT ANALYSIS [M8 RIGHT SIDE OF BOCHA CREEK – N 22°45'987" E 069°43'119"]**

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2020	NOVEMBER 2020	DECEMBER 2020	JANUARY 2021	FEBRUARY 2021	MARCH 2021	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1	Organic Matter	%	0.42	0.64	0.69	0.57	0.62	0.52	FCO:2007
2	Phosphorus as P	µg/g	398	428	473	528	493	568	APHA(22 <sup>nd</sup> Edi) 4500 C
3	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	--
4	Petroleum Hydrocarbon	µg/g	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	PLPL-TPH
5	<b>Heavy Metals</b>								
5.1	Aluminum as Al	%	4.63	4.43	4.61	5.14	4.78	4.95	AAS APHA 3111 B
5.2	Total Chromium as Cr <sup>+3</sup>	µg/g	170	209	179	168	153	113	AAS 3111B
5.3	Manganese as Mn	µg/g	768	804	738	701	689	712	AAS APHA 3111 B
5.4	Iron as Fe	%	4.52	4.7	4.59	4.87	4.65	4.86	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.5	Nickel as Ni	µg/g	39.4	58	63	71	69.4	53	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.6	Copper as Cu	µg/g	28.6	34	51	68	57.4	46	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.7	Zinc as Zn	µg/g	170	213	180	159	135	123	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.8	Lead as Pb	µg/g	2.14	1.9	1.59	2.3	2.49	2.75	AAS APHA(22 <sup>nd</sup> Edi)3111 B
5.9	Mercury as Hg	µg/g	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	AAS APHA- 3112 B
6	<b>Benthic Organisms</b>								
6.1	Macrobenthos	--	Gastropods Crustaceans Polychaetes	Polychaete worms Bivalves Isopods	Crustaceans Gastropods	Crustaceans Polychaetes <i>Amphipods</i>	Crustaceans Polychaetes	Crustaceans Polychaetes Bivalves	APHA (22 <sup>nd</sup> Edi) 10500-C
6.2	MeioBenthos	--	--	Nematodes	Foraminiferans	Harpacticoids Turbellarians	Nematodes Foraminiferans	Nematodes	APHA (22 <sup>nd</sup> Edi) 10500-C
6.3	Population	no/ m <sup>2</sup>	439	409	352	559	471	469	APHA (22 <sup>nd</sup> Edi) 10500-C



**H. T. Shah**  
**Lab Manager**




**Dr. Arun Bajpai**  
**Lab Manager (Q)**

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### RESULTS OF MARINE WATER [M11 MPT T1 JETTY N 22°42'278" E 069°43'450"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2020		NOVEMBER 2020		DECEMBER 2020		JANUARY 2021		FEBRUARY 2021		MARCH 2021		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.27	8.24	8.24	8.19	8.27	8.23	8.23	8.20	8.29	8.27	8.25	8.23	IS3025(P11)83Re.02
2	Temperature	oC	30.2	29.9	30.2	30.0	30.1	29.9	29.9	29.7	30.1	30	30.3	30.1	IS3025(P9)84Re.02
3	Total Suspended Solids	mg/L	197	228	180	199	167	181	150	173	132	146	127	106	IS3025(P17)84Re.02
4	BOD (3 Days @ 27 °C)	mg/L	3	Not Detected	3.2	Not Detected	3.5	Not Detected	3.4	Not Detected	3.0	Not Detected	3.2	Not Detected	IS 3025 (P44)1993Re.03E dition2.1
5	Dissolved Oxygen	mg/L	5.9	5.7	5.9	5.6	5.8	5.6	5.9	5.6	6.1	5.9	5.9	5.7	IS3025(P38)89Re.99
6	Salinity	ppt	36.5	36.9	36.2	36.6	36.3	36.7	36.1	36.5	36.9	37.3	36.7	37.2	APHA (22 <sup>nd</sup> Edi) 2550 B
7	Oil & Grease	mg/L	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	APHA(22 <sup>nd</sup> Edi)552 0D
8	Nitrate as NO <sub>3</sub>	μmol/L	3.28	2.94	3.86	3.64	3.56	3.23	3.19	3.27	3.32	3.17	2.81	2.56	IS3025(P34)88
9	Nitrite as NO <sub>2</sub>	μmol/L	0.93	0.82	0.74	0.59	0.43	0.38	0.73	0.86	0.58	0.43	0.67	0.48	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH <sub>3</sub>	μmol/L	2.24	2.13	2.36	2.20	2.16	2.10	2.28	2.34	2.63	2.51	2.41	2.36	IS3025(P34)88Cla.2.3
11	Phosphates as PO <sub>4</sub>	μmol/L	2.18	2.1	2.58	2.31	2.49	2.37	2.34	2.56	2.56	2.37	2.13	1.92	APHA(22 <sup>nd</sup> Edi) 4500 C
12	Total Nitrogen	μmol/L	6.45	5.89	6.96	6.43	6.15	5.71	6.20	6.47	6.53	6.11	5.89	5.4	IS3025(P34)88
13	Petroleum Hydrocarbon	μg/L	11.2	Not Detected	16.0	Not Detected	20.0	Not Detected	17	Not Detected	10.6	Not Detected	14.3	Not Detected	PLPL-TPH
14	Total Dissolved Solids	mg/L	37456	37824	37192	37566	37306	37716	36994	37538	37894	38740	38174	38658	IS3025(P16)84Re.02
15	COD	mg/L	21.0	Not Detected	23	Not Detected	26	Not Detected	28	19	25	18	28	22.0	APHA(22 <sup>nd</sup> Edi) 5520-D Open Reflux
A	<b>Phytoplankton</b>														
16.1	Chlorophyll	mg/m <sup>3</sup>	3.15	2.67	2.67	2.35	3.15	2.99	3.04	2.72	3.25	2.83	2.88	2.72	APHA (22 <sup>nd</sup> Edi) 10200-H
16.2	Phaeophytin	mg/m <sup>3</sup>	1.5	2.1	2.1	2.3	1.3	1.8	1.89	1.91	1.53	1.84	2.16	2.02	APHA (22 <sup>nd</sup> Edi) 10200-H
16.3	Cell Count	No. x 10 <sup>3</sup> /L	158	106	136	98	152	106	172	98	186	106	166	96	APHA (22 <sup>nd</sup> Edi) 10200-H
16.4	Name of Group	--	<i>Pinnularia</i>	<i>Cyclotella</i>	<i>Melosira</i>	<i>Navicula</i>	<i>Skeleton</i>	<i>Nitzschia</i>	<i>Rhizosole</i>	<i>Navicula</i>	<i>Cyclotella</i>	<i>Nitzschia</i>	<i>Rhizosole</i>	<i>Synedra</i>	APHA (22 <sup>nd</sup> Edi) 10200-H

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Lab Manager (Q)



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[illegible]

## Lab Manager



### Lab Manager (Q)

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### RESULTS OF MARINE WATER [M12 SPM N 22°40'938" E 069°39'191"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2020		NOVEMBER 2020		DECEMBER 2020		JANUARY 2021		FEBRUARY 2021		MARCH 2021		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.26	8.23	8.25	8.20	8.27	8.18	8.26	8.21	8.31	8.27	8.25	8.21	IS3025(P11)83Re.02
2	Temperature	oC	30.2	30.1	30.3	30.0	30.1	29.9	29.9	29.8	30	30.1	30.2	30	IS3025(P9)84Re.02
3	Total Suspended Solids	mg/L	187	209	157	179	168	180	137	158	120	143	138	115	IS3025(P17)84Re.02
4	BOD (3 Days @ 27 °C)	mg/L	3.2	Not Detected	3.4	Not Detected	3.1	Not Detected	3.3	Not Detected	3.1	Not Detected	3.2	Not Detected	IS 3025 (P44)1993Re.03E dition2.1
5	Dissolved Oxygen	mg/L	5.8	5.6	5.9	5.7	5.9	5.8	5.9	5.7	6.1	5.9	5.9	5.7	IS3025(P38)89Re.99
6	Salinity	ppt	36.6	36.9	36.5	36.8	36.4	36.9	36.1	36.6	36.8	37.3	36.7	37.1	APHA (22 <sup>nd</sup> Edi) 2550 B
7	Oil & Grease	mg/L	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	APHA(22 <sup>nd</sup> Edi)552 OD
8	Nitrate as NO <sub>3</sub>	μmol/L	3.28	2.97	4.13	3.86	3.64	3.49	3.34	3.53	3.25	3.19	2.93	2.75	IS3025(P34)88
9	Nitrite as NO <sub>2</sub>	μmol/L	0.74	0.56	0.94	0.73	0.78	0.63	0.71	0.86	0.56	0.43	0.61	0.58	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH <sub>3</sub>	μmol/L	2.10	1.87	2.18	1.96	2.10	1.70	2.26	2.41	2.73	2.56	2.49	2.3	IS3025(P34)88Cla.2.3
11	Phosphates as PO <sub>4</sub>	μmol/L	1.8	1.56	2.36	2.14	2.34	1.9	2.17	2.06	2.5	2.39	2.16	1.95	APHA(22 <sup>nd</sup> Edi) 4500 C
12	Total Nitrogen	μmol/L	6.12	5.40	7.25	6.55	6.52	5.82	6.31	6.80	6.54	6.18	6.03	5.63	IS3025(P34)88
13	Petroleum Hydrocarbon	μg/L	15.0	Not Detected	20.0	Not Detected	22.0	Not Detected	13	Not Detected	11.8	Not Detected	12.9	Not Detected	PLPL-TPH
14	Total Dissolved Solids	mg/L	37568	37834	37456	37746	37416	37906	37118	37706	37803	38714	38209	38604	IS3025(P16)84Re.02
15	COD	mg/L	23.0	Not Detected	25	Not Detected	24	19.0	28	17	26	17.3	27	21	APHA(22 <sup>nd</sup> Edi) 5520-D Open Reflux
<b>A Phytoplankton</b>															
16.1	Chlorophyll	mg/m <sup>3</sup>	2.99	2.83	2.72	2.61	2.93	2.77	3.15	2.83	3.20	2.99	2.86	2.61	APHA (22 <sup>nd</sup> Edi) 10200-H
16.2	Phaeophytin	mg/m <sup>3</sup>	2.1	2.0	2.1	2.5	2.2	2.1	1.75	2.22	1.73	1.20	2.3	1.83	APHA (22 <sup>nd</sup> Edi) 10200-H
16.3	Cell Count	No. x 10 <sup>3</sup> /L	150	106	158	102	166	108	196	104	198	104	152	127	APHA (22 <sup>nd</sup> Edi) 10200-H
16.4	Name of Group Number	--	<i>Pinnularia sp.</i>	<i>Cymbella sp.</i>	<i>Amphipro ra sp.</i>	<i>Navicula sp.</i>	<i>Cyclotella sp.</i>	<i>Nitzschia sp.</i>	<i>Nitzschia sp.</i>	<i>Navicula sp.</i>	<i>Skeletonema sp.</i>	<i>Cymbella sp.</i>	<i>Coscinodi scus sp.</i>	<i>Nitzschia sp.</i>	APHA (22 <sup>nd</sup> Edi) 10200-H

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	and name of group species of each group		<i>Melosira sp.</i>	<i>Amphora sp.</i>	<i>Biddulphi a sp.</i>	<i>Rhizosole nia sp.</i>	<i>Biddulphi a sp.</i>	<i>Navicula sp.</i>	<i>Skeletonema sp.</i>	<i>Synedra sp.</i>	<i>Rhizosole nia sp.</i>	<i>Nitzschia sp.</i>	<i>Rhizosole nia sp.</i>	<i>Synedra sp.</i>
			<i>Skeletonema sp.</i>	<i>Fragillaria sp.</i>	<i>Coscinodiscus sp.</i>	<i>Synedra sp.</i>	<i>Skeletonema sp.</i>	<i>Coscinodiscus sp.</i>	<i>Thalassiosira sp.</i>	<i>Biddulphi a sp.</i>	<i>Biddulphi a sp.</i>	<i>Pinnularia sp.</i>	<i>Thalassiosira sp.</i>	<i>Pleurosigma sp.</i>
			<i>Ceratium</i>	<i>Navicula sp.</i>	<i>Gyrosigma sp.</i>	<i>Cyclotella sp.</i>	<i>Thalassionema sp.</i>	<i>Synedra sp.</i>	<i>Pleurosigma sp.</i>	--	<i>Coscinodiscus sp.</i>	<i>Cyclotella sp.</i>	<i>Cheatoceous sp.</i>	<i>Navicula sp.</i>
			<i>Nitzschia sp.</i>		<i>Nitzschia sp.</i>	--	<i>Pleurosigma ma sp.</i>	--			<i>Pleurosigma ma sp.</i>	--	--	--
B	Zooplanktons													
17.1	Abundance (Population)	noX10 <sup>3</sup> /100 m <sup>3</sup>	25		21		24		39		34		27	APHA (22 <sup>nd</sup> Edi) 10200-G
17.2	Name of Group		Amphipods		Siphonophores		Gastropods		Gastropods		Gastropods		Ostracods	APHA (22 <sup>nd</sup> Edi) 10200-G
	Number	--	Mysids		Gastropods		Polychaetes		Polychaetes		Polychaetes		Decapods	
	and name of group species of each group		Gastropods		Ostracods		Decapods		Decapods		Decapods		Polychaetes	
			Chaetognaths		Isopods		Forminiferans		Mysids		Copepods		Foraminiferans	
17.3	Total Biomass	ml/100 m <sup>3</sup>	3.1		2.9		2.75		3.55		3.60		2.7	APHA (22 <sup>nd</sup> Edi) 10200-G
C	Microbiological Parameters													
18.1	Total Bacterial Count	CFU/ml	2300		2410		2360		2270		2340		2410	IS 5402:2002
18.2	Total Coliform	/ml	Absent		Absent		Absent		Absent		Absent		Present	APHA(22 <sup>nd</sup> Edi)922 19.21-D
18.3	Ecoli	/ml	Absent		Absent		Absent		Absent		Absent		Absent	IS:1622:1981Edi. 2.4(2003-05)
18.4	Enterococcus	/ml	Absent		Absent		Absent		Absent		Absent		Present	IS : 15186 :2002
18.5	Salmonella	/ml	Absent		Absent		Absent		Absent		Absent		Absent	IS : 5887 (P-3)
18.6	Shigella	/ml	Absent		Absent		Absent		Absent		Absent		Absent	IS : 1887 (P-7)
18.7	Vibrio	/ml	Absent		Absent		Absent		Absent		Absent		Absent	IS : 5887 (P-5)



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### RESULTS OF ETP OUTLET

SR. NO.	TEST PARAMETERS	UNIT	Liquid Terminal ETP Outlet						GPCB Permissible Limit
			Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	
1	Colour	Co-pt	--	--	--	30	20	25	100
2	pH	--	--	--	--	7.28	7.56	7.13	6.5 to 8.5
3	Temperature	°C	--	--	--	29.9	30.1	30.3	40
4	Total Suspended Solids	mg/L	--	--	--	43	37	25	100
5	Total Dissolved Solids	mg/L	--	--	--	1703	1823	2070	2100
6	COD	mg/L	--	--	--	68	61	78	100
7	BOD (3 Days @ 27 °C)	mg/L	--	--	--	11	12	15	30
8	Chloride as Cl	mg/L	--	--	--	498	453	432	600
9	Oil & Grease	mg/L	--	--	--	3.6	4.1	3.1	10
10	Sulphate as SO <sub>4</sub>	mg/L	--	--	--	472	428	398	1000
11	Ammonical Nitrogen as NH <sub>3</sub>	mg/L	--	--	--	3.69	2.78	3.1	50
12	Phenolic Compound	mg/L	--	--	--	Not Detected	Not Detected	Not Detected	1
13	Copper as Cu	mg/L	--	--	--	Not Detected	Not Detected	Not Detected	3
14	Lead as Pb	mg/L	--	--	--	Not Detected	Not Detected	Not Detected	0.1
15	Sulphide as S	mg/L	--	--	--	1.24	1.68	1.4	2
16	Cadmium as Cd	mg/L	--	--	--	Not Detected	Not Detected	Not Detected	2
17	Fluoride as F	mg/L	--	--	--	0.36	0.27	0.24	2
18	Residual Chlorine	mg/L	--	--	--	0.60	0.6	0.7	0.5 min



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Lab Manager (Q)

**RESULT OF AMBIENT AIR QUALITY MONITORING**

ADANI PORT – TUG BERTH 600 KL PUMP HOUSE								
Sr. No.	Date of Sampling	Particulate Matter (PM <sub>10</sub> ) $\mu\text{g}/\text{m}^3$	Particulate Matter (PM <sub>2.5</sub> ) $\mu\text{g}/\text{m}^3$	Sulphur Dioxide (SO <sub>2</sub> ) $\mu\text{g}/\text{m}^3$	Oxides of Nitrogen (NO <sub>2</sub> ) $\mu\text{g}/\text{m}^3$	Carbon Monoxide as CO $\text{mg}/\text{m}^3$	Hydrocarbon as CH <sub>4</sub> $\text{mg}/\text{m}^3$	Benzene as C <sub>6</sub> H <sub>6</sub> $\mu\text{g}/\text{m}^3$
1	02/10/2020	72.68	31.57	24.24	40.20	0.74	ND*	ND*
2	06/10/2020	91.22	48.65	18.64	34.23	0.93	ND*	ND*
3	09/10/2020	84.27	45.69	22.43	42.56	0.50	ND*	ND*
4	13/10/2020	79.56	36.28	15.25	38.29	0.64	ND*	ND*
5	16/10/2020	87.23	44.19	19.82	41.26	0.88	ND*	ND*
6	20/10/2020	92.46	51.27	23.46	44.20	0.70	ND*	ND*
7	23/10/2020	85.63	40.57	21.58	35.75	0.57	ND*	ND*
8	27/10/2020	74.23	42.57	12.64	30.23	0.73	ND*	ND*
9	30/10/2020	82.46	37.28	17.38	33.29	0.80	ND*	ND*
10	03/11/2020	68.36	29.37	21.54	38.67	0.53	ND*	ND*
11	06/11/2020	76.35	47.22	17.52	33.31	0.78	ND*	ND*
12	10/11/2020	80.22	44.56	11.24	28.44	0.32	ND*	ND*
13	13/11/2020	74.55	49.26	23.50	39.52	0.54	ND*	ND*
14	17/11/2020	83.42	41.35	14.23	21.57	0.76	ND*	ND*
15	20/11/2020	78.37	37.57	18.57	34.28	0.52	ND*	ND*
16	24/11/2020	84.25	50.22	20.59	40.22	0.71	ND*	ND*
17	27/11/2020	62.46	26.46	8.59	31.63	0.61	ND*	ND*
18	01/12/2020	85.37	49.34	11.22	23.49	0.65	ND*	ND*
19	04/12/2020	61.52	28.62	21.62	41.30	0.57	ND*	ND*
20	08/12/2020	82.63	50.22	19.64	37.58	0.88	ND*	ND*
21	11/12/2020	75.35	39.57	12.81	28.50	0.46	ND*	ND*
22	15/12/2020	88.21	46.35	18.63	25.68	0.96	ND*	ND*
23	18/12/2020	70.31	33.62	20.24	35.36	0.73	ND*	ND*
24	22/12/2020	86.27	48.34	14.57	30.25	0.63	ND*	ND*
25	25/12/2020	93.53	54.34	22.21	39.56	0.72	ND*	ND*
26	29/12/2020	83.64	42.64	17.26	42.32	1.01	ND*	ND*
27	01/01/2021	75.62	48.39	18.32	22.69	0.42	ND*	ND*
28	05/01/2021	81.76	44.31	13.59	26.26	0.70	ND*	ND*
29	08/01/2021	79.34	52.34	11.70	23.24	0.62	ND*	ND*
30	12/01/2021	73.58	32.53	20.25	25.55	0.73	ND*	ND*

Continue ...



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**RESULT OF AMBIENT AIR QUALITY MONITORING**

ADANI PORT – TUG BERTH 600 KL PUMP HOUSE								
Sr.No.	Date of Sampling	Particulate Matter (PM <sub>10</sub> ) µg/m <sup>3</sup>	Particulate Matter (PM <sub>2.5</sub> ) µg/m <sup>3</sup>	Sulphur Dioxide (SO <sub>2</sub> ) µg/m <sup>3</sup>	Oxides of Nitrogen (NO <sub>2</sub> ) µg/m <sup>3</sup>	Carbon Monoxide as CO mg/m <sup>3</sup>	Hydrocarbon as CH <sub>4</sub> mg/m <sup>3</sup>	Benzene as C <sub>6</sub> H <sub>6</sub> µg/m <sup>3</sup>
31	15/01/2021	41.42	35.61	12.56	28.51	0.31	ND*	ND*
32	19/01/2021	70.65	47.55	14.28	19.62	0.54	ND*	ND*
33	22/01/2021	60.51	24.59	19.64	33.49	0.53	ND*	ND*
34	26/01/2021	80.64	43.77	21.30	38.42	0.80	ND*	ND*
35	29/01/2021	88.51	51.26	15.54	31.81	0.64	ND*	ND*
36	02/02/2021	62.53	29.54	10.31	24.29	0.31	ND*	ND*
37	05/02/2021	78.33	25.42	12.57	21.19	0.66	ND*	ND*
38	09/02/2021	68.34	39.40	9.29	22.62	0.34	ND*	ND*
39	12/02/2021	70.36	36.53	14.53	26.48	0.17	ND*	ND*
40	16/02/2021	50.52	23.42	16.24	19.60	0.48	ND*	ND*
41	19/02/2021	65.34	33.57	13.51	30.18	0.65	ND*	ND*
42	23/02/2021	58.31	28.37	15.45	34.19	0.60	ND*	ND*
43	26/02/2021	86.32	44.27	8.60	17.54	0.49	ND*	ND*
44	02/03/2021	68.26	26.34	18.65	35.68	0.49	ND*	ND*
45	05/03/2021	95.37	49.59	14.59	28.55	0.16	ND*	ND*
46	09/03/2021	73.57	23.59	22.69	38.44	0.17	ND*	ND*
47	12/03/2021	84.63	52.63	12.72	30.24	0.27	ND*	ND*
48	16/03/2021	72.62	37.36	11.56	24.49	0.62	ND*	ND*
49	19/03/2021	92.42	51.63	15.82	29.57	0.29	ND*	ND*
50	23/03/2021	86.26	47.55	13.42	32.67	0.47	ND*	ND*
51	26/03/2021	78.25	43.56	17.22	31.57	0.11	ND*	ND*
52	30/03/2021	82.43	33.41	9.46	23.62	0.42	ND*	ND*
<b>LIMIT<sup>#</sup></b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>4</b>	<b>Not Specified</b>	<b>5</b>
<b>TEST METHOD</b>		IS:5182(Part 23):Gravimetric CPCB - Method (Vol.I,May-2011)	Gravimetric-CPCB - Method (Vol.I,May-2011)	IS:5182(Part II):Improved West and Gaeke	IS:5182(Part VI):Modified Jacob & Hochheiser (NaOH-NaAsO <sub>2</sub> )	NDIR Digital Gas Analyzer	SOP: HC: GC/GCMS/Gas analyzer	IS 5182 (Part XI):2006/CPCB Method

\*Not Detected

 #: Industrial, Residential, Rural and other Area Notification Dated 16<sup>th</sup> Nov.2009 as per national Ambient Air Quality Standards, CPCB New Delhi.



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Lab Manager




Dr. Arun Bajpai

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**POLLUCON**

LABORATORIES PVT. LTD.

Environmental Auditors, Consultants & Analysts.  
Cleaner Production / Waste Minimization Facilitator

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**RESULT OF AMBIENT AIR QUALITY MONITORING**

NEAR FIRE STATION								
Sr. No.	Date of Sampling	Particulate Matter (PM10) $\mu\text{g}/\text{m}^3$	Particulate Matter (PM 2.5) $\mu\text{g}/\text{m}^3$	Sulphur Dioxide (SO2) $\mu\text{g}/\text{m}^3$	Oxides of Nitrogen (NO2) $\mu\text{g}/\text{m}^3$	Carbon Monoxide as CO $\text{mg}/\text{m}^3$	Hydrocarbon as CH <sub>4</sub> $\text{mg}/\text{m}^3$	Benzene as C <sub>6</sub> H <sub>6</sub> $\mu\text{g}/\text{m}^3$
1	02/10/2020	62.55	24.56	10.67	19.55	0.57	ND*	ND*
2	06/10/2020	50.21	27.22	14.25	25.65	0.77	ND*	ND*
3	09/10/2020	71.58	41.63	17.33	31.75	0.30	ND*	ND*
4	13/10/2020	68.55	28.43	6.56	34.52	0.72	ND*	ND*
5	16/10/2020	73.53	38.42	13.53	24.59	0.61	ND*	ND*
6	20/10/2020	67.56	33.59	15.19	18.54	0.74	ND*	ND*
7	23/10/2020	70.25	36.55	11.25	29.69	0.47	ND*	ND*
8	27/10/2020	52.61	23.43	20.29	22.80	0.39	ND*	ND*
9	30/10/2020	66.37	29.39	8.88	15.68	0.46	ND*	ND*
10	03/11/2020	55.64	23.38	14.51	29.56	0.60	ND*	ND*
11	06/11/2020	63.21	31.58	8.58	16.26	0.46	ND*	ND*
12	10/11/2020	72.64	40.23	15.66	24.68	0.66	ND*	ND*
13	13/11/2020	66.22	29.61	17.22	36.26	0.48	ND*	ND*
14	17/11/2020	70.55	26.43	23.40	33.43	0.58	ND*	ND*
15	20/11/2020	62.75	30.40	20.45	38.67	0.84	ND*	ND*
16	24/11/2020	79.31	47.34	18.86	18.98	0.79	ND*	ND*
17	27/11/2020	68.44	28.61	12.60	23.89	0.47	ND*	ND*
18	01/12/2020	65.32	34.54	13.61	26.37	0.55	ND*	ND*
19	04/12/2020	50.35	39.27	19.30	33.66	0.64	ND*	ND*
20	08/12/2020	67.70	36.51	17.49	29.61	0.78	ND*	ND*
21	11/12/2020	53.44	22.67	14.31	32.36	0.24	ND*	ND*
22	15/12/2020	73.66	29.32	11.57	21.83	0.76	ND*	ND*
23	18/12/2020	78.76	49.77	9.58	18.72	0.40	ND*	ND*
24	22/12/2020	89.62	35.51	12.64	25.81	0.80	ND*	ND*
25	25/12/2020	71.62	31.53	10.88	22.61	0.61	ND*	ND*
26	29/12/2020	64.27	30.40	15.59	28.60	0.70	ND*	ND*
27	01/01/2021	80.36	38.43	14.57	18.61	0.60	ND*	ND*
28	05/01/2021	63.67	33.46	11.53	15.62	0.52	ND*	ND*
29	08/01/2021	72.51	35.67	9.63	20.61	0.46	ND*	ND*
30	12/01/2021	69.42	40.36	16.40	33.28	0.50	ND*	ND*

Continue ...

H. T. Shah

Lab Manager



Dr. Arun Bajpai

Lab Manager (Q)

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Recognised by MoEF, New Delhi Under Sec. 12 of Environmental (Protection) Act-1986

**RESULT OF AMBIENT AIR QUALITY MONITORING**

NEAR FIRE STATION								
Sr.N o.	Date of Sampling	Particulate Matter (PM <sub>10</sub> ) $\mu\text{g}/\text{m}^3$	Particulate Matter (PM <sub>2.5</sub> ) $\mu\text{g}/\text{m}^3$	Sulphur Dioxide (SO <sub>2</sub> ) $\mu\text{g}/\text{m}^3$	Oxides of Nitrogen (NO <sub>2</sub> ) $\mu\text{g}/\text{m}^3$	Carbon Monoxide as CO $\text{mg}/\text{m}^3$	Hydrocarbon as CH <sub>4</sub> $\text{mg}/\text{m}^3$	Benzene as C <sub>6</sub> H <sub>6</sub> $\mu\text{g}/\text{m}^3$
31	15/01/2021	75.62	43.83	6.66	14.22	0.16	ND*	ND*
32	19/01/2021	86.30	52.74	10.61	25.67	0.23	ND*	ND*
33	22/01/2021	49.36	21.62	17.67	36.53	0.63	ND*	ND*
34	26/01/2021	68.62	47.55	18.64	29.49	0.56	ND*	ND*
35	29/01/2021	43.76	27.69	13.98	27.62	0.24	ND*	ND*
36	02/02/2021	56.28	25.43	17.23	20.59	0.16	ND*	ND*
37	05/02/2021	84.38	40.36	15.65	18.42	0.45	ND*	ND*
38	09/02/2021	89.75	50.35	12.45	26.41	0.22	ND*	ND*
39	12/02/2021	80.46	45.63	18.43	21.49	0.38	ND*	ND*
40	16/02/2021	69.36	39.27	21.30	39.49	0.36	ND*	ND*
41	19/02/2021	73.60	28.44	11.27	23.58	0.41	ND*	ND*
42	23/02/2021	82.63	46.34	13.23	29.30	0.26	ND*	ND*
43	26/02/2021	43.52	25.43	16.23	24.52	0.63	ND*	ND*
44	02/03/2021	70.63	23.59	15.30	24.28	0.46	ND*	ND*
45	05/03/2021	76.86	26.47	10.57	21.37	0.31	ND*	ND*
46	09/03/2021	87.82	42.41	16.53	25.64	0.37	ND*	ND*
47	12/03/2021	73.46	36.22	20.33	34.35	0.13	ND*	ND*
48	16/03/2021	65.62	34.59	17.64	23.46	0.22	ND*	ND*
49	19/03/2021	77.12	43.41	13.36	33.33	0.15	ND*	ND*
50	23/03/2021	68.62	40.36	19.21	30.57	0.36	ND*	ND*
51	26/03/2021	58.76	48.64	12.49	26.38	0.53	ND*	ND*
52	30/03/2021	78.12	20.58	11.24	29.35	0.40	ND*	ND*
<b>LIMIT<sup>#</sup></b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>4</b>	<b>Not Specified</b>	<b>5</b>
<b>TEST METHOD</b>		IS:5182(Part 23):Gravimetric CPCB - Method (Vol.I,May-2011)	Gravimetric-CPCB - Method (Vol.I,May-2011)	IS:5182(Part II):Improved West and Gaeke	IS:5182(Part VI):Modified Jacob &Hochheiser (NaOH-NaAsO <sub>2</sub> )	NDIR Digital Gas Analyzer	SOP: HC: GC/GCMS/Gas analyzer	IS 5182 (Part XI):2006/CPCB Method

\*Not Detected

#: Industrial, Residential, Rural and other Area Notification Dated 16<sup>th</sup> Nov.2009 as per national Ambient Air Quality Standards, CPCB New Delhi.**H. T. Shah****Lab Manager****Dr. Arun Bajpai****Lab Manager (Q)**

**RESULT OF AMBIENT AIR QUALITY MONITORING**

ADANI HOUSE								
Sr. No.	Date of Sampling	Particulate Matter (PM10) $\mu\text{g}/\text{m}^3$	Particulate Matter (PM 2.5) $\mu\text{g}/\text{m}^3$	Sulphur Dioxide (SO2) $\mu\text{g}/\text{m}^3$	Oxides of Nitrogen (NO2) $\mu\text{g}/\text{m}^3$	Carbon Monoxide as CO $\text{mg}/\text{m}^3$	Hydrocarbon as CH <sub>4</sub> $\text{mg}/\text{m}^3$	Benzene as C <sub>6</sub> H <sub>6</sub> $\mu\text{g}/\text{m}^3$
1	02/10/2020	57.56	18.58	20.55	35.61	0.49	ND*	ND*
2	06/10/2020	65.61	37.61	8.30	17.52	0.37	ND*	ND*
3	09/10/2020	60.37	30.24	22.30	27.54	0.44	ND*	ND*
4	13/10/2020	55.22	25.36	11.23	30.80	0.55	ND*	ND*
5	16/10/2020	62.65	32.57	15.39	37.25	0.31	ND*	ND*
6	20/10/2020	78.25	43.57	19.21	32.50	0.41	ND*	ND*
7	23/10/2020	64.27	29.57	12.55	33.56	0.76	ND*	ND*
8	27/10/2020	59.24	33.57	21.24	34.54	0.62	ND*	ND*
9	30/10/2020	71.24	31.49	13.90	20.69	0.53	ND*	ND*
10	03/11/2020	62.58	26.20	8.70	19.58	0.79	ND*	ND*
11	06/11/2020	70.67	41.22	12.36	22.76	0.62	ND*	ND*
12	10/11/2020	66.23	32.49	19.87	32.43	0.36	ND*	ND*
13	13/11/2020	58.68	27.55	9.60	20.45	0.60	ND*	ND*
14	17/11/2020	65.47	23.45	20.23	28.61	0.44	ND*	ND*
15	20/11/2020	72.53	34.62	16.42	25.64	0.70	ND*	ND*
16	24/11/2020	68.36	36.29	13.44	36.48	0.87	ND*	ND*
17	27/11/2020	55.21	20.53	6.90	15.61	0.72	ND*	ND*
18	01/12/2020	60.51	30.23	17.51	34.51	0.46	ND*	ND*
19	04/12/2020	72.38	35.66	15.35	38.34	0.39	ND*	ND*
20	08/12/2020	55.66	43.56	13.67	23.52	0.69	ND*	ND*
21	11/12/2020	66.27	26.34	16.34	35.67	0.38	ND*	ND*
22	15/12/2020	78.68	34.53	9.54	18.66	0.71	ND*	ND*
23	18/12/2020	62.86	45.53	7.55	26.19	0.27	ND*	ND*
24	22/12/2020	96.75	52.76	10.23	22.32	0.56	ND*	ND*
25	25/12/2020	76.48	44.53	12.51	19.55	0.42	ND*	ND*
26	29/12/2020	58.66	24.37	8.66	27.56	0.77	ND*	ND*
27	01/01/2021	69.36	32.69	11.53	25.88	0.29	ND*	ND*
28	05/01/2021	52.42	38.76	8.63	19.32	0.47	ND*	ND*
29	08/01/2021	85.76	49.63	16.46	31.50	0.33	ND*	ND*
30	12/01/2021	90.60	51.63	12.68	21.07	0.45	ND*	ND*

Continue ...



H. T. Shah

Lab Manager




Dr. Arun Bajpai

Lab Manager (Q)

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ADANI HOUSE								
Sr. No.	Date of Sampling	Particulate Matter (PM <sub>10</sub> ) $\mu\text{g}/\text{m}^3$	Particulate Matter (PM <sub>2.5</sub> ) $\mu\text{g}/\text{m}^3$	Sulphur Dioxide (SO <sub>2</sub> ) $\mu\text{g}/\text{m}^3$	Oxides of Nitrogen (NO <sub>2</sub> ) $\mu\text{g}/\text{m}^3$	Carbon Monoxide as CO $\text{mg}/\text{m}^3$	Hydrocarbon as CH <sub>4</sub> $\text{mg}/\text{m}^3$	Benzene as C <sub>6</sub> H <sub>6</sub> $\mu\text{g}/\text{m}^3$
31	15/01/2021	63.52	37.67	15.25	28.24	0.40	ND*	ND*
32	19/01/2021	95.84	43.52	17.53	32.57	0.17	ND*	ND*
33	22/01/2021	38.42	18.77	13.83	30.48	0.39	ND*	ND*
34	26/01/2021	70.36	31.61	14.57	35.38	0.60	ND*	ND*
35	29/01/2021	77.54	39.43	9.21	24.56	0.69	ND*	ND*
36	02/02/2021	76.34	36.25	19.45	28.28	0.19	ND*	ND*
37	05/02/2021	71.52	24.31	17.22	25.37	0.31	ND*	ND*
38	09/02/2021	58.63	26.84	15.34	30.39	0.57	ND*	ND*
39	12/02/2021	66.22	29.48	7.71	18.61	0.27	ND*	ND*
40	16/02/2021	57.33	33.49	10.24	15.40	0.64	ND*	ND*
41	19/02/2021	60.36	30.44	8.66	21.51	0.53	ND*	ND*
42	23/02/2021	52.42	21.24	11.54	31.20	0.44	ND*	ND*
43	26/02/2021	69.32	34.20	13.53	22.38	0.21	ND*	ND*
44	02/03/2021	57.28	19.65	12.66	20.34	0.52	ND*	ND*
45	05/03/2021	69.24	41.27	18.30	36.88	0.44	ND*	ND*
46	09/03/2021	77.55	33.66	8.68	21.56	0.48	ND*	ND*
47	12/03/2021	63.56	26.51	11.51	23.62	0.41	ND*	ND*
48	16/03/2021	79.22	31.52	13.85	29.67	0.25	ND*	ND*
49	19/03/2021	55.64	20.28	9.63	25.49	0.39	ND*	ND*
50	23/03/2021	67.52	37.59	16.41	28.44	0.14	ND*	ND*
51	26/03/2021	62.66	32.65	10.61	18.66	0.56	ND*	ND*
52	30/03/2021	74.31	27.51	6.81	22.32	0.23	ND*	ND*
<b>LIMIT<sup>#</sup></b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>4</b>	<b>Not Specified</b>	<b>5</b>
<b>TEST METHOD</b>		IS:5182(Part 23):Gravimetric CPCB - Method (Vol.I,May-2011)	Gravimetric-CPCB - Method (Vol.I,May-2011)	IS:5182(Part II):Improved West and Gaeke	IS:5182(Part VI):Modified Jacob & Hochheiser (NaOH-NaAsO <sub>2</sub> )	NDIR Digital Gas Analyzer	SOP: HC: GC/GCMS/Gas analyzer	IS 5182 (Part XI):2006/CPCB Method

\*Not Detected

#: Industrial, Residential, Rural and other Area Notification Dated 16<sup>th</sup> Nov.2009 as per national Ambient Air Quality Standards, CPCB New Delhi.

H. T. Shah

Lab Manager



Dr. Arun Bajpai

Lab Manager (Q)

### RESULT OF AMBIENT AIR QUALITY MONITORING

CT-3 RMU-2								
Sr.N o.	Date of Sampling	Particulate Matter (PM10) $\mu\text{g}/\text{m}^3$	Particulate Matter (PM 2.5) $\mu\text{g}/\text{m}^3$	Sulphur Dioxide (SO2) $\mu\text{g}/\text{m}^3$	Oxides of Nitrogen (NO2) $\mu\text{g}/\text{m}^3$	Carbon Monoxide as CO $\text{mg}/\text{m}^3$	Hydrocarbon as CH <sub>4</sub> $\text{mg}/\text{m}^3$	Benzene as C <sub>6</sub> H <sub>6</sub> $\mu\text{g}/\text{m}^3$
1	02/10/2020	66.32	28.47	14.22	22.61	0.86	ND*	ND*
2	06/10/2020	81.24	45.36	11.84	29.34	0.60	ND*	ND*
3	09/10/2020	76.67	40.27	20.65	35.61	0.81	ND*	ND*
4	13/10/2020	83.58	36.43	8.42	15.64	0.79	ND*	ND*
5	16/10/2020	78.66	41.23	21.26	34.67	0.48	ND*	ND*
6	20/10/2020	82.65	46.31	17.84	28.64	0.63	ND*	ND*
7	23/10/2020	75.65	34.23	19.54	25.34	0.52	ND*	ND*
8	27/10/2020	84.21	47.57	23.43	39.45	0.68	ND*	ND*
9	30/10/2020	77.55	33.73	15.89	30.40	0.40	ND*	ND*
10	03/11/2020	85.76	44.37	18.58	26.33	0.64	ND*	ND*
11	06/11/2020	79.36	36.51	16.21	30.42	0.26	ND*	ND*
12	10/11/2020	92.68	54.27	24.26	40.86	0.55	ND*	ND*
13	13/11/2020	80.78	46.25	11.20	24.64	0.30	ND*	ND*
14	17/11/2020	75.67	37.22	20.42	31.60	0.38	ND*	ND*
15	20/11/2020	83.68	45.58	14.84	23.42	0.80	ND*	ND*
16	24/11/2020	90.44	53.44	9.53	22.66	0.45	ND*	ND*
17	27/11/2020	72.64	32.48	17.59	37.56	0.41	ND*	ND*
18	01/12/2020	78.62	46.33	20.89	39.48	0.74	ND*	ND*
19	04/12/2020	65.65	31.57	11.36	26.36	0.65	ND*	ND*
20	08/12/2020	88.36	55.39	15.67	32.46	0.86	ND*	ND*
21	11/12/2020	79.68	43.38	9.62	27.50	0.41	ND*	ND*
22	15/12/2020	82.41	40.34	16.29	33.52	0.58	ND*	ND*
23	18/12/2020	90.62	42.63	13.80	29.32	0.92	ND*	ND*
24	22/12/2020	80.34	45.62	17.79	34.26	0.66	ND*	ND*
25	25/12/2020	87.36	48.74	14.36	36.21	0.52	ND*	ND*
26	29/12/2020	76.35	32.65	10.71	30.62	0.37	ND*	ND*
27	01/01/2021	85.62	43.67	16.29	31.52	0.53	ND*	ND*
28	05/01/2021	76.62	24.83	21.63	35.63	0.57	ND*	ND*
29	08/01/2021	92.76	44.67	18.59	29.66	0.42	ND*	ND*
30	12/01/2021	86.50	33.77	14.60	30.69	0.61	ND*	ND*

Continue ...



H. T. Shah

Lab Manager




Dr. Arun Bajpai

Lab Manager (Q)

**RESULT OF AMBIENT AIR QUALITY MONITORING**

CT-3 RMU-2								
Sr.N o.	Date of Sampling	Particulate Matter (PM <sub>10</sub> ) $\mu\text{g}/\text{m}^3$	Particulate Matter (PM <sub>2.5</sub> ) $\mu\text{g}/\text{m}^3$	Sulphur Dioxide (SO <sub>2</sub> ) $\mu\text{g}/\text{m}^3$	Oxides of Nitrogen (NO <sub>2</sub> ) $\mu\text{g}/\text{m}^3$	Carbon Monoxide as CO $\text{mg}/\text{m}^3$	Hydrocarbon as CH <sub>4</sub> $\text{mg}/\text{m}^3$	Benzene as C <sub>6</sub> H <sub>6</sub> $\mu\text{g}/\text{m}^3$
31	15/01/2021	80.34	41.67	8.82	22.66	0.25	ND*	ND*
32	19/01/2021	90.62	39.63	19.55	36.81	0.37	ND*	ND*
33	22/01/2021	55.76	36.51	15.71	40.26	0.71	ND*	ND*
34	26/01/2021	87.62	51.57	10.86	25.65	0.65	ND*	ND*
35	29/01/2021	82.62	46.58	17.24	34.59	0.58	ND*	ND*
36	02/02/2021	82.65	44.33	21.64	36.60	0.27	ND*	ND*
37	05/02/2021	89.35	48.53	19.41	28.60	0.39	ND*	ND*
38	09/02/2021	94.36	55.39	16.48	33.47	0.32	ND*	ND*
39	12/02/2021	85.76	51.28	22.43	29.43	0.42	ND*	ND*
40	16/02/2021	78.84	45.33	12.62	26.28	0.52	ND*	ND*
41	19/02/2021	92.52	54.36	17.53	38.65	0.62	ND*	ND*
42	23/02/2021	87.56	49.82	20.31	20.43	0.40	ND*	ND*
43	26/02/2021	91.76	52.40	18.57	27.63	0.37	ND*	ND*
44	02/03/2021	80.36	35.64	23.69	44.53	0.57	ND*	ND*
45	05/03/2021	70.42	30.40	21.20	40.26	0.66	ND*	ND*
46	09/03/2021	93.42	47.62	18.41	29.46	0.74	ND*	ND*
47	12/03/2021	78.62	55.39	10.51	38.63	0.54	ND*	ND*
48	16/03/2021	60.24	43.63	19.39	34.51	0.68	ND*	ND*
49	19/03/2021	87.62	56.35	16.36	39.53	0.50	ND*	ND*
50	23/03/2021	94.36	50.32	25.41	42.45	0.71	ND*	ND*
51	26/03/2021	72.52	40.34	15.52	33.43	0.60	ND*	ND*
52	30/03/2021	88.62	53.44	20.25	36.28	0.33	ND*	ND*
<b>LIMIT<sup>#</sup></b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>4</b>	<b>Not Specified</b>	<b>5</b>
<b>TEST METHOD</b>		IS:5182(Part 23):Gravimetric CPCB - Method (Vol.I,May-2011)	Gravimetric-CPCB - Method (Vol.I,May-2011)	IS:5182(Part II):Improved West and Gaeke	IS:5182(Part VI):Modified Jacob &Hochheiser (NaOH-NaAsO <sub>2</sub> )	NDIR Digital Gas Analyzer	SOP: HC: GC/GCMS/Gas analyzer	IS 5182 (Part XI):2006/CPCB Method

\*Not Detected

 #: Industrial, Residential, Rural and other Area Notification Dated 16<sup>th</sup> Nov.2009 as per national Ambient Air Quality Standards, CPCB New Delhi.



H. T. Shah

Lab Manager




Dr. Arun Bajpai

Lab Manager (Q)

## RESULTS OF NOISE LEVEL MONITORING

### Result of Noise level monitoring [Day Time]

SR. NO.	Name of Location	ADANI PORT – TUG BERTH 600 KL PUPM HOUSE					
		Result [Leq dB(A)]					
	Sampling Date & Time	23/10/2020	17/11/2020	09/12/2020	20/01/2021	20/02/2021	11/03/2021
1	6:00-7:00	59.1	60.4	58.6	53.7	58.8	62.4
2	7:00-8:00	62.4	65.4	64.1	51.8	60.2	67.4
3	8:00-9:00	68.4	68.1	65.7	56.9	62.4	67.2
4	9:00-10:00	64.4	61.8	63.8	59.7	63.8	69.2
5	10:00-11:00	62.1	70.6	68.5	47.3	65.6	61.4
6	11:00-12:00	61.8	65.2	66.6	61.7	58.4	60.4
7	12:00-13:00	67.4	68.4	65.1	63.4	69.4	68.4
8	13:00-14:00	69.8	62.9	63.6	64.4	65.2	72.4
9	14:00-15:00	62.1	66.7	67.2	63.2	66.1	69.4
10	15:00-16:00	61.5	63.1	64.5	62.8	68.1	70.5
11	16:00-17:00	68.4	63.4	62.9	62.4	61.4	65.4
12	17:00-18:00	65.1	62.2	64.3	58.3	67.8	63.4
13	18:00-19:00	62.8	68.8	66.2	64.3	72.1	61.5
14	19:00-20:00	61.0	68.4	65.8	54.8	70.6	62.8
15	20:00-21:00	62.8	65.5	64.6	58.7	65.5	68.1
16	21:00-22:00	61.8	61.7	63.2	53.5	68.8	63.8
Day Time Limit*		75 Leq dB(A)					

### Result of Noise level monitoring [Night Time]

SR. NO.	Name of Location	ADANI PORT – TUG BERTH 600 KL PUPM HOUSE					
		Result [Leq dB(A)]					
	Sampling Date & Time	23/10/2020	17/11/2020	09/12/2020	20/01/2021	20/02/2021	11/03/2021
1	22:00-23:00	62.4	65.3	64.5	63.7	62.2	60.1
2	23:00-00:00	68.4	65.2	67.3	56.4	61.2	62.5
3	00:00-01:00	62.1	61.5	64.9	51.2	63.8	68.4
4	01:00-02:00	63.1	62.5	61.5	56.7	67.4	69.1
5	02:00-03:00	65.8	68.4	66.2	59.4	62.4	62.4
6	03:00-04:00	62.8	63.4	64.8	45.4	63.9	65.2
7	04:00-05:00	61.4	62.8	65.1	46.9	62.8	63.1
8	05:00-06:00	62.8	60.4	61.4	47.8	61.8	60.8
Night Time Limit*		70 Leq dB(A)					



H. T. Shah

Lab Manager




Dr. Arun Bajpai

Lab Manager (Q)

## **RESULTS OF NOISE LEVEL MONITORING**

### **Result of Noise level monitoring [Day Time]**

SR. NO.	Name of Location	NEAR FIRE STATION					
		Result [Leq dB(A)]					
	Sampling Date & Time	09/10/2020	20/11/2020	08/12/2020	06/01/2021	10/02/2021	25/03/2021
1	6:00-7:00	60.8	60.4	61.7	56.8	60.1	68.4
2	7:00-8:00	65.2	68.5	67.2	62.4	64.8	62.1
3	8:00-9:00	62.1	65.4	64.6	53.7	62.5	66.8
4	9:00-10:00	61.4	63.8	62.8	61.4	69.3	69.5
5	10:00-11:00	64.1	72.4	70.2	65.7	70.2	64.1
6	11:00-12:00	63.2	62.5	61.1	67.4	63.2	60.2
7	12:00-13:00	68.4	61.5	60.3	69.8	69.4	65.3
8	13:00-14:00	62.5	63.4	64.5	63.4	70.5	63.4
9	14:00-15:00	61.2	65.4	63.9	71.4	65.4	69.7
10	15:00-16:00	69.4	68.5	65.8	67.8	72.8	60.1
11	16:00-17:00	65.1	69.4	66.2	68.5	63.5	63.1
12	17:00-18:00	66.8	62.1	71.3	70.3	62.4	65.5
13	18:00-19:00	70.2	62.8	68.7	66.5	65.1	60.4
14	19:00-20:00	68.5	62.8	65.2	68.8	62.8	61.8
15	20:00-21:00	64.1	64.8	62.4	61.8	68.4	65.8
16	21:00-22:00	62.1	68.7	65.1	55.8	63.8	62.7
Day Time Limit*		75 Leq dB(A)					

### **Result of Noise level monitoring [Night Time]**

SR. NO.	Name of Location	NEAR FIRE STATION					
		Result [Leq dB(A)]					
	Sampling Date & Time	09/10/2020	20/11/2020	08/12/2020	06/01/2021	10/02/2021	25/03/2021
1	22:00-23:00	69.5	65.5	64.2	61.4	66.5	65.5
2	23:00-00:00	65.2	62.4	63.8	52.4	65.1	62.1
3	00:00-01:00	67.4	64.2	66.1	48.3	62.5	60.1
4	01:00-02:00	62.5	63.5	65.9	47.3	63.4	63.8
5	02:00-03:00	66.9	65.8	63.4	44.2	59.1	59.4
6	03:00-04:00	62.4	62.5	60.3	43.1	62.8	61.5
7	04:00-05:00	61.8	68.4	63.2	49.2	60.2	65.1
8	05:00-06:00	63.4	63.8	61.6	51.3	68.1	62.4
Night Time Limit*		70 Leq dB(A)					



H. T. Shah

Lab Manager




Dr. Arun Bajpai

Lab Manager (Q)

## RESULTS OF NOISE LEVEL MONITORING

### Result of Noise level monitoring [Day Time]

SR. NO.	Name of Location	ADANI HOUSE					
		Result [Leq dB(A)]					
		20/10/2020	10/11/2020	15/12/2020	14/01/2021	11/02/2021	04/03/2021
1	6:00-7:00	63.1	63.8	62.4	46.8	62.4	60.1
2	7:00-8:00	68.8	65.1	66.1	47.3	60.5	65.1
3	8:00-9:00	72.1	68.4	70.9	49.3	68.4	66.8
4	9:00-10:00	69.5	62.5	68.8	42.7	71.4	70.1
5	10:00-11:00	64.2	63.4	66.6	55.8	62.5	68.5
6	11:00-12:00	61.5	68.4	65.4	59.7	72.5	66.1
7	12:00-13:00	62.8	66.1	71.3	54.9	70.1	62.5
8	13:00-14:00	69.5	62.8	68.2	57.3	62.1	64.5
9	14:00-15:00	63.1	69.8	62.8	55.2	69.7	69.5
10	15:00-16:00	62.4	62.4	64.7	54.4	66.1	71.4
11	16:00-17:00	66.1	69.5	68.1	56.7	67.4	68.3
12	17:00-18:00	68.4	62.1	65.9	53.8	69.3	63.4
13	18:00-19:00	65.2	61.5	64.3	58.3	63.5	68.2
14	19:00-20:00	63.1	63.4	65.2	51.8	61.4	62.2
15	20:00-21:00	69.5	68.4	67.4	53.7	60.4	63.1
16	21:00-22:00	66.4	62.8	65.1	49.7	65.4	61.5
Day Time Limit*		75 Leq dB(A)					

### Result of Noise level monitoring [Night Time]

SR. NO.	Name of Location	ADANI HOUSE					
		Result [Leq dB(A)]					
		20/10/2020	10/11/2020	15/12/2020	15/01/2021	11/02/2021	04/03/2021
1	22:00-23:00	65.8	67.4	66.8	58.7	63.8	60.1
2	23:00-00:00	68.4	65.2	67.2	69.7	68.4	62.5
3	00:00-01:00	61.2	62.5	63.1	41.2	60.1	67.4
4	01:00-02:00	62.3	68.4	65.4	46.8	59.4	60.3
5	02:00-03:00	68.1	61.5	65.3	45.2	55.1	60.2
6	03:00-04:00	60.4	66.2	64.7	46.1	53.8	65.4
7	04:00-05:00	63.2	62.7	63.2	44.8	62.1	61.2
8	05:00-06:00	62.8	68.4	61.6	42.8	60.5	63.8
Night Time Limit*		70 Leq dB(A)					



H. T. Shah

Lab Manager




Dr. Arun Bajpai

Lab Manager (Q)

## RESULTS OF NOISE LEVEL MONITORING

### Result of Noise level monitoring [Day Time]

SR. NO.	Name of Location	CT-3 RMU-2					
		Result [Leq dB(A)]					
	Sampling Date & Time	10/06/2020	06/11/2020	16/12/2020	25/01/2021	17/02/2021	10/03/2021
1	6:00-7:00	58.8	59.2	60.2	52.4	57.4	58.4
2	7:00-8:00	60.4	63.1	61.7	56.8	56.4	65.6
3	8:00-9:00	68.4	61.8	62.8	49.7	60.4	60.1
4	9:00-10:00	65.2	61.4	63.8	51.5	67.9	62.5
5	10:00-11:00	62.4	69.7	64.3	55.8	65.2	65.3
6	11:00-12:00	63.8	71.5	70.6	53.8	63.8	62.3
7	12:00-13:00	67.4	63.8	68.2	59.2	68.4	65.1
8	13:00-14:00	62.8	65.4	66.1	61.7	62.8	68.5
9	14:00-15:00	64.5	69.1	67.9	68.7	69.9	64.2
10	15:00-16:00	66.1	68.4	65.8	63.7	62.3	61.7
11	16:00-17:00	62.1	68.7	67.2	69.8	70.4	63.4
12	17:00-18:00	61.5	64.1	64.6	57.8	66.7	66.1
13	18:00-19:00	68.4	62.8	65.1	56.9	62.4	68.4
14	19:00-20:00	63.2	61.7	66.3	61.4	62.5	69.4
15	20:00-21:00	62.8	60.1	64.2	52.7	66.8	62.4
16	21:00-22:00	63.4	62.7	63.1	48.7	68.1	62.8
Day Time Limit*		75 Leq dB(A)					

### Result of Noise level monitoring [Night Time]

SR. NO.	Name of Location	CT-3 RMU-2					
		Result [Leq dB(A)]					
	Sampling Date & Time	06/10/2020	06/11/2020	16/12/2020	25/01/2021	17/02/2021	10/03/2021
1	22:00-23:00	68.4	65.8	67.1	68.2	64.4	63.8
2	23:00-00:00	65.2	65.4	64.4	61.8	61.2	58.4
3	00:00-01:00	63.4	62.4	65.3	48.9	63.4	55.1
4	01:00-02:00	65.8	68.4	66.2	41.8	61.4	62.1
5	02:00-03:00	62.4	63.4	64.6	43.7	62.5	60.4
6	03:00-04:00	61.4	61.4	62.3	43.2	68.4	58.1
7	04:00-05:00	62.3	62.8	63.2	47.1	64.2	62.4
8	05:00-06:00	63.7	62.7	61.9	49.2	62.8	59.2
Night Time Limit*		70 Leq dB(A)					



H. T. Shah

Lab Manager




Dr. Arun Bajpai

Lab Manager (Q)

**RESULT OF STACK MONITORING**

SR NO	TEST PARAMETERS	UNIT	STD. LIMIT	THERMIC FLUID HEATER (BITUMEN-01)	THERMIC FLUID HEATER (BITUMEN-02)	HOT WATER SYSTEM-1	HOT WATER SYSTEM-2	TEST METHOD
<b>OCTOBER 2020</b>								
1	Particulate Matter	mg/Nm <sup>3</sup>	<b>150</b>	19.36	--	28.38	30.61	IS:11255 (Part-I):1985
2	Sulfur dioxide	ppm	<b>100</b>	4.74	--	6.57	7.45	IS:11255 (Part-II):1985
3	Oxides of Nitrogen	ppm	<b>50</b>	25.37	--	34.22	38.62	IS:11255 (Part-VII):2005
<b>NOVEMBER 2020</b>								
1	Particulate Matter	mg/Nm <sup>3</sup>	<b>150</b>	26.41	--	32.41	--	IS:11255 (Part-I):1985
2	Sulfur dioxide	ppm	<b>100</b>	6.27	--	5.73	--	IS:11255 (Part-II):1985
3	Oxides of Nitrogen	ppm	<b>50</b>	28.78	--	30.73	--	IS:11255 (Part-VII):2005
<b>DECEMBER 2020</b>								
1	Particulate Matter	mg/Nm <sup>3</sup>	<b>150</b>	--	--	37.62	--	IS:11255 (Part-I):1985
2	Sulfur dioxide	ppm	<b>100</b>	--	--	7.63	--	IS:11255 (Part-II):1985
3	Oxides of Nitrogen	ppm	<b>50</b>	--	--	35.52	--	IS:11255 (Part-VII):2005
<b>JANUARY 2021</b>								
1	Particulate Matter	mg/Nm <sup>3</sup>	<b>150</b>	--	--	--	--	IS:11255 (Part-I):1985
2	Sulfur dioxide	ppm	<b>100</b>	--	--	--	--	IS:11255 (Part-II):1985
3	Oxides of Nitrogen	ppm	<b>50</b>	--	--	--	--	IS:11255 (Part-VII):2005
<b>FEBRUARY 2021</b>								
1	Particulate Matter	mg/Nm <sup>3</sup>	<b>150</b>	--	--	32.42	--	IS:11255 (Part-I):1985
2	Sulfur dioxide	ppm	<b>100</b>	--	--	5.71	--	IS:11255 (Part-II):1985
3	Oxides of Nitrogen	ppm	<b>50</b>	--	--	33.54	--	IS:11255 (Part-VII):2005
<b>MARCH 2021</b>								
1	Particulate Matter	mg/Nm <sup>3</sup>	<b>150</b>	21.29	--	35.71	--	IS:11255 (Part-I):1985
2	Sulfur dioxide	ppm	<b>100</b>	5.76	--	7.76	--	IS:11255 (Part-II):1985
3	Oxides of Nitrogen	ppm	<b>50</b>	30.71	--	37.56	--	IS:11255 (Part-VII):2005

\*Below detection limit

Results on 11 % O<sub>2</sub> Correction when Oxygen is greater than 11 %. And 12% CO<sub>2</sub> correction when CO<sub>2</sub> is less than 12%**H. T. Shah****Lab Manager****Dr. Arun Bajpai****Lab Manager (Q)**

## RESULTS OF D.G. STACK MONITORING

31/01/2021							
SR. NO.	TEST PARAMETERS	Unit	Adani Port			GPCB Limit	Test Method
			D.G. Set-1 (500 KVA)	D.G. Set-2 (500 KVA)	D.G. Set-3 (500 KVA)		
1	Particulate Matter	mg/Nm <sup>3</sup>	25.36	17.53	22.31	150	IS:11255 (Part-I):1985
2	Sulphur Dioxide	ppm	5.05	4.49	7.52	100	IS:11255 (Part-II):1985
3	Oxide of Nitrogen	ppm	34.55	37.57	31.52	50	IS:11255 (Part-VII):2005

\*DG sets are used as standby, so stack monitoring is done on quarterly basis. Results on 15 % O<sub>2</sub> Correction when Oxygen is greater than 15 %

31/01/2021				25/03/2021			
SR. NO.	TEST PARAMETERS	Unit	Adani Port			GPCB Limit	Test Method
			D.G. Set-4 (500 KVA)	D.G. Set-5 (500 KVA)	D.G. Set -6, 7 & 8 (1250 KVA, each)		
1	Particulate Matter	mg/Nm <sup>3</sup>	18.50	22.64	22.61	150	IS:11255 (Part-I):1985
2	Sulphur Dioxide	ppm	6.49	5.29	6.76	100	IS:11255 (Part-II):1985
3	Oxide of Nitrogen	ppm	36.24	31.29	35.42	50	IS:11255 (Part-VII):2005

\*DG sets are used as standby, so stack monitoring is done on quarterly basis. Results on 15 % O<sub>2</sub> Correction when Oxygen is greater than 15 %



H. T. Shah

Lab Manager




Dr. Arun Bajpai

Lab Manager (Q)

30/01/2021

SR. NO.	TEST PARAMETERS	Unit	CT-4			GPCB Limit	Test Method
			D.G. Set-1 (1500 KVA)	D.G. Set-2 (1500 KVA)	D.G. Set-3 (1500 KVA)		
1	Particulate Matter	mg/Nm <sup>3</sup>	21.25	25.65	23.85	150	IS:11255 (Part-I):1985
2	Sulphur Dioxide	ppm	4.20	7.32	5.65	100	IS:11255 (Part-II):1985
3	Oxide of Nitrogen	ppm	29.58	36.35	34.26	50	IS:11255 (Part-VII):2005

\*DG sets are used as standby, so stack monitoring is done on quarterly basis. Results on 15 % O<sub>2</sub> Correction when Oxygen is greater than 15 %

12/02/2021

SR. NO.	TEST PARAMETERS	Unit	CT-3 (South Basin)			GPCB Limit	Test Method
			D.G. Set-1 (1500 KVA)	D.G. Set-2 (1500 KVA)	D.G. Set-3 (1500 KVA)		
1	Particulate Matter	mg/Nm <sup>3</sup>	30.86	24.55	22.40	150	IS:11255 (Part-I):1985
2	Sulphur Dioxide	ppm	6.28	5.58	3.59	100	IS:11255 (Part-II):1985
3	Oxide of Nitrogen	ppm	35.71	32.41	30.86	50	IS:11255 (Part-VII):2005

\*DG sets are used as standby, so stack monitoring is done on quarterly basis. Results on 15 % O<sub>2</sub> Correction when Oxygen is greater than 15 %



H. T. Shah

Lab Manager




Dr. Arun Bajpai

Lab Manager (Q)

### Minimum Detection Limit [MDL]

Ambient Air Parameters		
Sr. No.	Test Parameter	MDL
1	Particulate Matter (PM <sub>10</sub> ) (µg/m <sup>3</sup> )	10
2	Particulate Matter (PM 2.5) (µg/m <sup>3</sup> )	10
3	Sulphur Dioxide (SO <sub>2</sub> ) (µg/m <sup>3</sup> )	5
4	Oxides of Nitrogen (µg/m <sup>3</sup> )	5
5	Hydrogen Sulphide as H <sub>2</sub> S (µg/m <sup>3</sup> )	6

Stack Parameters		
Sr.No.	Test Parameter	MDL
1	Particulate Matter (mg/Nm <sup>3</sup> )	10
2	Sulphur Dioxide (ppm)	1.52
3	Oxides of Nitrogen (ppm)	2.65
4	Carbon Monoxide (mg/Nm <sup>3</sup> )	0.1
5	Hydro Carbon NMHC (ppm)	1.0

Sea Water Parameters			
SR. NO.	TEST PARAMETERS	UNIT	MDL
1	pH	--	2
2	Temperature	°C	2
3	Total Suspended Solids	mg/L	2
4	BOD (3 Days @ 27 °C)	mg/L	1
5	Dissolved Oxygen	mg/L	0.1
6	Salinity	ppt	1
7	Oil & Grease	mg/L	2
8	Nitrate as NO <sub>3</sub>	µmol/L	0.5
9	Nitrite as NO <sub>2</sub>	µmol/L	0.01
10	Ammonical Nitrogen as NH <sub>3</sub>	µmol/L	0.2
11	Phosphates as PO <sub>4</sub>	µmol/L	0.5
12	Petroleum Hydrocarbon	µg/L	1
13	Total Dissolved Solids	mg/L	10
14	COD	mg/L	3
15	Primary productivity	mgC/L/day	0.1
16	Chlorophyll	mg/m <sup>3</sup>	0.1
17	Phaeophytin	mg/m <sup>3</sup>	0.1
18	Cell Count	No. x 10 <sup>3</sup> /L	1

Sea Sediment Parameters			
SR. NO.	TEST PARAMETERS	UNIT	MDL
1	Organic Matter	%	0.1
2	Phosphorus as P	µg/g	1
3	Petroleum Hydrocarbon	µg/g	1
4	Aluminum as Al	%	0.1
5	Manganese as Mn	µg/g	1
6	Mercury as Hg	µg/g	0.1



H. T. Shah

Lab Manager




Dr. Arun Bajpai

Lab Manager (Q)



STP Water parameter(mg/L)		
Sr. No.	Test parameter	MDL
1	pH	2
2	Total Suspended Solids (mg/L)	2
3	BOD (3 days @ 270 C) (mg/L)	1
4	Residual Chlorine (mg/L)	0.2
5	Fecal Coliform (MPN INDEX/100 mL)	1.8

ETP Water Parameters			
SR. NO.	TEST PARAMETERS	UNIT	MDL
1	Colour	Co-pt	2
2	pH	--	2
3	Temperature	°C	2
4	Total Suspended Solids	mg/L	2
5	Total Dissolved Solids	mg/L	10
6	COD	mg/L	3
7	BOD (3 Days @ 27 °C)	mg/L	1
8	Chloride as Cl	mg/L	1
9	Oil & Grease	mg/L	2
10	Sulphate as SO <sub>4</sub>	mg/L	1
11	Ammonical Nitrogen as NH <sub>3</sub>	mg/L	0.2
12	Phenolic Compound	mg/L	0.005
13	Copper as Cu	mg/L	0.01
14	Lead as Pb	mg/L	0.01
15	Sulphide as S	mg/L	0.1
16	Cadmium as Cd	mg/L	0.002
17	Fluoride as F	mg/L	0.05

**H. T. Shah****Lab Manager****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

# **"HALF YEARLY ENVIRONMENTAL MONITORING REPORT"**

**FOR**

**BORE HOLE WATER  
ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED  
TAL: MUNDRA, KUTCH, MUNDRA – 370 421**

**MONITORING PERIOD:  
OCTOBER 2020 TO MARCH 2021**

**PREPARED BY:****POLLUCON LABORATORIES PVT.LTD.**

**PLOT NO.5/6 "POLLUCON HOUSE", OPP. BALAJI INDUSTRIAL SOCIETY,  
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**TC - 5945****ISO 9001:2015****ISO 14001:2015****ISO 45001:2018**

**POLLUCON** LABORATORIES PVT. LTD.Environmental Auditors, Consultants & Analysts.  
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**RESULTS OF BORE HOLE WATER**

SR. NO	TEST PARAMETERS	UNIT	RESULTS			TEST METHOD
			PUMP HOUSE-1	PUMP HOUSE-2	PUMP HOUSE-3	
	Sampling Date		17/12/2020	17/12/2020	17/12/2020	
1	pH	--	8.32	8.07	8.13	IS3025(P11)83Re.02
2	Salinity	ppt	4.78	1.44	1.76	APHA 2520B
3	Oil & Grease	mg/L	Not Detected	Not Detected	Not Detected	APHA(22ndEdi)5520D
4	Hydrocarbon	mg/L	Not Detected	Not Detected	Not Detected	GC/GC-MS
5	Lead as Pb	mg/L	0.043	0.037	0.048	AAS APHA(22ndEdi)3111 B
6	Arsenic as As	mg/L	Not Detected	Not Detected	Not Detected	AAS APHA 3114 B
7	Nickel as Ni	mg/L	Not Detected	Not Detected	Not Detected	AAS APHA(22ndEdi)3111 B
8	Total Chromium as Cr	mg/L	Not Detected	0.029	0.033	AAS 3111B
9	Cadmium as Cd	mg/L	Not Detected	Not Detected	Not Detected	AAS APHA(22ndEdi)3111 B
10	Mercury as Hg	mg/L	Not Detected	Not Detected	Not Detected	AAS APHA- 3112 B
11	Zinc as Zn	mg/L	Not Detected	0.42	0.27	AAS APHA(22ndEdi)3111 B
12	Copper as Cu	mg/L	Not Detected	Not Detected	Not Detected	AAS APHA(22ndEdi)3111 B
13	Iron as Fe	mg/L	0.39	2.84	2.68	AAS APHA(22ndEdi)3111 B
14	Insecticides/Pesticides	mg/L	Absent	Absent	Absent	GC/GC-MS
15	Depth of Water Level from Ground Level	meter	1.82	2.0	1.65	--

**H. T. Shah****Lab Manager****Dr. Arun Bajpai****Lab Manager (Q)**

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SR. NO	TEST PARAMETERS	UNIT	RESULTS		TEST METHOD
			NEAR ETP OFFICE	NEAR ETP PLANT	
			17/12/2020	17/12/2020	
1	pH	--	8.03	7.84	IS3025(P11)83Re.02
2	Salinity	ppt	7.4	11.6	APHA 2520B
3	Oil & Grease	mg/L	2.6	Not Detected	APHA(22ndEdi)5520D
4	Hydrocarbon	mg/L	Not Detected	Not Detected	GC/GC-MS
5	Lead as Pb	mg/L	0.058	0.28	AAS APHA(22ndEdi)3111 B
6	Arsenic as As	mg/L	Not Detected	Not Detected	AAS APHA 3114 B
7	Nickel as Ni	mg/L	Not Detected	Not Detected	AAS APHA(22ndEdi)3111 B
8	Total Chromium as Cr	mg/L	Not Detected	Not Detected	AAS 3111B
9	Cadmium as Cd	mg/L	Not Detected	Not Detected	AAS APHA(22ndEdi)3111 B
10	Mercury as Hg	mg/L	Not Detected	Not Detected	AAS APHA- 3112 B
11	Zinc as Zn	mg/L	0.15	0.71	AAS APHA(22ndEdi)3111 B
12	Copper as Cu	mg/L	Not Detected	Not Detected	AAS APHA(22ndEdi)3111 B
13	Iron as Fe	mg/L	0.28	4.2	AAS APHA(22ndEdi)3111 B
14	Insecticides/Pesticides	mg/L	Absent	Absent	GC/GC-MS
15	Depth of Water Level from Ground Level	meter	2.1	2.1	--

H. T. Shah

Lab Manager



Dr. Arun Bajpai

Lab Manager (Q)

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Borehole Water Parameters			
SR. NO.	TEST PARAMETERS	UNIT	MDL
1	pH	--	2
2	Salinity	mg/L	0.5
3	Oil & Grease	mg/L	2
4	Hydrocarbon	mg/L	0.01
5	Lead as Pb	mg/L	0.01
6	Arsenic as As	mg/L	0.001
7	Nickel as Ni	mg/L	0.02
8	Total Chromium as Cr	mg/L	0.025
9	Cadmium as Cd	mg/L	0.002
10	Mercury as Hg	mg/L	0.005
11	Zinc as Zn	mg/L	0.06
12	Copper as Cu	mg/L	0.01
13	Iron as Fe	mg/L	0.1
14	Insecticides/Pesticides	mg/L	0.1

H. T. Shah

Lab Manager



Dr. Arun Bajpai

Lab Manager (Q)

# **Annexure – 3**

## Details of Greenbelt Development at APSEZ, Mundra

Total Green Zone Detail Till Up to March – 2021					
LOCATION	Area (In Ha.)	Trees (Nos.)	Palm (Nos.)	Shrubs (SQM)	Lawn (SQM)
SV COLONY	71.63	34920	7962	69426.00	100646.00
PORT & NON SEZ	81.51	149192	19220	75061.78	62062.38
SEZ	116.60	227120	20489	220583.60	28162.03
MITAP	2.52	8168	33	3340.00	4036.00
WEST PORT	100.25	244112	70331	24612.00	22854.15
AGRI PARK	8.94	17244	1332	5400.00	2121.44
SOUTH PORT	14.45	27530	3470	3882.00	3327.26
Samudra Township	56.89	62522	11834	20908.89	47520.07
Productive Farming (Vadala Farm)	23.79	27976	--	--	--
<b>TOTAL (APSEZ)</b>	<b>476.56</b>	<b>798784</b>	<b>134671</b>	<b>423214.27</b>	<b>270729.33</b>
		<b>Total Saplings: 933455 Nos.</b>			

## **Details of Mangrove Afforestation done by APSEZ**

Sl. no.	Location	Area (ha)	Duration	Species	Implementation agency
1	Mundra Port	24.0	-	Avicennia marina	Dr. Maity, Mangrove consultant of India
2	Mundra Port	25.0	-	Avicennia marina	Dr. Maity, Mangrove consultant of India
3	Luni/Hamirmora (Mundra, Kutch)	160.8	2007 - 2015	Avicennia marina, Rhizophora mucronata, Ceriops tagal	GUIDE, Bhuj
4	Kukadsar (Mundra, Kutch)	66.5	2012 - 2014	Avicennia marina	GUIDE, Bhuj
5	Forest Area (Mundra)	298.0	2011 - 2013	Avicennia marina	-
6	Jangi Village (Bhachau, Kutch)	50.0	2012 - 2014	Avicennia marina	GUIDE, Bhuj
7	Jakhau Village (Abdasa, Kutch)	310.6	2007-08 & 2011-13	Avicennia marina, Rhizophora mucronata, Ceriops tagal	GUIDE, Bhuj
8	Sat Saida Bet (Kutch)	255.0	2014-15 & 2016-17	Avicennia marina & Bio diversity	GUIDE, Bhuj
9	Dandi Village (Navsari)	800.0	2006 - 2011	Avicennia marina, Rhizophora mucronata, Ceriops tagal	SAVE, Ahmedabad
10	Talaza Village (Bhavnagar)	50.0	2011-12	Avicennia marina	SAVE, Ahmedabad
11	Narmada Village (Bhavnagar)	250.0	2014 - 2015	Avicennia marina	SAVE, Ahmedabad
12	Malpur Village (Bharuch)	200.0	2012-14	Avicennia marina	SAVE, Ahmedabad
13	Kantiyajal Village (Bharuch)	50.0	2014-15	Avicennia marina	SAVE, Ahmedabad
14	Devla Village (Bharuch)	150.0	210-16	Avicennia marina	SAVE, Ahmedabad
15	Village Tala Talav (Khambhat, Anand)	100.0	2015 - 2016	Avicennia marina	SAVE, Ahmedabad
16	Village Tala Talav (Khambhat, Anand)	38.0	2015 - 2016	Avicennia marina	GEC, Gandhinagar
17	Aliya Bet, Village Katpor (Hansot, Bharuch)	62.0	2017-18	Avicennia marina & Rhizophora spp.	GEC, Gandhinagar
<b>Total Mangrove Plantation:</b>		<b>2889.90 Ha</b>			

# **Annexure – 4**

APSEZL/EnvCell/2020-21/101

Date: 02.12.2020

To,  
The Regional Officer  
Regional Office  
Gujarat Pollution Control Board (East - Kutch),  
Gandhidham, Kutch - 370201.

**Subject: Intimation regarding Re-commissioning of Liquid Terminal ETP**

**Reference:**

1. CC&A Order No. AWH - 83561, dated 09.01.2017, Valid till 20.11.2021
2. Our letter dated 14.09.2020 (Annexure - 1)

Dear Sir,

With reference to above stated subject and references, we would like to inform you that our Effluent Treatment Plant was under maintenance due to modification of biological treatment scheme, which had been intimated to your good office vide our letter dated 14.09.2020.

The entire modification work has been completed and ETP is recommissioned from 16<sup>th</sup> November 2020. We are operating ETP regularly and efficiently to achieve the permissible norms and entire treated water from ETP is being utilized for horticulture purpose on land within APSEZ premises.

This is for your information and kind perusal.

Thanking you,

For, Adani Ports and Special Economic Zone Limited

Bhagwat Swaroop Sharma  
(Head - Environment Mundra & Tuna Port)



CC To:

Unit Head (Kutch), Gujarat Pollution Control Board, Gandhinagar - 382010.

*12/03/2020*  
**Gujarat Pollution Control Board**  
**Head Office**  
**Sector No. 10-A,**  
**Gandhinagar-382010**

Adani Ports and Special Economic Zone Ltd  
Adani House,  
PO Box No. 1  
Mundra, Kutch 370 421  
Gujarat, India  
CIN: L63090GJ1998PLC034182

Tel +91 2838 25 5000  
Fax +91 2838 25 5110  
info@adani.com  
www.adani.com

Registered Office: Adani Corporate House, Shantigram, Nr. Vaishno Devi Circle, S.G. Highway, Khodiyar, Ahmedabad - 382421, Gujarat, India

APSEZL/EnvCell/2020-21/101

Date: 02.12.2020

To,  
The Regional Officer  
Regional Office  
Gujarat Pollution Control Board (East - Kutch),  
Gandhidham, Kutch - 370201.

**Subject: Intimation regarding Re-commissioning of Liquid Terminal ETP**

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For, Adani Ports and Special Economic Zone Limited

Bhagwat Swaroop Sharma  
(Head - Environment Mundra & Tuna Port)

CC To:

Unit Head (Kutch), Gujarat Pollution Control Board, Gandhidham - 382010.



8-12-20  
**Received**  
Gujarat Pollution Control Board  
Regional Office  
Kutch (East)

Adani Ports and Special Economic Zone Ltd  
Adani House,  
PO Box No. 1  
Mundra, Kutch 370 421  
Gujarat, India  
CIN: L63090GJ1998PLC034182  
Tel: +91 2838 25 5000  
Fax: +91 2838 25 51110  
info@adani.com  
www.adani.com

Registered Office: Adani Corporate House, Shantigram, Nr. Vaishno Devi Circle, S.G. Highway, Khodiyar, Ahmedabad - 382421, Gujarat, India

# **Annexure – 5**



# **OIL SPILL CONTINGENCY RESPONSE PLAN TIER 1**

(To be used in conjunction with OSRA Vol-1 and Vol-2)

**ADANI PORTS AND SPECIAL  
ECONOMIC ZONE LIMITED**

**POST BAG NO. 1**

**NAVINAL ISLAND**

**MUNDRA 370 421**

**PH. : (02838) 289221 / 289371**

**FAX : (02838) 289170 / 289270**

Reviewed By : Capt. Divya Gupta	Issue No. : 01	Issued On : 01.10.2020
Approved By : Capt. Anubhav Jain	Revision No. : 05	Page 1 of 98

ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.  
MUNDRA  
OIL SPILL CONTINGENCY RESPONSE PLAN

**Section 00: Document Control**

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When the controlled copy holder ceases to be the authorized recipient of this document, the document should be returned to the HOD (Marine), Mundra Office.

This document is distributed as per Oil Spill Contingency Response plan. In addition, documents on a "need based" basis will be distributed.

All documents so distributed will be controlled documents & identified by a unique control number as per Oil Spill Contingency Response plan.

The holder of the control copy shall ensure that the persons working under him, who are responsible for any activity described in this document are made aware of such responsibility. These persons shall be given this document to read and as acknowledgment of having read shall sign the **OSCRP – Section 01 Record of Circulation** page of this document.

All persons to whom the documents have been circulated shall also be made aware of any revisions thereto by the holder of the controlled copy of the document. The person shall, after reading, sign in the **OSCRP – Section 01 Record of Circulation** page of this document as acknowledgment of having read and understood the document.

DISTRIBUTION LIST OF OIL SPILL CONTINGENCY RESPONSE PLAN			
SN.	Issued To	Copy No.	Date of Issue
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2.	Management Representative	02	01/01/2014
3.	Marine Control Room	03	01/01/2014
4.	Sr. Manager (Fire Services)	04	01/01/2014
5.	Auditor's Copy	05	01/01/2014
6.	Systems Co-ordinator	Original Copy	01/01/2014
7.	HOD (Marine)	06	01/01/2014
8.	Coast Guard	07	01/01/2014
.			

The Unique no. of this copy is: \_\_\_\_\_

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# OIL SPILL CONTINGENCY RESPONSE PLAN

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ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.  
MUNDRA  
OIL SPILL CONTINGENCY RESPONSE PLAN

## Section 03: Strategy

### 1 Introduction

- 1.1 Authorities and responsibilities
- 1.2 Coordinating committee
- 1.3 Statutory requirements
- 1.4 Mutual aid agreements
- 1.5 Geographical limits of plan
- 1.6 Interfaces with ROSDCP and NOSDCP

### 2 Risk assessment

- 2.1 Identification of activities and risks
- 2.2 Types of oil likely to be spilled
- 2.3 Probable fate of spilled oil
- 2.4 Development of oil spill scenarios including worst case discharge
- 2.5 Shoreline sensitivity mapping
- 2.6 Shoreline resources, priorities for protection
- 2.7 Special local considerations

### 3 Response strategy

- 3.1 Philosophy and objectives
- 3.2 Limiting and adverse conditions
- 3.3 Oil spill response in offshore zones
- 3.4 Oil spill response in coastal zones
- 3.5 Shoreline oil spill response
- 3.6 Storage and disposal of oil and oily waste

### 4 Equipment

- 4.1 Marine oil spill response equipment
- 4.2 Inspection, maintenance and testing
- 4.3 Shoreline equipment, supplies and services

### 5 Management

- 5.1 Crisis manager and financial authorities
- 5.2 Incident organization chart
- 5.3 Manpower availability (on-site, on call)
- 5.4 Availability of additional manpower
- 5.5 Advisors and experts – spill response, wildlife and marine environment
- 5.6 Training / safety schedules and drill / exercise programme

### 6 Communications

- 6.1 Incident control room and facilities
- 6.2 Field communications equipment
- 6.3 Reports, manuals, maps, charts and incident logs

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**ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.  
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**Action and operations**

**7 Initial procedures**

- 7.1** Notification of oil spill to concerned authorities,
- 7.2** Preliminary estimate of response tier
- 7.3** Notifying key team members and authorities
- 7.4** Manning Control Room
- 7.5** Collecting information (oil type, sea / wind forecasts, aerial surveillance, beach reports)
- 7.6** Estimating fate of slick (24, 48, 72 hours)
- 7.7** Identifying resources immediately at risk, informing parties

**8 Operations planning**

- 8.1** Assembling full response team
- 8.2** Identifying immediate response priorities
- 8.3** Mobilizing immediate response
- 8.4** Media briefing
- 8.5** Planning medium-term operations (24, 48 and 72 hour)
- 8.6** Deciding to escalate response to higher tier
- 8.7** Mobilizing or placing on standby resources required
- 8.8** Establishing field command post communications

**9 Control of operations**

- 9.1** Establishing a Management team with experts and advisors
- 9.2** Updating information (sea, wind, weather forecasts, aerial surveillance, beach reports)
- 9.3** Reviewing and planning operations
- 9.4** Obtaining additional equipment, supplies, manpower
- 9.5** Preparing daily incident log and management reports
- 9.6** Preparing operations accounting and financial reports
- 9.7** Preparing releases for public and press conferences
- 9.8** Briefing local and government officials

**10 Termination of operations**

- 10.1** Deciding final and optimal levels of beach clean-up
- 10.2** Standing down equipment, cleaning, maintaining, replacing
- 10.3** Preparing formal detailed report
- 10.4** Reviewing plans and procedures from lessons learnt

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ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.  
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OIL SPILL CONTINGENCY RESPONSE PLAN

## Data Directory

### Maps / Charts

1. Coastal facilities, access roads, telephones, hotels etc.
2. Coastal charts, currents, tidal information (ranges and streams), prevailing winds
3. Risk locations and probable fate of oil
4. Shoreline resources for priority protection
5. Shoreline types
6. Sea zones and response strategies
7. Coastal zones and response strategies
8. Shoreline zones and clean up strategies
9. Oil and waste storage / disposal sites
10. Sensitivity Maps/ Atlas

### Lists

1. **Primary Oil spill Equipment:** booms, skimmers, spray equipment, dispersant, absorbents, oil storage, Radio communications etc. (Manufacturer, type, size, location, transport, contact, delivery time, cost and conditions)
2. **Auxiliary Equipment:** Tugs and work boats, aircraft, vacuum trucks, tanks and barges, loaders and graders, plastic bags, tools, protective clothing, communication equipment etc. (Manufacturer, type, size, location, transport, contact, delivery time, cost and conditions)
3. **Support Equipment:** Aircraft, communications, catering, housing, transport, field sanitation and shelter etc. (Availability, contact, cost and conditions)
4. **Sources of Manpower:** Contractors, local authorities, caterers, security firms (Availability, numbers, skills, contact, cost and conditions)
5. **Experts and Advisors:** Environment, safety, auditing (Availability, contact, cost and conditions)
6. **Local and National Government contacts:** Name, rank and responsibility, address, telephone, fax, telex.

### Data

1. Specifications of oils commonly traded
2. Wind and weather
3. Information sources

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ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.  
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**Annexures**

Annexure 1	Initial Oil Spill Report
Annexure 2	POLREP Report
Annexure 3	List of resources available
Annexure 4	List of Telephone numbers of Expert and advisors
Annexure 5	Responsibilities: Marine Officer / SPM Officer
Annexure 6	Responsibilities: Marine Manager / On Scene Commander
Annexure 7	Responsibilities: SPM Pilot
Annexure 8	Responsibilities: HOD – Marine
Annexure 9	Oil Spill Progress report
Annexure 10	Emergency response Log
Annexure 11	Classification of oils
Annexure 12	Response Guidelines
Annexure 13	Site Specific Health and Safety Plan.
Annexure 14	Indian Chart 2079
Annexure 15	List of recycler approved by state of Gujarat
Annexure 16	List of agency for support & guidance for rescue & rehabilitation of oiled bird & mangroves management during oil spill

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**ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.  
MUNDRA  
OIL SPILL CONTINGENCY RESPONSE PLAN**

## **Strategy**

### **1. Introduction**

The movement of Petroleum/ Petroleum-products from the production centre in middle east to Adani Ports and SEZ Ltd and various other ports in Gulf of Kutch is handled through ships at sea and to refineries using pipe lines on ground. Like any other port, Adani Port is very much vulnerable to oil spill disaster arising due to collision, leakage or grounding of vessels in sea and damage to pipelines on ground.

This action plan prepared by Adani Ports and SEZ Ltd, Mundra is to combat the oil spill (LOS-DCP) is in accordance with the NOS-DCP, International Petroleum Industry Environmental Conservation Association (IPIECA).

#### **1.1 Authorities and responsibilities**

##### **Adani Ports and SEZ Limited**

APSEZL has responsibility for dealing with oil spillages which occur within port limit if the estimated quantity of product lost is 700 tons or less.

Should the spill migrate to other areas, the Coast Guard Monitor will assume the position of On Scene Commander and will direct the response effort. In both cases, APSEZL will act and deploy their resources as required by the relevant On Scene Commander.

This operational version of Oil Spill Contingency Response Plan for the Adani Ports and SEZ Ltd, Mundra is intended for use by all such personnel like Marine Personnel, Tug Masters and all others as indicated in the Spill Response Organization who may be involved in the response to oil spills which may occur within Adani Port Limits.

This plan has been prepared as per the stipulation of Ministry of Environment and Forest Clearance (MoEF) and Coast Guard Requirements.

##### **Gujarat Maritime Board**

While responsibility for oil spill contingency remains with conservator of the port – Gujarat Maritime Board Port Officer, this plan (Tier 1) demonstrates the readiness of Adani Port for mitigating oil spill incidents.

Port Conservator will monitor and provide the necessary assistance required for administering the oil spill operation within the port limit.

##### **Indian Coast Guard**

The Indian Coast Guard has a statutory duty to protect the maritime and other national interests of India in the Maritime Zones of India and to prevent and control marine pollution. Coast Guard is also the Central Co-ordinating Authority for marine pollution control in the country. The Indian Coast Guard is responsible for implementation and enforcement of the relevant marine pollution laws.

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MUNDRA**

**OIL SPILL CONTINGENCY RESPONSE PLAN**

The National Oil Spill Disaster Contingency Plan stipulates the organizational and operational details to effectively combat a national oil spill contingency. The plan promotes the development of Regional and Local Contingency Plans in the three Coast Guard Regions.

The Coast Guard Monitor will assume the role of On Scene Commander in the event that any oil spill involving PLL operations exceeds 700 tons.

**Gujarat Pollution Control Board**

The Gujarat Pollution Control Board is responsible for, and control, waters up to 5 km from the shoreline. They require to be advised of all pollution incidents.

**Ministry of Environment, Gujarat**

The Ministry requires to be informed of all pollution incidents.

**Emergency Response Team**

Emergency Response Team (ERT) is the nomenclature used to describe the command and control team established for an oil spill incident at the jetty or in the jetty approaches, with representatives of organizations attending as described in section 2.4.

The ERT will convene at the Terminal Control Room, under the chairmanship of the Terminal Manager, and will consist of a Management Team and a Support Team as noted in section 2.3.

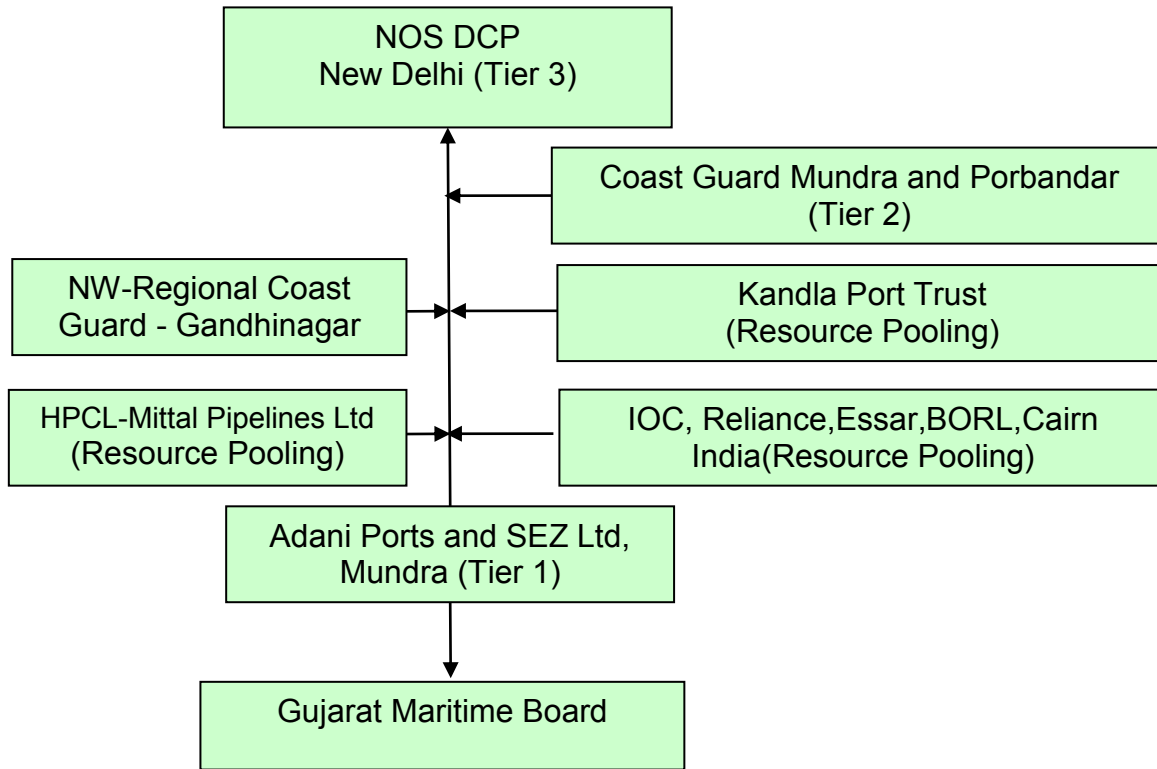
It is a strategic plan to quickly call on additional resources in a systematic manner firstly from Adani port and subsequently from other ports.

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MUNDRA

OIL SPILL CONTINGENCY RESPONSE PLAN

**1.2 Coordinating Committee**



**1.3 Statutory requirements**

The Indian Government is a signatory to the International Convention on Oil Pollution Preparedness, Response and Co-operation which came into force in May 94. Under the NOSDCP, it is obligatory for a port to have a Local Oil Spill Contingency Plan to combat oil spills within port limits.

This oil spill contingency response plan (Tier 1) is the response plan in accordance with the facilities available at Adani Port only.

This plan is prepared in accordance with:

- Marine Environmental Impact Assessment of SPMs, COTs and connecting pipelines of APSEZL at Mundra dated February 2001, prepared by National Institute of Oceanography, Mumbai.
- Report on Risk assessment study and On-site disaster management Plan for SPMs, COTs and connecting Pipelines of Adani Ports and Special Economic Zone Limited, by TATA AIG Risk Management Services Limited, dated February 2001.
- HAZOP study report of SPM Terminal pipeline project by Intec Engineering, dated 26/02/2004.
- IPIECA guide to Contingency planning for oil spills on water.
- Oil spill risk assessment and contingency plan study done by M/s Environ Software Pvt. Ltd. (Copy enclosed)

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**ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.  
MUNDRA  
OIL SPILL CONTINGENCY RESPONSE PLAN**

**1.4 Mutual aid agreements**

APSEZL signed MOU with HPCL Mittal Pipelines Limited, Mundra operating in the region of Gulf of Kutch to have mutual aid agreement for the purpose of assisting each other within stipulated time frame with best combination of resources to combat and overcome any large and worst spill with the intent of maximizing the availability of the private, public and government sector response resources during oil spills where assistance is requested by another member.

As per agreement, the member agencies of the affected member state or province may directly request cascable response resources located in oil handling agencies operating in the region of Gulf of Kutch.

**1.5 Geographical limits of plan**

Adani Ports and SEZ Ltd, Mundra is situated at the North head of Gulf of Kutch which is at the west coast of India. Ships calling Adani Port therefore have to traverse across the GOK. This oil spill contingency response plan (Tier 1) is applicable for the following:

- 1) Loading and Unloading of liquid cargo at the Multi-purpose terminal jetty at the Adani Port.
- 2) Unloading of the crude oil the vessels at the single point mooring (SPM) to offload 70,000 to 3,00,000 DWT.
- 3) Bunkering operations carried out within the port limits.
- 4) Any spill that occurs from any source within port limit (including West Basin, South Basin and LNG Terminal) whether at berths, anchorages or in the channel.

APSEZL falls within the area jurisdiction of The Commander, No.1 Coast Guard District (Gujarat), located at Porbandar. Mundra has a full-fledged Indian Coast Guard Station. The Port limit of APSEZL, Mundra is shown in enclosed chart in annexure 14.

**1.6 Interface with ROSDCP and NOSDCP**

For responding to oil spill, the Indian Coast Guard has developed the National Oil Spill Disaster Contingency Plan NOSDCP which has the approval of the Committee of Secretaries and has been in operation since 1996. The NOSDCP brings together the combined resources of the various organizations and departments, Coast Guard, Ports and Oil handling Agencies, and related industries, to provide a level of preparedness to the threat posed to the marine environment by oil spills.

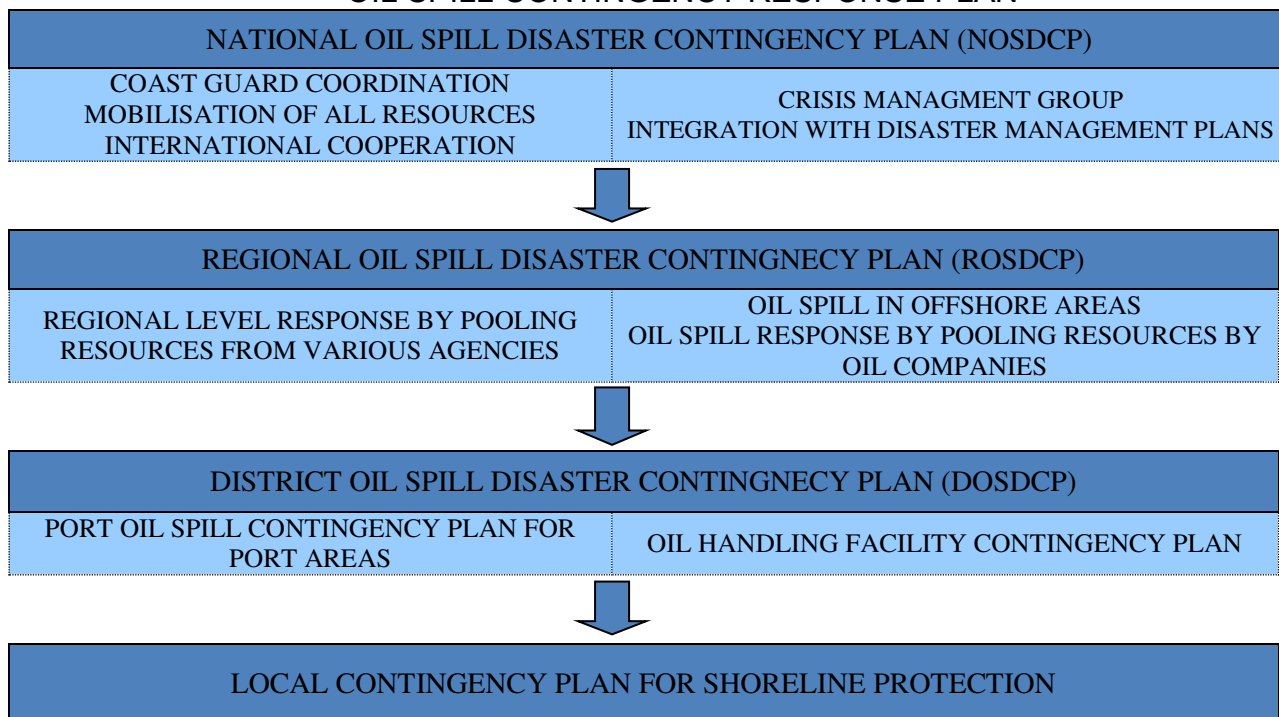
The NOSDCP sets out a clear definition of the responsibilities of the major participants, such as the Coast Guard, various ministries and departments, ports and oil industry.

The national oil spill contingency plan hierarchy outlined in Figure 1 consists of NOSDCP at the apex level to coordinate significant or disaster type spills, the Regional Oil Spill Disaster Contingency plan (ROSDCP) to coordinate spill in the Gulf of Kutch, utilizing the resources available within the region.

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ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.  
MUNDRA

**OIL SPILL CONTINGENCY RESPONSE PLAN**



**Figure 1 - Contingency Plan hierarchy**

The aim of Local Contingency Plan - for the Mundra Port, is to outline arrangements for responding to oil spills in the coastal and shoreline areas, with the aim of protecting against environmental pollution as a result of oil spill or, where this is not possible, minimize the effect and respond the oil spill in an environment friendly manner and dispose the collected oil/debris in according to the existing laws/regulations/orders in force. CONTINGENCY PLAN FOR SHORELINE PROTECTION  
DISTRICT OIL SPILL CONTINGENCY PLAN

## 2 Risk Assessment

The number of vessels calling annually at APSEZL is more than 3000 including Chemical, Gas and oil tankers. The threat of oil spill is much high in Gulf of Kutch and is very oil spill sensitive area. A marine national park is located in the Southern shore of GOK. There is a popular beach spot on the Northern shore namely Mandvi. Lastly, as GOK is a closed system, any oil spilled will arrive to the shores.

### 2.1 Identification of activities and risks

The scenario of the spill are classified under two categories :

- Oil Spill at Mundra Port Multi-Purpose Terminals
- Oil Spill at SPM

The oil spill could occur due to various reasons at any of the APSEZL's marine facilities (SPMs, Basins/ berths, anchorage or approach channel) within the new Mundra Port limit. The spills beyond these areas are not covered in this plan. Both the categories are discussed in detail

Accidental oil spill at Multipurpose terminals/ Basins/ berths, anchorage or approach channel is possible from overflow of slop tanks, bunker tanks, reception facility and road tankers (generally a low pressure operation).

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MUNDRA**

**OIL SPILL CONTINGENCY RESPONSE PLAN**

Accidental oil spill at the SPM may be due to hose puncture while unloading, failure of swivel joint of SPM or Leakage of Crude Oil at PLEM or from the submarine pipeline.

Following risks are being addressed to mitigate incident of oil pollution:

- Connection of hoses with established work instructions for use of blank flanges, drip trays etc.
- Thorough understanding of use of OSD and limitations of vessel surging due to slack mooring ropes in given weather conditions.
- Monitoring of ships pump room atmosphere, display of fire notices and acknowledging accidental explosion through the use of IMO ship / shore check list.
- Spillage of F.O. during bunkering operations by using bunkering check list
- Ballast discharge contamination or malfunction of ship's sea side valves by prohibiting such operations without written permission of the port.
- Non use of reception facility of the port by ships on cost plus basis.

**Operational leakage**

**Spill due to floating hose failure at SPM: (183 t, at pumping rate of 10000 m<sup>3</sup>/h of crude oil for 75 sec): (Spill points - S1 at HMEL SPM & S2 at Mundra SPM)**

Crude oil pumping rate from the tanker to the shore tanks will be varying between 5000 m<sup>3</sup>/hr and 10000 m<sup>3</sup>/hr. In the present study, the maximum pumping rate of 10000m<sup>3</sup>/hr has been considered to assess the risk on a higher side. The Safety Break Away Coupling in the crude oil transfer hose will be activated within a few seconds in the event of hose rupture or hose failure. Again for the sake of assessing higher risk, a response time of 60 sec – 75 sec (worst case scenario) is considered to estimate the amount of oil that would spill at the SPM. Thus the quantity of crude oil spill has been estimated to be a maximum of 183 tons in the event of hose failure or rupture.

**Spill due to rupture of sub-sea crude oil pipeline from SPM to shore tanks: (384 tons of crude oil, at pumping rate of 10000 m<sup>3</sup>/hr for 60 sec): Spill point S3 taken at midpoint of the pipeline from HMEL SPM to LFP)**

Crude oil pumping rate from the tanker will be in the range of 5000 m<sup>3</sup>/hr to 10000 m<sup>3</sup>/hr. In the present study, to assess the maximum risk, pumping rate of 10000 m<sup>3</sup>/hr has been considered. The minimum wall thickness of sub-sea crude oil pipeline is 15.6 mm and the maximum thickness is 24 mm. Moreover all along, 5 inches concrete cladding (weight coating) is provided on the surface of the pipeline. Crude oil pipelines designed, constructed and laid as per the international norms are safe and leakages are extremely rare during their designed life. However, a rupture of size 1 cm x 12.7 cm has been assumed for assessing the quantum of oil spill through sub-sea pipeline.

The maximum manifold pressure will be 12 kg/cm<sup>2</sup> and crude oil will be pumped to the shore tanks without any boosting device in-between. As the level in the tanker depletes, discharge pressure would also be reduced. Moreover, with the flow distance the crude oil pressure inside the pipe drops. For the sake of assessing the amount of oil spill in case of rupture of sub-sea pipeline, an average pressure of 10 kg/cm<sup>2</sup> and a water column height of 35 m have been considered.

Accordingly the quantity of Crude oil spill has been estimated using the formula given by

$$Q = C_d A (2gH)^{1/2}$$

Where,

Q = quantity of spill (m<sup>3</sup>/s)

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$C_d$  = coefficient of discharge (0.9)

$A$  = Area of rupture ( $m^2$ ) (1 cm x 12.7 cm)

$H$  = Net head (m) ( $6.5 \text{ kg/cm}^2 = 65 \text{ m}$ )

This would give a value of  $0.04 \text{ m}^3$  of crude oil per sec spilling out of the pipeline through the rupture as the pump will be in operation.

The availability of solenoid operated hydraulic shutoff valves in the sub-sea pipeline, which will get activated in less than 15 seconds time as soon as the pressure falls, will limit the amount of oil leaked in case of pipe rupture and consequent drop inside the pipeline. However 60 sec response time has been considered for quantification of oil spill. Accordingly the quantity of Crude oil spill has been estimated to be  $2.4 \text{ m}^3$  before the pump discharge valve closes. However, there will be high pressure inside the pipeline initially and the oil inside the pipeline will start leaking into the waters through the hole as the pressure inside the pipe line is higher than the outside pressure, even after the valve is closed and pumping is stopped. Even after the pipeline inside pressure equalises the outside static pressure acting on the rupture, oil continues to start leaking as the density difference between the oil and water; oil being lighter and LFP is higher in elevation compared to the pipeline elevation. Two factors need to be considered here; the specific gravity of the crude oil inside the pipeline is less than 1 whereas the sea water specific gravity is more than 1. Also depending on the location of the hole/leak, there will always be a static head of sea water acting on the leak when the oil tries to flow out and sea water trying to flow in to occupy the place vacated by the leaked oil. Hence all the oil in the pipeline will not leak and there would be an equilibrium point reached when there would be no more oil leaking from the hole as the sea water pressures effectively blocks the oil leak. Also, the leak would be attended to within the stipulated time as per the standard maintenance procedures followed by the organisation. For the purpose of this study and as a worst case scenario before the leak is repaired by the established maintenance procedures, it is assumed that a maximum of 5% of the pipeline oil volume would leak and though it would be a continuous leak, this total quantity is taken to be instantaneous for the purpose of the study.

The pipeline length is approximately 10 km (from SPM to LFP) and the pipeline size is 42" NB. The pipeline volume works out to be approximately  $8662 \text{ m}^3$  or 7622 t.

Hence the total oil leaked due to rupture in sub-sea pipeline will be  $2.15 \text{ t} + 5\%$  of pipeline volume of oil in t ( $0.05 \times 7622 = 381 \text{ t}$ ) which works out to be a maximum of 383.45 t, say 384 t of crude oil.

For the purpose of simulation studies, this spill on the pipeline is assumed to have taken place at the midway point from HMEL SPM to LFP (designated as spill point **S3** in the report) and is taken on the sub-sea pipeline from HMEL SPM to LFP. As the pipeline from HMEL SPM to LFP and the Mundra SPM to LFP run very close only one leak point in the pipeline is studied as it gives a representative oil spill study for the pipeline leakage scenario.

**Spill due to collision at SPM: (Spill points S1 & S2)**

Crude Oil is received at SPM by ocean tankers having capacity between 90,000-360,000 metric tons. Crude Oil is pumped to shore tanks through pipeline/s from the SPM. In the present scenario, collision of the vessel at the SPM or tanker route with another vessel enroute to other terminals can cause partial damage to the vessels cargo tanks (not more than 3 nos. of cargo tanks) leading to a maximum oil spill of about 700 tons to 25,000 tons of crude oil. In the present study, the probable quantity of crude oil spill due collision at SPM is considered as 700 tons at the minimum and as 25,000 tons at the maximum.

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**Spill due to collision or grounding in the tanker route: (Spill point S4)**

Tankers are expected to call at the SPMs frequently depending upon the demand for the refineries for the crude oil. These tankers may meet accidents like collision with other vessels or grounding in the vicinity of the SPM. In case of such accidents, the spillage may vary depending on the size of the tanker and the extent of damage and number of cargo tanks ruptured etc. In the present study the probable quantity of spill in the tanker route considered for modelling is 25000 tons at a point which lies on the tanker route to SPM not exactly within Mundra port limit; but a spill point is taken along the tanker route in the Gulf but close to the Mundra port limit.

**Spills at the berths (applicable to berths at West Basin, South Basin, East Basin, North Basin, LNG berth and existing cargo berths of Mundra port.)**

Oil spills can take place at the berths in the basins during the loading / unloading as well as berthing and traversing operations. The likely spill scenarios are discussed below:

**a) Spills during the navigation of the vessel along the approach channel: (Spill point S7 for West Basin)**

The spill location can be anywhere in the path. One location along the approach path has been selected for carrying out for model runs.

**b) Spills around the jetty (in the maneuvering basin / turning circle): (Spill point S6 for West Basin and Spill point S10 for South Basin)**

This can occur due to tug boat impacting the vessel and grounding of the vessel. One location around the jetty at the turning circle has been considered for the computational runs

**c) Spills at the berths: (Spill point S5 for West Basin, Spill point S9 for South Basin, Spill point S13 for East Basin, Spill point S14 for North Basin, Spill point S8 for LNG jetty, Spill point S11 for MMPT 1 and Spill point S12 for MICT / AMCT berth locations)**

During the loading/unloading operations spills may take place due to one or more of the following: –

Hose/ loading arm leakage (liquid products handled at the liquid berth), overflow on the vessel deck, vessel grounding at the jetty, vessel colliding with jetty, fire and explosion on the vessel or at the jetty, during bunkering operations etc.

**Spills along approach Channel / Route**

Vessels to the port berths follow the Deep Water route in Gulf of Kutch and Pilot boards at Pilot Boarding Ground “A” or “B”, subject to tide and the berth allotted to the tanker.

While the risk of grounding is low, it cannot be wholly eliminated; the most likely causes are steering or propulsion system failure or navigational error, any of which could result in grounding on the channel margins. Given that the bed of the Gulf is rocky at some places the likelihood of any significant hull damage cannot be ruled out. In a general case scenario, weld fractures in the forward bunker tanks could give rise to a release of approximately 10 Tons of diesel oil and in a worst case scenario extensive damage to the bunker tanks may occur which would cause a spill of 500 to 700 t of FO spill.

**Collision**

The risk of collision while transiting the channel is negligible given the reason that port authorities use sophisticated ship tracking and navigational systems as the Gulf traffic has increased. These systems would ensure that the chances of any collision are remote or non-existent when ships / marine craft traverses / transits through the channel. However, even if any collision occurs, it is beyond reasonable

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doubt that such an incident would result in the fore part rather than the parallel mid-body of the vessel and the loss of integrity of hull plating of a cargo tank is most unlikely. A spill quantity of 700 t can be the maximum in such a scenario.

**Berthing Incident**

Oil and/ or liquid chemical spill can occur as a result of hull coming in contact with the corners of the jetty structure during ship berthing or un-berthing maneuvers. Such incidents are generally due to failure of a

vessel's main propulsion or steering systems, loss of control onboard on support tug in attendance or Master error or wrong judgment.

The potential spill quantities involved depend on the vessel type and the location and extent of the impact damage; hull damage to a 20000 DWT – 80000 DWT tanker / vessel in way of a forward or aft wing tank, for example, could give rise to a release of some 500 Tons of product. The potential spill quantity, should hull plating be ruptured in way of an aft wing diesel oil bunker tank can, historically, be up to 100 Tons.

**Tug Impact**

There are well-documented incidents where cargo or bunker oil has been released as a result of hull impact damage by tugs. This can occur when tugs are approaching a vessel underway prior to berthing, or when coming alongside a moored vessel prior to un-berthing. The potential spill quantities again depend on the location and extent of the impact damage but can be over 20 tons for Diesel oil and 100 Tons for cargo (FO) oil. Spills from this cause are considered to be of low likelihood but the risk is acknowledged.

**Loading Arms / Flexible hoses**

The operation of loading arms / flexible hoses can lead to minor releases of oil. Common sources are vent valves, swivel joints and hydraulic lines. Such spillage seldom exceeds 0.1 Tons.

**Cargo Tank Overflow**

Cargo tank overflows can occur on board loading vessels; spills of this nature can be due to instrumentation failure, tank valve mismanagement or operator error. The spill quantity is a function of the flow rate and also the number of tanks being loaded at the time of the incident. Some of the oil and/or chemical will be retained on deck but, in a worst case scenario, up to 3 tons could escape overboard.

**Hull Failure**

The incidence of oil pollution due to hull failure is low and some 84% of the incidents attributed to this cause by ITOPF involved spill quantities of less than 7 tons; these spills were caused mainly by minor hull fractures and weld failures. The potential for more serious incidents with spill quantities in excess of 700 tons must however be acknowledged.

**Fire and Explosion**

Fires and explosions on board ship represent a safety hazard with the risk of pollution as a secondary impact. Most tankers engaged for trading will be equipped with inert gas systems. Given the controls, which are imposed and enforced by APSEZL authorities in respect of the oxygen content of cargo tanks, the risk of fire and/or explosion in the cargo spaces must be regarded as minimal, insofar as cargo transfer operations are concerned.

Strict monitoring and control of the main cargo pump room atmosphere will minimize the fire and explosion risks associated with this space.

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Fires resulting from uncontrolled smoking in the accommodation, unauthorized hot work such as welding, and engine room fires can spread rapidly if not dealt with swiftly and can give rise to incidents of a very serious nature.

While the likelihood of fire or explosion occurring on board vessels berthed at the Mundra port berths is low, the risk is nevertheless acknowledged. Such an incident could give rise to a spillage of 700 tons or more.

**Bunkering – spillage of fuel oil**

Bunkering at the port may sometimes give rise to spills due to hose failure and / or bunker tank overflow etc. in spite of the strict regulatory supervision of the port operations. These spills could be as small as a few kgs to a maximum of 500 t of FO.

As can be seen from the spill scenarios mentioned above, the spills range from extremely negligible quantities to enormous quantities in rare catastrophic events. The simulation of oil spills does not vary significantly in various scenarios except for the magnitude of impact zone and the quantity involved in such impacts. Though the software is intended to be used for specific scenarios so as to get the trajectory and other weathering information; in this study, a few hypothetical scenarios have been simulated and computations carried out considering the worst-case scenarios of oil spills at the different likely locations in the domain.

Based on the above deliberations, the following scenarios for computations have been selected for carrying out modeling studies for the oil spill trajectory and weathering processes.

**Computational Scenarios:**

<b>Spill Locations</b>	<b>Pre-monsoon (Jan)</b>	<b>Monsoon (July)</b>	<b>Post monsoon (Nov)</b>
<b>SPM</b>			
Crude oil spill of 183 t at the pumping rate of 10000 m <sup>3</sup> /hr (for 75 sec release) at the SPMs (due to Hose failure) Spill points: <b>S1</b> and <b>S2</b> During spring and neap tide conditions (tide conditions : PF and PE)	▪	▪	•
Instantaneous crude oil spill of 700t at the SPMs Spill points: <b>S1</b> and <b>S2</b>	▪	▪	•
Instantaneous crude oil spill of 25000t at the SPMs -- Spill points: <b>S1</b> and <b>S2</b>	▪	▪	•
<b>Pipeline Leakage</b>			
Crude oil spill of 384 t at the pumping rate of 10000 m <sup>3</sup> /hr (for 60 sec release) along the pipeline corridor at a select (midway) point of subsea pipeline in the pipeline routes. -- Spill point: <b>S3</b>	▪	▪	•
<b>Tanker route</b>			
Instantaneous crude oil spill of 25000t along the tanker route at select location. Spill point: <b>S4</b>	▪	▪	•

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<b>West Basin (berths)</b>			
100 tons (due to Berthing incident/ collision) at the West Basin berths (FO) Spill point: <b>S5</b>	■	■	●
50 Tons (due to Berthing incident/ collision (diesel oil tanks) at the West Basin berths (HSD) Spill point: <b>S5</b>	■	■	●
700 Tons due to Hull Failure / Fire / Explosion (FO) at the berths -- Spill point: <b>S5</b>	■	■	●
In the maneuvering basin: ○ 20 Tons of HSD oil due to Tug Impact (HSD) ○ 100 Tons of FO due to Tug Impact Spill point: <b>S6</b>	■	■	●
Along the vessel route at one location: Instantaneous oil spill of 700t along the tanker route at a select location.(FO): Spill point: <b>S7</b>	■	■	●
<b>LNG Berth</b>			
100 tons (due to Berthing incident/ collision) at the LNG berth (FO) -- Spill point: <b>S8</b>	■	■	●
50 Tons (due to Berthing incident/ collision (diesel oil tanks)) at the LNG berth (HSD) – Spill point: <b>S8</b>	■	■	●
700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth-- Spill point: <b>S8</b>	■	■	●
<b>South Basin (Berths)</b>			
100 tons (due to Berthing incident/ collision) at the South Basin berths (FO) -- Spill point: <b>S9</b>	■	■	●
50 Tons (due to Berthing incident/ collision (diesel oil tanks) at the South Basin berths(HSD) – Spill point: <b>S9</b>	■	■	●
700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth -- Spill point: <b>S9</b>	■	■	●
At the turning circle: ○ 20 Tons of HSD oil due to Tug Impact ○ 100 Tons of FO due to Tug Impact Spill point: <b>S10</b>	■	■	●
<b>At the existing MMPT 1 Berth: : Spill Point S11</b>			
100 tons (due to Berthing incident/ collision) at the berth(FO) -- Spill point: <b>S11</b>	■	■	●
50 Tons (due to Berthing incident/ collision (diesel oil tanks)) at the berth (HSD) – Spill point: <b>S11</b>	■	■	●
700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth	■	■	●

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<b>At the existing MICT / AMCT Berths:</b> <b>: Spill point S12</b>			
100 tons (due to Berthing incident/ collision) at the (FO) - Spill point <b>S12</b>	■	■	●
700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth - Spill point <b>S12</b>	■	■	●
<b>At the East Basin:</b> <b>Spill point S13</b>			
100 tons (due to Berthing incident/ collision) at the East Basin berth (FO) - Spill point <b>S13</b>	■	■	●
<b>At the North Basin:</b> <b>Spill point S14</b>			
100 tons (due to Berthing incident/ collision) at the North Basin berth (FO) - Spill point <b>S14</b>	■	■	●

## 2.2 Types of oil likely to be spilled

Mundra Port mainly deals with Vegetable oils, Furnace oil, Naphtha, Methanol, High Speed Diesel, Super Kerosene Oil and other light oils at its Multi-Purpose terminal. The vessels calling at the port (or the designated anchorage areas) may spill fuel, diesel or a minimal quantity of lubricating oils. The SPM is being used to discharge crude oils from tankers.

At Berths:

- Vegetable oils,
- Furnace oil,
- Naphtha,
- Methanol,
- High Speed Diesel,
- Super Kerosene Oil,
- Carbon Black Feed Stock (CBFS),
- Motor Spirit,
- Other light oils
- Other HNS Substances

At SPM:

- Crude oil

At anchorages or within port limits:

- Fuel oil,
- Diesel oil,
- Minimal quantity of lubricating oil.

## 2.3 Probable fate of spilled oil

APSEZL is all weather, commercial port with geographical and hydrological advantages on the West Coast of India, in the Gulf of Kutch. Tidal range is between +0.37 m during Neaps and + 6.40 m during springs. Tidal streams flow 070<sup>0</sup> – 250<sup>0</sup> at an average rate of 3 kts and 4-5 kts during spring tides.

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It has been observed from the modeling study that during pre-monsoon season, the spills occurring at the APSEZL marine facilities move towards the southern / southwestern part of the Gulf of Kutch nearer to the facilities depending on tide phase.

The spills taking place at the APSEZL marine facilities move towards northern coast of Gulf of Kutch during monsoon season and affect the coast near Mundra, Kandla etc.

During post - monsoon season, the spills taking place at the APSEZL marine facilities move towards south / southwest and affect the islands /coast on southern side of the Gulf of Kutch.

The surface or subsurface oil spill consists of slick floating on the water surface, which partially dissolves in the water and partially evaporates into the atmosphere. There is a continuous exchange between the suspended and surface oil (floating oil). The assumption made in deriving the governing equations is that the thickness of the oil layer is negligible in comparison with the water depth.

In addition to the location, size and physico-chemical properties of the spill, other major factors affect the fate of the oil slick are governed by complex interrelated transport (turbulence) and weathering processes (evaporation, emulsification and dissolution). The spilled oil spreads and moves by the forces of winds and currents. A small portion of hydrocarbons begin to go into solution in the underlying water column, but most of the oil is lost through evaporation into the atmosphere. In the present model, all these processes are considered in the transport of Oil Slick.

Out of the above mentioned oils the vegetable or light oils do not pose any significant threat to the environment.

The spilled 'persistent' crude oil (or fuel oil) undergoes a number of physical and chemical changes known as "weathering". The major weathering processes are spreading, evaporation, dispersion, emulsification, dissolution, oxidation sedimentation and biodegradation.

*The term persistent is used to describe those oils which, because of their chemical composition, are usually slow to dissipate naturally when spilled into the marine environment and are therefore likely to spread and require cleaning up. Non-persistent oils tend to evaporate quickly when spilled and do not require cleaning up. Neither persistence nor non-persistence is defined in the Conventions. However, under guidelines developed by the 1971 Fund, an oil is considered non-persistent if at the time of shipment at least 50% of the hydrocarbon fractions, by volume, distill at a temperature of 340°C (645°F), and at least 95% of the hydrocarbon fractions, by volume, distill at a temperature of 370°C (700°F) when tested in accordance with the American Society for Testing and Materials Method D86/78 or any subsequent revision thereof."*

- a) **Spreading:** is one of the most significant processes during early stages of a spill is initially due to gravity. The oil spreads as a coherent slick and the rate is influenced by its activity. After a few hours, the slick begins to break-up and after this stage, spreading is primarily due to turbulence. Wind and wave actions also tend to fragment the slick, breaking it up into islands and windrows.
- b) **Evaporation:** The rate and extent of evaporation depends primarily on the volatility of the oil. In general, oil components with a boiling point below 200 D C evaporate within 4 to 16 hours in tropical conditions. Spills of refined products such as kerosene and gasoline evaporate completely and light crude lose up to 40 % of its volume within a few hours. In contrast, heavy crude and fuel oils undergo little evaporation.
- c) **Dispersion:** Waves and turbulence act on the slick to produce droplets of oil of different sizes. Small droplets remain in suspension while the larges ones rise to the surface. The rate of dispersion mainly depends on the nature of the oil and the sea state. Oils which remain fluid can spread unhindered by other weathering processes can disperse completely in moderate sea conditions within a few days. Viscous oils tend to form thick lenses on the water surface with slow

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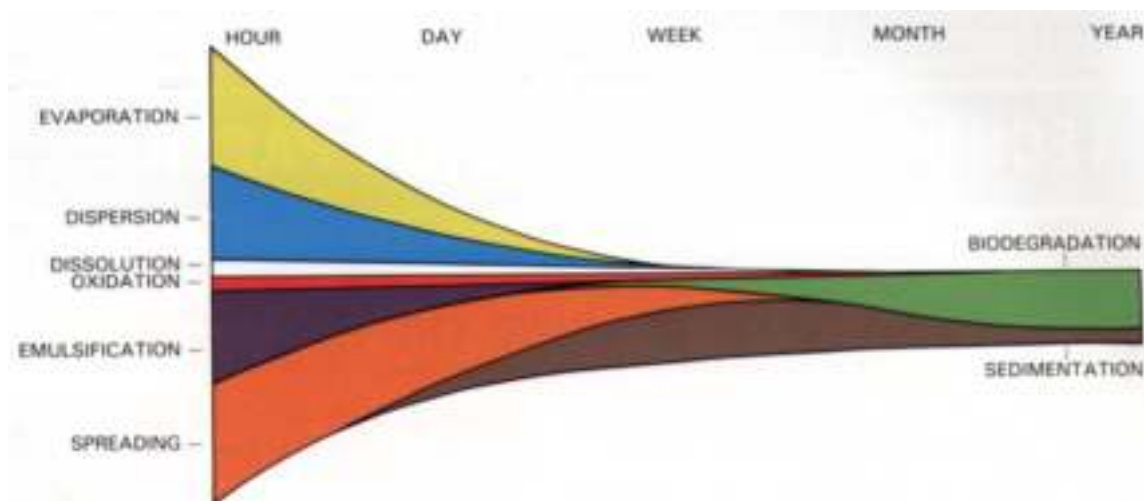
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tendency to disperse, which can persist for several weeks.

- d) **Emulsification:** Several oils have tendency to absorb water to form water-in-oil emulsions thereby increasing the volumes of the emulsified mass by a factor of 3 to 4. The rate at which the oil is emulsified is largely a function of sea state though viscous oils absorb water slowly. In turbulent sea conditions, low viscosity oils can incorporate as high as 80 % water by volume within 2 to 3 hours.
- e) **Dissolution:** The heavy components of crude oil are virtually insoluble in sea water while lighter compounds are slightly soluble. Hence levels of dissolved PHC rarely exceed 1 mg/l following a spill. Therefore, dissolution, does not make a significant contribution to the removal of oil from the sea surface.
- f) **Sedimentation:** Very few oils are sufficiently heavy to sink in sea water. However, the weathered residue gets mixed up with the suspended substances in water and may sink. This process becomes significant when water-in-oil emulsions attain specific gravity near to one and therefore need very little suspended substances to exceed the specific gravity of sea water (1.025).
- g) **Oxidation:** Hydrocarbon molecules react with oxygen and either breaks down into soluble products or combine to form persistent tars. Many of these oxidation reactions are promoted by sunlight and their effect on overall dissipation is minor in relation to other weathering processes.
- h) **Biodegradation :** Sea water contains a range of marine bacteria, moulds and yeasts which can use oil as source of carbon and energy. The main factors affecting the rate of biodegradation are temperature and the availability of oxygen and nutrient, principally compounds of nitrogen and phosphorous. Each type of micro-organism tends to degrade a specific group of hydrocarbons and whilst a range of bacteria exists between them which are capable of degrading most of the wide variety of compounds in crude oil, some components are resistant to attack.

Because the micro-organisms live in sea water, biodegradation can only take place at an oil/water interface. At sea, the creation of oil droplets, either through natural or chemical dispersion, increases the interfacial area available for biological activity and so enhances degradation.

The processes of spreading, evaporation, dispersion, emulsification and dissolution are most important during the early stages of a spill whilst oxidation, sedimentation and biodegradation are long-term processes, which determine the ultimate fate of oil. Fig.3.1 shows schematic diagram of weathering processes with time.



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**Schematic diagram of weathering processes with time**

It should be appreciated that throughout the lifetime of an oil slick, it continues to drift on the sea surface, independent of these processes. The actual mechanism governing movement is complex but experience shows that oil drift can be predicted by taking into account wind-induced effects and surface water currents. These can be calculated using mathematical modeling to determine the oil spill trajectory. The wind-induced effect is normally taken as 1-3% of the wind velocity, and the current effect as 110% of the current velocity. Reliable prediction of slick movement is clearly dependent upon the availability of good wind, tide and current data.

An understanding of the way in which weathering processes interact is important in forecasting their combined effect in changing the characteristics of different oils and the lifetime of slicks at sea. In order to predict such interactions, numerical models have been developed, based on theoretical and empirical considerations.

Accidental oil spills as indicated in 'Oil Spill Scenario' in section 2.1 of this plan might occur in the area of SPM. On the basis of the data modeled, the results indicate that

- a) about 38 % of hydrocarbons are lost by evaporation, 2.8 % by emulsification and 0.75 % by dissolution within 5 hours;
- b) the quantum of dissolved oil increases up to initial 5 hours and thereafter decreases as lighter (more soluble) hydrocarbons evaporate;
- c) after 50 hour, no oil dissolves;
- d) the trend of emulsified oil is similar to that of evaporated oil but emulsification occurs at a slow rate;
- e) the radius of oil slicks increases to nearly 1400 m at the end of 148 hours; and
- f) the maximum PHC concentration in water is about 39 µg/l.

The spill trajectories clearly reveal the dominance of wind in deciding the location of landfall of the weathered oil. Thus during June-August, the spill will be preferentially transported in the north east direction under the influence of south west winds while during October-November, and possible up-to February, the oil will be predominantly carried to the southern shore. It is also evident that under the influence of the southwest winds, the oil will be deposited on the northern shore within 60 hours, while it might take about 80 hours to reach the southern shore during north east winds.

#### **2.4 Development of oil spill scenarios including worst case discharge**

The scenario of the spill are classified under two categories:

1. Oil Spill at Mundra Port Multi-Purpose Terminals/ Basins
2. Oil Spill at SPM

Oil Spill at Mundra Port Multi-Purpose Terminals/ Basins

- a) Leak during cargo transfer operations Minor (250 liters)

This can occur at the start of cargo operations, during operation due to leakage in pipes, expansion joints, and at the time of disconnection of hose at manifold. However, such instances are remote on implementation of International Safety Management by Ships and Quality Management systems by Port.

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b) Slop tank / bunker tank overflow at, Jetty / Ship Minor (250 - 1000 ltrs.)

This source of pollution is purely of an accidental nature. The ship is expected to be ship shape with good trained crew and this has been emphasized to the Master of the vessel at the time of cargo transfer / bunkering. Based on a rate of 20 cbm/hr. and reaction time of 1 min, and hose content of 150 ltrs., likely spill is only 250 litres. A ship shore check list for cargo operations and bunkering is employed. A joint declaration is made by Marine Staff and Chief Officer / Master and enforced by Marine Manager. This results in good ship / shore co-ordination.

c) Spill during berthing (tug impact) Moderate (3000 liters)

Accidental contact with tugs or another marine structure is a possibility but quantum is not going to be significant because of Fendering system employed and training given to tug crews. Also with concept of double hull tanker the entire cargo compartments are protected by another hull, thus cargo spillage due to impact of tug is remote.

d) Grounding / Hull Damage :

APSEZL operates dry cargo & liquid cargo berths. Tankers mainly carry Furnace oil, Naphtha, Methanol, High Speed Diesel, Super Kerosene Oil and Vegetable oil. Oil transfer operations at the jetty are supervised by Liquid terminal staff. Manifold area has receptacle facilities to prevent accidental spills at connection / disconnection time. Berthing is done under controlled conditions and spill due to contact damage to underwater oil tanks is very remote. Radio officer controls movement of vessels in and around the berth and traffic presently is insignificant to pose any collision damage risk. Under water sea bed characteristic is soft sand. The berth area of about 500<sup>2</sup> m is surveyed monthly for any changes and underwater obstructions; hence grounding resulting into oil spill is very remote.

**Oil Spill at SPM**

a) Hose Puncture while unloading:

In such an event, crude oil, about 10670 Kgs may spill onto water. On spillage the oil slick will be carried away at a distant location depending upon water current and wind direction. The trained crew of the maintenance vessel patrolling the area during unloading, would control the oil slick movement by using booms and subsequently, the oil will be collected by the skimmer.

b) Failure of Swivel joint of SPM:

In this event about 17780 Kgs of crude oil may spill onto water. In this case the leakage may be detected visually by the personnel monitoring the operation from the ship tanker or by the detectors provided on the SPM.

c) Leakage of Crude oil at PLEM or from the submarine pipeline:

This case will occur at least 20 m below the water surface, oil being lighter than water will travel upward and float on to water. By the time oil water reaches the sea water surface, the oil droplets may start undergoing “weathering process” and it may form emulsion along with water.

d) Ship Collision Frequency :

Based on the statistical data and its analysis carried out by National Institute of Oceanography, the probability of this type of accident is about one in every seven years for the traffic projection and hence, this case is ignored.

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e) Ship Grounding Frequency :

Based on the statistical data and its analysis carried out by National Institute of Oceanography, the probability of this type of accident is about one in eleven years for the traffic projection and hence, this case is also ignored. Also with concept of double hull tanker the entire cargo compartments are protected by another hull, thus cargo spillage due to grounding is remote.

## 2.5 Shoreline sensitivity mapping

Gulf of Kutch is a typical semi-enclosed basin where the tidal forces interact with the open ocean waters of the sea, across its western open boundary at Okha. The currents of the region are tidal-driven and the water column is vertically well mixed. These features make the numerical modeling task easier, as a 2-D hydrodynamic model is sufficient to accurately reproduce the tides and currents for the study region in the Gulf of Kutch at Mundra.

The model domain of longitudes of 68° 50' 56.7" E and 70° 27' 36.9" E and the latitudes of 22° 14' 58.8" N and 23° 01' 49.1" N is selected for carrying out sensitivity analysis and predicting the fate and transport of oil spill that may take place at APSEZL's SPMs, Basins, berths and tanker route near Mundra coast in Gulf of Kutch.

The bottom roughness in the Gulf of Kutch varies due to the variation of bed sediment grain sizes. The bed consists of various sizes of clay, sand, silt and rocky soils. In the present study a uniform Manning's roughness coefficient has been used for numerical runs of hydrodynamic processes. The filled contours of Chezy's roughness coefficient are shown in Fig. A.1.4. The same roughness coefficient has been used to predict tides and tidal velocities in the Mundra area for prediction of oil spill trajectory.

The interpolated Chezy's coefficient calculated based on Manning's roughness and total water depth is shown in Fig.A1.4. The sensitivity analysis has been carried out with various Manning's value, which is the combined effect of  $d_{50}$  sediment size and bed configuration, to calibrate the model with respect to the tide data of March and October 1994, at Sikka. The computational runs were continued with various sets of various bed roughness values till computed and measured tide levels are within the acceptable limit.

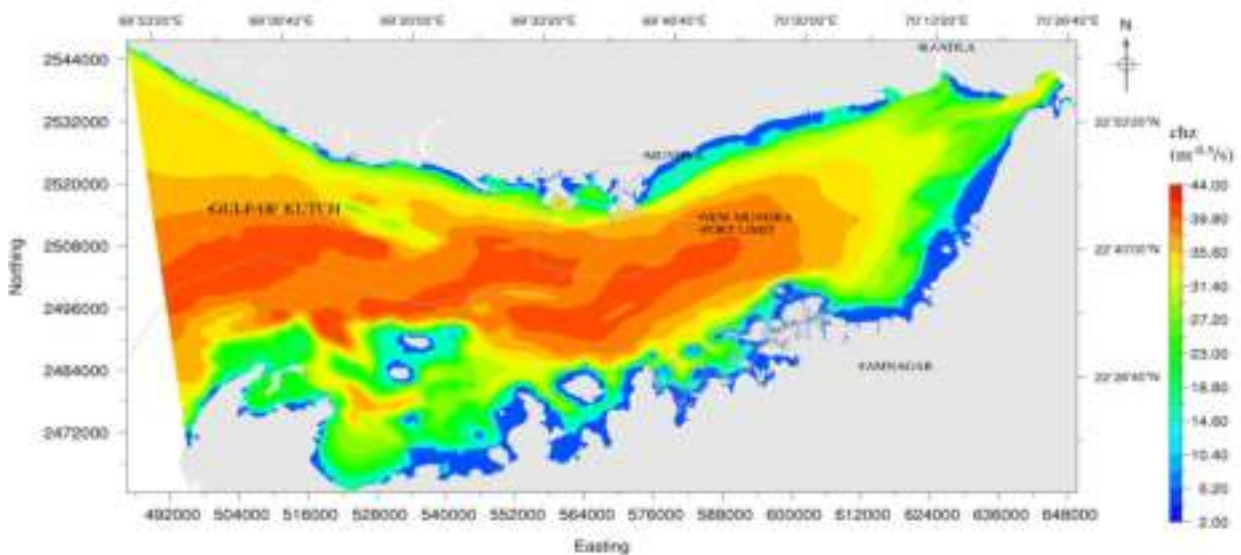


Fig.A1.4 Chezy's coefficient

For Shoreline sensitivity mapping refer Volume 2 (Annexure-V, VI and VII) of Oil Spill Risk Assessment.

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## **2.6 Shoreline resources, priorities for protection**

The SPMs and the Marine facilities (Existing Berths, South Basin, West Basin, North Basin, East Basin and LNG Berth etc.) are located in the Northern side of Gulf of Kutch at Mundra. VLCCs bring Crude oil and unload at the two SPMs which are connected to the Shore tanks by means of Submarine pipelines. The Crude unloaded at these SPMs is pumped through Submarine pipeline to Shore tank farm area.

Various Marine craft / solid cargo/ liquid cargo vessels traverse through the Gulf waters to berth at the various Terminals / Berths located in the new Mundra port limit. The general layout of the various facilities like SPMs, terminals etc. within the Mundra port limit area are shown in Fig.1.1 to Fig.1.4 in chapter 1. There is a probability of spillage at SPMs, along the sub-sea pipelines and tanker route during unloading operations and transportation. Apart from these operations at the SPMs, loading / unloading operations at the different berths of the Mundra port – South Basin, West Basin, North Basin, East Basin, LNG jetty and existing berths also may give rise to accidental spills at the berth locations. The spills at these locations may affect the shore and other facilities along the coast of Gulf of Kutch. The coast of Mundra has tidal flats, sand bars and not much in the way of mangroves. The mangroves, Marine Park / Marine Sanctuary etc. are on the Southern side of Gulf of Kutch. As it was observed that the spills occurring at the various locations of the APSEZL Marine facilities may reach the Coast on the Northern side as well as on the Southern side of the Gulf depending upon the season, there is a need to protect the environment in the event of an oil spill at any of the APSEZL Marine facilities.

### **Shoreline Resources available with APSEZL, Mundra for deployment during shoreline cleanup/emergent situation:**

<b>Item</b>	<b>Quantity</b>
Oil Spill Dispersants	15000 liters
Sorbent pads	2000 nos.
Portable dispersant storage tank: 1000 ltr capacity	1 no.
Portable pumps	2 nos.
Oil discharge hose, 3", 2 x 10 m	1 set
Tanker Trucks	04 nos.
Mini Vacuum Pump (30 m <sup>3</sup> / hr)	05 nos.
Sorbent Boom Pack( 12.5cm x 4 M)	500 mtr
Slurry Pump (60 m <sup>3</sup> / hr)	01 no.
Start Tank with capacity 10000 liter(10 m <sup>3</sup> )	02 nos.
OSD Applicator- Oil Dispersant Spry Unit(20 ltr) for use on beach and inter tidal zones	02 nos.

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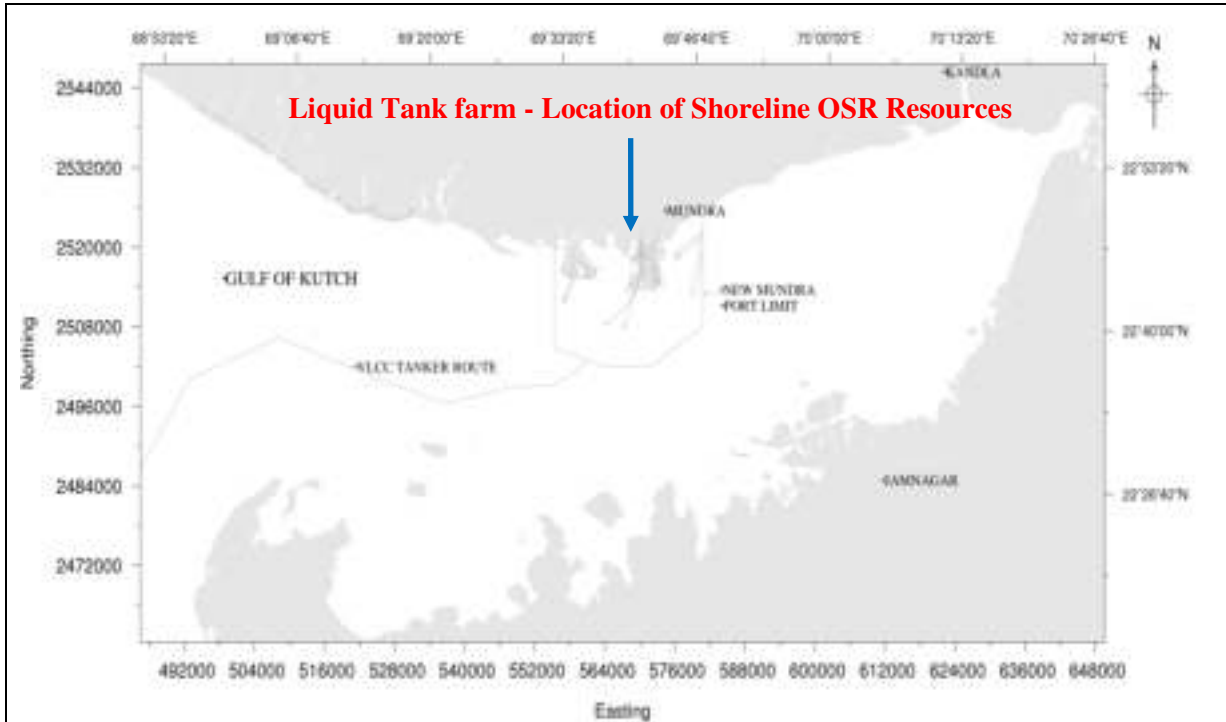


Fig.1.1 :General Arrangement of the marine facilities at Mundra port showing the VLCC route and facilities within the new Mundra port limit considered for carrying out the oil spill risk assessment studies.

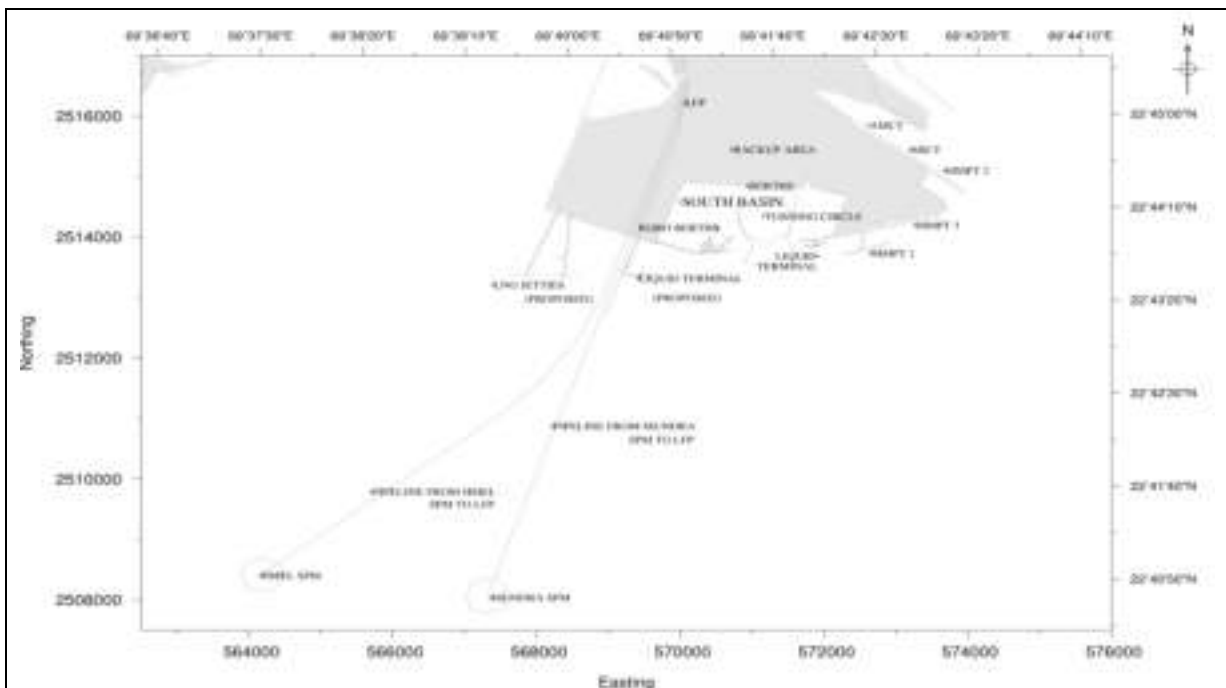


Fig1.2: Zoomed up portion of the South Basin showing the berths, turning circle, LNG jetty and existing berths as well as SPMs.

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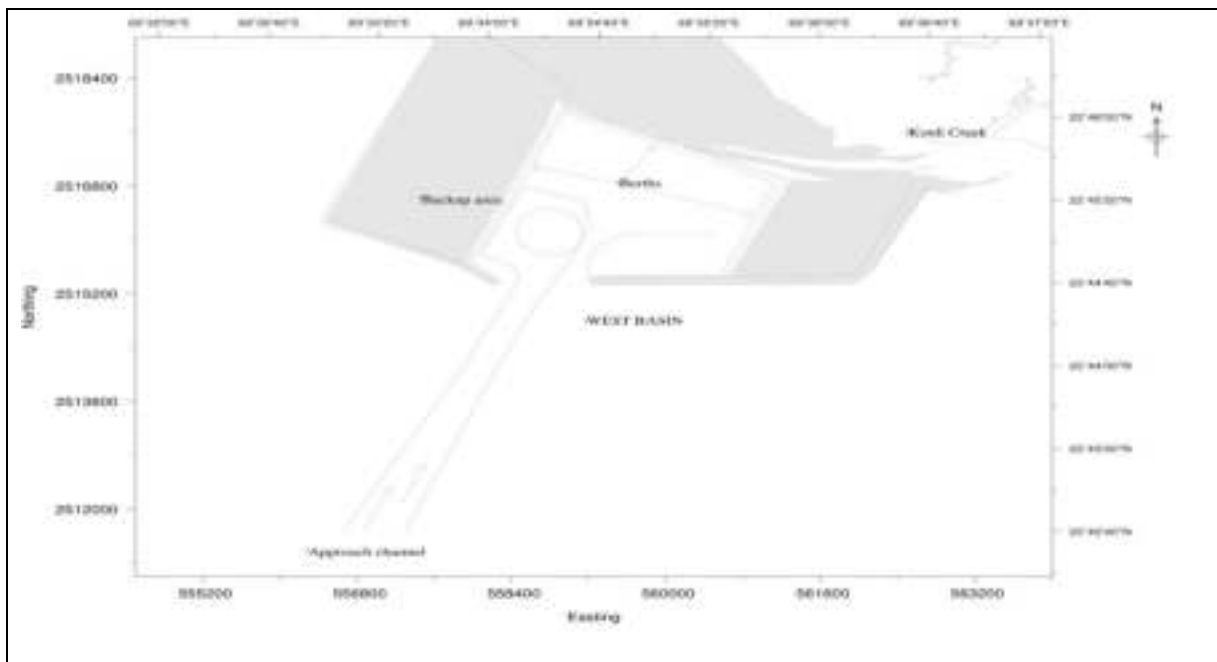


Fig.1.3 Zoomed up portion of the West Basin showing the berth locations and the approach channel for the vessels

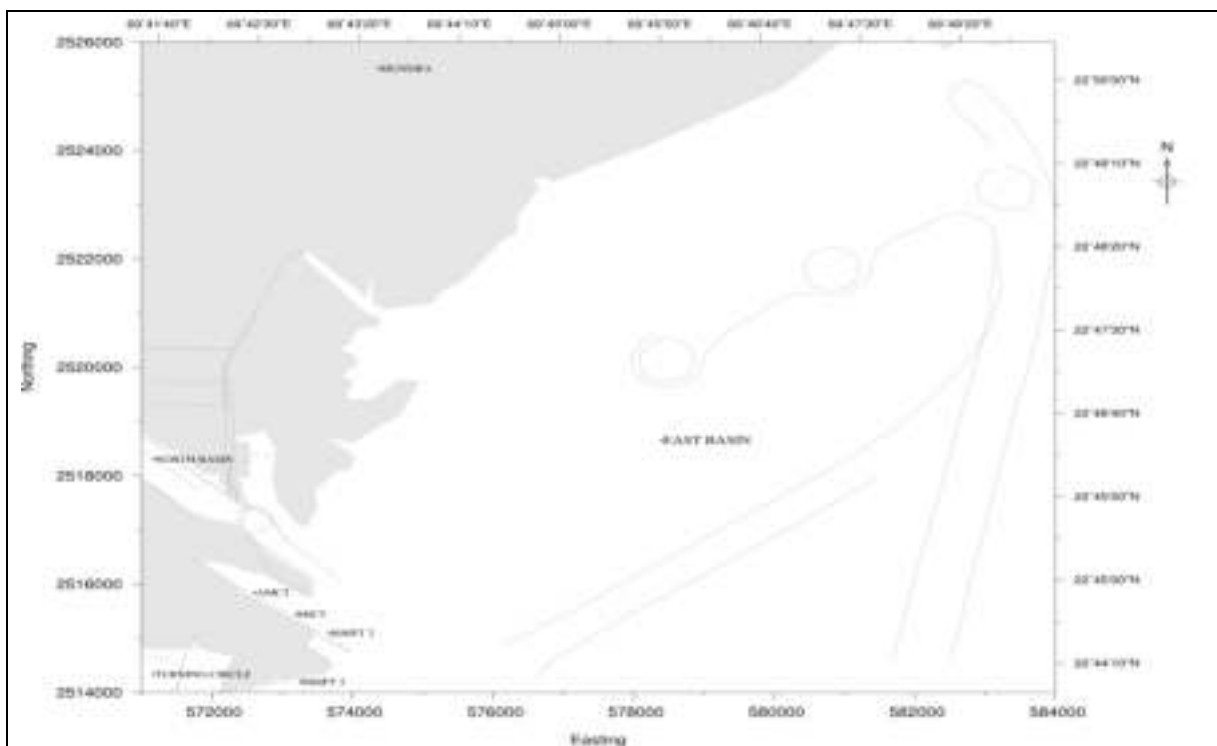


Fig.1.4 Zoomed up portion showing the East Basin & North Basin

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**Marine resources in Gulf of Kutch**

**Phytoplankton**

Phytoplanktons are vast array of minute and microscopic plants passively drifting in natural waters and mostly confined to the illuminated zone. In an ecosystem these organisms constitute primary producers forming the first link in the food chain. Phytoplankton long has been used as indicators of water quality. Some species flourish in highly eutrophic waters while others are very sensitive to organic and/or chemical wastes. Some species develop noxious blooms, sometimes creating offensive tastes and odours or anoxic or toxic conditions resulting in animal death or human illness. Because of their short life cycles, plankton responds quickly to environmental changes. Hence their standing crop in terms of biomass, cell counts and species composition are more likely to indicate the quality of the water mass in which they are found. Generally, phytoplankton standing crop is studied in terms of biomass by estimating chlorophyll and primary productivity, while in terms of population by counting total number of cells and their generic composition. When under stress or at the end of their life cycle, chlorophyll in phytoplankton decomposes to phaeophytin as one of the major products.

**Phytopigments**

During April 2010, the phytoplankton pigments viz. chlorophyll a (1.7 – 2.4 mg/m<sup>3</sup>; av 1.9 mg/m<sup>3</sup>) and phaeophytin (0.3 – 1.2 mg/m<sup>3</sup>; av 0.7 mg/m<sup>3</sup>) varied considerably. In October 2010, chlorophyll a ranged from 2.0 – 4.2 mg/m<sup>3</sup> (av 3.1 mg/m<sup>3</sup>) and phaeophytin from 0.7 - 1.1 mg/m<sup>3</sup> (av 0.7 mg/m<sup>3</sup>) (Tables 8.1 and 8.2). The average concentration (mg/m<sup>3</sup>) of chlorophyll a off Vadinar during different sampling events (2010) is listed in Table 8.1:

**Table 8.1: Average chlorophyll a (mg/m<sup>3</sup>) off Vadinar (April 2010 to October 2010)**

Area	Pathfinder	Nearshore	ESSAR DP	IOC SPM	ESSAR SPM	Salaya Creek	Gulf
April 2010	2.4	2.1	1.9	1.4	2.0	2.0	1.7
Oct 2010	2.1	4.2	2.8	4.1	2.0	-	3.7

The values of phaeophytin during the present monitoring period are given in Tables 8.2, while, the average concentrations (mg/m<sup>3</sup>) between different sampling events (April 2010 and October 2010) are listed in Table 8.2.

**Table 8.2: Average phaeophytin (mg/m<sup>3</sup>) off Vadinar (April 2010 to October 2010)**

Month	Pathfinder	Nearshore	ESSAR DP	IOC SPM	Essar SPM	Salaya Creek	Gulf
April 2010	1.2	0.6	0.8	0.3	0.6	0.8	0.6
Oct 2010	1.1	0.9	1.1	0.9	0.7	-	0.8

**Phytoplankton population**

As is generally the case with Coastal waters, the phytoplankton population density (68-332 nox10<sup>3</sup>/l; av 186 no x 10<sup>3</sup>/l) and generic diversity (11-30 no; av 18 no) varied over a wide range and in a random manner during April 2010 (Table 8.3). In October 2010 the phytoplankton population density ranged from 100-789.6 nox10<sup>3</sup>/l (av 329.4 no x 10<sup>3</sup>/l) and generic diversity ranged from 12-25 no (av 19 no) (Table 8.4) off Vadinar.

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**Table 8.3: Average phytoplankton population density (no x 10<sup>3</sup>/l) and total genera (no) off Vadinar (April 2010 to October 2010)**

Month	Pathfinder		Nearshore		ESSAR DP		IOC SPM	
	Cell count (nox10 <sup>3</sup> /l)	Total genera (no.)	Cell count (nox10 <sup>3</sup> /l)	Total genera (no.)	Cell count (nox10 <sup>3</sup> /l)	Total genera (no.)	Cell count (nox10 <sup>3</sup> /l)	Total genera (no.)
Apr-10	216.2	19	200.5	17	192.7	15	127.7	18
Oct 2010	203.1	19	446.6	20	323.6	23	360.4	18

Month	Essar SPM		Salaya Creek		Gulf	
	Cell count (nox10 <sup>3</sup> /l)	Total genera (no.)	Cell count (nox10 <sup>3</sup> /l)	Total genera (no.)	Cell count (nox10 <sup>3</sup> /l)	Total genera (no.)
Apr-10	124	16	198.5	18	211	15
Oct 2010	260	16	-	-	487.6	14

The above results indicated wide temporal and spatial fluctuations in the standing stock of phytoplankton between April 2010 and October 2010 off Vadinar. In general, the coastal waters revealed high average cell counts during October 2010 as compared to previous data. The generic diversity of phytoplankton during April 2010 widely varied with the dominance of genera such as Nitzschia (17.7%), Guinardia (16.7%), Skeletonema (9.1%), Thalassiosira (7.4%), Hemiaulus (7.2%), Navicula (6.1%), Rhizosolenia (4.5%), Biddulphia (3.4%) and Leptocylindrus (3.4%). In October 2010, the dominant phytoplankton genera were Leptocylindrus (57.6%), Guinardia (13.9%), Nitzschia (8.1%) and Chaetoceros (7.2%)

### Mangroves

According to one estimate the dense mangrove cover of Narara Bet is spread over an area of 5.5 km<sup>2</sup>. The mangrove area has increased in recent years due to extensive plantations made by the Forest Department. Mangrove cover and mudflat areas (km<sup>2</sup>) in Jamnagar, Lalpur, Khambalia and Kalyanpur Talukas estimated based on satellite data are given in Table 8.4 below:

**Table 8.4: Mangrove areas (km<sup>2</sup>) along Jamnagar coast**

Taluka	Mangroves (Dense)	Mangroves (Sparse)	Tidal mudflats
Jamnagar	12.03	23.91	83.53
Lalpur	1.96	3.95	50.50
Khambalia	3.86	11.48	101.94
Kalyanpur	0.04	0.01	0.78

\*Singh H.S., 2000. Mangrove in Gujarat, GEER foundation

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**Mangroves at Vadinar**

The intertidal expanse in the vicinity of Dargah ranged in 1 – 1.2 km. Lower intertidal zone was muddy with dense algal growth. The mid and upper intertidal zone sustained mangrove vegetation of ~ 500 m width. The zone around HTL was dominated by a sandy beach with ~ 5 m width and a narrow beam at the backshore. The distribution of mangroves at Vadinar during the present monitoring (April 2010) is given in Table 8.5 below:

**Table 8.5: Distribution of mangroves at Vadinar (Dargah - North side)**

	Location	Species	% FQ	Density	Height (m)	DBH (cm)	Seedling (no/m <sup>2</sup> )
D1	22° 26' 42.6''N 69° 42' 07.8''E	<i>A. marina</i>	100	Sep-67 -38	0.5 - 3.5	<2.6 - 6	0 - 2
D2	22° 26' 50.5''N 69° 41' 52.9''E	<i>A. marina</i>	40	0 - 5 -2	0.5 - 1.5	<2.5 - 4	0 - 1
<b>Vadinar (Dargah - south side; afforested area)</b>							
D3	22° 26' 30.8''N 69° 42' 05.6''E	<i>A. marina</i>	100	(20 - 75) -50	1.0 - 2.3	<1.5 - 5	0 - 15

As evident from above data, the stand density of *A.marina* at two locations (D1 and D2) along North-east of Vadinar Dargah varied from nil to 67 plants/100 m<sup>2</sup> with higher density of plants noticed at location D1. Frequency of occurrence ranged from 40 - 100% in the mid and upper intertidal zones. The height varied from 0.5 to 3.5 m. Mostly the plants were dwarf (av 1 m) with occasional tall plants of 3.5 m. Diameter at Breadth Height (DBH) varied from <2.5 to 6 cm. The seedling density was poor and varied from 0 - 2 no/m<sup>2</sup>. The mid intertidal segment was the popular feeding site for flocks of flamingos.

The upper intertidal expanse along South-west of Vadinar Dargah (D3) showed good growth of afforested mangroves (Table 8.5). The density of mangroves ranged from 20 - 75 plants/100 m<sup>2</sup> with an average of 50 plants/100 m<sup>2</sup>. The plant height varied from 1.0 to 2.3 m and the DBH ranged from <1.5 to 5 cm. The seedling density was low (0-15 no/m<sup>2</sup>), however, better than that noticed along North-east of Vadinar - Dargah (D1 & D2). Present results are comparable with earlier monitoring studies (2007 - 2009).

**Mangroves at Narara**

The intertidal expanse along the IOCL pipeline corridor varied from 2000 - 2200 m. The mangroves vegetation from upper intertidal region was observed to be healthy, dominated by *A.marina* on both sides of the pipeline corridor. Four locations (N1 to N4) were selected for monitoring of mangroves at Narara as detailed in below given Table 7.6.

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**Table 8.6: Distribution of mangroves at Narara**

	Location	Species	% FQ	Density	Height (m)	DBH (cm)	Seedling (no/m <sup>2</sup> )
N1	22° 27' 56.8''N 69° 43' 43.2''E	<i>A.marina</i>	100	20-45 (38)	2-3	3-8	0-85
		<i>C.tagal</i>	10	0.7*	-	-	-
		<i>R.mucronata</i>	5	0.2*	-	-	-
N2	22° 27' 59.1''N 69° 43' 21.3''E	<i>A.marina</i>	100	60-90 (85)	2-4	25-12	0-7
N3	22° 28' 03.5''N 69° 43' 27.4''E	<i>A.marina</i>	100	28-85 (50)	0.5-2.5	<15-7	0-55
		<i>R mucronata</i>	3	-	-	-	-
N4	22° 28' 07.2''N 69° 43' 24.6''E	<i>A.marina</i>	100	30-130 (80)	0.5-3.5	<2.0-3.5	0-10

\* no/500 m<sup>2</sup>

As can be noticed in the above table, the plant density of *A.marina* varied from 20 - 130 plants/100 m<sup>2</sup> with a frequency of occurrence of 100% at Narara. The species like *Ceriops tagal* (7 plants/500 m<sup>2</sup>) and *Rhizophora mucronata* (2 plants/500 m<sup>2</sup> - 3 plants/100 m<sup>2</sup>) were rarely noticed. The locations N2 (85 plants/100 m<sup>2</sup>) and N4 (80 plants/100 m<sup>2</sup>) revealed better average density of *A.marina* as compared to the rest. The height of *A.marina* varied from 0.5 to 4 m with N2 and N4 locations indicating better plant height than the rest. The DBH varied from <1.5 to 12 cm at the monitoring locations. The seedling density ranged from 0 - 85 no/m<sup>2</sup> with N1 and N3 locations sustained better seedling density than the rest. Few new plants (30 - 45 cm in height) of *C.tagal* and *R.mucronata* were noticed at the EOL pipeline corridor during the present monitoring.

#### Sand dune vegetation

The narrow beach of ~ 5 m width around HTL along Narara Bet is marked with berm of ~ 1.5-2 m width, followed by back shore sandy zone. Occasional shrubs of *Salicornia brachiata* and *Suaeda maritima* are observed on the backshore sandy zone. The sand dune flora is more predominant on berm and immediate back shore zone of ~5 m width. Sand dune flora is represented by seven species viz; *Crassa sp*, *Cyperus arenarius*, *Launea sp*, *Suaeda maritima*, *Salicornia brachiata*, unidentified *Poaceae* member and unidentified *Fabaceae* member.

#### Seaweeds and Seagrasses

Seaweeds, which are known as a source of food, fodder and manure, are mostly found attached to various substrata like sandy, muddy and coralline sediments as well as rocky areas and play a significant role in enriching the sea by adding dissolved organic matter, nutrients and detritus besides serving as nursery areas for the larvae and juveniles of innumerable marine organisms. Some green Seaweeds are edible, red algae are the important source of agar and some of the brown algae are used for manufacturing algin and alginic acid. Seaweeds are also used to produce some bioactive compounds.

The algal zone of Narara Bet is confined to 1.2-2.5 km width. A total of 62 species of algae and 3 species of sea grasses are recorded from this region. Among them *Lyngbya*, *Caulerpa*, *Cladophora*, *Ulva*, *Cystoceira*, *Dictyota*, *Hydroclathrus*, *Padina*, *Sargassum*, *Acanthopora*, *Amphiroa*, *Champia*, *Centraceros*, *Gracilaria*, *Hypnea* and *Polysiphonia* were common with the dominance of *Padina* and *Gracilaria* at the lower reef flat. The open mudflats of Narara Bet are dominated by algae like *Enteromorpha*, *Ulva*, *Lyngbya* and *Polysiphonia*, while, the upper sandy shore and mangrove areas are associated with *Enteromorpha* and *Ulva*. Seagrasses such as *Halophila ovata* and *Halodule uninervis* are common in patches on sandy regions of the reef, while, *Halophila beccarii* occasionally occurred on mudflats along the tidal channels.

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*Open mudflats near Dargah and Narara pipeline corridor supported growth of twelve marine algae dominated by Enteromorpha spp (Table 8.7). The biomass of Enteromorpha estimated at ~ 4 kg/m<sup>2</sup>.*

**Table 8.7: Marine algal flora along Narara/Vadinar**

Sr. No.	Species	% FO*	ES*
1	<i>Enteromorpha clathrata</i>	100	D
2	<i>Enteromorpha intestinalis</i>	100	D
3	<i>Caulerpa racemosa</i>	50	C
4	<i>Ulva fasciata</i>	100	D
5	<i>Ulva lactuta</i>	100	D
6	<i>Ulva reticulate</i>	90	D
7	<i>Codium elongatum</i>	30	O
8	<i>Sargassum ilicifolium</i>	45	C
9	<i>Sargassum tenerimum</i>	60	CD
10	<i>Gracilaria corticata</i>	55	C
11	<i>Gracillaria verrucosa</i>	85	C
12	<i>Polysiphonia platycarpa</i>	20	O

\*%FO: Percentage Frequency Occurrence, ES: Ecological Status, D: Dominant (% FO = 80-100), CD: Co-dominant (% FO = 60-79), C: Common (% FO = 40-59), O: Occasional (% FO = 20-39).

The intertidal zone of Kalubhar Tapu harbours 47 species of marine algae and three species of seagrasses. The reef areas of this island are dominated by *Dictyota*, *Gracilaria*, *Padina*, *Hydroclathrus*, *Ulva* and *Hypnea*. The open mudflats and sandy areas at the upper intertidal are preferred by *Enteromorpha*, *Ulva*, *Lyngbya* and *Polysiphonia*. The sandy region of the reef flat supported seagrasses like *Halophila* and *Halodule*.

### **Zooplankton**

The zooplankton standing stock in terms of biomass and population density during April 2010 (Table 8.8) varied from 0.2 to 121.2 ml/100m<sup>3</sup> (av 3.3 ml/100m<sup>3</sup>) and 2.2-722.7 x 10<sup>3</sup>/100m<sup>3</sup> (av 39 x 10<sup>3</sup>/100m<sup>3</sup>), respectively while during October 2010 the zooplankton biomass and abundance ranged from 0.2 to 12.0 ml/100m<sup>3</sup> (av 3.5 ml/100m<sup>3</sup>) and 2.5-157.8 x 10<sup>3</sup>/100m<sup>3</sup> (av 48.4 x 10<sup>3</sup>/100m<sup>3</sup>) respectively suggesting normal secondary production off Vadinar during the monitoring period.

The average zooplankton biomass (ml/100m<sup>3</sup>), population density (nox10<sup>3</sup>/100m<sup>3</sup>) and total groups (no) off Vadinar during the monitoring period varied in accordance with the data presented in Table 8.8.

**Table 8.8: Average values of zooplankton (A) biomass (ml/100m<sup>3</sup>) (B) Population density (nox10<sup>3</sup>/100m<sup>3</sup>) and (c) total groups (no) off Vadinar (April 2010 – October 2010)**

Area		Pathfinder	Nearshore	ESSAR DP	IOC SPM	Essar SPM	Salaya Creek	Gulf
April 2010	A	8.3	1.1	1.1	0.9	1.4	2.5	3.5
	B	89.9	24.6	14.4	22.7	12.7	20.4	37.4
	C	17	15	12	16	13	16	17
Oct 2010	A	4	3.9	1.5	3	5.7	-	2.1
	B	57.4	55.9	23.5	30.5	83.1	-	32.8
	C	13	11	10	10	9	-	7

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The overall zooplankton standing stock was low and highly variable off Vadinar which could be due to high patchiness and seasonal variability in their distribution apart from high grazing pressure at higher trophic levels.

During April 2010, 24 faunal groups were identified in the coastal waters off Vadinar during the monitoring period while 17 faunal groups were present in the samples of October 2010. The most common faunal groups were copepods (40.5%), decapod larvae (19%), gastropods (22.5%), lamellibranchs (10.7%), and foraminiferans (2.1%) in April 2010. In addition to the above, groups like chaetognaths, siphonophores, *Lucifer* sp, polychaetes, ctenophores, medusae, amphipods, ostracods, mysids, heteropods, isopods, stomatopod larvae, appendicularians and fish larvae were also frequently noticed but in less numbers during April 2010. During October 2010, the dominant groups were copepods (93.6%) and decapod larvae (4.8%). In general, the coastal waters off Vadinar revealed a moderate production of zooplankton associated with random fluctuations and seasonal changes.

**Macro benthos**

The organisms inhabiting the sediment are referred as benthos. Depending upon their size, benthic animals are divided into three categories, macrofauna, microfauna and meiofauna and macrofauna. Benthic community responses to environmental perturbations are useful in assessing the impact of anthropogenic perturbations on environmental quality. Macrobenthic organisms which are considered for the present study are animals with body size larger than 0.5 mm. The presence of benthic species in a given assemblage and its population density depend on numerous factors, both biotic and abiotic.

**Intertidal macrofauna**

During April 2010, Intertidal macrofauna was studied along 5 transects viz. 1 transect (Transect I) at Kalubhar Island and 4 transects at Narara Bet. Several locations were sampled along each transect between the HTL and the LTL viz; High Water (HW), Mid Water (MW) and Low Water (LW). The intertidal macrofaunal standing stock in terms of population density (50-7800 no/m<sup>2</sup>, av 2292 no/m<sup>2</sup>) and biomass (0.1-37.2 g/m<sup>2</sup>; wet wt, av. 9.2 g/m<sup>2</sup>; wet wt) varied widely During the post monsoon, only the first three transects were sampled. In October 2010, the intertidal macrofaunal standing stock in terms of population density ranged from 0-3625 no/m<sup>2</sup> (av 1185 no/m<sup>2</sup>) and biomass from 0-67.8 g/m<sup>2</sup>; wet wt (av. 14.6 g/m<sup>2</sup>; wet wt). These results are compared with historical data in Table 8.9.

**Table 8.9 Average of intertidal macro benthos off Vadinar during April 2010 to October 2010, (A) Biomass (g/m<sup>2</sup>) (B) Population density (no/m<sup>2</sup>) and (C) Total groups**

Transect		I	II	III	IV	V
April 2010	A	11.2	4.2	13.7	10.7	6.1
	B	3983	1172	1292	2401	2614
	C	5	3	6	6	3
Oct 2010	A	11.9	16.8	15.1	-	-
	B	1495	904	1156	-	-
	C	5	7	5	-	-

Overall, the intertidal region sustained good faunal standing stock and diversity and the contribution of major faunal components are comparable over the past many years at Narara Bet/Kalubhar.

**Subtidal macrofauna**

Subtidal macrofauna was studied at 13 stations in the coastal system off Vadinar during April 2010 and at 10 stations during October 2010. The distribution of subtidal faunal standing stock in terms of biomass (0.3 - 41.0 g/m<sup>2</sup>; av 8.0 g/m<sup>2</sup> wet wt) and population density (150-8925 no/m<sup>2</sup>; av 1902 no/m<sup>2</sup>) during April 2010. In October 2010 the biomass ranged from 0.3 – 23.9 g/m<sup>2</sup> (av 7.1 g/m<sup>2</sup>; wet wt) and population density ranged from 125-14975 no/m<sup>2</sup> (av 2282 no/m<sup>2</sup>) The current data is listed (April 2010 – Oct 2010) in Table 8.10.

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**Table 8.10 Average of subtidal macrobenthos off Vadinar during April 2010 to October 2010, (A) Biomass (g/m<sup>2</sup>) (B) Population density (no/m<sup>2</sup>) and (C) Total groups**

Area		Pathfinder	Nearshore	ESSAR DP	IOC SPM	ESSAR SPM	Salaya Creek	Gulf
April 2010	A	11.2	2.9	2.0	6.1	1.3	15.5	6.4
	B	3833	338	388	694	2375	1553	1865.5
	C	7	3	4	6	5	6	4
Oct 2010	A	12.1	7.7	1.9	4.9	1.8	-	10.6
	B	5019	2967	400	1169	181	-	1652
	C	8	5	4	4	2	-	7

The macrobenthic population was dominated by polychaetes (50.1%), amphipods (18.5%), pelecypods (8.2%), decapod larvae (7.4%), tanaids (3.6%) and foraminiferans (3.2%) during April and by polychaetes (76.3%), amphipods (12.3%) and pelecypods (5%) during October 2010.

### Corals and associated biota

Live corals at the Narara and Kalubhar reefs are mainly confined to the lower littoral (reef flat) and shallow subtidal zones (< 8 m). They are absent at the upper reef flat probably because of high rate of sedimentation and long exposure during low tide.

### Narara Bet

The eastern segment of Narara Bet represents a formation of vast mud flat, which resulted in significant negative influence on the live coral population. Many regions along the reef flat on the western side are exposed during low tide for prolonged periods because of which the distribution of live corals was poor. In all 30 and 22 Scleractinian species have been identified in the intertidal and subtidal zones respectively of Narara Bet with *Montipora*, *Goniopora*, *Porites*, *Favia*, *Favites*, *Goniastrea*, *Platygyra*, *Cyphastrea*, *Pseudosiderastrea*, *Turbinaria*, *Leptastrea* and *Symphyllia* as the dominant genera.

In general, the live coral density decreased with depth. The live corals were absent beyond 8 m (CD). However, the subtidal area at Narara sustained good coral populations within 5 m (CD). Distance-wise corals were rich within 250 m towards the sea from the LTL. The corals of the genera *Montipora*, *Porites*, *Favites*, *Goniastrea*, *Goniopora*, *Cyphastrea*, *Leptastrea*, *Favia* and *Turbinaria* dominated the subtidal area.

### Kalubhar

In general, Kalubhar reef sustained relatively healthy live corals at the lower intertidal and subtidal (<7 m depth) zones as compared to the population at the Narara reef. The north and north-west regions of Kalubhar had better coral density and diversity as compared to the east and south-east regions because of high sedimentation of the reef flat and the subtidal zones. Overall, 30 and 7 species of Scleractinians in the intertidal and subtidal zones respectively at Kalubhar have been identified. The corals at Kalubhar were mainly represented by genera *Montipora*, *Favia*, *Favites*, *Porites*, *Goniastrea*, *Goniopora*, *Cyphastrea*, *Platygyra*, and *Symphyllia* and *Turbinaria*. The live corals were absent at the reef edge of 50 m width due to total exposure for longer period whereas their coverage increased (90 to 100%) at the reef slope below 1 m depth.

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A rich reef associated flora and fauna was noticed at Kalubhar. The common and dominant seaweed genera were *Sargassum*, *Gelidiella*, *Acanthophora*, *Ulva*, *Caulerpa*, *Codium*, *Dictyota*, *Padina*, *Halymenia*, *Enteromorpha*, and *Gracillaria*. Varieties of sponges were associated with coral boulders. The fauna consisted of coelenterates (*Zoanthus* sp., *Discosoma* sp., *Stoichactis giganteum*, *Cerianthus* sp. and variety of corals), annelids (various polychaetes), echiuroid (*Ikedella misakiensis*), crustaceans (amphipods, isopods, *Acetes* sp., shrimps and crabs), molluscs (*Octopus* sp., *Sepia* sp., *Loligo* sp., gastropods, bivalves, nudibranchs etc.) echinoderms and variety of reef fishes.

### **Fishery**

Gujarat ranks number one position in marine fish production in India. The Gulf contributes about 22% to the fish production of the state. The share of the Jamnagar District is between 5 and 14% (av 10%) to the State's total marine fish landings. The important fish landing centres in the vicinity of IOCL SPM area which falls under Khambalia zone are Vadinar, Bharana, Nana Amla and Salaya which together contributed about 6823 t, 8253 t and 5330 t of fish landings in 2006-07, 2007-08 and 2008-09 respectively to the total landings of the Jamnagar District. Similarly, the important fish landing centres in the vicinity of Sikka which falls under Jamnagar zone are Sachana, Baid, Sarmat, Bedi and Sikka which together contributed about 4768 t, 5122 t and 5848 t of fish landings in 2006-07, 2007-08 and 2008-09 respectively. Within the Jamnagar zone, the major landings (98%) were from Sachana (32%), Baid (27%), Sikka (19.7%) and Bedi (18.9%) during the last 3 years. Within the Khambalia zone, the major landings (81-89%) were at Salaya during the period 2006-09. On an average the Khambalia zone (56.5%) contributed to about 13% higher fish landings than Jamnagar zone (43.5%) for the last 3 years. However, the landings at Sikka (1.3%) and Vadinar (0.5%) to the total landings of the district were negligible during the period 2006-2009.

### **Reptiles and mammals**

The reptiles are mainly represented by marine turtles *Chelonia mydas* and *Lepidochelys olivacea* which breed and spawn on the sandy beach along the Sikka-Vadinar coast as well as on the islands.

Dolphin (*Dolphinus delphis*) and whale (*Balanoptera* sp) are common in the Gulf. Though occurrence of Dugong (*Dugong dugon*) in the Gulf particularly along the Jamnagar coast has been reported, there are no recent sightings.

The resources discussed above likely to be threatened are tidal flats, Phytoplankton, Phytopigments, Mangroves, seaweeds and seagrasses, Zooplankton, Macrobenthos, Corals and associated biota, salt works fishing activities and other vocational related to marine sensitive areas in the coast of Vadinar and Sikka.

It has been observed from the modeling study that during pre-monsoon season, the spills occurring at the APSEZL marine facilities move towards the southern / southwestern part of the Gulf of Kutch nearer to the facilities depending on tide phase.

The spills taking place at the APSEZL marine facilities move towards northern coast of Gulf of Kutch during monsoon season and affect the coast near Mundra, Kandla etc.

During post - monsoon season, the spills taking place at the APSEZL marine facilities move towards south / southwest and affect the islands /coast on southern side of the Gulf of Kutch.

### **2.7 Special local considerations**

Considering the distant proximity of various other installations with the port of Mundra, in case of a tier 1 spill, no other special considerations are deemed to be required apart from an active spill response close to the port facility itself.

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### 3 Response strategy

#### 3.1 Philosophy and objectives

This plan is intended to assist APSEZL in dealing with an accidental release or discharge of oil. Its primary purpose is to set in motion the necessary actions to stop or minimize the discharge and to mitigate its effects. Effective planning ensures that the necessary actions are taken in a structured, logical and timely manner.

This plan guides the HOD– Marine and his Duty Staff through the decisions which will be required in an incident response. The tables, figures and checklists provide a visible form of information, thus reducing the chance of oversight or error during the early stages of dealing with an emergency situation.

For this plan to be effective, it must be:

- familiar to those APSEZL staff with key response functions;
- regularly exercised; and,
- Reviewed and updated on a regular basis.

This plan uses a tiered response to oil and chemical pollution incidents. The plan is designed to deal with Tier One spillage. The products handled are likely to pose a greater fire and safety, rather than an environmental risk; there may thus be additional factors involving the safety of personnel, which will take precedence over the pollution response. In this case, reference must be made to the APSEZL Emergency Procedures Manual. The salvage and casualty management of any vessel that poses a threat of pollution is priority considerations.

During oil spill response activities, account must be taken of the following:

- site hazard information
- adherence to permit procedures
- spill site pre-entry briefing
- boat safety
- APSEZL safety manual and material safety data sheets
- Personal protective equipment needs
- heat stress
- decontamination

#### 3.2 Limiting and adverse conditions

APSEZL is situated in natural protected Gulf of Kutch and there are less incidences of heavy wind or any other factor affecting operation.

#### 3.3 Oil spill response in offshore zones

SPM handles (unloading) crude oil and pumps it to shore tank farm area through sub-sea pipeline. The impact of such spills on marine environment is on the higher side. Hence, oil spill equipments are required for combating oil in case of such spills at the marine facilities at Mundra.

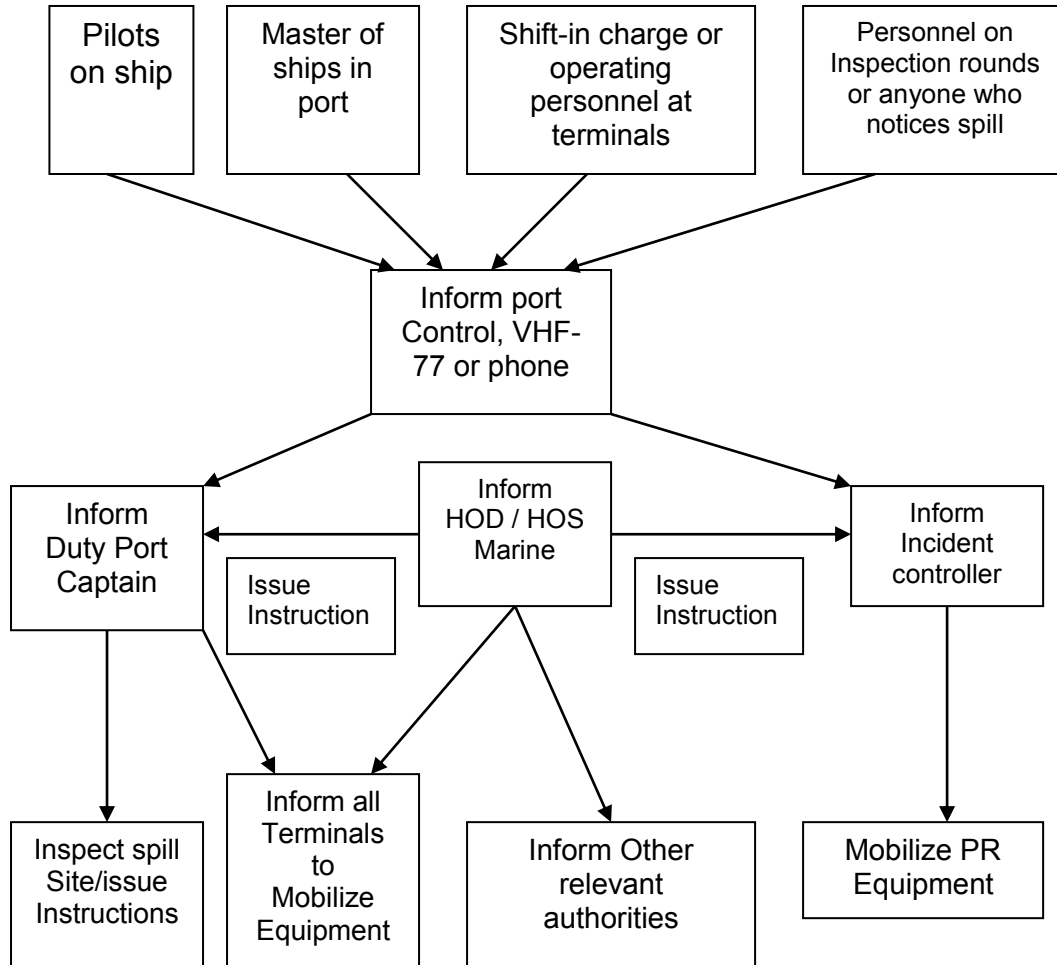
Based on the oil spill modeling study, it has been observed that crude oil spill of 700 tons (Tier-I) will spread over an area having radius of around 400 m within 4hr. APSEZL has already having facilities for combating a Tier-1 spill.

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**3.4 Oil spill response in coastal zones**

*Contingency Chart to deal with Oil Spill*



**On-site Crisis Management Group – Action Group**

In an emergency, the personnel available at or near the incident site play vital role. This concept is made use of in nominating the Key Persons. It is necessary to nominate a functionary as the Incident Controller who is invariably a shift-in-charge of the facility. The Incident Controller tackling the emergency in real times requires the support from various other services i.e. Fire & Safety, Medical Services covering communication, transport and personal functions etc. A key person for each of these services therefore, is nominated.

Overall in charge of these activities is **Chief Operating Officer – Mundra Port**. The different functional coordinators, designated, will co-ordinate with Chief Controller in their respective functional areas. It is suggested that key personal chart be developed, giving the names, designation, telephone nos. of top level personnel who will act as coordinators in different disciplines/services. The duties and the responsibilities of various Key Persons and Coordinators need to be written down on a chart and should be made available across the organization at the site / location.

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**Roles & Responsibilities**

**Incident Control Officer – (HOS – Marine / Duty Port Captain)**

- Directs and co-ordinates all field operations at the scene of the accident
- Assess incident/crisis at site, nature, location, severity, casualties, resource requirement
- Classifies incident - Advises Exe. Controller, Civil Defence, Dy. Conservator, Traffic Manager - regarding crisis severity status and emergency level, wind direction, temperature, casualties and resource requirements.
- **Conducts initial briefing to Chairman**
- Activates elements of the terminal emergency plan/ site response actions
- Protect port personnel and the public
- Directs security/fire fighting/oil spillage/gas leakage/vessel accidents/natural calamities, cargo operations shutdown
- Search for casualties and arrange first aid and hospitalization
- Brief or designate a person to brief, personnel at the incident scene
- Determine information needs and inform Crisis Management Group
- Coordinates all functional heads in field operations group to take action
- Manages incident operations to mitigate for re-entry and recovery
- Coordinate search and rescue operations
- Arrange evacuation of non-essential workers to assembly points –outside port
- Arranges tugs, mooring boats and pilot(s) for sailing vessel(s)
- Co-ordinates actions, requests for additional resources and periodic tactical and logistical briefings with Site Emergency Coordinator
- Coordinate incident termination and cleanup activities
- Instructs various emergency squads as necessary

**Site Emergency Coordinator – (Senior Pilot and Duty Radio Officer)**

- Direct operations from the emergency control center with assistance from Crisis Management Group
- Take over central responsibility from the Site incident controller (SIC)
- Decide level of crisis and whether to activate off site emergency plan
- Instruct SIC to sound appropriate alarm
- Direct the shutting down, evacuation and other operations at the port
- Monitor on site and off site personal protection, safety and accountability
- Monitor that casualties if any are given medical aid and relatives informed
- Exercise direct operational control of the works outside the affected works
- Monitor control of traffic movements within the port
- Coordinate with the senior operating staff of the fire, police and statutory authorities
- Issue authorized statements to the news media
- Review and assess possible developments to determine the most probable course of events
- Authorize the termination of the emergency situation by sounding the all clear siren-continuous long single tone siren for one minute
- Control rehabilitation of affected areas after emergency
- Arrange for a log of the emergency

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**Fire Coordinator – (HOS - Fire / HOS -Safety)**

(Under the direction of the Incident Control Officer)

- Announces fire incident point over the public address system and evacuates workers to the assembly points
- Informs fire station immediately and leads fire fighting team to the incident location
- Informs SIC if external fire tender / fire-fighting equipment / materials/mutual aid is required
- If necessary, arranges and activates other fire-fighting equipment
- Arranges safety equipment e.g. fire suits, protective gloves and goggles, breathing apparatus
- In liaison with Civil Engineering Department, ensures that adequate water pressure is maintained in the fire hydrant system/at the area supply
- Maintains adequate records

**HOS - Security / Duty Security Officer**

- Directs, gate security and facilitates evacuation, transport, first aid, rescue
- Controls the entry of unauthorized persons and vehicles-disperses crowd
- Permits the entry of authorized personnel and outside agencies for rescues operations without delay. Liaises with State police
- Allows the entry of emergency vehicles such as ambulances without hindrances
- Ensures that residents within port area are notified about disaster and instructs to evacuate if necessary
- Ensure that all people are aware of the assembly points, where the transportation vehicles are available
- Ensure that the people are as per the head count available with the assembly point section of that area
- Liaise with the Chief Medical Officer to ensure first aid is available at the assembly points
- Carry out a reconnaissance of the evacuated area before declaring the same as evacuated and report to SIC.

**Medical Superintendent**

- Direct medical team
- Set up casualty collection centre arrange first aid posts
- Arrange for adequate medicine, antidotes, oxygen, stretchers etc
- Contact and cooperate with local hospitals and ensure that the most likely injuries can be adequately treated at these facilities e.g. burns
- Advise Chief Emergency Controller on industrial hygiene and make sure that the facility personnel are not exposed to unacceptable levels of toxic compounds
- Make arrangements for transporting and treating the injured
- Inform the hospitals of the situation in case of a toxic release and appraise them of the antidotes necessary for the treatment
- Maintain a list of blood groups of each employee with special reference to rare blood groups
- Liaise with Govt. Hospitals/Red Cross

**Marine Pollution Coordinator – Manager (Marine / pollution control)**

- Minimizes the impact of an accident on the environment for which it would develop methodologies to control hazardous spills
- Monitors cooperation with emergency response squads to conduct the actual cleanup work during and after the emergency.

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- In case of fire and specially if the fire involves toxic/flammable materials, to ensure responsible actions for containing the run off fire water and other water from the damaged units
- Determines the level of contamination of the site as a result of the accident
- During cyclones/floods arranges sand bags and transfers important plans and documents to higher levels

**Traffic Coordinator – Duty Port Captain**

- Directs operation staff
- Prepares vessels to vacate from berth
- Arranges to protect cargo in vicinity from damage
- Arranges to segregate and shift cargo in sheds
- Submits consolidated list of dangerous goods in port including tankers in port and tank farms in port area
- Coordinates with ship owners / agents/C & F agents/stevedores

**Communications Officer – (Duty Port Captain / Duty Marine Control officer)**

- Ensure telephone operator/signal room advises entire emergency team
- On receipt of instructions from the chief Incident controller, notifies the fire brigade/police/hospitals/district collector/mutual aid partners
- Keep the switchboard open for emergency calls and transmit the same to the concerned personnel effectively
- Refrain from exchanging any information with authorized persons unless authorized to do so by the Chief Incident Controller
- Maintains contact with other vessels through VTMS

**Chief Emergency Controller – (Head - HSE)**

- Inform district emergency authorities-District Collector, Medical officer-Coast Guard Pollution control -Inspector of factories-Inspector of Dock Safety & Health,
- Activate the off site plan if necessary
- Liaise with Jt. Secy./Director MOST (Ministry of Shipping) or relevant Govt. authority
- Inform the media

**Civil Coordinator – (HOS – Environment cell / HOS - Estate)**

- Inform Gujarat Pollution Control Board and other environmental agencies about the incident for getting necessary guidance
- Instruct the contractors to carry out urgent civil works if required
- Hire the barges for collecting the spilled oil, if required

**Marine Engineering Coordinator – (HOS – SPM / Diving Team in-charge)**

- Organise the tugs for combating the pollution
- Start the rigging of pollution combating equipment on tugs/launches
- Hire additional crafts if required

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**HOD- Corporate affairs:**

- Collect detailed information periodically and liaise with press about the incident
- Arrange transport facilities, if required
- Inform local authorities/District Collector about the incident (as per EAP)

**HOS - Legal & HOD - Estate:**

- Issue notice under Major Port Trusts Act, Indian Ports Act(Prevention & Control of Pollution) Rules, etc; to the defaulting master/owner/agent
- Arrange for settlement of claims related to the pollution(as per EAP)

**3.5 Shoreline oil spill response**

Most oil spills reach the shorelines and cause visible oil pollution which is particularly sensitive to public opinion. The selection and correct application of clean up techniques are therefore essential. When an oil spill occurs on open water the optimal solution is to intercept and recover the oil before it reaches the shoreline. This is because:-

- The environmental damage is normally less critical in the open water environment
- The logistics of oil removal becomes more complex in the varied natural environment of coastlines compared with the open sea.
- The costs of oil recovery increases dramatically when oil reaches sensitive shorelines compared with open water operations.

Experience has shown that it is very difficult to avoid some oil reaching the shorelines. Mechanical equipment and chemical treatment at sea are often insufficient to recover all oil spilled at sea. When the oil reaches the shoreline, a number of different parameters specific for this particular situation have to be taken into consideration:-

- Quantity of oil
- Characteristics of the oil (for instance, toxicity and viscosity)
- Prevailing on-site conditions (weather, season, tides, temperature)
- Shoreline type or combination of types (cliffs, pebble, sand, marsh)
- Special Considerations

**The four main steps in a shoreline clean-up operation are:**

**Step 1: Assessment**

- Determine the need to clean, setting priorities in line with this contingency plan
- Determine required degree of clean-up for each area in accordance with priorities
- Attain agreement between clean-up team, ecological experts, government authorities

**Step 2: Select Clean-up Method**

- Choose method appropriate to type of shoreline, access, degree of oiling
- Minimize damage caused by choice of clean-up technique, degree of clean-up
- Address conflicts of interest (e.g. needs of amenity use versus environment or response speed versus aggressiveness)

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**Step 3: Clean-up Operations**

- Monitor clean-up, confirm choices made above, re-evaluate if necessary
- Minimize disturbance of shoreline features
- Minimize collection of un-oiled debris, sediments

**Step 4: Termination / Monitoring**

- Ongoing assessment of clean-up operations
- Determine when clean-up objectives have been met
- Post-spill monitoring to confirm recovery of shoreline features, biota

**The four main methods for shoreline clean-up are as follows:-**

**A. Pumping and Skimming Techniques**

- Applicable to shorelines that are heavily oiled.
- Often the first step in cleaning a heavily contaminated shoreline.
- Preferred option because it results in fluid wastes that are relatively free of sediments and debris, which are more easily dealt with in disposal.
- Pumping and skimming techniques can also be used in conjunction with flushing techniques.

**B. Flushing Techniques**

- Use water or steam to flush oil from the beach, and direct it to a recovery location.
- Applicable to heavily contaminated beaches, and substrates that are relatively impermeable (e.g., mud and saturated beaches, boulders, and man-made structures) that will not allow the flushed oil to penetrate the beach surface.
- Typically carried out in conjunction with a skimming operation. The flushed oil is directed down-slope to skimmers positioned at the water's edge, with booms deployed around the skimmers to prevent any loss of the water.
- Options of using low or high pressure water, and of using ambient temperature water versus warm water or steam.
- Low pressure, cold water is generally the least effective, particularly with sticky oils and emulsions, but is least harmful on the environment.
- High pressure water and heated water and steam are more effective, but may remove and/or kill beach-dwelling organisms.

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C. Sediment Removal Techniques

- Applicable to a variety of shoreline types, and in particular, when the shoreline is heavily contaminated, though likely to cause the greatest environmental impact
- The requirements are access for the heavy equipment required for transporting away oily debris and sediments for disposal and a surface which is able to support heavy equipment
- An important factor to consider is the depth of oil penetration
- Important to limit the depth of material removed in order to minimise disturbance to the beach, and to minimise disposal requirements
- The best option is to use manual labour to pick up the oily sediment and mechanical means to transport it away

D. Biodegradation Techniques

- Generally refers to "active" bioremediation, where nutrients and/or microorganisms are applied to enhance natural degradation
- Generally suitable for areas that are lightly oiled, especially lightly oiled salt marshes and tidal flats where the use of equipment could increase the environmental effects by forcing oil into the substrate
- It can also be used as a final clean-up step following more active efforts

The shoreline clean-up operation is normally not an emergency operation as is the case with an oil spill on open water. A clean-up project can last many weeks or months depending on the amount of oil spilled. Many wrong decisions can be made in planning and carrying out a shoreline clean-up operation. The contingency plan must be used in combination with consulting experts with experience of shoreline clean up. The agencies such as NIO, NEERI, Ports and Oil companies have experts with experience which is relevant for the specific oil spill situation and they should be consulted prior undertaking shoreline clean-up.

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### 3.6 Storage and disposal of oil and oily waste

After the natural degradation by coagulation and evaporation of oil on water, residual oil and waste material collected during a Tier 1 response will be disposed off by in-situ or terrestrial burning.

	Type of material	Separation methods	Disposal methods
LIQUIDS	Non-emulsified oils	Gravity separation of free water	Use of recovered oil as fuel or refinery feedstock
	Emulsified oils	Emulsion broken to release water by ; - Heat treatment - Emulsion breaking chemicals - Mixing with sand	Use of recovered oil as fuel or refinery feedstock. Burning Return of separated sand to source.
SOLIDS	Oil mixed with sand	Collection of liquid oil leaching from sand during temporary storage Extraction of oil from sand by washing with water or solvent Removal of solid oil by sieving	Use of recovered oil as fuel or refinery feedstock. Direct disposal Stabilization with inorganic material. Degradation through land farming or composting. Burning
	Oil mixed with cobbles, pebbles or shingle	Collection of liquid oil leaching from beach material during temporary storage Extraction of oil from beach material by washing with water or solvents	Direct disposal. Burning
	Oil mixed with wood, plastics, sea weeds, sorbents	Collection of liquids leaching from debris during temporary storage Flushing of oil from debris with water	Direct disposal. Burning. Degradation through land farming or composting for oil mixed with sea weeds or natural sorbents.
	Tar balls	Separation from sand by sieving	Direct disposal Burning

#### Location for Dug Pond for temporary storage of oily water:

To store the contaminated oily water, temporary dug pond will be excavated for storage of oily water. It is expected that 20 times volume of oil & water mixture will be generated if oil spill happen in the sea. Storage capacity of dug pond of volume 14000 m<sup>3</sup> considering spill of level 1 (Tier-1) is required.

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Location Identified for Dug Pond behind Maruti Yard (Lat. 22° 45.252'N , Long. 69° 41.093'E) is roposed.



- Size of Dug Pond to be provided : 100 mtr X 100mtr X 1.5mtr
- Total storage capacity (m3) : considering 20 times oily water @ 700 m3 = 14000 m3

Once the contaminated mixture of oil and water is stored, the same will be transferred via tanker to following location. Following are the steps require to be followed.

1. Oil Water Separator: Capacity 25 m3/hr.
2. Effluent Treatment Plant: Capacity 120 KLD
3. Parallely oil recyclers will be approached for the collection and transportation of the oily water.
4. Contaminated Soil / Sediments will be directly sent to the Treatment Storage and Disposal Facility (TSDF) site. List of Oil recyclers and TSDF sites are shown in Annexure – 15
5. Different types of equipment & manpower require for creating dug pond:

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Name of Equipment	Quantity	Primary Responsibility of Equipment & Material	Secondary Responsibility
Excavator	10 Nos.	Marine Dept.	MHS section (Dry Cargo) / Asset Department / Procurement
JCB Machines	10 Nos.	Marine Dept.	ES Civil / Asset Department / Procurement
<b>Material</b>			
HDPE Liners for dug pond	10600 Sq. mtr.	Marine Dept.	Stores & Procurement

In phase wise manner stored oily water will be treated at both the above facility to separate oil from water to the possible extent. Whereas, after recovery of oil from water, water confirming to the effluent discharge limit of oil (< 10 ppm) will be discharged in to sea.

Whereas in case oily water will not capable of treat at OWS & ETP will be dispose through sending it to registered recyclers, for which APSEZL have already done tie up with the registered recyclers as mentioned in **Annexure – 15**.

APSEZL have also done necessary tie up with various institutes/agency/NGO as mentioned in **Annexure – 16** for providing service for rescue & rehabilitation of oil soaked birds as well as restoration of mangroves, when oil reaches to the sea shore and mangrove areas during oil spill. Mobile van / vehicle require for rescue of oil soaked birds to transfer from affected area to treatment facility center.

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## 4 Equipment

### 4.1 Marine oil spill response equipment

Detailed in Annexure 3

### 4.2 Inspection, maintenance and testing

The equipments are being kept in working condition. Routine inspection, maintenance and testing performed as per the stipulated requirements.

### 4.3 Shoreline equipment, supplies and services

The shoreline clean-up equipment which are essential for the oil removal operations at beaches are as follows:-

- Protective clothing for everybody (including boots and gloves), spare clothing.
- Cleaning material, rags, soap, detergents, and brushes.
- Equipment to clean clothes, machinery, etc., with jets of hot water.
- Plastic bags (heavy duty) for collecting oily debris.
- Heavy duty plastic sheets for storage areas especially for the lining of temporary storage pits.
- Spades, shovels, scrapers, buckets, rakes
- Ropes and lines
- Anchors, buoys
- Lamps and portable generators
- Whistles
- First Aid material.

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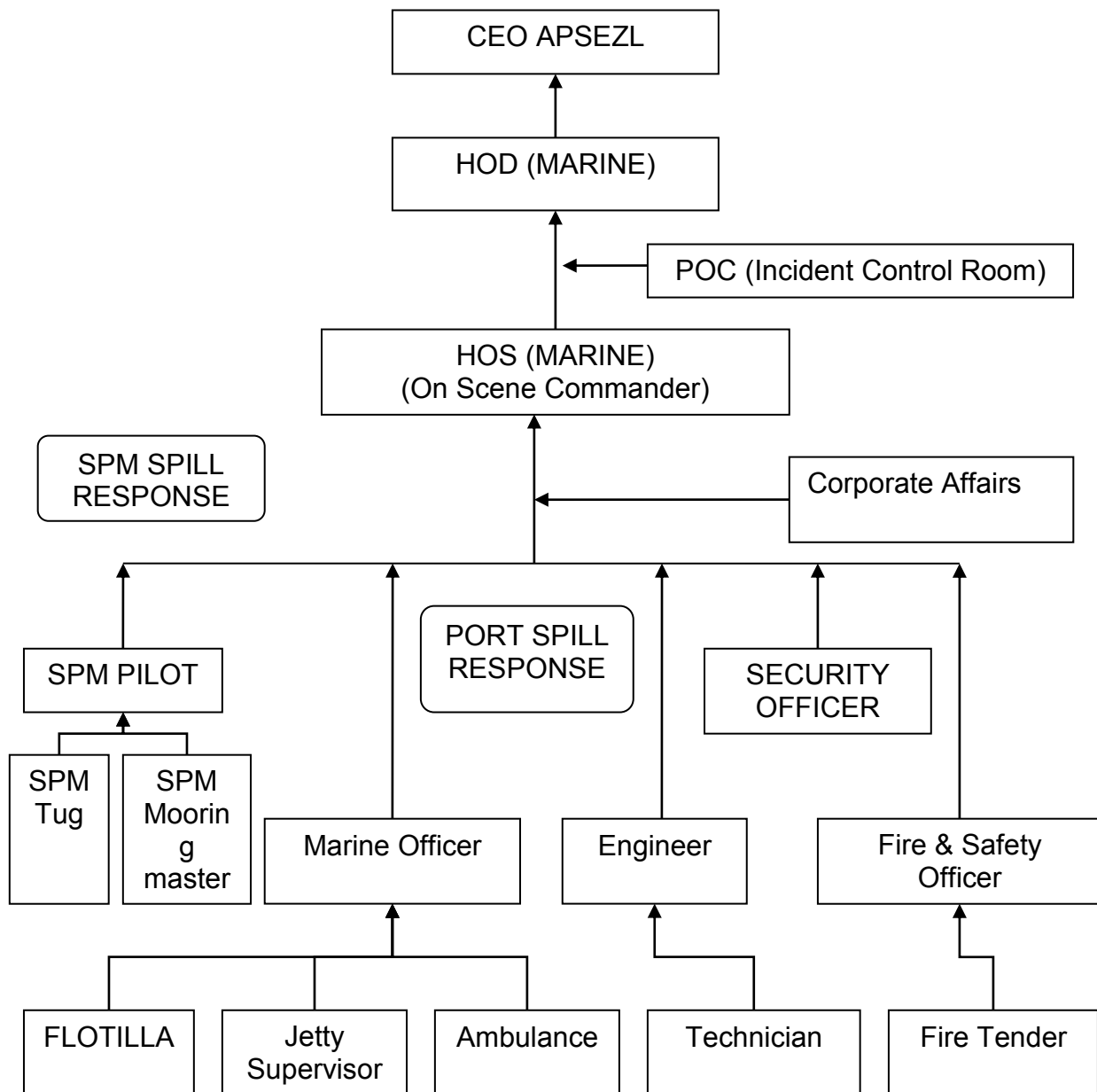
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## 5 Management

### 5.1 Crisis manager and financial authorities

The COO of APSEZL is the final authority of the oil spill response in case of a Tier 1 scenario. He is responsible for raising the level of the response if required and summoning additional help. The authority of all financial decisions rest with him.

### 5.2 Incident organization chart



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**5.3 Manpower availability (on-site, on call)**

In an event of incident Kandla Port Trust, Gujarat Maritime Board, Gulf of Kutch Ports, District and Regional plans are deemed to have been implemented. Adani Ports and Special Economic Zone Limited (APSEZL) manpower and resources will be put at the disposal and will be deployed as required, provided APSEZL is the polluter and spill is within the Port Limits.

In the event of APSEZL not being the polluter and any event outside the port limit of Adani Port, APSEZL equipment will be subject to mutual assistance plan and it will be the responsibility of the above forum.

**5.4 Availability of additional manpower**

Similarly in the event of APSEZL being the polluter, additional manpower and supplies can be requested from the resources which are part of this forum.

A numbers of private parties have their labor force working round the clock in the port and on call these can be available.

**5.5 Advisors and experts – spill response, wildlife and marine environment**

APSEZL, being the nodal agency in this LOS-DCP, will function as the main agency. In the event of the emergency getting raised to higher tier, i.e. in case the incidence becomes a national disaster, the help and advice of Indian Coast Guard will be taken.

**5.6 Training / safety schedules and drill / exercise programme**

Training of all APSEZL staff who may get involved in implementing this plan is acknowledged. In house and external facilities (of ICG) are used periodically to impart training as per matrix below. Marine Manager has been appointed as training coordinator and custodian of oil pollution equipment. He shall organize training, drills and inspection of equipment as per the plan in force.

<b>Training Module</b>	<b>Duration</b>	<b>Frequency</b>	<b>Participants</b>	<b>Remarks</b>
IMO Model Course	2-5 days	Once	Key persons	By Maritime Training Institute
Oil Spill	1-5 days	Once every 5 years	Key persons	Coast Guard
Oil spill equipment	1-5 days	Once every Year	Managers	In house
Oil spill Management course	1 day	Once every year	Managers & junior staff	In house for in-depth knowledge
Notification exercise	1-2 hours	6 months	Operational staff	Check systems & communication
Table top	2-6 hours	12 months	Managers	Interactive discussions
Incident	6-8 hours	12 months with others	All	Mock drill

**Number of IMO Level-1 and IMO Level-2 qualified staff available with Adani Ports and SEZ Ltd, Mundra:**

**IMO Level-1 - 28**

**IMO Level-2 - 04**

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## 6 Communications

### 6.1 Incident control room facilities

Detailed in Annexure 3

### 6.2 Field communication equipment

Detailed in Annexure 3

### 6.3 Reports, manuals, maps, charts and incident logs

A copy of the relevant manual is kept with HOD – Marine. Maps/ Charts of APSEZL are kept in Marine Control Tower and attached in Annexures

## Action and operations

## 7 Initial procedures

### 7.1 Notification of oil spill to concerned authorities

The emergency (due to spill) should be initiated by the first person noticing it by activating the fire alarm from the nearest call-point or by contacting the fire control room immediately on the internal telephone or through mobile phone or through VHF Channel.

The SPM Pilot or On Scene Commander will report the spill to the Marine Control Room.

### 7.2 Preliminary estimate of response tier

The first few minutes after the incident / accident are invariably the most critical period in prevention of escalation. Therefore the person available at or near the incident site (and often responsible for carrying out that particular activity) on round the clock basis play a vital role in an emergency. The SPM Pilot or On Scene Commander will report the spill to the control room along with his estimate of the response tier.

### 7.3 Notifying key team members and authorities

Statutory First Information Report (FIR - given in annexure 1) is to be communicated by fastest means possible to President, GMB port and CG at Porbandar followed by full Pollution Report (POLREP – given in annexure 2). The report is to be updated, should the oil spill not be contained and likely to increase to Tier 2

### 7.4 Manning Control Room

Auxiliary control center is located at Port Operation Centre. Escalation of emergency if any is monitored here. Statutory reporting procedures of FIR and POLREP of developing situation and action taken are also sent from this center. The detail of the contacts to whom the information is to be given is placed at Annexure 4.

### 7.5 Collecting information (oil type, sea / wind forecasts, aerial surveillance, beach reports)

Marine Manager has the responsibility of arranging the collection of the relevant information which will help in mitigating the emergency

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#### **7.6 Estimating fate of slick (24, 48, 72 hours)**

Considering the prevalent tidal stream, wind and weather conditions, section 8.3 is to be used in estimating the fate of the slick

#### **7.7 Identifying resources immediately at risk, informing parties**

Depending on the quantity of fluid spilled and the prevalent wind & weather conditions, the resources / facilities immediately at risk have to be identified by the On scene commander and the concerned parties informed.

### **8 Operations planning**

#### **8.1 Assembling full response team**

On being appraised of the spill, the duty marine officer will inform the marine manager, who will, in turn initiate the assembly of the complete response team which essentially involves relaying information to all relevant personnel, parties and authorities and informing them of the initial response requirements.

#### **8.2 Identifying immediate response priorities**

Depending on the initial estimated response tier and the prevalent weather conditions, the marine manager, in consultation with the on scene SPM pilot / marine officer will identify the immediate resources at risk and the response priorities.

#### **8.3 Mobilizing immediate response**

The Manager - Marine will initiate the mobilization procedure of the spill equipment, resources and personnel depending on the scale of emergency at hand.

#### **8.4 Media briefing**

No other person is authorized to communicate with any external party by any means whatsoever unless expressly permitted by the HOD – Marine or COO, APSEZL.

#### **8.5 Planning medium-term operations (24, 48 and 72 hour)**

The HOD – Marine will plan the subsequent action to be taken in response to the tier 1 spill after the initial response is well under way and its consequences / effectiveness are duly evaluated.

#### **8.6 Deciding to escalate response to higher tier**

After carefully assessing the scenario and appraising the efficiency of the initial response in the prevalent conditions, the HOD – Marine will decide whether or not to escalate the response.

#### **8.7 Mobilizing or placing on standby resources required**

It is recommended that in case of a doubt (as the exact estimate of the quantity of oil spilled is quite difficult and the boundaries between the tiers will inevitably be blurred) it is important to be prepared to involve the next higher tier from the earliest moments. It is easier to stand down an alerted system than to try to escalate a response by calling up unprepared reserves at a late stage.

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### **8.8 Establishing field command post communications**

Communications between the Emergency Response Center/ Marine Control room and marine personnel during the response to any oil spillage will be primarily by VHF marine band radio on Channel 73 or 77

Communications between the Marine Control Room and other vessels will be established on VHF radio Channel 16 and will thereafter be conducted on Channel 73 / 77.

Use of cellular telephones will be minimized.

Communications between the Emergency Response Center/ Marine Control Room and external authorities and organizations will be undertaken by telephone and facsimile.

## **9 Control of operations**

### **9.1 Establishing a Management team with experts and advisors**

Detailed in Annexure 4

### **9.2 Updating information (sea, wind, weather forecasts, aerial surveillance, beach reports)**

The Marine Control Room is well equipped in assimilating data on weather and its forecasts. In case of a Tier 1 response, aerial surveillance and beach reports are not deemed to be essential

### **9.3 Reviewing and planning operations**

Ongoing response and its influence in mitigating the situation will have to be constantly under review in order to contain the spill at the earliest.

### **9.4 Obtaining additional equipment, supplies, manpower**

While deciding not to elevate the tier of the response the HOD- marine may still request additional resources from nearby port facilities which are essentially members of the common forum and are obliged to assist.

### **9.5 Preparing daily incident log and management reports**

A complete report will be submitted by the Marine Manager to the HOD (Marine) every morning (in case the response extends to more than 1 day).

Format for the above report in Annexure 9

### **9.6 Preparing operations accounting and financial reports**

The Port's accounting department will assess the expenditure incurred in the ongoing operation and submit a report to the President's office.

### **9.7 Preparing releases for public and press conferences**

The COO's office, HOD – Marine and the Corporate communications cell will formulate the requisite press releases from time to time and hold press conferences.

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### **9.8 Briefing local and government officials**

The COO's office, HOD – Marine and the Corporate communications cell will formulate the requisite reports to brief local and government officials..

## **10 Termination of operations**

### **10.1 Deciding final and optimal levels of beach clean-up**

If at all a distant beach is affected, the COO APSEZL office will decide the optimal levels of cleanup in consultation with the conservator of the port – Gujarat Maritime Board Port Officer.

### **10.2 Standing down equipment, cleaning, maintaining, replacing**

Considering the natural disintegration of the residual oil on water after the cleanup of the bulk amount, The HOD – Marine will decide when to stand down the response. The resources which have been used will have to be re-instated to the original condition by elaborate cleanup or replacement.

### **10.3 Preparing formal detailed report**

The COO's office, HOD – Marine and the Corporate communications cell will formulate the requisite reports to brief local and government officials and media.

### **10.4 Reviewing plans and procedures from lessons learnt**

A complete spill response report will be produced by the Marine manager providing comprehensive and all-inclusive details of the circumstances leading to the spill, initial response and consequent affect of the same, subsequent follow up, effect of prevailing weather, adverse situations, safety issues, difficulties faced and lessons learnt.

Requisite changes will be affected to this plan on basis of such report.

Such a report will also be prepared by the marine manager after each drill or training session and requisite modification(s) incorporated to the plan in order to enhance the overall efficacy of the same.

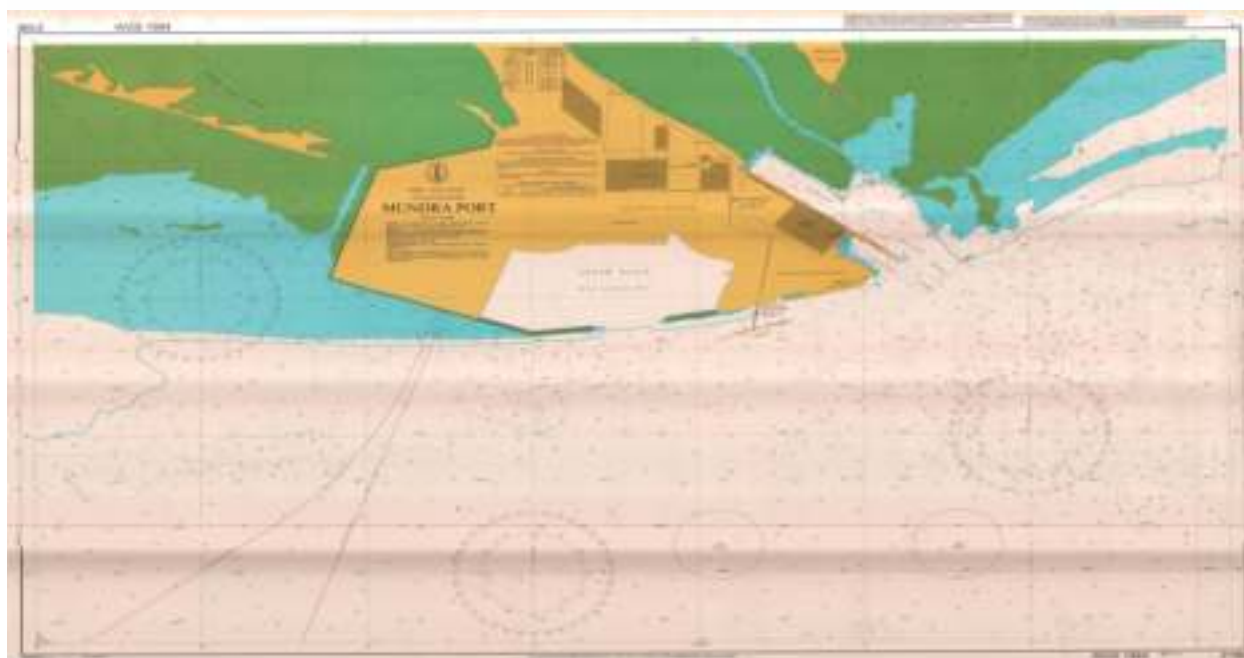
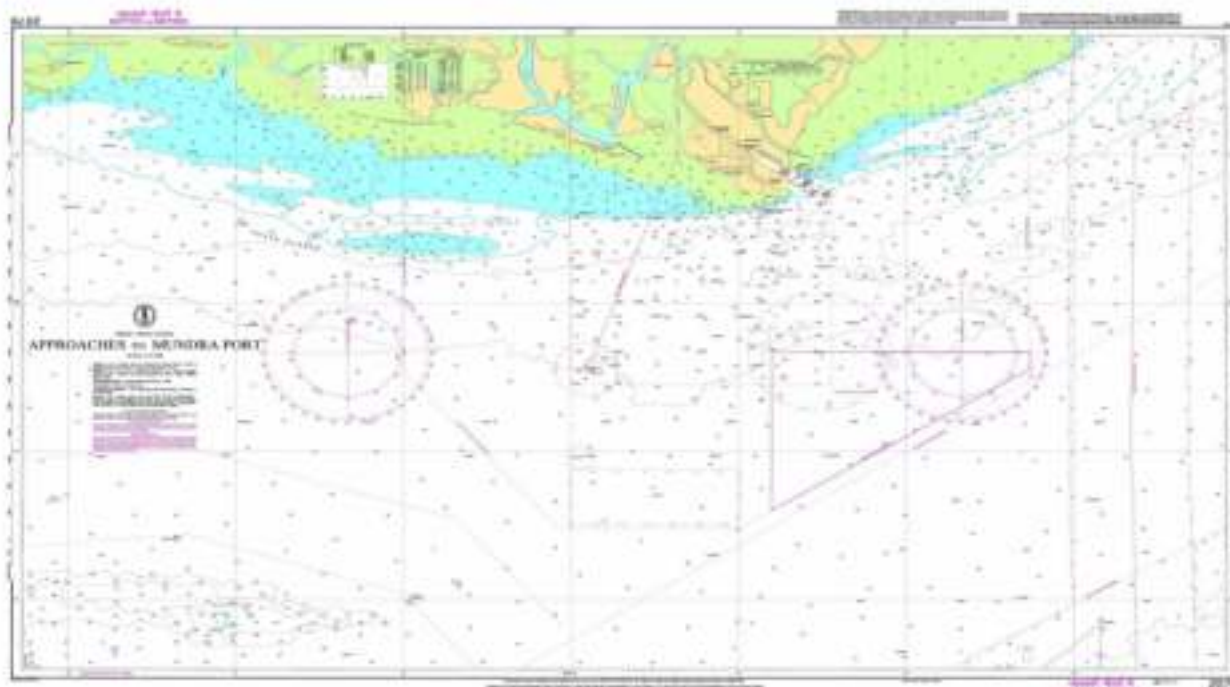
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**2. Coastal charts, currents, tidal information (ranges and streams), prevailing winds**

Currents, tidal information (ranges and streams) : Detailed in Annexure- II, Annexure- III and Annexure- IV (Volume 2) of Oil Spill Risk Assessment



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**3. Risk locations and probable fate of oil**

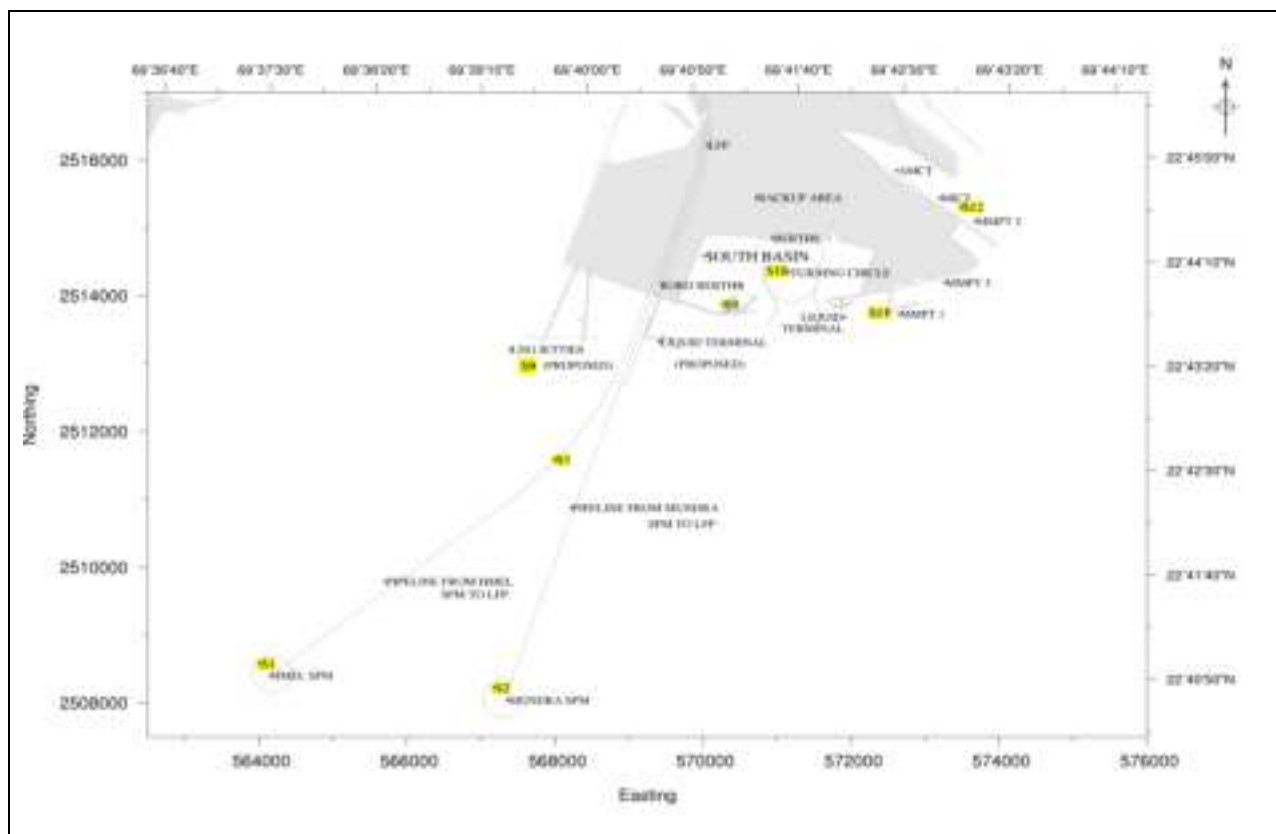


Fig.1: General layout of the Mundra port facilities of APSEZL showing the location of Spill Points for SPMs, South Basin berths, LNG jetty and existing berths

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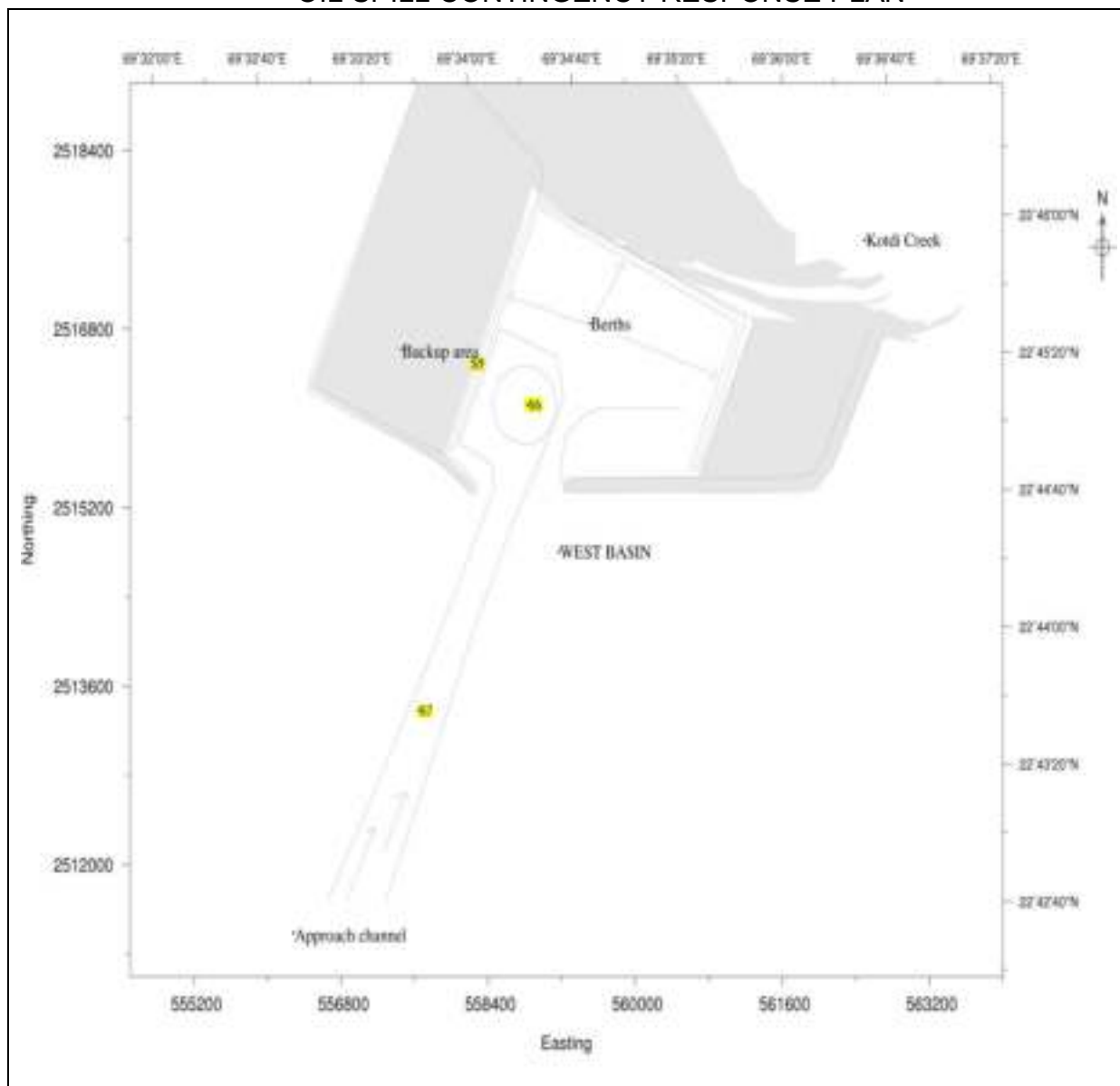


Fig.2: Zoomed up portion of Mundra port facilities of APSEZL showing the location of Spill Points for West Basin

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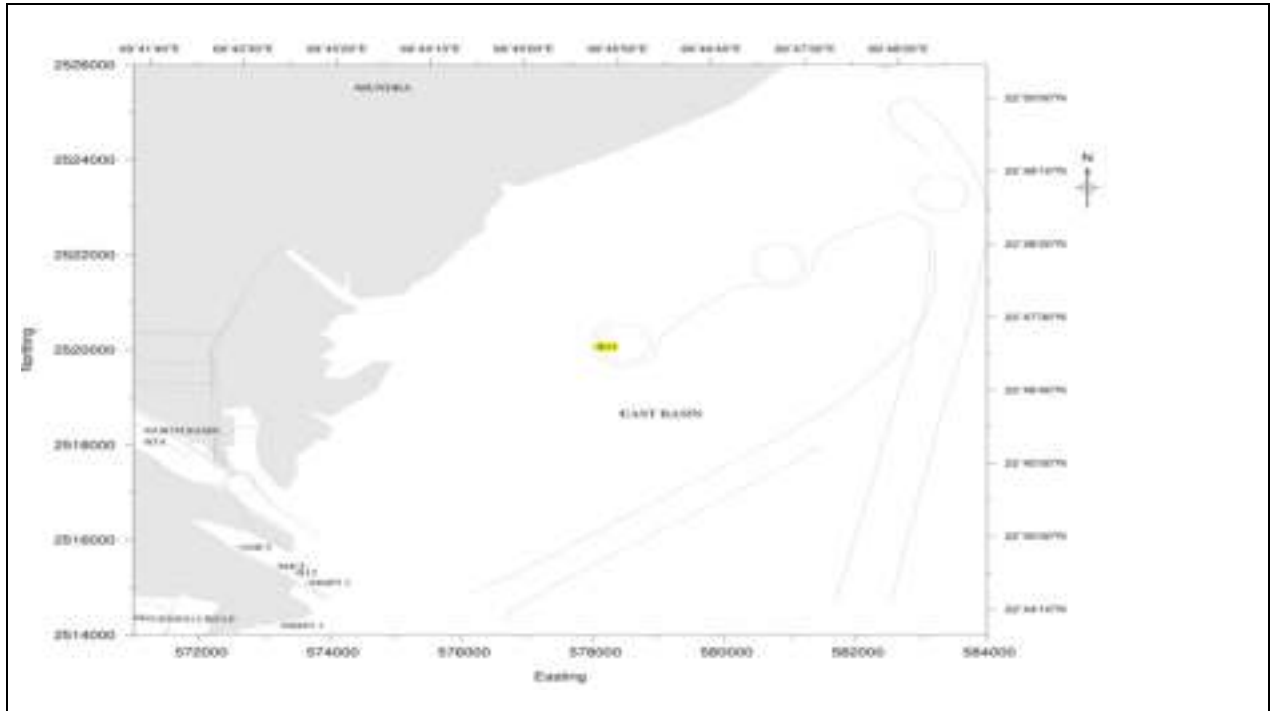
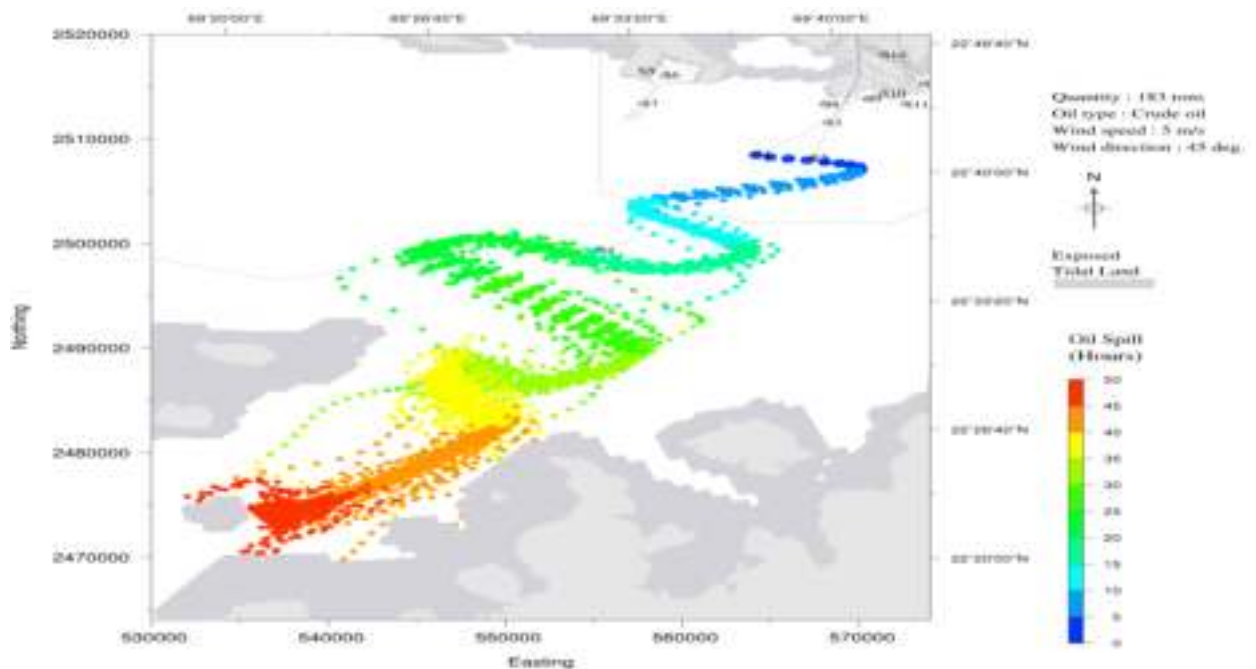


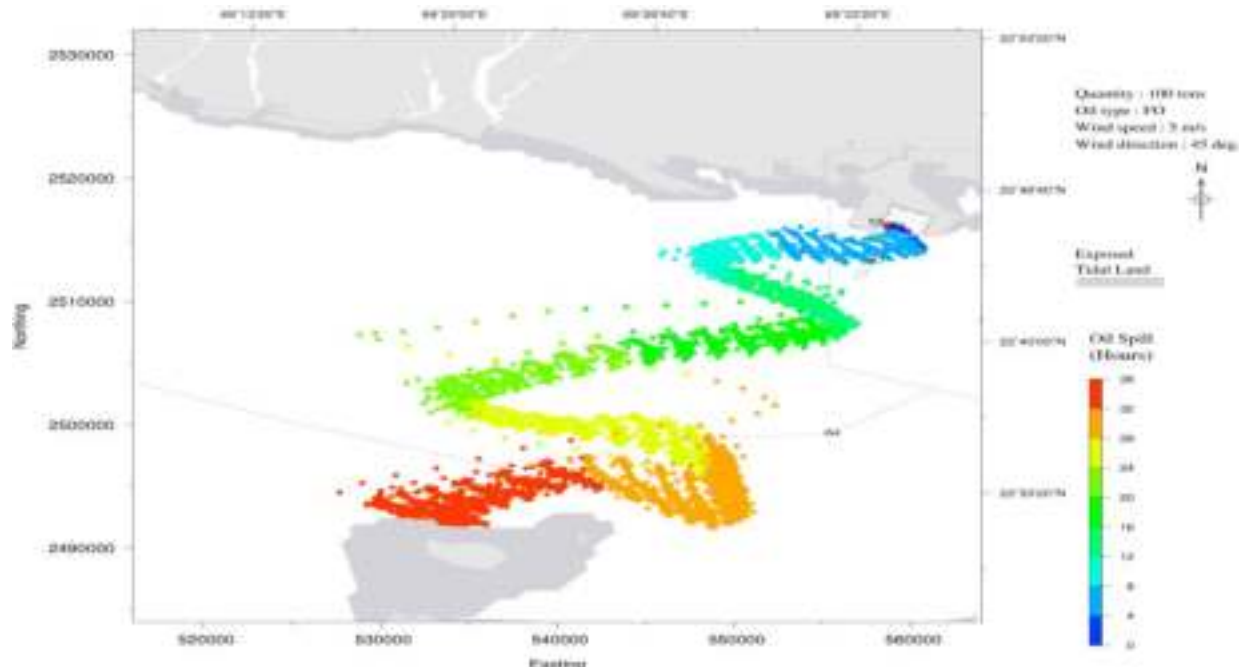
Fig.3: Zoomed up portion of Mundra port facilities of APSEZL showing the location of Spill Points for North Basin & East Basin



Oil Spill trajectory due to instantaneous crude oil leakage of 700 t (due to collision) at spill point S1 (HMEL SPM) after 50 hours during flood condition of the neap tide

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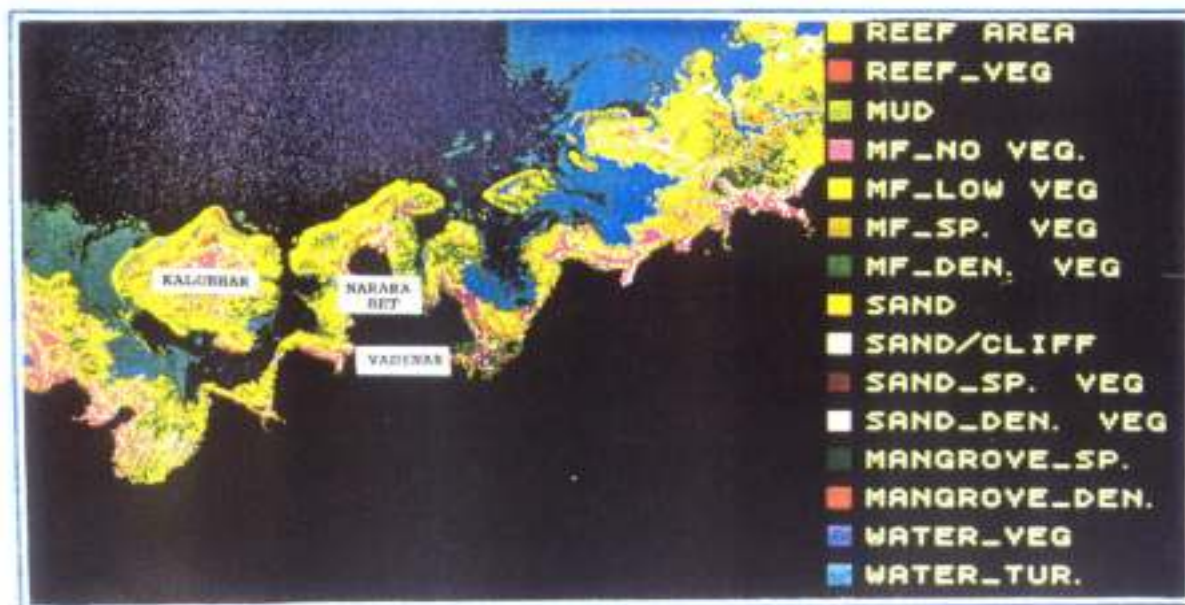
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Oil Spill trajectory due to instantaneous FO leakage of 700 t (due to hull failure/ fire / explosion) at typical berth location in the West Basin

For Risk locations and probable fate of oil refer Annexure- V (Volume 2) of Oil Spill Risk Assessment.

**Shoreline resources for priority protection**



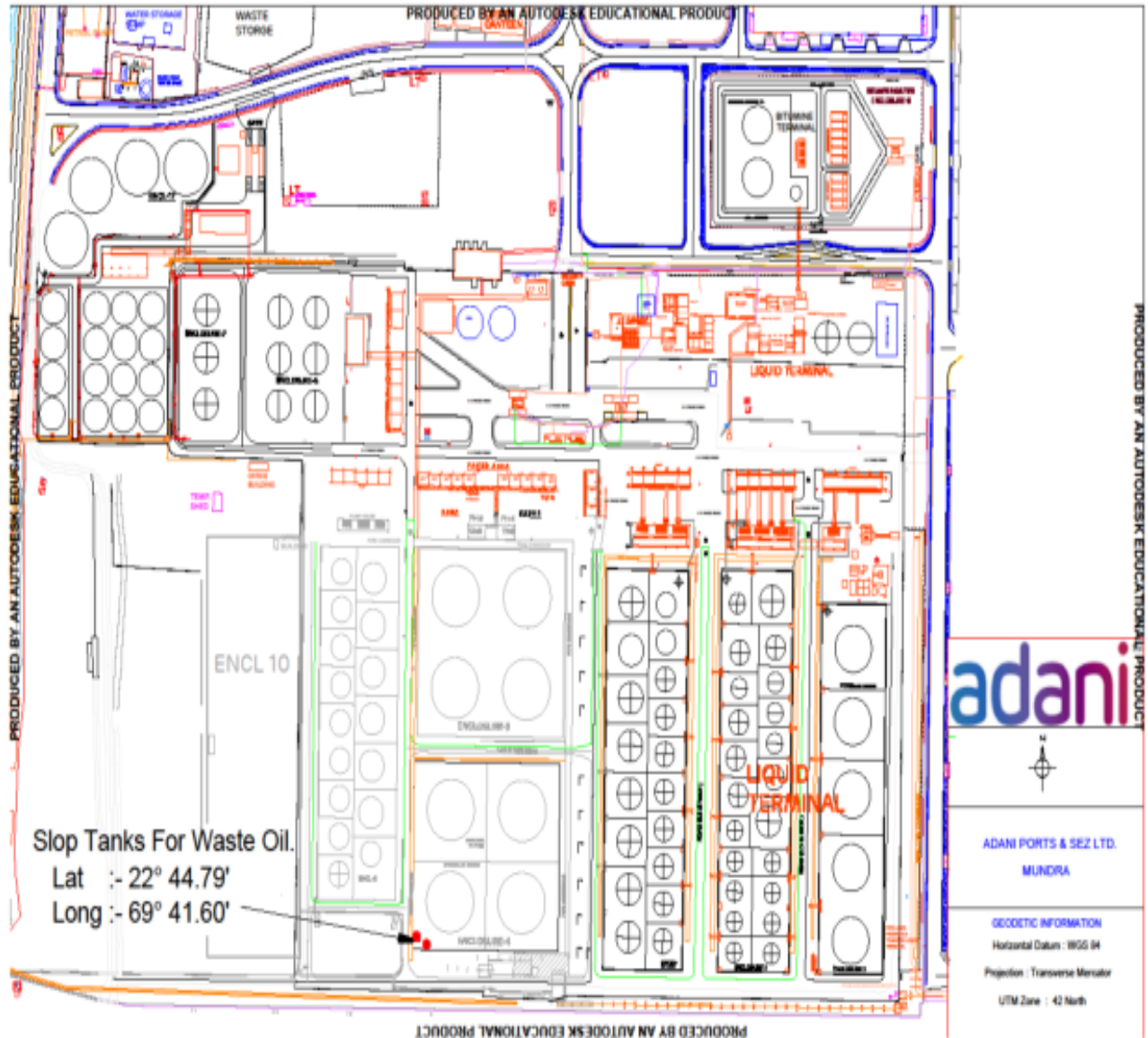
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Oil and Waste Storage / Disposal sites

Oil and Waste storage / Disposal tank No. 46, 109 and 110 are available within Liquid Tank farm.



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**Sensitivity Maps/ Atlas**

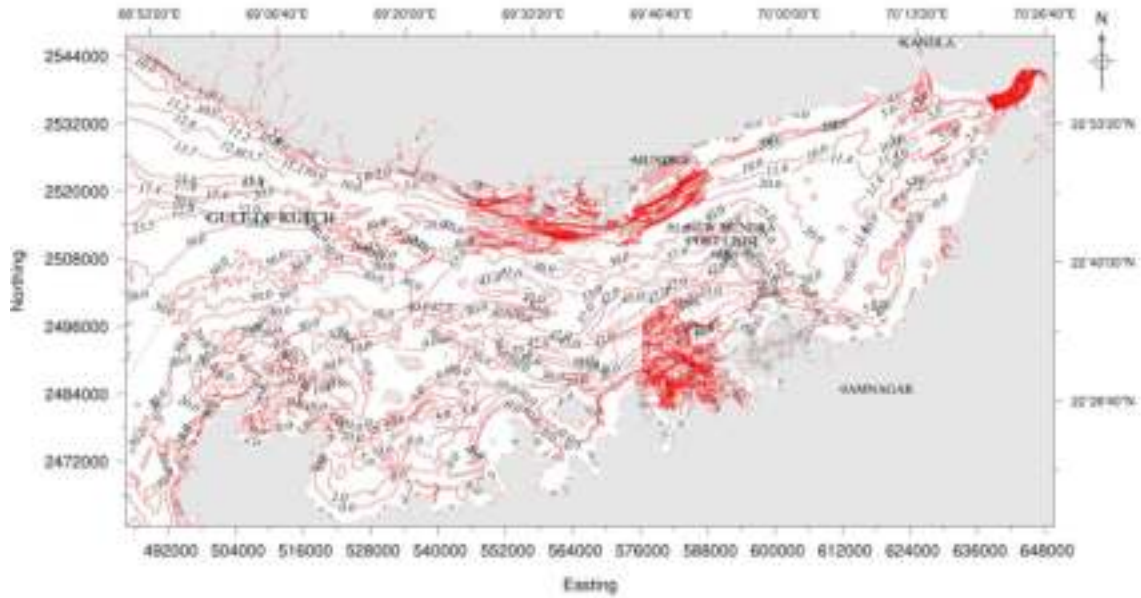


Fig.A1.1 Terrain features of study domain.



Fig.A1.2 Computational grid

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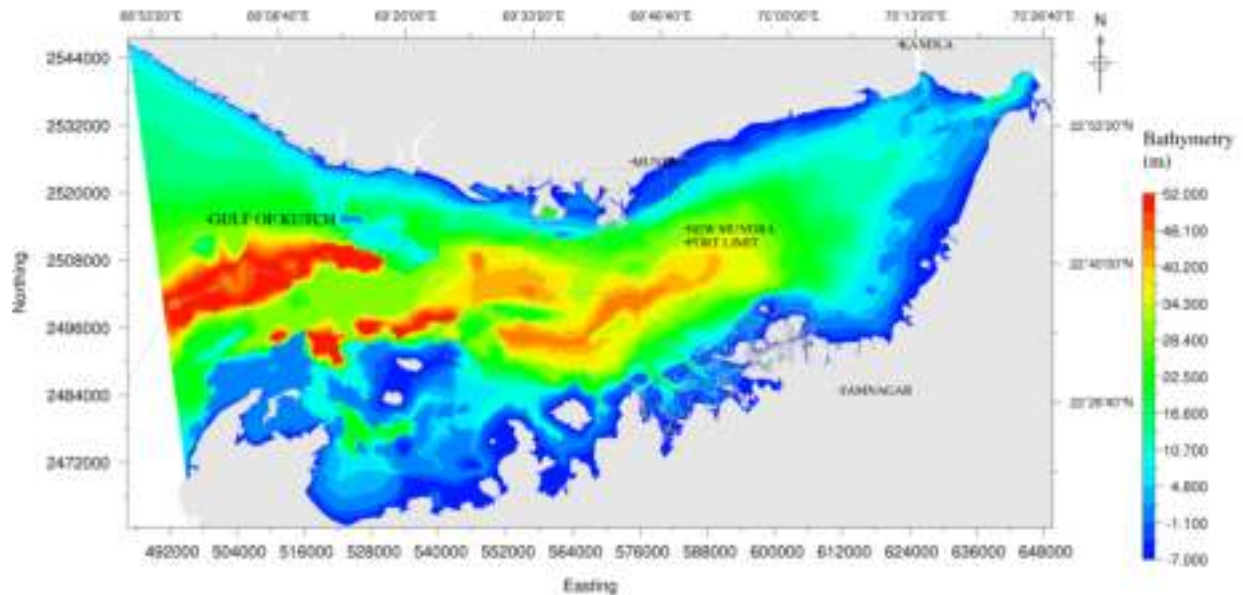


Fig.A1.3 Interpolated depth contours

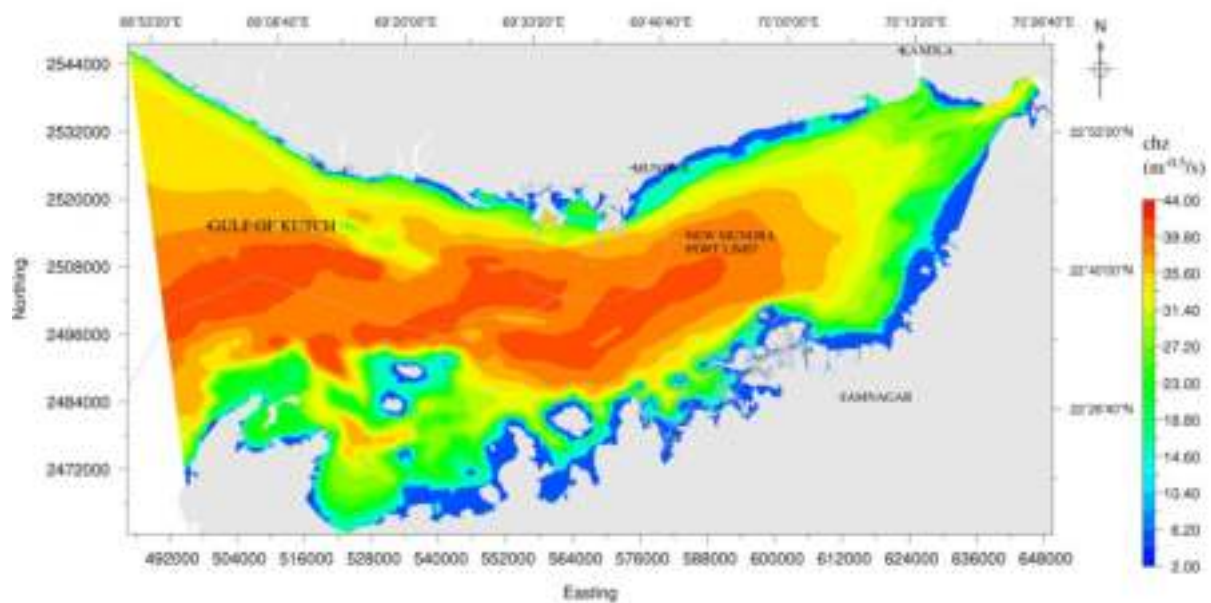


Fig.A1.4 Chezy's coefficient

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**Lists**

1. **Primary Oil spill Equipment:** booms, skimmers, spray equipment, dispersant, absorbents, oil storage, Radio communications etc.

Detailed in Annexure 3

2. **Auxiliary Equipment:** Tugs and work boats, aircraft, vacuum trucks, tanks and barges, loaders and graders, plastic bags, tools, protective clothing, communication equipment etc.

Detailed in Annexure 3

3. **Support Equipment:** Aircraft, communications, catering, housing, transport, field sanitation and shelter etc. (Availability, contact, cost and conditions)

Not applicable

4. **Sources of Manpower:** Contractors, local authorities, caterers, security firms (Availability, numbers, skills, contact, cost and conditions)

Refer Para 5.3

5. **Experts and Advisors:** Environment, safety, auditing (Availability, contact, cost and conditions)

Detailed in Annexure 4

6. **Local and National Government contacts:** Name, rank and responsibility, address, telephone, fax, telex.

Detailed in Annexure 4

**Data**

**1. Specification of Oils commonly traded**

At the liquid berth, the representative products that would be handled are petroleum products like FO/ HSD / SKO / MS / CBFS / CPO / Naphtha etc. Vessels calling at the port will be having FO and HSD for their propulsion requirements.. The products like MS, Naphtha etc are oils of non – persistent nature; they tend to evaporate fast and will not stay long on the surface of the sea waters. Hence spill studies have been carried out for FO and HSD spills at the berths.

At the SPMs, Crude oil unloading takes place.

Physical and Chemical Properties of products handled at the SPMs, Berths and of the propulsion fuels of the ships / tankers

Data on the properties for the hydrocarbons / products handled at the jetty is required for quantitative hazard identification and consequence calculations. The properties of the FO and HSD, the petroleum hydrocarbons likely to be spilled due to the operations at the jetty are given in Table-3.1.

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**Table-3.1: Properties of Crude Oil, FO and Diesel**

Sl. No	Chemical	Boiling Range (° C)	Specific Heat of Liquid (J/Kg ° K)	Heat of Evaporation (x 10 <sup>5</sup> J/Kg)	Heat of Combustion (x 10 <sup>5</sup> J/Kg)
1	Crude Oil	IBP - 700+	2385	3.4	425
2	HSD	200 - 350	2889	4.65	448
3	Fuel Oil	180 - 450	2500	3.4	452

The following characteristics of oil are used for modelling study:

**(a) Crude Oil**

Sp. Gr = 0.82 to 0.88

Surface Tension = 3.0 e-03

Molar Volume = 0.002

Viscosity: 275 CST at 37.8 deg C

Wax content: 12 – 19 %

Pour point of untreated crude: 30 deg C

Pour point of treated crude: 18 deg C

**(b) FO**

Sp. Gr = 0.92

Boiling point = > 260° C

Vapor pressure = < 0.1 psia at 21° C

**(c) HSD**

Sp. Gr = 0.86

Pour point = 6° C - 18° C

Vapor pressure = 2.12 to 26 mm Hg at 21° C

## **2. Wind and weather**

### **Meteorological and Oceanographic Conditions**

The met-ocean conditions have been previously ascertained at several stages in the course of various studies conducted in past in respect of Mundra port projects. Flow modeling for the Mundra port location has been covered in the model developed by Environ, India, who have developed the model for whole of Gulf as relevant to Mundra region. It has been observed during model studies that flow regime does not have significant changes due to the proposed developments. The following are the main hydro-meteorological parameters for planning and designing of the marine facilities described below.

### **Rainfall and Temperature**

The Kutch is a semi-arid region with weak and erratic rainfall confined largely to June-October period. With a few rainfall days, the climate is hot and humid from April till October and pleasant during brief winter from December to February. Although the monthly mean maximum temperature recorded is 37°C during 2005, it occasionally exceeds 40°C. Rainfall alone forms the ultimate source of freshwater resource to the region. The average rainfall at Mundra is about 400 mm/year.

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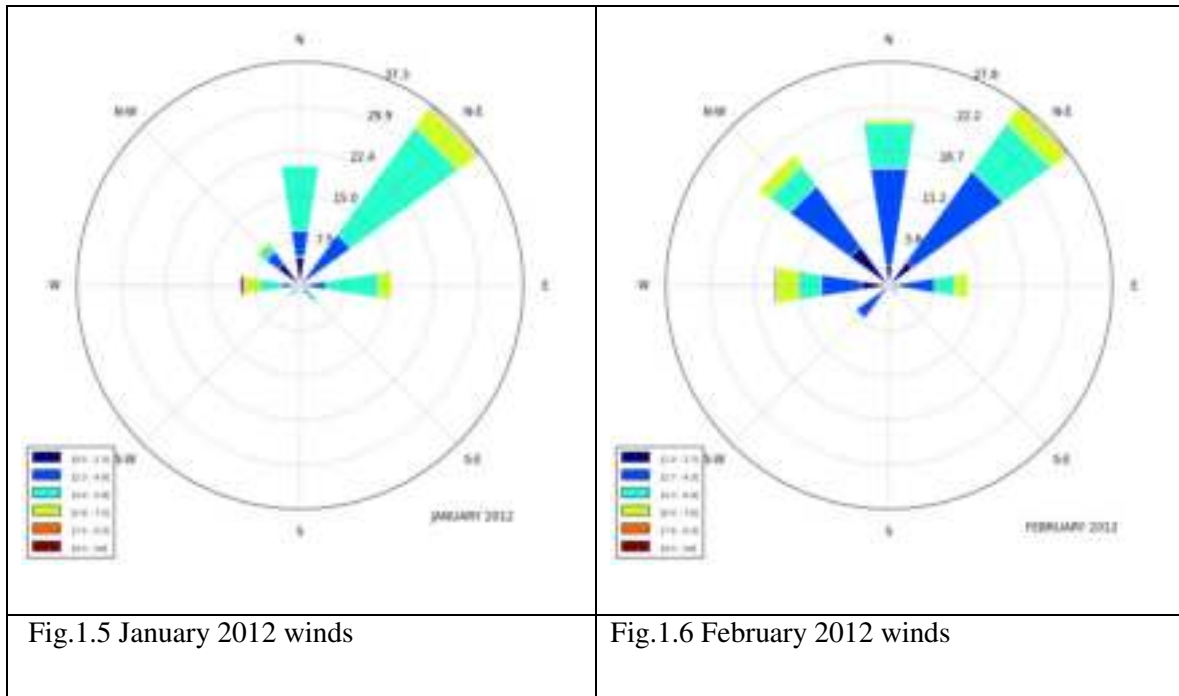
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**Cyclones**

Cyclonic disturbances strike North-Gujarat, particularly the Kachchh and Saurashtra regions, periodically. These disturbances generally originate over the Arabian Sea and sometimes the Bay of Bengal. Generally during June, the storms are confined to the area North of 15°N and East of 65°E. In August, the initial stages, they move along the northwest course and show a large latitudinal scatter. West of 80°E, the tracks tend to curve towards North. During October the direction of movement of a storm is to the West in the Arabian Sea. However, East of 70°E some of the storms move North-Northwest and later recurves North East to strike Gujarat-North Mekran coast.

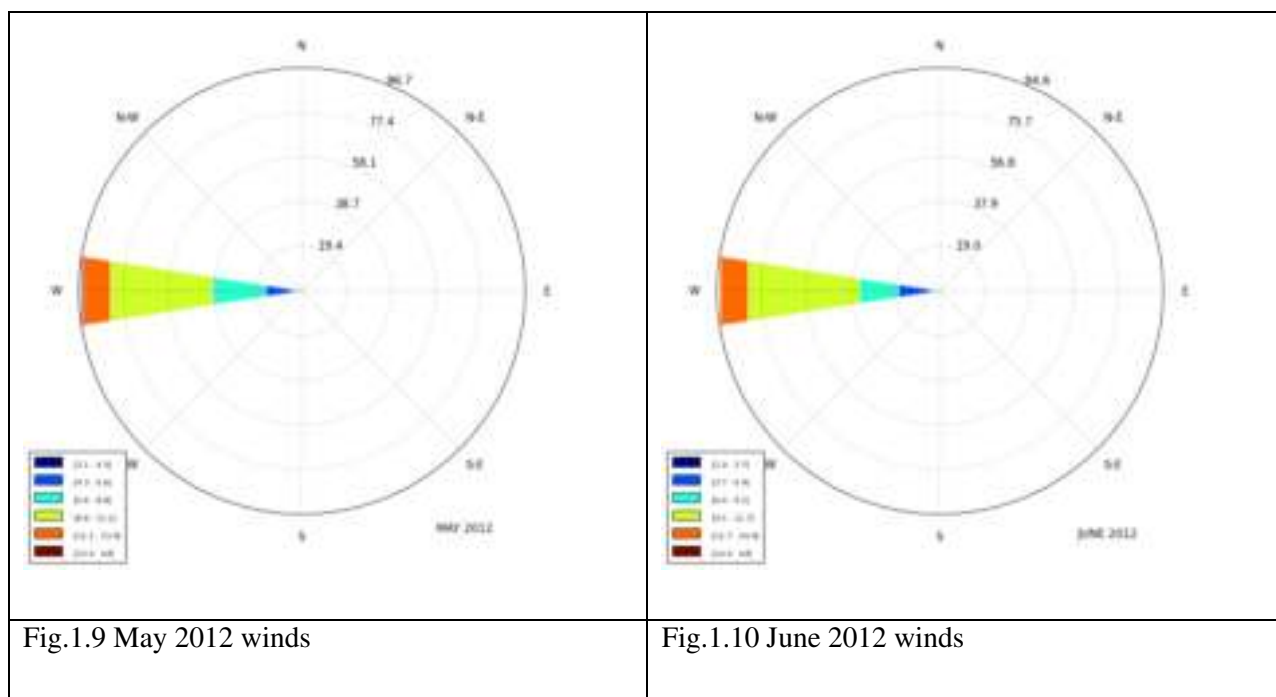
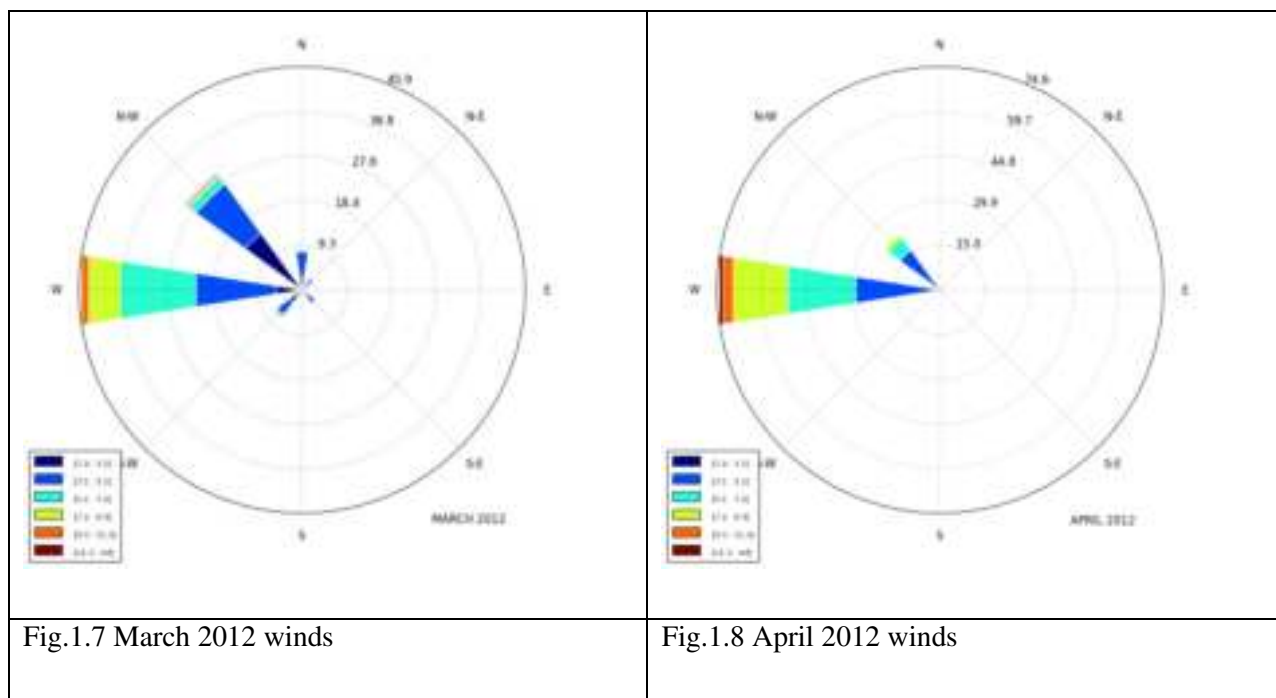
**Wind**

There are strong winds at times at Mundra Port. The month wise wind rose diagrams for the year 2012 and for the months of January and February of the year 2013 are given below. In the period lasting over months March to May the wind direction is generally SWW (225° - 250°) and velocity varies from 20 to 25 Knots. From June through August, the wind direction is predominantly SW and velocity varies from 25 to 30 Knots with short gusts going up to 35 to 40 Knots. Towards end of September and through October wind direction changes to NE with velocities ranging from 7 to 10 Knots. Direction remaining same the velocity varies 10 knots to 25 Knots in the period November to January. February is the calm period when wind direction is Southerly with velocity in the range of 7 Knots. Stormy weather may generate winds having velocity up to 100 Knots which should be taken as the worst case scenario for design of tall structures and heavy duty cranes.



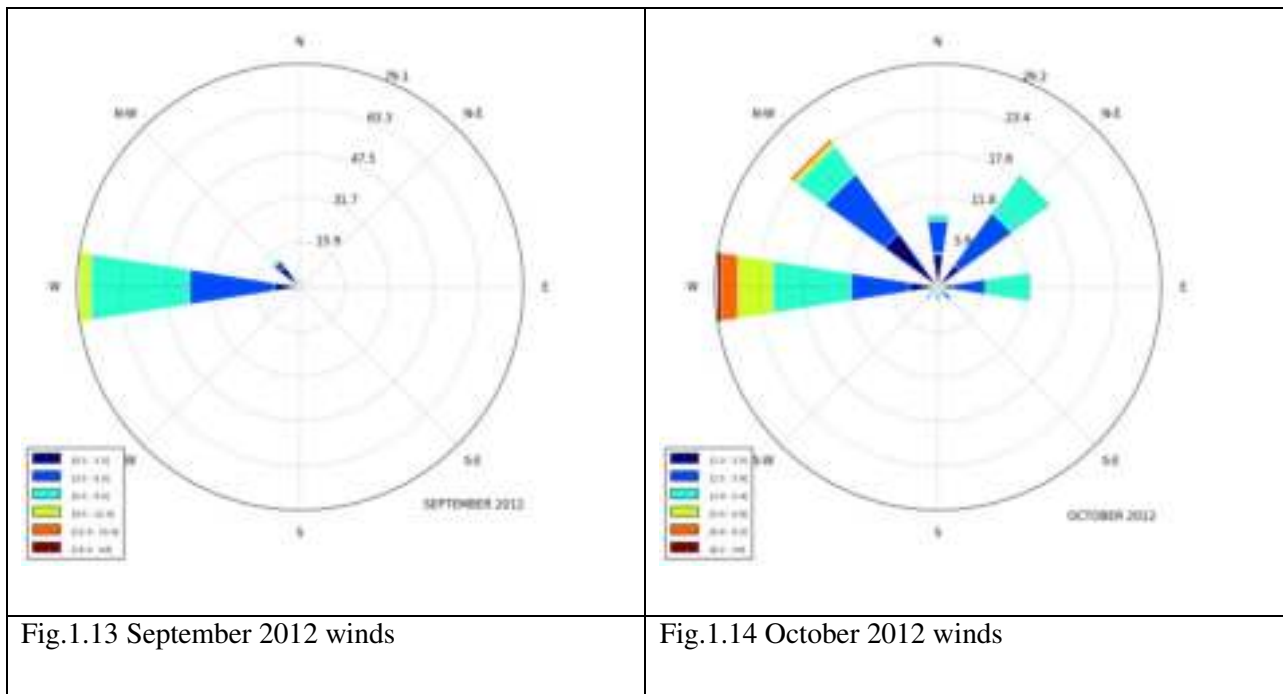
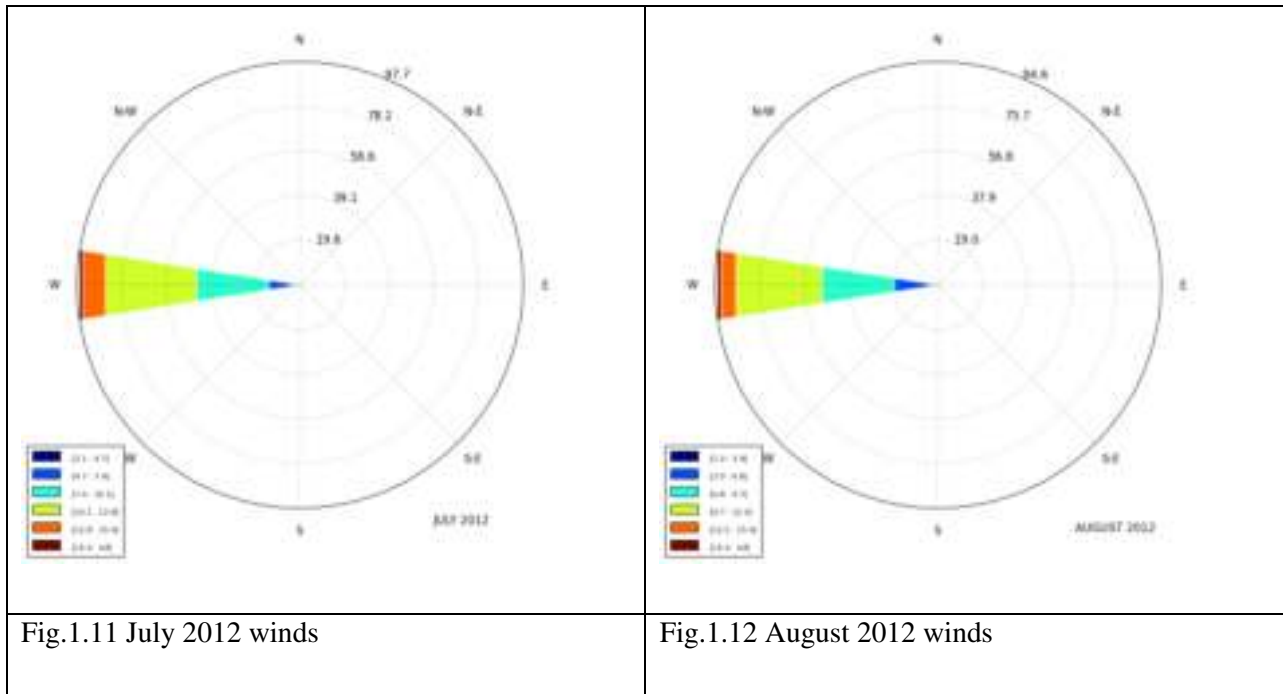
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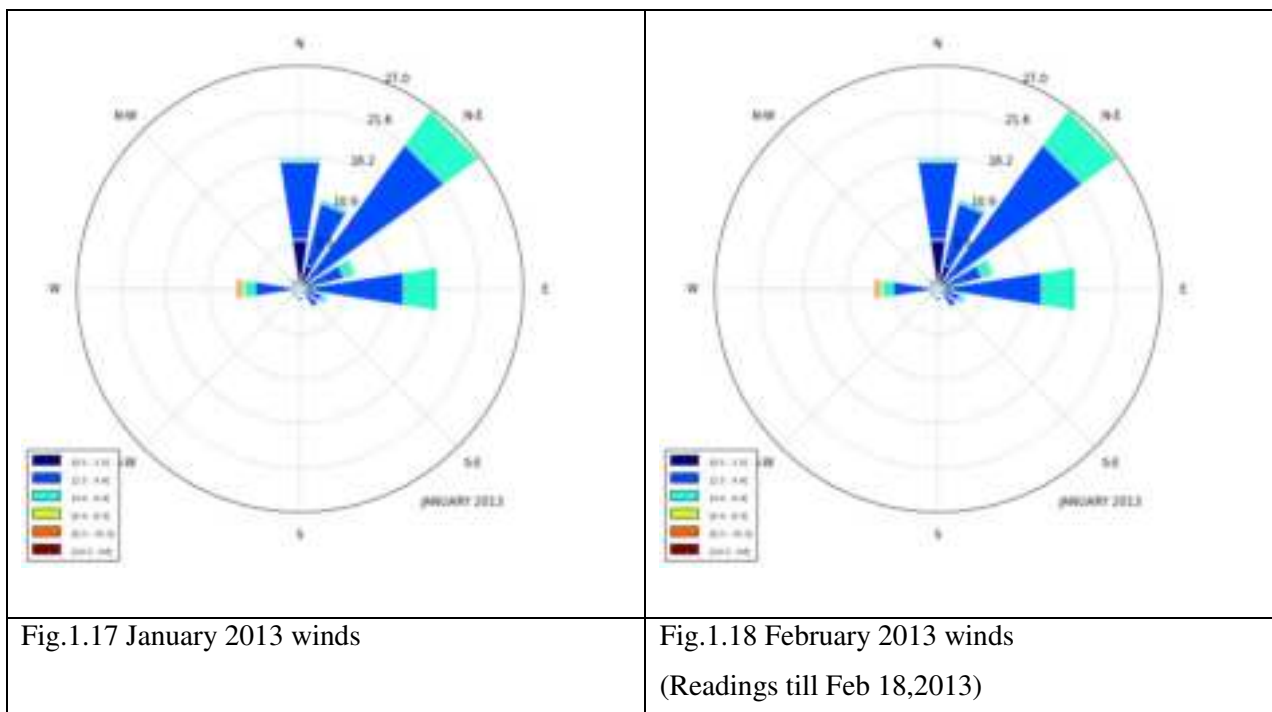
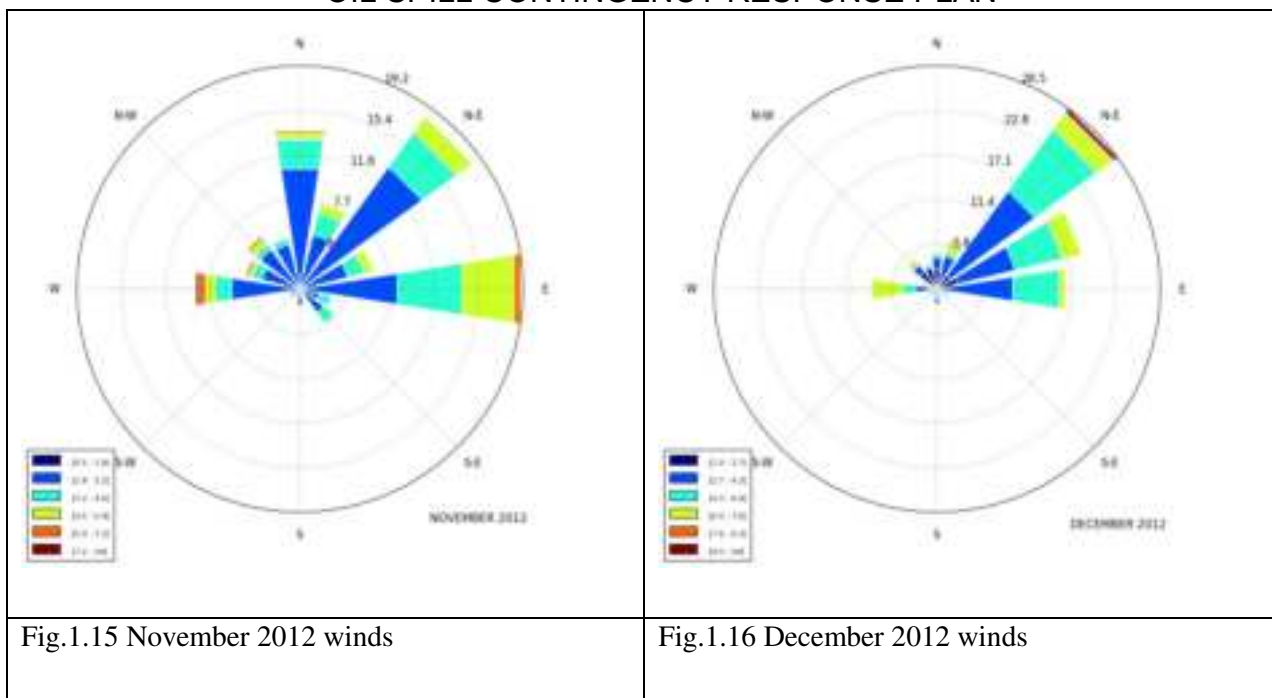
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**Tides**

The tidal planes were assessed in 1998 and are as shown in Table below.

The Highest Astronomical Tide (HAT) is estimated to be about +6.4 m above chart datum (CD), and the Lowest Astronomical Tide (LAT) to be at 0.0 m CD.

Tide	Height (m) above CD
Mean High Water Springs	5.8
Mean High Water Neaps	4.6
Mean Low Water Neaps	2.1
Mean Low Water Springs	1.0

**Currents**

Currents in the approaches to the port are dominated by the tidal flows, with predictable variations over diurnal, monthly and annual time scales. Currents in this part of the Gulf flow parallel to the natural sea-bed contours. Currents can be relatively strong, with speeds in excess of 3.0 Knots reported at sometimes of the year. The Admiralty Chart shows currents off Navinal point to be 3.0 Knots East & West bound. It is observed that the currents are usually aligned with the bed contours and are stronger in deeper waters off the coast. The impact of future development over the existing coast-line can be determined by the change in current speed resulting from the proposed developments.

**Waves**

In past HR Wallingford (HRW) has studied the wave climate considering wave energy from locally generated waves and swell propagating in to the Gulf of Kutch from the Arabian Sea. The results of the study carried out by HRW are presented in the Table below.

**Design Waves at Mundra**

Direction Sector (°N)	Return Period (years)	Inshore Direction (°N)	Hs (m)	T2 (sec)
210	1	222	1.2	5.0
	5	222	1.4	5.3
	20	221	1.6	5.8
	100	221	1.8	6.1
240	1	226	1.5	5.4
	5	226	1.7	5.8
	20	225	1.8	6.1
	100	225	2.0	6.5
270	1	239	1.4	5.5
	5	236	1.7	6.3
	20	236	1.8	6.7
	100	235	2.0	7.4
300	1	240	0.8	5.2
	5	240	0.9	5.6
	20	239	1.0	6.2
	100	238	1.2	6.7

Atmospheric stability is an important factor for predicting the dispersion characteristics of gases/vapours into the surrounding environment. Change in atmospheric stability is a direct consequence of the vertical

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temperature structure. The stability effects are mathematically represented through Pasqual parameters. The following stability classification is employed:

<b>Stability Class</b>	<b>Atmospheric Condition</b>
A	Very Unstable
B	Unstable
C	Slightly Unstable
D	Neutral
E	Stable
F	Very Stable

Condition of atmospheric stability is estimated by a suitable method that uses dispersion parameters viz., vertical temperature gradient, profile of the winds and roughness factor. The roughness factor for the Mundra area is small since it mainly comprises of plain land.

The following meteorological information has been taken in the calculations for the Mundra area (GMB-2010):

Average ambient temperature : 30°C  
Average wind speed : Wind data for the whole year 2012 is available and is used  
Stability condition : F (Very Stable)

### **3 Information sources**

This plan is prepared in accordance with:

- a) Marine Environmental Impact Assessment of SPMs, COTs and connecting pipelines of APSEZL at Mundra dated February 2001, prepared by National Institute of Oceanography, Mumbai.
- b) Report on Risk assessment study and On-site disaster management Plan for SPMs, COTs and connecting Pipelines of Adani Ports and Special Economic Zone Limited, by TATA AIG Risk Management Services Limited, dated February 2001.
- c) HAZOP study report of SPM Terminal pipeline project by Intec Engineering, dated 26/02/2004.
- d) IPIECA guide to Contingency planning for oil spills on water.
- e) Oil spill risk assessment and contingency plan study done by M/s Environ Software Pvt. Ltd. (Copy enclosed)

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**ANNEXURES**

INITIAL OIL SPILL REPORT		ANNEXURE 1
Particulars of person, office reporting		
Tel No.		
Date & time of incident		
Spill location		
Likely cause of spill		Witness
Initial response action		By
Any other information		
<p>This FIR is to be sent to Marine Manager by fastest means of communication possible. It is an offence not to report oil pollution incident.</p> <p>This FIR is to be followed by company's incident report also.</p> <p>Following POLREP report to the Government through nearest CG information will also be required:</p>		
Identity of informant		
Time of FIR		
Source of spill		
Cause of spill		
Type of spill		
Colour code information (from CG)		
Radius of slick		
Tail		
Volume		
Quantity		
Weather		
Tide / current		
Density		
Layer thickness		
Air / Sea temp.		
Predicted slick movement		
Size of spill classification (Tier 1, 2 or 3)		

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POLREP		ANNEXURE 2
In case of an oil spill, APSEZ will provide information to Commandant Coast Guard District 1 Porbandar COMDIS 1 and Coast Guard Station Mundra in the following format:		
SN.	Parameter	Data
1.	Identity of the informant	
2.	Time of information receipt	
3.	Source of Spill	
4.	Cause of Spill	
5.	Type of oil	
6.	Colour code information	
7.	Configuration	
8.	Radius	
9.	Tail	
10.	Volume	
11.	Quantity	
12.	Weathered or Fresh	
13.	Density	
14.	Viscosity	
15.	Wind	
16.	Wave Height	
17.	Current	
18.	Layer Thickness	
19.	Ambient air temperature	
20.	Ambient sea temperature	
21.	Predicted slick movement	
22.	Confirm Classification of spill size	
<b>Additional Information :</b>		

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LIST OF RESOURCES AVAILABLE						ANNEXURE 3
Tugs Available for Oil Spill Containment						
Name of Tug	Type	BHP	OSD	AFFF	Capacity (cubm/Hr)	BP
Dolphin No. 4	ASD	2200 X 2	3000 ltr	2000 ltr	1200	55
Dolphin No. 29	ASD	2200 X 2	3000 ltr	2000 ltr	1200	55
Dolphin No. 10	ASD	3000 X 2	3000 ltr	-	-	70
Dolphin No. 11	ASD (DSV)	2200 X 2	3000 ltr	2000 ltr	1200	55
Dolphin No. 14	ASD	3000 X 2	3000 ltr	2000 ltr	1200	70
Dolphin No. 15	ASD	3000 X 2	3000 ltr	2000 ltr	1200	70
Dolphin No. 16	ASD	3000 X 2	3000 ltr	2000 ltr	1200	70
Dolphin No. 17	ASD	3000 X 2	3000 ltr	-	-	70
Dolphin No. 18	ASD	3000 X 2	3000 ltr	2000 ltr	1200	70
Brahmini	ASD	2000 x 2	3000 ltr	2000 ltr	1200	65
Baitarni	ASD	2000 x 2	3000 ltr	2000 ltr	1200	65
Khushboo	Fixed screw	401 X 2	-	-	-	10
<p>Dolphin No. 4, 29, 10, 11, 14, 15, 16, 17, 18, Brahmini and Baitarni are fitted with Oil Spill Dispersant boom and proportionate pump to mix OSD and Sea water as required. The tugs are also fitted with a fire curtain and remote controlled fire monitors.</p> <p><b>All above eleven Tugs have class notation as Harbour Tugs and are certified to work within the Harbour limits only.</b></p> <p>Reception Facility : 12" pipe line, connected to a slop tank at chemical tank farm.</p> <p>Dolphin 11 has fire fighting system of 1200 m3/hr along with 20 ton lifting "A" frame and diving support facility.</p> <p><b>Location of Oil Spill Equipment:</b> The Oil Spill Equipment stored in SPM Store.</p> <p><b>Resources / Equipment Available with APSEZL, Mundra</b></p>						

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Item	Quantity
<b>Canadyne Fence Boom (Reel model 7296/8496 with Power Pack, Towing bridles and Tow lines - 235 meter</b>	1 no
Power pack with boom reel with hydraulic hoses	2 nos.
Power pack - 20 KV with boom reel with hydraulic hoses	2 nos.
<b>Lamor Side Collector system (Recovery Capacity 123 m³/ hr)</b> (Side collector LSC-3C/2300(01CO2-P536). Oil transfer pump OT A 50 with oil transfer hose set	2 nos. 2 sets
<b>Lamor Minimax 12 m³ skimmer</b>	2 sets
Power pack for skimmers with hydraulic hoses	4 nos.
Power pack - 20 KV for skimmers with hydraulic hoses	1 no.
<b>Floating tank (25 m³)</b>	1 nos.
Foot pumps for floating tank	6 nos
Oil Spill Dispersants	5000 ltr
Portable dispersant storage tank: 1000 ltr capacity	1 no.
Portable pumps	2 nos.
Two – way hydraulic maneuvering panel	2 nos
<b>Oil Containment Boom</b> -Length 2000 metres, Height -1500 mm, Draft-900mm, Free Board-600mm	2000 mtr
<b>Current Buster Boom</b> -Fasflo -75 (for response in fast current)	2 Nos
<b>Skimmer-KOMARA 15 Duplex Skimmer System with floating IMP 6 Pump.</b>	4 Nos
<b>12.5T Flexible Floating Storage Tank (PUA).</b>	3 Nos
Diesel Driven Transfer Pump for Flex Barge	2 Nos
Site Hose Kit for the transfer Pump for the Flex Barge	2 Nos
3" & 2"Hose Adaptor for Transfer Pump and Hose	2 Nos
<b>Shoreline Cleanup Equipment</b>	
Mini Vac System	5 Nos
<b>OSD Applicator</b> - Oil Dispersant Spry Unit(20 Ltr) for use on Beach and Inter Tidal Zones	2 Nos
Startank with Capacity 10000 liter(10m³)	2 Nos
Sorbent Boom Pack(12.5cm x4 M)	500 mtr
Sorbent pad	2000 Nos

**Facilities in the Marine Control room:**

1. Tidal stream gauge: This can accurately read the prevalent rate of flow and direction of current.
2. Tide gauge: For accurately calculating the height of tide at any given time.
3. Wind gauge: For direction and speed of wind.
4. VHF sets (fixed and portable) with complete range of marine frequencies to be used for field operations.

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<b>LIST OF TELEPHONE NUMBERS OF EXPERT ADVISORS ANNEXURE 4</b>			
<b>List of Important Telephone Numbers of Govt. Officials and other neighboring Organisations (Expert and Advisors) related to Spill Combating Plan</b>			
<b>SN.</b>	<b>Company</b>	<b>Name and Designation</b>	<b>Telephone Numbers</b>
1.	APSEZL, Mundra	Chief Operating Officer Head Marine Pollution Response Officer Port Control	02838-6272602838-255727 02838-255727 02838-255761 / 289170 (Fax) 02838-255739
2.	Kandla Port Trust	Chairman Dy. Conservator Harbor Master Signal Station	02836-233001 / 234601 02836-223585 / 220235 02836-270201 02836-270194 / 549
3	Indian Oil Corporation, Mundra	CM (Ops) Manager (Ops) Control Room	02838- 222194 02838- 222197 02838- 224444
4	Indian Oil Corporation, Vadinar	DGM (Ops) Manager Tech Services Port Control	02833-256527 02833-256464 02833-256555
5	Reliance Petroleum Ltd Jamnagar	Marine Chief Senior Port Captain Port Control	0288-4013607 0288-4013750 0288-4012600 / 4012610
6	The Commanding Officer Indian Coast Guard Station, Mundra	ICGS, Mundra Station Ops Officer	02838 - 271402 & 03 (Tel) 02838 – 271404 (Fax)
7	The Commander Coast Guard Region (North West), Gandhinagar	COMCG (NW) Regional Ops & Plans Officer	079-23243241 (Tel) 079-23243283 (Fax)
8	The Commander No.1 Coast Guard District (Guj), Porbandar	COMDIS-1 District Ops & Plans Officer	0286-2214422 (Tel) 0286-2210559 (Fax)
9	The Commander Coast Guard Region (West) Mumbai	COMCG (W) Regional Ops & Plans Officer	022-24376133 (Tel) 022-24333727 (Fax)
10	The Officer-in-Charge Coast Guard Pollution Response Team (West), Mumbai	PRT (W) Officer-in-Charge	022-23722438 (Tel) 022-23728867 (Fax)
11	Gujarat Maritime Board	Vice Chairman & CEO Chief Nautical Officer	079-23238346 / 23238363 079-23234716

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12	Ministry of Environment Govt. of Gujarat	Director (Environment)	079-23252154 / 23251062 079-23252156 ( Fax )
13	Gujarat Pollution Control Board	Environmental Engineer	079-232 22756 079-232 22784 (Fax)

**List Of Important Telephone Numbers Of Adani Group Personnel**

S.No.	Description / contact person / designation	Telephone Nos.	
		Landline	Mobile
01	Capt. Anubhav Jain, Head – Marine & Head CT-4	02838 - 255727	91 9925223674
02	Mr.–Jagdish Patel Head CT-3	91-2838 - 255998	91 9979855979
03	Capt. Aditya Gaur, HOS-Marine	02838 – 255730	91 6359981603
04	Capt. Divya Gupta. , HOS-Marine	02838- 255947	91 6359631088
05	Mr. Sanjay Kewalramani, Head-Marine Technical	02838- 255844	91 9925150056
06	Mr. Yogesh Nandaniya, Manager-SPM	02838- 2562379	91 6359775168
07	Mr. Hari Govindan V	91-2838 - 285072	91 9879104805
08	Marine control, APSEZL	02838 – 255333 / 255761	91 9825228673
09	Port Operation center, APSEZL	02838 –255762	91 9825000949
10	Port security Control, APSEZL	02838 – 289322	91 9825000933
11	Head - Security, APSEZL	02838 – 255999	91 9099991093
12	Head - Health, safety & Environment, APSEZL	02838 - 255777	91 7574894383
13	Head - Fire Dept. APSEZL	02838 – 255857	91 7069083035
14	Occupational Health Centre	02838 - 255710	91 8980015070

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Marine Officer/ SPM Mooring master ANNEXURE 5		
<b>Responsibilities</b>	<ul style="list-style-type: none"> <li>• Observe or receive report of oil or chemical spill incident</li> <li>• Initiate measures to prevent/ reduce further spillage</li> <li>• Maintain communication with other all vessels</li> </ul>	
Step	Actions	Additional Information
<b>Alert</b>	<input type="checkbox"/> (Marine Manager / On Scene Commander / SPM Pilot) <input type="checkbox"/> Tugs and other support/ response craft	<i>VHF Channel 73 / 77</i>
<b>Initial Actions</b>	<input type="checkbox"/> Stop all cargo operations <input type="checkbox"/> Ensure all safety precautions taken/observed <input type="checkbox"/> Verify incident details <input type="checkbox"/> Advise all relevant information to (Marine Manager / On Scene Commander / or SPM Pilot) <input type="checkbox"/> Initiate personal log <input type="checkbox"/> Place tugs/other response craft on stand-by	<i>Liaise with Terminal Shift Engineer</i>
<b>Further Actions</b>	<input type="checkbox"/> Brief (Marine Manager / On Scene Commander / SPM Pilot as necessary) <input type="checkbox"/> Mobilize response equipment/ personnel as directed by (Marine Manager / On Scene Commander / <input type="checkbox"/> Maintain personal log of communications and events <input type="checkbox"/> Act as instructed by (Marine Manager / On Scene Commander / SPM Pilot	
<b>Final Actions</b>	<input type="checkbox"/> Submit personal log to HOD – Marine <input type="checkbox"/> Attend debrief	

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MARINE MANAGER / On Scene Commander ANNEXURE 6		
<b>Responsibilities</b>	<ul style="list-style-type: none"> <li>Initially assess situation</li> <li>Verify classification</li> <li>Verify fate of spill</li> <li>Verify resources immediately at risk, inform parties</li> <li>Provide accurate situation reports to Radio Room/ HOD – Marine</li> <li>Collect evidence and/ or statements</li> <li>Liaise with HOD-Health, Safety, Environment &amp; Fire</li> <li>Liaise with incident vessel regarding status of oil spill (if applicable)</li> </ul>	
Step	Actions	Additional Information
<b>Alert</b>	HOD – Marine	
<b>Initial Actions</b>	<input type="checkbox"/> Proceed to incident location, assume role of On-Scene Coordinator <input type="checkbox"/> Ensure all safety precautions have been taken <input type="checkbox"/> Initiate response / <input type="checkbox"/> Investigate cause/ source of spill <input type="checkbox"/> Communicate all information to HOD – Marine <input type="checkbox"/> Ensure samples of spilled oil taken <input type="checkbox"/> Initiate personal log <input type="checkbox"/> Take photographic evidence <input type="checkbox"/> Collect evidence and take statements	<i>Stopped or ongoing</i>
<b>Further Actions</b>	<input type="checkbox"/> Ensure resources are being deployed as required <input type="checkbox"/> Provide co-ordination at-sea response <input type="checkbox"/> Provide detailed situation reports to HOD- Marine <input type="checkbox"/> Liaise with -Health, Safety Environment & Fire Department.	
<b>Final Actions</b>	<input type="checkbox"/> Submit personal log to HOD – Marine <input type="checkbox"/> Attend debrief	

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SPM Pilot			ANNEXURE 7
<b>Responsibilities</b>	<ul style="list-style-type: none"> <li>Initially assess situation</li> <li>Verify classification</li> <li>Provide accurate situation reports to Radio Room/ OSC</li> <li>Collect evidence and/ or statements</li> <li>Liaise with incident vessel regarding status of oil spill (if applicable)</li> </ul>		
Step	Actions	Additional Information	
<b>Alert</b>	<input type="checkbox"/> Marine Control Room <input type="checkbox"/> OSC <input type="checkbox"/> Tugs and other support / response crafts	<i>VHF Channel 73 / 77</i>	
<b>Initial Actions</b>	<input type="checkbox"/> Assume role of On-Scene Coordinator <input type="checkbox"/> Investigate cause/ source of spill <input type="checkbox"/> Communicate all information to Marine Control Room <input type="checkbox"/> Ensure samples of spilled oil taken <input type="checkbox"/> Initiate personal log <input type="checkbox"/> Take photographic evidence <input type="checkbox"/> Collect evidence and take statements	<i>Stopped or ongoing</i>	
<b>Further Actions</b>	<input type="checkbox"/> Ensure resources are being deployed as required <input type="checkbox"/> Provide co-ordination of the at-sea response <input type="checkbox"/> Provide detailed situation reports to HOD – Marine		
<b>Final Actions</b>	<input type="checkbox"/> Submit personal log to HOD – Marine <input type="checkbox"/> Attend debrief		

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HOD – Marine ANNEXURE 8		
<b>Responsibilities</b>	<ul style="list-style-type: none"> <li>• Confirm/ amend initial classification</li> <li>• Manage the APSEZL response</li> <li>• Authorize expenditure after consultation with COO APSEZL</li> <li>• Brief COO, APSEZL</li> <li>• Liaise with Coast Guard</li> <li>• Approve press statements for release</li> </ul>	
Step	Actions	Additional Information
<b>Alert</b>	<input type="checkbox"/> Coast Guard <input type="checkbox"/> External organizations	
<b>Initial Actions</b>	<input type="checkbox"/> Verify/ amend spill classification <input type="checkbox"/> Ensure all safety precaution have been taken <input type="checkbox"/> Confirm external organizations have been alerted <input type="checkbox"/> Convene Emergency Response Team <input type="checkbox"/> Predict slick movement <input type="checkbox"/> Liaise with vessel Agents/ Owners as appropriate	
<b>Further Actions</b>	<input type="checkbox"/> Chair the Emergency Response Team meetings <input type="checkbox"/> Constantly review the strategy being employed and advise of changes where necessary <input type="checkbox"/> Approve all expenditure commitments <input type="checkbox"/> Brief President APSEZ <input type="checkbox"/> Agree press statements with Corporate Relations Chief <input type="checkbox"/> Confirm formal samples have been taken <input type="checkbox"/> Advise Coast Guard if oil migrates outside of Local Area	
<b>Final Actions</b>	<input type="checkbox"/> Terminate the clean-up <input type="checkbox"/> Collate personal logs. <input type="checkbox"/> Prepare the incident report. <input type="checkbox"/> Hold full de-brief involving all members.	
<b>Final</b>		

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# OIL SPILL CONTINGENCY RESPONSE PLAN

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Control Room Officer

HOD – Marine

## Classification of Oil

## ANNEXURE 11

### Group 1 oils

A: \*API > 45 (Specific gravity < 0.8)

B: Pour point °C

C: Viscosity @ 10–20°C: less than 3 CSt

D: % boiling below 200°C: greater than 50%

E: % boiling above 370°C: between 20 and 0%

	A	B	C	D	E
Asgard	48	-28	2 @ 10°C	58	14
Arabian Super Light	51	-39	2 @ 20°C		
Cosack	48	-18	2 @ 20°C	51	18
Curlew	47	-13	2 @ 20°C	57	17
F3 Condensate	54	<43	1 @ 10°C	81	0
Gopland	52	-13	1.5 @ 20°C	63	8
Hedra	52	-42	2.5 @ 10°C	60	11
Terengganu condensate	73	-36	0.5 @ 20°C	>95	0
Wolykurt	49	-53	2 @ 20°C	55	4
Gasoline	58		0.5 @ 15°C	100	0
Kerosene	45	-35	2 @ 15°C	50	0
Naptha	55		0.5 @ 15°C	100	0

### Group 3 oils

A: \*API 17.5–35 (Specific gravity 0.85–0.95)

B: Pour point °C

C: Viscosity @ 10–20°C: between 8 CSt and semi solid

D: % boiling below 200°C: between 10 and 35%

E: % boiling above 370°C: between 30 and 65%

Low pour point <6°C

	A	B	C	D	E
Alaska North Slope	28	-18	32 @ 15°C	32	41
Arabian Heavy	28	-40	55 @ 15°C	21	56
Arabian Medium	30	-21	25 @ 15°C	22	51
Arabian Light	33	-40	14 @ 15°C	25	45
Bonny Light	35	-11	25 @ 15°C	26	30
Iranian Heavy	31	-36	25 @ 15°C	24	48
Iranian Light	34	-32	15 @ 15°C	26	43
Khafji	28	-57	80 @ 15°C	21	55
Simi	33	-12	18 @ 10°C	32	38
Thunder Horse	35	-27	10 @ 10°C	32	39
Tia Juana Light	32	-42	500 @ 15°C	24	45
Troll	33	-9	14 @ 10°C	24	35
IFO 180	18–20	10–30	1,500–3,000 @ 15°C		–

High pour point >5°C

	A	B	C	D	E
Cabinda	33	12	Semi-solid	18	56
Coco	32	21	Semi-solid	21	46
Gamba	31	23	Semi-solid	11	54
Mandji	30	9	70 @ 15°C	21	53
Minas	35	18	Semi-solid	15	58

### Group 2 oils

A: \*API 35–45 (Specific gravity 0.8–0.85)

B: Pour point °C

C: Viscosity @ 10–20°C: between 4 Cst and semi-solid

D: % boiling below 200°C: between 20 and 50%

E: % boiling above 370°C: between 15 and 50%

Low pour point <6°C

	A	B	C	D
Arabian Extra Light	38	-30	3 @ 15°C	26
Azeri	37	-3	8 @ 20°C	29
Brent	38	-3	7 @ 10°C	37
Draugen	40	-15	4 @ 20°C	37
Dukhan	41	-49	9 @ 15°C	36
Liverpool Bay	45	-21	4 @ 20°C	42
Sokol (Sakhalin)	37	-27	4 @ 20°C	45
Rio Negro	35	-5	23 @ 10°C	29
Umm Shaif	37	-24	10 @ 10°C	34
Zakum	40	-24	6 @ 10°C	36
Marine Gas oil (MGO)	37	-3	5 @ 15°C	

High pour point >5°C

	A	B	C	D
Amna	36	19	Semi-solid	25
Beatrice	38	18	32 @ 15°C	25
Bintulu	37	19	Semi-solid	24
Escravos	34	10	9 @ 15°C	35
Sarir	38	24	Semi-solid	24
Statfjord	40	6	7 @ 10°C	38

### Group 4 oils

A: \*API <17.5 (Specific gravity >0.95) or

B: Pour point >30°C

C: Viscosity @ 10–20°C: between 1500 CSt and semi-solid

D: % boiling below 200°C: less than 25%

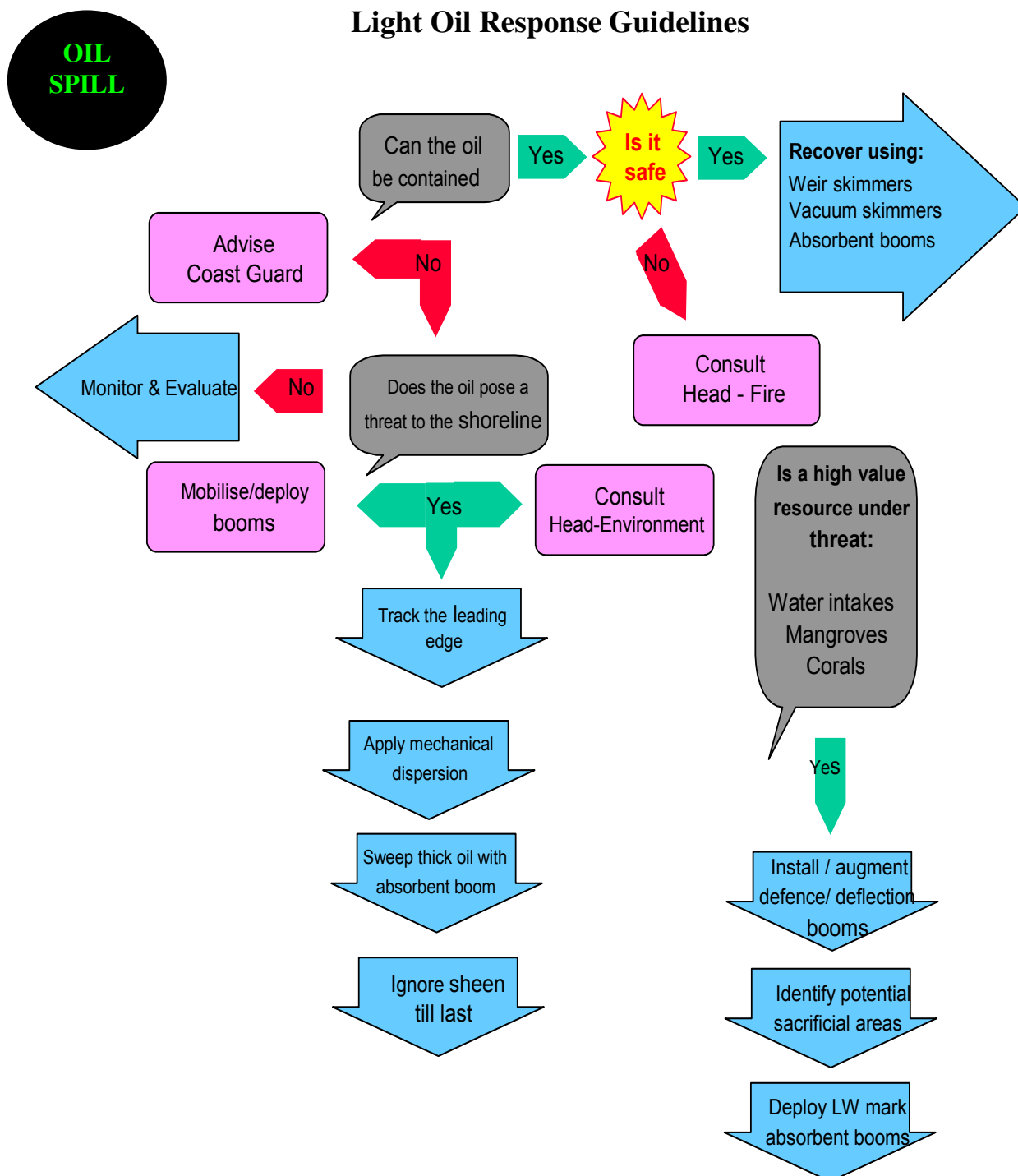
E: % boiling above 370°C: greater than 30%

	A	B	C	D	E
Bachuquero 17	16	-29	3,000 @ 15°C	10	60
Boscan	10	15	Semi-solid	4	80
Cinta	33	43	Semi-solid	10	54
Handil	33	35	Semi-solid	23	33
Merey	17	-21	7,000 @ 15°C	7	70
Nile Blend	34	33	Semi-solid	13	59
Pilon	14	-3	Semi-solid	2	92
Shengji	24	21	Semi-solid	9	70
Tachang	31	35	Semi-solid	12	48
Tia Juana Pesado	12	-1	Semi-solid	3	78
Widuri	33	46	Semi-solid	7	70
IFO 380	11–15	10–30	5,000–30,000 @ 15°C		

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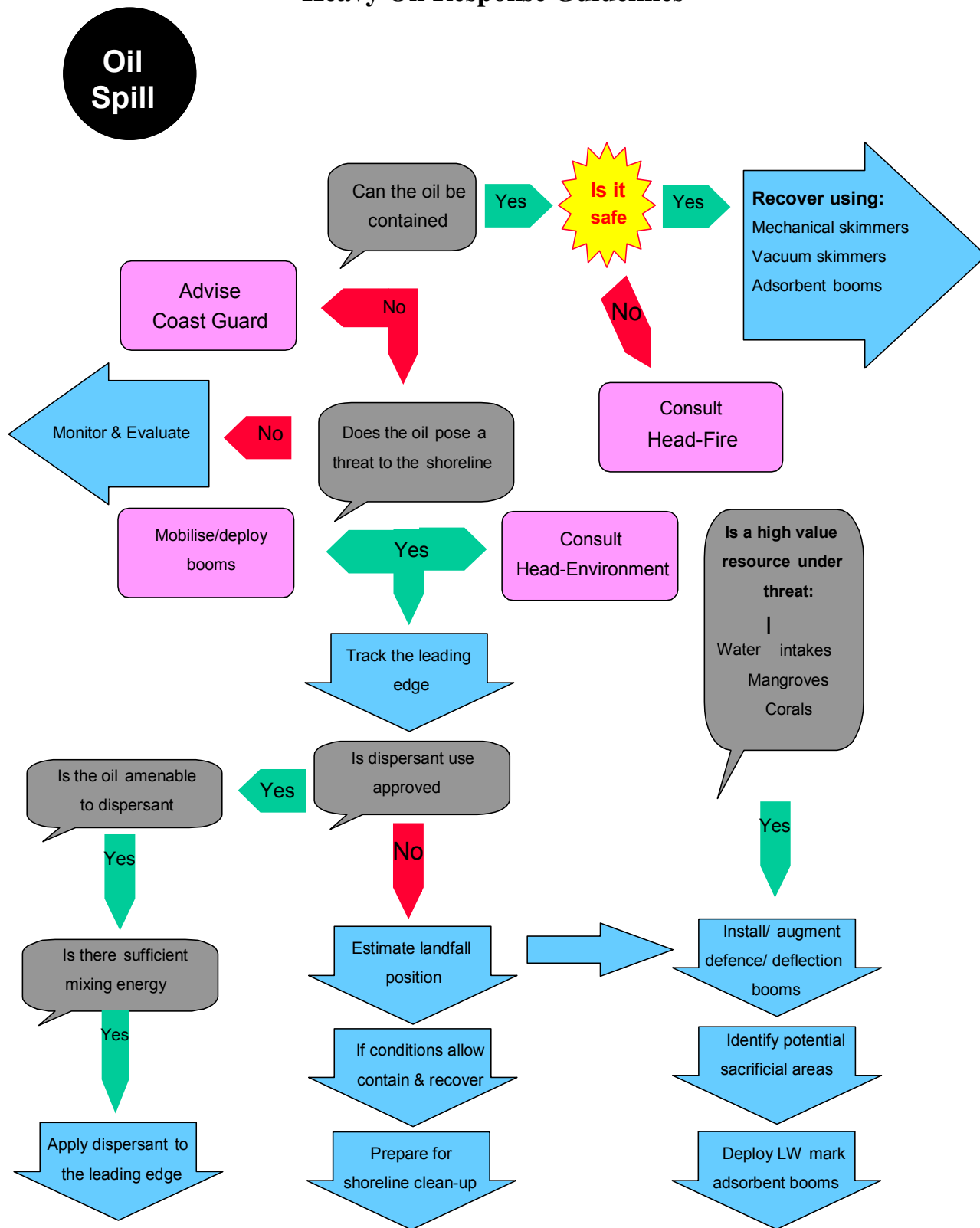
<b>Response Guidelines</b>	<b>ANNEXURE 12</b>
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### Heavy Oil Response Guidelines



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## ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.

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## Site Specific Health and Safety Plan

## ANNEXURE 13

## Assessment Form

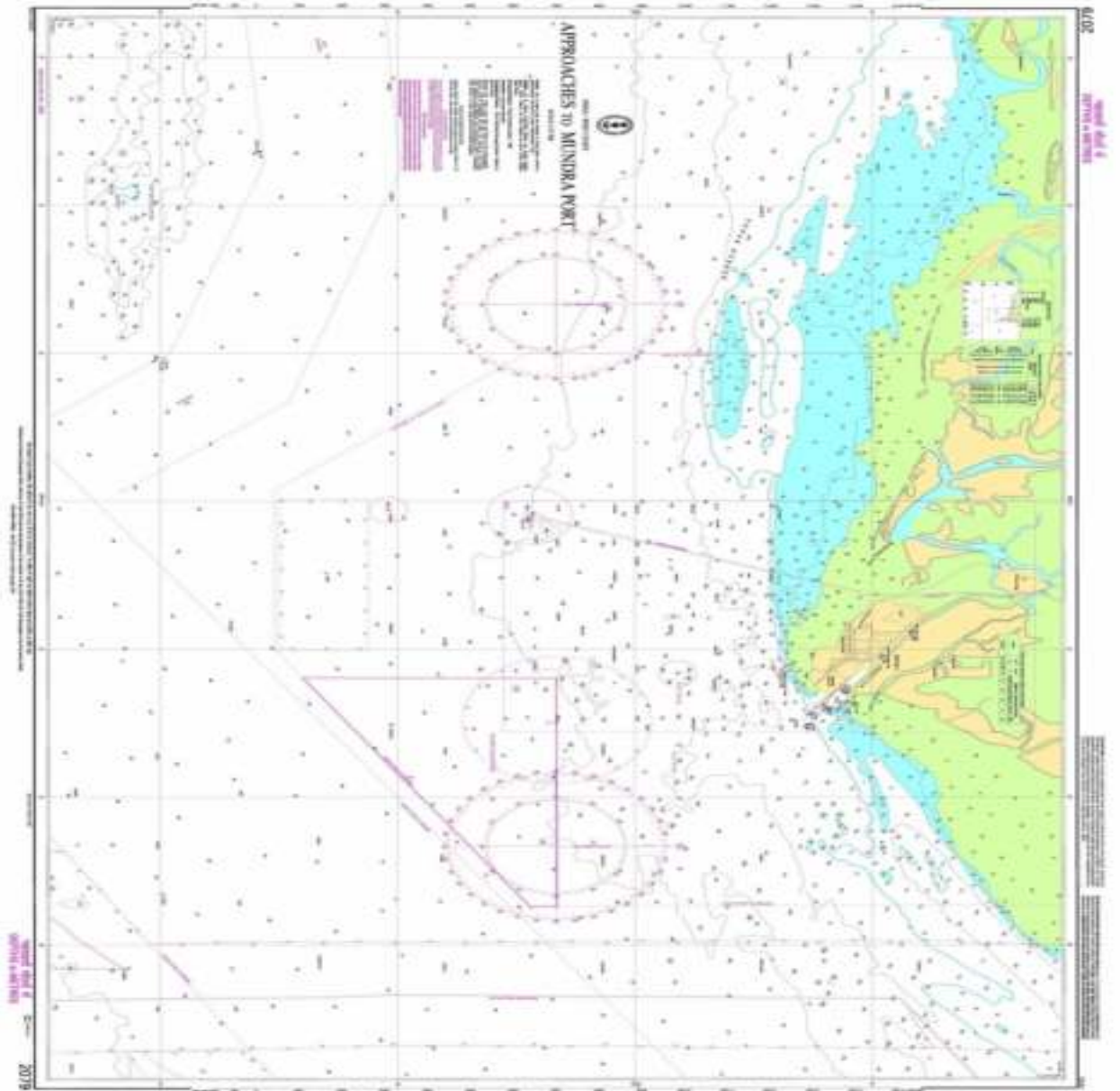
<b>1. APPLIES TO SITE :</b>					
<b>2. DATE :</b>		<b>3. TIME :</b>		<b>4. INCIDENT :</b>	
<b>5. PRODUCT(S) :</b>					(Attach MSDS)
<b>6. Site Characterization</b>					
<b>6a. Area</b>	<input type="checkbox"/> Open water	<input type="checkbox"/> Inshore water	<input type="checkbox"/> River / Creek	<input type="checkbox"/> Salt marsh	<input type="checkbox"/> Mudflats
	<input type="checkbox"/> Shoreline	<input type="checkbox"/> Sand	<input type="checkbox"/> Shingle	<input type="checkbox"/> Intake Channel	
<b>6b. Use</b>	<input type="checkbox"/> Commercial	<input type="checkbox"/> Industrial	<input type="checkbox"/> Public	<input type="checkbox"/> Government	<input type="checkbox"/> Recreational
	<input type="checkbox"/> Residential	<input type="checkbox"/> Other			
<b>7. Site Hazards</b>					
	<input type="checkbox"/> Boat safety	<input type="checkbox"/> Fire, explosion, in-situ burn	<input type="checkbox"/> Slips, trips and falls		
	<input type="checkbox"/> Chemical hazards	<input type="checkbox"/> Heat stress	<input type="checkbox"/> Steam and hot water		
	<input type="checkbox"/> Drum handling	<input type="checkbox"/> Helicopter operations	<input type="checkbox"/> Tides		
	<input type="checkbox"/> Equipment operations	<input type="checkbox"/> Lifting	<input type="checkbox"/> Trenches, excavations		
	<input type="checkbox"/> Electrical hazards	<input type="checkbox"/> Motor vehicles	<input type="checkbox"/> Visibility		
	<input type="checkbox"/> Fatigue	<input type="checkbox"/> Noise	<input type="checkbox"/> Weather		
	<input type="checkbox"/> Others	<input type="checkbox"/> Overhead/buried utilities	<input type="checkbox"/> Work near water		
	<input type="checkbox"/>	<input type="checkbox"/> Pumps and hoses			
<b>8. Air Monitoring</b>					
	<input type="checkbox"/> O <sub>2</sub>	<input type="checkbox"/> LEL	<input type="checkbox"/> Benzene	<input type="checkbox"/> H <sub>2</sub> S	<input type="checkbox"/> Other
<b>9. Personal Protective Equipment</b>					
<input type="checkbox"/> Foot Protection		<input type="checkbox"/> Coveralls			
<input type="checkbox"/> Head Protection		<input type="checkbox"/> Impervious suits			
<input type="checkbox"/> Eye Protection		<input type="checkbox"/> Personal Floatation			
<input type="checkbox"/> Ear Protection		<input type="checkbox"/> Respirators			
<input type="checkbox"/> Hand Protection		<input type="checkbox"/> Other			
<b>10. Site Facilities</b>					
<input type="checkbox"/> Sanitation	<input type="checkbox"/> First Aid	<input type="checkbox"/> Decontamination			
<b>11. Contact details :</b>					
<input type="checkbox"/> Doctor		Phone			
<input type="checkbox"/> Hospital		Phone			
<input type="checkbox"/> Fire		Phone			
<input type="checkbox"/> Police		Phone			
<input type="checkbox"/> Other		Phone			
<b>12. Date Plan Completed</b>					
<b>13. Plan Completed by</b>					

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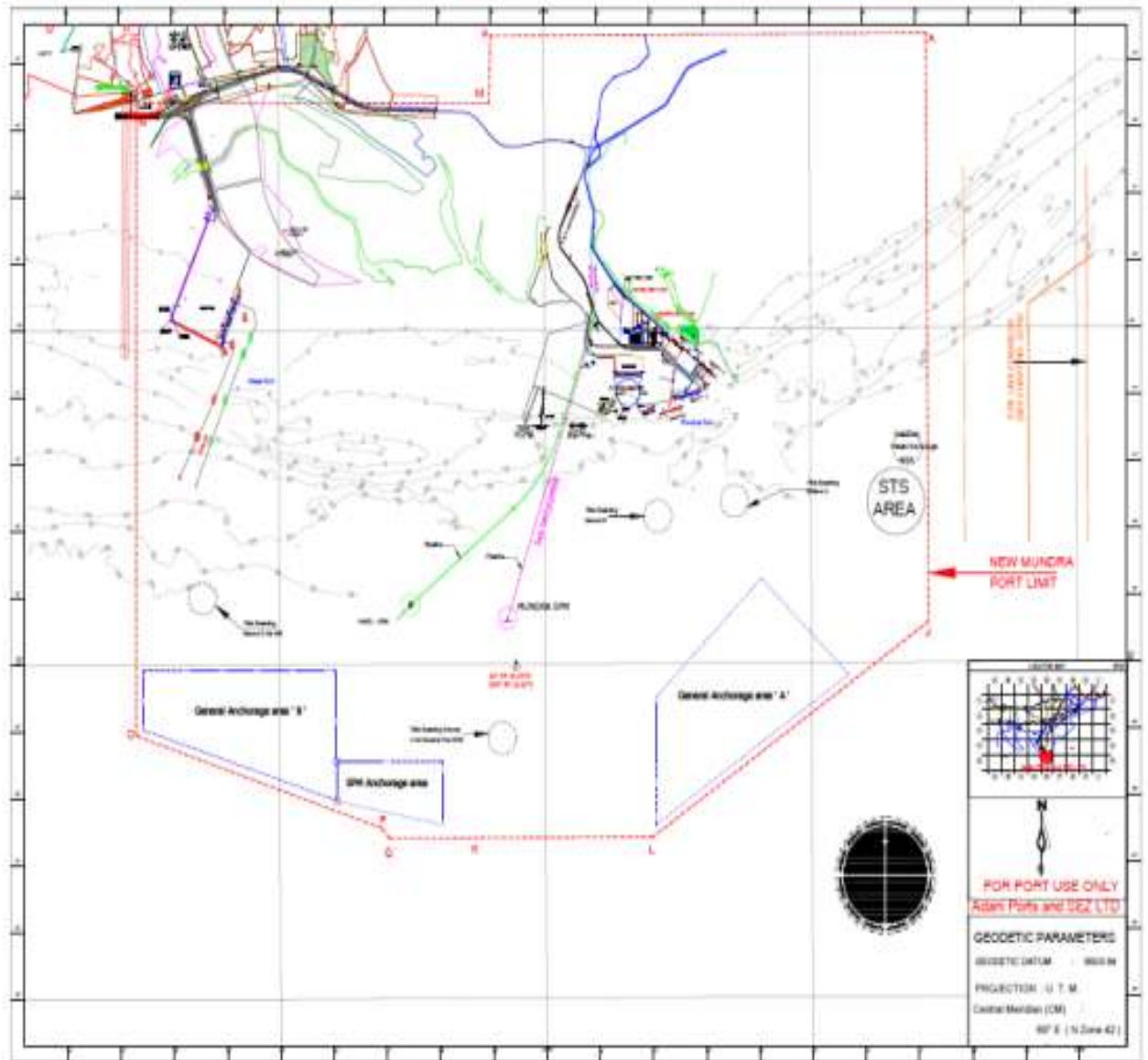
Indian Chart 2079

ANNEXURE 14



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<b>List of recycler approved by state of Gujarat</b>	<b>ANNEXURE 15</b>
------------------------------------------------------	--------------------

**LIST OF APPROVED VENDOR FOR COLLECTION & DISPOSAL OF OIL SPILL WASTE WATER  
AND OILY SOIL**

<b>Sr No.</b>	<b>Name of the party &amp; Contact Detail</b>	<b>Date of Issue of Passbook alongwith validity</b>	<b>Capacity</b>
1	M/s Jawrawala Petroleum, Plot No: 200/33, B/H Kashiram Textile Mill, Narol, Ahmedabad – 382405 Contact Detail - (079) - 25358099 (M) +91 9824045726	18/09/2012 to 17/09/2017	1. 4800 KLPA - Used Oil 2. 9000 KLPA – Waste Oil
2	M/s Reliance Barrel Supply co., 200/34, B/H- Kashiram Mill, Narol, Ahmedabad-382405 Contact Detail - (079) - 25356629 (M) +91 9824090021	03/09/2014 to 02/09/2019	1. 8280 KLA - Used Oil 2. 9000 KLA – Waste Oil
3	M/s Western India Petrochem Industry, Plot No-50, 51, GIDC Estate, Village Gozaria, Dist- Mehsana. Contact Detail - Tel:+91- 278- 420941 Fax:+91- 278- 429503	25/07/2014 to 24/07/2019	1. 3660 KLPA – Used oil 2. 11100 KLPA – waste oil
4	M/s Saurashtra Enviro Projects Pvt. Ltd.(SEPPL) 3rd Floor,K.G.Chambers, Udhana Darwaja, Ring Road, Surat, Gujarat, India-395002 Contact Detail - +91 261 2351248	TSDf Site	3,95,000 MT (Landfilling) + 7.50 Million Kcal/Hr. (Incineration)
5	M/s Bharuch Enviro Infrastructure Ltd, Ankleshwar Contact Detail - Phone 91-2646-253135 Fax 91-2646-222849	TSDf Site	23,00,000 MT (Landfilling) + 120 MT/Day (Incineration)
6	M/s Nandesari Environment Control Ltd. Nandesari, Vadodara, Contact Detail – Phone 265 – 2840818 Fax 265 – 2841017	TSDf Site	3,00,000 MT (Landfilling) + 700 Kg/Hr. (Incineration)

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**LIST OF AGENCY FOR SUPPORT & GUIDANCE FOR RESCUE & REHABILITATION OF OILED BIRD & MANGROVES MANAGEMENT DURING OIL SPILL**

**ANNEXURE 16**

Sr No.	Name of the party & Contact Detail	Contact Person	Contact Detail	Activity
1	Gujarat Institute of Desert Ecology P.O Box No. #83, Opp. Changleshwar Temple, Mundra Road Bhuj - 370001 Gujarat – India.	Dr. Thivakaran	EMAIL: desert_ecology@yahoo.com FAX: 02832-235027  02832-235025	Restoration of Mangroves
2	Kalapooranasuri Karunadham Karunadham Hospital, At – Shedata, Bhuj, Kutch		(M) 9925020776	Rescue of oil soaked birds / animals and medical treatment facility
3	Anchorwala Ahinshadham Bhagwan Mahavir Pashu Raksha Kendra, Pragpar, Mundra, Kutch.		Phone (02838) 22352	Rescue of oil soaked birds / animals and medical treatment facility
4	<b>ASHA Foundation</b> C/182, Ashoknagar, Opposite ISRO Satellite, Ahmedabad – 380015, Gujrat, India.	Lalubhai	Phone: 09824037521 ,09879877281 Email: ashahmedabad@yahoo.co.in Website: www.ashafoundationindia.org	Rescue of oil soaked birds / animals and medical treatment facility

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**Terms, definitions and abbreviations used in this plan**

APSEZL	Adani Ports and Special Economic Zone Ltd.
COO	Chief Operating Officer
DGM	Deputy General Manager
DGS	Directorate General of Shipping
ENGR.	Engineer
ESD	Emergency Shut Down
FIR	First Information Report
FO	Furnace Oil
GMB	Gujarat Maritime Board
GPCB	Gujarat Pollution Control Board
HOD	Head Of Department
HQ	Head Quarters
HSD	High Speed Diesel
ICG	Indian Coast Guard
IMO	International Maritime Organization
IPMS	Integrated Port Management System
KPT	Kandla Port Trust
LWS	Low Water State
MCLS	Maximum Credible loss scenario
MMD	Mercantile Maritime Deptt.
MOEF	Ministry of Environment & Forest
MSDS	Material Safety Data Sheets
NOS DCP	National Oil Spill Disaster Contingency Plan
OSC	On Scene Commander
PLEM	Pipe line end manifold
POLREP	Pollution Report
PPE	Personal Protective Equipment
PR	Public Relations Officer
R/O	Radio Officer
SKO	Super Kerosene Oil

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**MUNDRA**  
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**Certificate of Endorsement**

(To be certified personally by an officer not below the post of Deputy Conservator of a port facility or the Installation Manager of an oil installation, or offshore installation, or equivalent legally responsible authority)

**I hereby certify that:**

- 1 The oil spill contingency plan for the facility under my charge has been prepared with due regard to the relevant international best practices, international conventions, and domestic legislation.
2. The nature and size of the possible threat including the worst case scenario, and the resources consequently at risk have been realistically assessed bearing in mind the probable movement of any oil spill and clearly stated.
3. The priorities for protection have been agreed, taking into account the viability of the various protection and clean-up options and clearly spelt out.
4. The strategy for protecting and cleaning the various areas have been agreed and clearly explained.
5. The necessary organization has been outlined, the responsibilities of all those involved have been clearly stated, and all those who have a task to perform are aware of what is expected of them.
6. The levels of equipment, materials and manpower are sufficient to deal with the anticipated size of spill. If not, back-up resources been identified and, where necessary, mechanisms for obtaining their release and entry to the country have been established.
7. Temporary storage sites and final disposal routes for collected oil and debris have been identified.
8. The alerting and initial evaluation procedures are fully explained as well as arrangement for continual review of the progress and effectiveness of the clean-up operation.
9. The arrangements for ensuring effective communication between shore, sea and air have been described.
10. All aspects of plan have been tested and nothing significant found lacking.
11. The plan is compatible with plans for adjacent areas and other activities.
12. The above is true to the best of my knowledge and belief.
13. I undertake to keep the plan updated at all times and keep the Indian Coast Guard informed of any changes through submission of a fresh certificate of endorsement.

Seal:

**Capt. Anubhav Jain**  
**AGM - Marine & PFSO**  
**Adani Ports & SEZ Ltd.**  
**Mundra - Kutch - Gujarat**

Signature:

Name: Capt. Anubhav Jain

Designation: Head - Marine

Organization: Adani Ports and SEZ Ltd, Mundra

Date: 01 Oct 2020

Place: Mundra

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**OIL SPILL CONTINGENCY RESPONSE PLAN**

Appendix E5 to NOS DCP 2015

(Para 4.5 refers)

**Contingency Planning Compliance Checklist**

<b>Name of the Port/ Oil Handling Agency</b>	<b>Adani Ports and SEZ Limited, Mundra</b>
----------------------------------------------	--------------------------------------------

<b>DESCRIPTION</b>		<b>Complied Yes/No</b>	<b>Remarks</b>
<b>Risk Assessment</b>			
1.	Whether the facility produces / handles / uses / imports / stores any type of petroleum product.	Yes	<b>(Ref. OSCRP 2.2)</b>
2.	Whether risk assessment is done	Yes	<b>(Ref. OSCRP 2.0)</b>
3.	Who did the risk assessment	Yes	Environ Software (P) Ltd. & APSEZ
4.	Whether maximum volume of oil spill that can occur in the worst case scenario is considered.	Yes	<b>(Ref. OSCRP 2.4)</b>
5.	Whether relative measures of the probability and consequences of various oil spills including worst case scenario are taken into account.	Yes	<b>(Ref. OSCRP 2.4)</b>
6.	Whether all types of spills possible in the facility are considered including grounding, collision, fire, explosion, Rupture of hoses.	Yes	<b>(Ref. OSCRP 2.3 &amp; 2.4)</b>
7	Please specify the list of oils considered for risk assessment	Yes	<b>(Ref. OSCRP 2.2)</b>
8	Whether the vulnerable areas are estimated by considering maximum loss scenario and weather condition	Yes	<b>(Ref OSCRP 2.1 Computational Scenarios)</b>
9	Whether impacts on the vulnerable areas are made after considering the marine protected areas ,population ,fishermen ,salt pans ,mangroves ,corals, and other resources within that area	Yes	<b>(Ref. OSCRP 2.6)</b>
10	Whether measures for reduction of identified high risk are included by reducing the consequences through spill mitigation measures	Yes	<b>(Ref. OSCRP 1.4, 2.3, 2.6. 3 &amp; 5)</b>
11	Whether steps have been considered to reduce risks to the exposed population by increasing safe distances by acquiring property around the facility ,if possible	NA	All facilities developed within SEZ keeping safe distances from the exposed population.
12	Whether risk levels are established for each month after considering the probability with tide and current and consequences of each such spill	Yes	<b>(Ref. OSCRP 2.1 computational scenarios &amp; 2.3)</b>
13	Whether prevention and mitigation measures are included in the plan	YES	<b>(Ref. OSCRP 4.0, 7.0, 8.0 &amp; 9.0)</b>
14	Whether the spill may affect the shoreline.(length of the shoreline with coordinated)	Yes	<b>Ref. OSCRP 2.3 &amp; 2.6)</b>
15	Whether time taken the oil spill to reach ashore in each quantity of spill in various month are mentioned in the plan	Yes	<b>(Ref. OSCRP 2.3)</b>
16	Whether sensitivity mapping has been carried out	Yes	<b>(Ref. OSCRP 2.5)</b>
17	Does the sensitivity mapping clearly identify the vulnerable areas along with MPAs, corals fishermen community, salt pans, mangroves and other socio-economic elements in the area	Yes	<b>(Ref. OSCRP 2.5 &amp; 2.6)</b>

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18	Do the sensitivity maps indicate area to be protected on priority	Yes	(Ref. OSCRP 2.6)
19	Does the maps indicate boom deployment locations	NA	Booms not deployed permanently
20	Whether any marine protected area will be affected	YES	(Ref. OSCRP 2.5 & 2.6)
21	Whether total number of fishermen likely to affected is mentioned in the plan	Yes	(Ref. OSCRP 2.6)
22	Whether any saltpan in the area is going to be affected	Yes	(Ref. OSCRP 2.6)
23	Whether any mangroves in the area will be affected by a spill	Yes	(Ref. OSCRP 2.6)
<b>Preparedness</b>			
24	whether any containment equipment is available	Yes	(Ref. OSCRP Annex 3)
25	Whether any recovery equipment is available	Yes	(Ref. OSCRP Annex 3)
26	Whether the facility is having any temporary storage capacity	Yes	(Ref. OSCRP Annex 3)
27	Whether location of the oil spill response equipment is mentioned in the plan	Yes	Has been included in Annex 3
28	Whether suitable vessels available for deploying the boom skimmer etc.	Yes	(Ref. OSCRP Annex 3)
29	Whether OSD held with facility	Yes	(Ref. OSCRP Annex 3)
30	Whether the OSD held with the facility is approved for use in Indian waters	Yes	
31	Whether the facility has MoU with other operator for tier -1 preparedness	Yes	(Ref. OSCRP 1.4)
32	Whether the list of oil spill response equipment available with each agency in deliberation	Yes	MoU document
33	Whether the facility has any MoU with private OSRO	NA	Port itself is equipped to deal with oil spill emergencies
34	Whether the procedure for evoking the mutual aid is clearly described in the plan	Yes	(Ref. OSCRP 1.4)
35	Whether additional manpower is available	Yes	(Ref. OSCRP 5.4)
36	Whether list of approved recyclers is mentioned in the plan	Yes	List of recycler approved by state of Gujarat is included in Annexure 15.
37	Whether NEBA (net environmental Benefit Analysis) has been undertaken	Yes	Before commissioning of any new project, various environmental aspects with their positive or adverse impact is considered under EIA Environment Impact Assessment stage.
38	<b>Whether the areas from priority protection have identify in the plan</b>	YES	(Ref. OSCRP 2.5 & 2.6)
39	Whether relevant authorities and stakeholder were consulted for NEBA and during the areas for property protection	Yes	Before commissioning of any new project Environment Impact Assessment & Public consultation is carried out, in which relevant authorities & stakeholders



Reviewed By : Capt. Divya Gupta	Issue No. : 01	Issued On : 01.10.2020
Approved By : Capt. Anubhav Jain	Revision No. : 05	Page 96 of 98

**ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.  
MUNDRA  
OIL SPILL CONTINGENCY RESPONSE PLAN**

			were consulted.
40	Whether district administration has been appraised of the risk impact of oil spills?	Yes	District Level Disaster Management Plan is prepared and regularly updated at district level by District Collector of Kutchh. Under DMP Oil spillage contingency is identified as risk. During preparation & updating of disaster management plan, District Level Authority organises & compiles information from various industries of kutchh. APSEZL is regularly participating in the same & providing necessary information to district level administration.
<b>Action Plan</b>			
41	Whether the plan outlines procedure for reporting of oil spill to coast guard	Yes	<b>(Ref. OSCRP 7.3)</b>
42	Whether the oil spill response action is clearly mentioned	Yes	<b>(Ref .OSCRP 3.1 to 3.6)</b>
43	Whether the action plan include all duties to be attended in connection with an oil spill	Yes	<b>(Ref. OSCRP 3.4)</b>
44	Whether the action plan includes key personnel by their name and designation viz. C/C, S/C	Yes	<b>Ref. OSCRP Annexure-4</b>
45	Whether alternate coverage is planned to take care of the absence of a particular person [in cases where action plan is developed basic names]	Yes	<b>(Ref. OSCRP 5)</b>
46	Whether the plan includes assignment of all key coordinators viz.the communication controller ,safety coordinator ,Emergency management team, Administration and communication coordinator and safety coordinator	Yes	<b>(Ref. OSCRP 3.4)</b>
47	Whether contact directory containing numbers of key response and management personnel is intimated in the plan	Yes	Ref. OSCRP Annexure-4
48	Whether approved recyclers are identified for processing recovered oil and oily debris	Yes	List of approved recycler of Gujarat state is included in annexure 15.  Membership of common disposal facility for disposal of oily debris is also attached annexure 16.
49	Whether the shoreline likely to be affected is identified	Yes	<b>(Ref. OSCRP 2.5 &amp; 2.6)</b>
50	Whether final report on the incident is submitted to CGHQ as per NOS-DCP 2014	NA	<b>No incident</b>
51	Whether the spill incident and its consequences	NA	<b>No incident</b>

Reviewed By : Capt. Divya Gupta	Issue No. : 01	Issued On : 01.10.2020
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**ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.  
MUNDRA  
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	are informed to fishermen and other NGOs for environment protection through media		
	<b>Training and exercises</b>		
52	Whether mock fire /emergency response drills are specified in the plan	Yes	(Ref. OSCRP 5.6)
53	Whether the mock drills cover all types of probable oil spill	Yes	
54	Whether the plan mentions list of trained manpower	Yes	(Ref. OSCRP 5.6)
55	Whether record for periodic mock drill are maintained in a well-defined format	Yes	
56	Whether the plan updated according to the finding in mock-drills and exercises	Yes	
	DESCRIPTION		
57	What is the frequency of updation /review of contingency plan?	Yes	As Per NOSDCP 2015
58	Periodicity of joint exercises with mutual aid partner	Yes	
59	Frequency of mock-drills for practice	Yes	(Ref. OSCRP 5.6)
60	Whether the records for periodic mock drills are maintained in a well-defined format	Yes	(Ref. OSCRP 5.6)
61	Whether the plan is updated according to the finding of mock-drills and exercises	Yes	
62	Frequency of updation /review of contingency plan	Yes	As Per NOSDCP 2015
<p>I, hereby ,declare that the all information appended above and true and correct to my knowledge of belief</p> <div style="text-align: center;">   </div> <p>Date: 01 Oct 2020 <span style="float: right;">Chief conservator /Installation manager</span></p>			
<b>VERIFIED</b>			
<p>Date: <span style="float: right;">(District commander ICG ) or his representative</span></p>			
<p>Date: <span style="float: right;">(Regional commander ICG) or his representative</span></p>			

Reviewed By : Capt. Divya Gupta	Issue No. : 01	Issued On : 01.10.2020
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# **Annexure – 6**

ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.  
MUNDRA  
OIL SPILL CONTINGENCY RESPONSE PLAN

## ANNEXURES

<b>ANNEXURE 1</b>			<b>INITIAL OIL SPILL REPORT</b>	
Particulars of person, office reporting	Capt. Anubhav Jain - HOD Marine/ Capt. Aditya Gaur - HOS marine, APSEZ			
Tel No.	8980015245	6359981603		
Date & time of incident	08.10.2020 / 10:50 hrs			
Spill location	Near SPM			
Likely cause of spill	SPM Marine coupling leak		Witness – Boat Arcadia Krishna	
Initial response action	Informed Port Control		By- Boat Arcadia Krishna	
Any other information	OSR action plan initiated			
Identity of informant	Boat Arcadia Krishna (Hired by APSEZ)			
Time of FIR	10:50 HRS			
Source of spill	SPM marine coupling leak			
Cause of spill	SPM marine coupling leak			
Type of spill	Crude Oil			
Color code information (from CG)	Black			
Radius of slick	20 to 30 m			
Tail	25 m			
Volume	0.5 to 0.7 cubic meter approx.			
Quantity	750 to 850 L			
Weather	NE' Ly x 8 - 10 knots.			
Tide / current	Flooding / 0.1 to 0.3 knots.			
Density	0.7 to 0.8 specific gravity			
Layer thickness	0.6 to 0.8 mm approx.			
Air / Sea temp.	35 deg C / 26 deg C			
Predicted slick movement	Towards T-1			
Size of spill classification (Tier 1, 2 or 3)	Tier 1			

ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.  
MUNDRA  
OIL SPILL CONTINGENCY RESPONSE PLAN

ANNEXURE 2		POLREP
In case of an oil spill, MPSEZ will provide information to Commandant Coast Guard District 1 Porbandar COMDIS 1 and Coast Guard Station Vadinar CGS Vadinar in the following format:		
SN.	Parameter	Data
1.	Identity of the informant	Boat Arcadia Krishna
2.	Time of information receipt	10:50 hrs
3.	Source of Spill	SPM marine coupling leak
4.	Cause of Spill	SPM marine coupling flange bolt loosened
5.	Type of oil	Crude oil
6.	Colour code information	black
7.	Configuration	-
8.	Radius	20 to 30 m
9.	Tail	25 m
10.	Volume	0.5 to 0.7 cubic meter approx.
11.	Quantity	750 to 850 L
12.	Weathered or Fresh	Weathered
13.	Density	0.7 to 0.8 specific gravity
14.	Viscosity	-
15.	Wind	NE' Ly x 8 - 10 knots.
16.	Wave Height	0.1 to 0.2 m
17.	Current	0.1 to 0.3 knots.
18.	Layer Thickness	0.6 to 0.8 mm approx.
19.	Ambient air temperature	35 deg C
20.	Ambient sea temperature	26 deg C
21.	Predicted slick movement	Towards T-1
22.	Confirm Classification of spill size	Tier 1

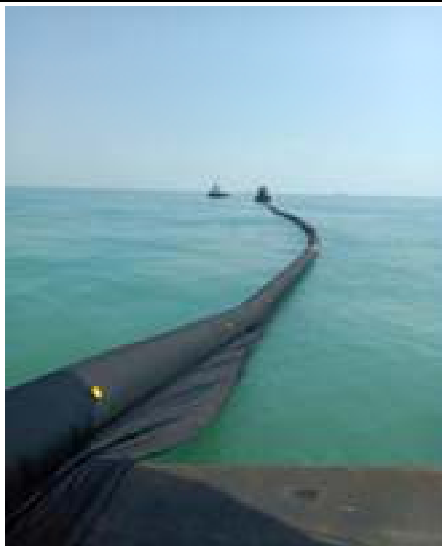
ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.  
MUNDRA  
OIL SPILL CONTINGENCY RESPONSE PLAN

**Log Sheet of Drill**

<b>Page Number:</b> 1 of 1		<b>Date:</b> 08.10.2020	
<b>Name:</b> Arpan Kumar Chowdhury		<b>Position:</b> Radio Officer	
<b>Contact Number:</b> 9825228673		<b>Signature:</b>	
<b>Time</b>	<b>Activity Completed:</b>		
10:50	Boat Arcadia Krishna information that there is a minor oil leaking from marine coupling of SPM floating hose string.		
10:52	HOD, HOS, SPM Manager informed.		
10:57	Informed Dolphin 11 to cast off from Anchorage and proceed to SPM for Oil Spill Response.		
11:45	Dolphin 11 reached near SPM and started deployment of Oil Spill Response equipment's.		
12:50	Deployment of Oil spill containment boom of 250 m completed and skimmer also deployed & oil recovery commenced.		
14:00	Oil spillage recovery drill completed. Boom and other oil spill response equipment recovered onboard. Mock Drill Called Off.		

ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.  
MUNDRA  
OIL SPILL CONTINGENCY RESPONSE PLAN

PHOTOS TAKEN DURING DRILL



## Personnel & Boats Participated in Drill

- 01 Mr. M P Choudhary
- 02 Mr. Yogesh Nandaniya
- 03 Mr. Vatsal Mistry
- 04 Mr. Ramdas Pawale
- 05 Mr. Bharmal Bishnoi
- 06 Mr. Upinder Samkaria
- 07 Mr. Sashikant Padave
- 08 Mr. Santosh Rasam
- 09 Mr. Dharamveer Yadav
- 10 Mr. Vijay Deep Singh
- 11 Mr. Ajay Goliyan
- 12 Mr. Neeraj Singh
- 10 Mr. Vishnu Mishra
- 11 Mr. Hiralal Maurya
- 12 Mr. Anil Kumar
- 13 Crew of Dolphin 11
- 14 Crew of Boat Arcadia Krishna
- 15 Crew of Boat Khusboo

ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.  
MUNDRA  
OIL SPILL CONTINGENCY RESPONSE PLAN

## ANNEXURES

<b>ANNEXURE 1</b>			<b>INITIAL OIL SPILL REPORT</b>
Particulars of person, office reporting	Capt. Sachin Srivastava - HOD Marine/ Capt. Aditya Gaur - HOS marine, APSEZ		
Tel No.	6359981603		
Date & time of incident	24.03.2021 / 1112 hrs		
Spill location	B-3 Tanker		
Likely cause of spill	Spill from vessel manifold	Witness – Boat Arcadia Krishna	
Initial response action	Initiated OSCRP		
Any other information	NO		
Identity of informant	Liquid Control		
Time of FIR	1112		
Source of spill	Vessel manifold		
Cause of spill	Spill from vessel manifold		
Type of spill	HSD		
Color code information (from CG)	Yellow		
Radius of slick	20 to 30 m		
Tail	25 m		
Volume	0.5 to 0.7 cubic meter approx.		
Quantity	750 to 850 L		
Weather	E' Ly x 3-4 knots.		
Tide / current	Ebbing / 0.1 to 0.3 knots.		
Density	0.2 to 0.86 kg/m cube approx.		
Layer thickness	0.02 mm approx.		
Air / Sea temp.	31 deg C / 30 deg C		
Predicted slick movement	Wly		
Size of spill classification (Tier 1, 2 or 3)	Tier 1		

ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.  
MUNDRA  
OIL SPILL CONTINGENCY RESPONSE PLAN

**ANNEXURE 2**

**POLREP**

In case of an oil spill, MPSEZ will provide information to Commandant Coast Guard District 1 Porbandar COMDIS 1 and Coast Guard Station Vadinar CGS Vadinar in the following format:

SN.	Parameter	Data
1.	Identity of the informant	Liquid Control
2.	Time of information receipt	112 hrs
3.	Source of Spill	Vessel Manifold
4.	Cause of Spill	Spill from vessel manifold
5.	Type of oil	HSD
6.	Colour code information	Yellow
7.	Configuration	-
8.	Radius	20 to 30 m
9.	Tail	25 m
10.	Volume	0.5 to 0.7 cubic meter approx.
11.	Quantity	750 to 850 L
12.	Weathered or Fresh	Fresh
13.	Density	0.2 to 0.86 kg/m cube approx.
14.	Viscosity	-2-4.5 CST@40 deg centigrade
15.	Wind	E' Ly x 3 - 4 knots.
16.	Wave Height	0.1 to 0.2 m
17.	Current	0.1 to 0.3 knots.
18.	Layer Thickness	0.2 to 0.4 mm approx.
19.	Ambient air temperature	31 deg C
20.	Ambient sea temperature	30 deg C
21.	Predicted slick movement	W'ly
22.	Confirm Classification of spill size	Tier 1

### Log Sheet of Drill

<b>Page Number:</b> 1 of 1	<b>Date:</b> 23-03-2021
<b>Name:</b> Yogesh Nandaniya/Sudhakar Singh	<b>Position:</b> Radio Officer
<b>Contact Number:</b> 9825228673	<b>Signature:</b>
<b>Activity Timeline:</b>	
<p>1112- Message received from liquid oil leakage (HSD) at B3.  1112- Informed to POC &amp; tug Dol 11 &amp; (Dol 10 for Stndby)  1113- Informed to HOD &amp; HOS  1113-POC confirmed that cargo stopped  1114- Informed to Dol-11 at 10 to keep ready OSD boom.  1114- POC informed all concern (Safety/Security/Medical/Fire)  1115- Informed to executive  1117- Informed to movement aborted SB7 out  1118- Informed to HOD Environment  1119- Dol-10 informed for castoff  1126- Dol-10 underway  1127- Informed to all tugs for prepare OSD boom and sby for emergency cast off  1130- Informed CB2 in pilot  1132- All concern arrived  1133- Informed vessel to activate vsl's OSCP  1137- Liquid Department started cleaning at berth  - Dol 11 started lowering Boom  1138- Dol -10 started spraying OSD  1139- Checked berth 1, 2, 4 are clear  1140- Dol 11 lowered skimmer and started collected oil  1149- All persons evacuated from T1  1230- Drill called off  1230-1240 – De-briefing meeting carried out with Liquid, safety, fire, security and contractor team</p>	

**Observations:**

1. Communication between Marine Control and Jetty was weak.
2. The Siren from MCP (Manual calling point) is activated only in LPG Control Room. Recommended that the siren should also be activated in Liquid Control Room.
3. Emergency Assembly Point presently marked at T-Junction recommended to shift near security cabin after consultation with safety.
4. Windsocks to be placed at conspicuous point at T-1.
5. Non spark shovels to be kept in the oil spill contingency trailer maintained by liquid team.
6. Tyre pressure was found de-flatted in trailer which can hamper mobility. Tyre pressure of trailer for equipment needs to be checked regularly.

**Personnel & Boats Participated in Drill****Off Shore**

- 01 Mr. M P Choudhary
- 02 Mr. Yogesh Nandaniya
- 03 Mr. Vatsal Mistry
- 04 Mr. Ramdas Pawale
- 05 Mr. Bharmal Bishnoi
- 06 Mr. Upinder Samkaria
- 07 Mr. Sashikant Padave
- 08 Mr. Santosh Rasam
- 09 Mr. Dharamveer Yadav
- 10 Mr. Vijay Deep Singh
- 11 Mr. Ajay Goliyan
- 12 Mr. Neeraj Singh
- 13 Mr. Vishnu Mishra
- 14 Mr. Hiralal Maurya
- 15 Mr. Ashok Tiwari - HMEL
- 16 Mr. Anil Kumar
- 17 Crew of Dolphin 11
- 18 Crew of Boat Arcadia Krishna
- 19 Crew of Boat Khusboo

**Onshore:**

1. Capt Tushar Kinikar
2. Chandrashekhar
3. Diwana Thapa
4. Satendra Nishad
5. Rupesh Pandey
6. Mehul Makwana
7. Representatives from Fire Department
8. Representatives from Liquid Department
9. Representatives from Safety Department
10. Representatives from Security Department

## Drill snap

Boom laying from Dol 11	OSD Spraying from Dol 10
	
Lowering of Skimmer	Collection of spilled oil by Skimmer
	
De-briefing	
	

# **Annexure – 7**

**BMW AUTHORIZATION FORM-III(Rule 10)**

Gujarat Pollution Control Board  
Paryavaran Bhavan, Sector-10/A,  
Gandhinagar - 382010  
Tele :23222756

**Distromed Kutchh Services Pvt. Ltd. ( 373266 )****Under the Rule-10 of the Biomedical waste (Management and Handling) Rules, 2016 framed under the EPACT'86**Authorization for operating a facility for **Generation,Segregation,Storage** of biomedical wastes.**BMW AUTH NO :BMW-333816, VALID UPTO : 01/06/2022****PCB Id : 21749****Application Inward No : 35914 , Date: 05/06/2017****BMW Id : 373266****CCA No: BAWH-87262 (01/06/2022)****File No : KUTCHH-INV-CF-361,**

**No of Beds : 4,442, Investment(in lakh) : 70.00, Act : B,A,W,H**  
**No of H.W : 3, Water Consumption(klpd) : 6.00, Scale : S**

In exercise of power conferred by this Board and after scrutiny of above referred application, Superintendent /  
 Incharge of **Distromed Kutchh Services Pvt. Ltd. at Survey No- 42/1/1,Kodki road, Ratia. , Ratia Tal :**

**Bhuj Dist : Kutch West** is here by granted an Authorisation to operate Health Care facility for  
**Generation,Segregation,Storage** of biomedical wastes on the premises of

**M/S. Self is a CBWTF Operator \* \* \* \* \*** situated at**-, Dist : -** Under**CBWTF Reg. No : NA, Valid Upto :**

**M/S. Self is a CBWTF Operator \* \* \* \* \***, **-, Dist: -** is hereby authorized for handling biomedical waste  
 as per the capacity given below:

- (i) Number of beds of HCF : **4,442**
- (ii) Number of healthcare facilities covered by CBWTF : **308**
- (iii) Installed Treatment and Disposal capacity : **3,000.00 KG/DAY**
- (iv) Area or Distance Covered by CBWTF : **150.00**
- (v) Qty of Biomedical waste handled, treated or disposed : **550.00**

1.The Authorisation is granted for **4,442** nos. of beds with generation of

Type of Waste Category (Kgs/Month)	YELLOW	WHITE (Translucent)	RED	BLUE
Qty permitted for Handling	18,000.00	1,500.00	3,500.00	6,000.00

category of biomedical wastes. **(Unit - Kgs/Month)**2.This BMW Authorisation shall be in force **for a period of (5 year, Valid Upto 01/06/2022)**This CCA Authorisation shall be in force **for a period of 5 year[up to 01/06/2022]**

3.This Authorisation is subject to the conditions stated in the Annexure-I attached here with and to such other conditions as  
 may be specified in the Rules for the time being in force under the Environment (Protection) Act 1986.

**BMW AUTHORIZATION FORM-III(Rule 10)**

Gujarat Pollution Control Board  
Paryavaran Bhavan, Sector-10/A,  
Gandhinagar - 382010  
Tele :23222756

**Distromed Kutchh Services Pvt. Ltd. ( 373266 )**

**Under the Rule-10 of the Biomedical waste (Management and Handling) Rules, 2016 framed under the EPACT'86**

4. The authorization shall comply with the provisions of the Environment (Protection) Act, 1986 and the rules made there under.
5. The authorization or its renewal shall be produced for inspection at the request of an officer authorised by the prescribed authority.
6. The person authorised shall not rent, lend, sell, transfer or otherwise transport the biomedical waste without obtaining prior permission of the prescribed authority.
7. Any unauthorised changes in personnel, equipment or working conditions as mentioned in the application by the person authorised shall constitute a breach of his authorisation.
8. It is the duty of the authorised person to take prior permission of the prescribed authority to close down the facility and such other terms and conditions may be stipulated by the prescribed authority.



e-Signed On 20/07/2017 15:52:09  
(Organic Authentication on AADHAR from UIDAI Server)  
**TPAV # CVUG6MJS3X**

**For & On behalf of  
Gujarat Pollution Control Board**



**K.C.Mistry, Unit Head**

**Remark:**  
**Specific Condition :**

**Encl.: Annexure-I**

**Issued to , Mrs. Vinod L. kachhadia, Distromed Kutchh Services Pvt. Ltd., Survey No- 42/1/1, Kodki road, Ratia. , Ratia Tal :Bhuj Dist :Kutch West (BMW Id: 373266 )**

Copy to Regional Office - Kutch West/ H.O

With a request to carry out periodically monitoring of above said hospital/clinic and submit the visit report to this Office.



GPCB

## GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar 382 010

Phone : (079) 23222425

(079) 23232152

Fax : (079) 23232156

Website : www.gpcb.gov.in

NO: GPCB/ID-17221/CCA/JNG-24(19)

RPAD

In exercise of the power conferred under section-25 of the Water (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution)-1981 and Authorization under rule 6(2) of the Hazardous and other Wastes (Management and Trans boundary movement) Rules, 2016 framed under the Environmental (Protection) Act-1986.

And whereas Board has received consolidated consent application No.139359 dated: 02/07/2018 for the Consolidated Consent and Authorization (CC & A) of this Board under the provisions/rules of the aforesaid Acts. Consents & Authorization are hereby granted as under:

### CONSENTS AND AUTHORISATION:

(Under the provisions/rules of the aforesaid environmental acts)

To,  
M/S. AMBUJA CEMENTS LTD,  
SURVEY NO: 315 to 320, 351 to 352, 395 to 410,  
P.O: AMBUJANAGAR-362715,  
TAL: KODINAR,  
DIST: GIR SOMNATH.

1. Consent Order No. : AWH-97567 date of issue: 05/12/2018

1.1 The consents shall be valid up to 18/09/2023 for use of outlet for the discharge of trade effluent & emission due to operation of industrial plant for manufacture of the following items/products:

Sr.No	Product	Capacity
1	Cement	1.5 Million TPA
2	Receiving, Common Storage, Handling & Processing facility for co-processing of Hazardous & Non-Hazardous Waste to be used at: 1. Ambuja Cement Unit (ID 17221) and 2. Gajambuja Unit (ID 17221)	1,50,000 TPA

**Clean Gujarat Green Gujarat**

ISO-9001-2008 & ISO-14001 - 2004 Certified Organisation

2. **CONDITIONS UNDER THE WATER ACT:**

2.1 The water consumption and waste water generation shall be as under.

	Water Consumption	Waste water generation
Industrial	250 KL/Day	Nil
Domestic	1550 KL/Day	1400 KL/Day

2.2 The quantity of sewage from the factory and from township shall not exceed 1400 KL/day.

2.3 Sewage shall be treated at Sewage Treatment Plant to conform to the following standards.

SR No	Parameters	Permissible Limit
1	pH	6.5-9.0
2	BOD (mg/l)	30
3	Total Suspended Solids (mg/l)	Less than 100
4	Fecal Coliform (FC) (MPN/100 ml)	Less than 1000

2.4 Treated water from Sewage Treatment Plant shall be utilized for following purpose.

- Plant cooling for Ambuja & Gajambuja plant
- Dust suppression on haul roads
- Horticulture and green belt development
- On land for irrigation
- Fire fighting purpose

3. **CONDITIONS UNDER THE AIR ACT:**

3.1 The following shall be used as fuel.

Sr No.	Fuel	Quantity
1	Coal/lignite/Pet coke or in combination with Alternate fuel (Non hazardous waste i.e. bio fuel/biomass/agro waste/RDF & SCF from MSW/plastic waste/type chips etc)	55 Ton/hr (Inclusive of Maximum 10 Ton/hr alternate fuel)

3.2 In any case, quantity of fuel shall not exceed 55 tons/Hr.

3.3 The quantity of imported pet coke shall as follows.

Source of petcoke	Quantity
Imported Petcoke (However, the overall Consumption of Coal/Petcoke i.e. imported Petcoke including indigenous Petcoke/Indigenous Coal/Imported Coal will not exceed 15500 MT/Month/165000 MT/Annum)	15500 MT/Month (186000 MT/Annum)

3.4 You shall have to comply all the conditions of Office Memorandum for Guidelines for Regulation and Monitoring of Imported Petcoke in India issued vide Letter dated 10<sup>th</sup> Sept 2018 by MoEFCC.

3.5 Imported Petcoke shall be used as feedstock and in any petcoke used by unit the sulphur content shall not be more than 7% in Petcoke.



# GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar 382 010

Phone : (079) 23222425

(079) 23232152

Fax : (079) 23232156

Website : www.gpcb.gov.in

- 3.6 HSD shall be used as a secondary fuel start-up of kiln.
- 3.7 Any other non hazardous & high calorific value material shall be used as alternative fuel of co-processing in cement kiln.
- 3.8 The applicant shall install & operate air pollution control system in order to achieve norms prescribed below
- 3.9 The flue gas emission through stack shall conform to the following standards:

Stack No.	Stack attached to	Stack height in Meter	Air Pollution Control system	Parameter	Permissible Limit
1	Raw Mill Kiln Exit	95	Glass Bag House & Selective Non - Catalytic Reduction (SNCR) System For NOx Reduction	Particulate Matter SO2 NOx HCL HF TOC	30 mg/Nm <sup>3</sup> 100 mg/Nm <sup>3</sup> 800 mg/Nm <sup>3</sup> 10 mg/Nm <sup>3</sup> 1 mg/Nm <sup>3</sup> 10 mg/Nm <sup>3</sup>
				Hg and its compounds	0.05 mg/Nm <sup>3</sup>
				Cd+Pb and Their compounds	0.05 mg/Nm <sup>3</sup>
				Sb+As+Pb+Co+Cr+V+Cu+Mn+Ni+V And their compounds	0.5 mg/Nm <sup>3</sup>
				Dioxins and Furans	0.1 ng TEC/Nm <sup>3</sup>
2	Clinker Cooler	35	ESP	Particulate Matter	30 mg/Nm <sup>3</sup>
3	Coal Mill	63	Bag Filter		
4	Cement Mill-I	34	Bag Filter		
5	Cement Mill-II	34	Bag Filter		

**Clean Gujarat Green Gujarat**

ISO-9001-2008 & ISO-14001 - 2004 Certified Organisation

6	Packing Plant-I	30	Bag Filter
7	Packing Plant-II	30	Bag Filter
8	Crusher	20	Bag Filter

Note:

- A) The monitored values of SO<sub>2</sub>, NO<sub>x</sub>, HCl, HF, TOC, Metals and Dioxins and Furans at main kiln stack shall be corrected to 10% Oxygen, on dry basis and the Norms for SO<sub>2</sub>, NO<sub>x</sub>, HCl, HF, TOC, Metals and Dioxins and Furans shall be applicable to main kiln stack and the norms for Particulate Matter (PM) shall be applicable to all the stacks in the plant.
- B) PM, SO<sub>2</sub>, NO<sub>x</sub> shall be monitored continuously. HCl, HF, TC, Metals and Dioxins and Furans shall be monitored once in a year.
- C) Scrubber meant for scrubbing emission shall not be used as quencher and plants having separate stack for gaseous emission for the scrubbing unit, the height of this stack shall be at least equal to the main stack.

3.10 There shall be no process gas emission

3.11 The concentration of the following parameters in the ambient air within the premises of the industry shall not exceed the limits specified hereunder.

PARAMETERS	PERMISSIBLE LIMIT	
	Annual	24 Hrs Average
Particulate Matter-10 (PM <sub>10</sub> )	60 Microgram/M <sup>3</sup>	100 Microgram/M <sup>3</sup>
Particulate Matter-2.5 (PM <sub>2.5</sub> )	40 Microgram/M <sup>3</sup>	60 Microgram/M <sup>3</sup>
SO <sub>2</sub>	50 Microgram/M <sup>3</sup>	80 Microgram/M <sup>3</sup>
NO <sub>x</sub>	40 Microgram/M <sup>3</sup>	80 Microgram/M <sup>3</sup>

3.12 The applicant shall install & operate air pollution control equipment Very efficiently and continuously so that the gaseous emission always conforms to the standards specified in Condition no.3.3 & 3.5 above.

3.13 The consent to operate the industrial plant shall lapse if at any time the parameters of the gaseous emission are not Within the tolerance limits specified in the condition no.3.3 & 3.5 above.

3.14 The applicant shall provide percholes, ladder, platform etc at chimney(s) for monitoring the air emissions and the same shall be open for inspection to/and for use of Board's staff. The chimney(s) vents attached to various sources of emission shall be designed by numbers such as S-1, S-2, etc. and these shall be painted/displayed to facilitate identification.

3.15 The industry shall take adequate measures for control of noise levels from its own sources within the premises so as to maintain ambient air quality standards in respect of noise to less than 75dB(A) during day time and 70 Db (A) during night time. Daytime is reckoned in between 6a.m. and 10 p.m. and nighttime is reckoned between 10 p.m. and 6 a.m.



## GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar 382 010

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### 4. GENERAL CONDITIONS: -

- 4.1 Any change in personnel, equipment or working conditions as mentioned in the consent form/order should immediately be intimated to this Board.
- 4.2 Applicant shall also comply with the general conditions given in annexure-I
- 4.3 Whenever due to accident or other unforeseen act or event, such emissions occur or is apprehended to occur in excess of standards laid down such information shall be forthwith reported to Board, Concerned Police Station, Office of Directorate of Health Service, Department of Explosives, Inspectorate of Factories and local body. In case of failure of pollution control equipments, the production process connected to it shall be stopped. Remedial actions/measures shall be implemented immediately to bring entire situation normal.
- 4.4 In order to enable the board to perform its functions of ascertaining the standards of effluent laid down by it for the discharge of the effluent under the condition no 2.3 of this order are complied with by the company while causing discharge of effluent, the applicant shall have to submit every month the analysis report of the samples of effluent got collected and analyzed by one of the laboratories recognized by the state Board.
- 4.5 The Environmental Management Unit/Cell shall be setup to ensure implementation on and monitoring of environmental safeguards and other conditions stipulated by statutory authorities. The Environmental Management Cell/Unit shall directly report to the Chief Executive of the organization and shall work as a focal point for internalizing environmental issues. These cells/units also coordinate the exercise of
- 4.6 The applicant shall also comply with the General Conditions as per Annexure - I enclosed.
- 4.7 The Board reserves the right to review and/or revoke the consent and/or make variations in the conditions, which the Board deems fit in accordance with Section 27 of the Act.
- 4.8 In case of change of ownership/management the name and address of the new owners/partners/directors/proprietor should immediately be intimated to the Board.
5. **HAZARDOUS AND OTHER WASTES (MANAGEMENT AND TRANSBOUNDARY MOVEMENT) RULES, 2016 Form -2(See Rule 6(2))**
- 5.1 Form # 1 grant of authorization for occupier or operator handling hazardous waste.
- 5.2 M/s. AMBUJA CEMENTS LTD is hereby granted an authorization to operate facility for following hazardous wastes on the premises situated at SURVEY NO: 315 to 320, 351 to 352, 395 to 410, P.O: AMBUJANAGAR - 362715, TAL: KODINAR, DIST: GIR SOMNATH.

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Sr. No	Type of waste	Quantity In MT/Annum	Schedules	Facility
1.	Tarry residue and still bottoms from distillation	150000	1.2	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
2.	Oil sludge and Emulsion	150000	4.1	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
3	Spent catalyst	150000	4.2	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
4	Organic residue from process	150000	4.4	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
5	Spent clay containing oil	150000	4.5	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
6	Used/Spent oil	93.50	5.1	Collection, Storage, Transportation, Disposal By Sale To Registered Recycler
7	Waste or residue containing oil	150000	5.2	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
8	Cathode residue including pot lining waste	150000	11.2	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
9	Phosphate sludge	150000	12.5	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
10	Plating metal sludge	150000	12.8	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
11	Sludge from acid recovery unit	150000	13.2	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln



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12	Distillation residue generating from production and for industrial use of solvents	150000	20.3	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
13	Process waste, residue and sludge	150000	21.1	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
14	Process residues	150000	22.2	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
15	Waste or residues (not made with vegetable or animal materials)	150000	23.1	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
16	Process waste sludge/residue containing acid, toxic metal, organic compounds (i.e. Chemical gypsum)	237250	26.1	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
17	Dust from air filtration system	150000	26.2	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
18	Spent solvent	150000	26.4	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
19	Spent catalyst	150000	26.5	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln

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20	Process residue and wastes	150000	28.1	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
21	Spent catalyst	150000	28.2	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln (As per List attached in Annexure 1)
22	Spent carbon	150000	28.3	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln (As per List attached in Annexure 2)
23	Off specification products	150000	28.4	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
24	Date expired products	150000	28.5	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
25	Spent solvent	150000	28.6	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
26	Process waste or residues	150000	29.1	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
27	Sludge containing residual pesticides	150000	29.2	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
28	Empty barrels/containers/liners contaminated with hazardous chemicals/waste (Only From Paint Industry Sector)	150000	33.1	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
29	Chemicals-containing residue arising from decontamination	150000	34.1	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln
30	Exhaust air or gas cleaning residue	150000	35.1	Collections, Reception, Recovery, Storage, Transportation By Co-Processing In Cement Kiln



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- 5.7 The industry should take necessary steps for prevention of any spillages / Leaching etc. in respect of Hazardous waste from the premises.
- 5.8 Cement plant shall have to explore the possibilities for transportation of Hazardous waste for the co-processing purpose through dedicated tankers with GPS enabled system in line with Hazardous Waste Rules -2016
- 5.9 The industry shall use Hazardous Waste tracking (HWT) system of XGN for online real time data for preparing online manifest system for regular updating for retrieval and maintain record thereof and to furnish details to the concerned GPCB, Regional Office & Head Office, Gandhinagar at regular interval.
- 5.10 The industry should maintain good housekeeping & maintain proper records of Hazardous Waste mentioned in Authorization.
- 5.11 The industry should submit the point wise compliance report on half yearly basis and monthly report in prescribed format annexed here with as (Annexure-A) to the Hazardous Waste Cell at Head Office Gandhinagar.
- 5.12 The industry should obtain prior regular permission of GPCB for co-processing of Hazardous wastes in cement kiln (if applicable) .
- 5.13 The industry should take all precautionary measure to prevent odour, nuisance and spillage during the storage and handling of Hazardous Waste.
- 5.14 The industry should obtain prior permission of trial run for co-processing of wastes for which regular permission is not issued to any cement plant.
- 5.15 The industry should follow the guideline of GPCB for labeling transportation, storage and disposal of hazardous wastes in a environmental sound manner.
- 5.16 The authorization is granted to operate a facility for collection, storage, transportation and ultimate disposal of Hazardous wastes as above.
- 5.17 The authorization shall be in force for a period up to 18/03/2023.
- 5.18 The authorization is subject to the conditions stated below and such other conditions as may be specified in the rules from time to time under the Environment (Protection) Act-1986.
- 5.19 It shall be the responsibility / duty of the applicant to take adequate steps while handling hazardous wastes to contain contaminants and prevent accident and their consequences on human and environment and prevent person working on the site with information, training and equipment and necessary to ensure their safety.
- 5.20 The applicant shall be liable for all damage caused to the environment or their party due to improper handling of Hazardous Wastes or Disposal of hazardous wastes.
- 5.21 The applicant shall be liable to pay financial penalties as levied for any violation of the provisions under Hazardous and other wastes (management and transboundary movement) rules, 2016 by the State Pollution Control Board with the prior approval of the Central Pollution Control Board.

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5.22 The applicant shall ensure that the Hazardous wastes are packaged and labeled, based on the composition in a manner suitable for safe handling, storage and transport. The labeling and packaging shall be easily visible and to be able to with stand physical conditions and climatic factors as per guidelines issued by the Central Pollution Control Board from time to time. The transport of hazardous wastes shall be in accordance with the provisions of the rules made by Central Government under the Motor Vehicles Act, 1988 & other guidelines issued from time to time and the transporter shall comply with the provisions of Hazardous and other wastes (management and transboundary movement) rules, 2016.

5.23 In case of transportation of Hazardous Wastes through a state other than the state of origin or destination the occupier shall intimate the concerned State Pollution Control board before, he hands over the Hazardous Waste to the transporter (if applicable).

**e. TERMS AND CONDITIONS OF AUTHORISATION**

- a) The applicant shall comply with the provisions of the Environment (Protection) Act - 1986 and the rules made there under.
- b) The authorization shall be produced for inspection at the request of an officer authorized by the Gujarat Pollution Control Board. The persons authorized shall not rent, lend, sell, and transfer of otherwise transport the hazardous wastes without obtaining prior permission of the Gujarat Pollution Control Board.
- c) Any unauthorized change in personnel, equipment or working conditions as mentioned in the authorization order by the persons authorized shall constitute a breach of this authorization.
- d) It is the duty of the authorized person to take prior permission of the Gujarat Pollution Control Board to close down the facility.
- e) An application for the renewal of an authorization shall be made as laid down in rule 5 (6) (ii).
- f) Industry shall have to manage waste oil, discarded containers etc as per Amended Rules-2003 and shall apply Authorization/submitt details for all applicable waste as per Amended Rules-2003 with 15 days.
- g) Industry shall submit annual report within 15 days and sub squinty by 30<sup>th</sup> June every year.

**7. General Conditions:**

- 7.1 The waste generator shall be totally responsible for (i.e. collection, storage, encapsulation, incineration, treatment, transportation and ultimate disposal) of the wastes generated.
- 7.2 Records of waste generation, its management and annual return shall be submitted to Gujarat Pollution Control Board in Form - 4 by 31<sup>st</sup> January of every year.
- 7.3 In case of any accident, details of the same shall be submitted in Form - 5 to Gujarat Pollution Control Board.
- 7.4 As per "Public Liability Insurance Act - 91" company shall get insurance Policy, if applicable.



# GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar 382 010

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In exercise of the power conferred under section-25 of the Water (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution)-1981 and Authorization under rule 6(b) of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules 2016 & as amended from time to time framed under the Environment (Protection) Act-1986.

And whereas Board has received consolidated consent application Inward I.D.NO. 144910 dated 05/10/2018 for the amendment in Consolidated Consent and Authorization (CC & A) of this Board and under the provisions/rules of the aforesaid acts. Consents & Authorization are hereby granted as under

## CONSENTS AND AUTHORIZATION:

(Under the provisions /rules of the aforesaid environmental acts)

To,

M/s Saurashtra Enviro Projects Pvt Ltd,

Plot no./Survey no. 386/1, 409/1, 414/1, 415 & 417

Vill: Juna Katarliya/Lakudiya,

Tal: Bhachau,

DIST: KUTCH-370 150

### 1. Consent Order No: AWH - 97731, Date of Issue 13/12/2018.

The consents shall be valid up to 05/11/2023 for use of outlet for the discharge of trade effluent and emission due to operation of industrial plant for following activities at Plot no./Survey no. 386/1, 409/1, 414/1, 415 & 417, Vill: Juna Katarliya/Lakudiya, Tal: Bhachau, Dist: Kutch, East- 370150.

SR. NO.	PRODUCTS	Capacity	Survey No
1	Secured Landfill Site	8,45,000 MT (Cell no.1 - 1,25,000MT, Cell no.2 - 2,75,000 MT, Cell no.3 - 4,50,000 MT) Closed & Capped	386/1, 409/1, 414/1, 415 & 417 Vill: Juna Katarliya/Lakudiya, Tal: Bhachau, Dist: Kutch, East- 370150.
2.	Incineration Facility	7.50 Million Kcal/Hour	

### 2. SPECIFIC CONDITION

- SEPL shall send generated leachate to M/s ACPCL for further treatment; unit shall maintain & submit monthly record.
- SEPL shall comply the submitted notarized undertaking dated 31/03/2018.
- In case of issue related to groundwater contamination or any other damage to environment in future, there shall be a joint responsibility and liability of both Saurashtra Enviro Projects Pvt. Ltd., and Ankleshwar Cleaner Process Technology Centre Pvt. Ltd., for conducting assessment study and remediation as per CPCB guidelines.
- Saurashtra Enviro Projects Pvt. Ltd shall bound to comply all the condition of ICYTE for the facilities as per business transfer agreement.
- Saurashtra Enviro Projects Pvt. Ltd will maintain their independent Escrow Accounts as per the guidelines.
- The Board shall not take any responsibility for legal/Civil dispute between Saurashtra Enviro Projects Pvt. Ltd and Ankleshwar Cleaner Process Technology Centre Pvt. Ltd.
- As Saurashtra Enviro Projects Pvt. Ltd. and Ankleshwar Cleaner Process Technology Centre Pvt. Ltd. have continuous premises, they shall provide fencing and demarcation of boundaries and shall have different identity.
- As all cells are closed of Saurashtra Enviro Projects Pvt. Ltd, No new waste shall be collected for TSD disposal.

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# GUJARAT POLLUTION CONTROL BOARD

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BY RPAD

No: GPCB/HAZ-GEN-680(1)/ID: 65572/

Date:

Amendment to Consolidated Consent Order No.AWH-97750 issued dated 14/12/2018

To,

M/s. Detox India Private Limited,

(Old Name: M/s. Ankleshwar Cleaner Process Technology Centre Pvt Ltd.)

Plot No: 383, 384, 386 P-2, 401, 409/2, 410, 411,

412/1, 412/2, 414 P-2, 416, 418, 178, 179,

Vill: Juna Katoriya, Lakadiya- 370150,

Tal: Bhachau & Dist: Kutch

**SUB:** - Consolidated Consent and Authorization (CC&A) under various Environment Acts / Rules.

**REF:** - (1) CCA Order No. GPCB/HAZ-GEN-680/ID-65572/480066 dated: 28/12/2018.

(2) Your letter dated: 02/01/2019 regarding change of name of the industry.

In exercise of the power conferred under section-25 of the Water (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution) Act-1981 and Authorization under rule 6(2) of the Hazardous and other waste (Management and Transboundary Movement) Rules'2016, framed under the EP Act-1986 and without reducing your responsibility under the said acts / Rules in any way; this Board is empowered to amend consent order in connection with above reference the CCA order No.AWH-97750 issued under the provisions of the various Environment Acts/ Rules, which stands amended as under.

The consents shall be valid up to dated: 04/10/2023 for operation of common hazardous waste TSDH, Forced Evaporation and pre-processing facility for disposal of hazardous waste received from member units at Plot No: 383, 384, 386 P-2, 401, 409/2, 410, 411, 412/1, 412/2, 414 P-2, 416, 418, 178, 179 of Vill: Juna Katoriya, Lakadiya- 370150, Tal: Bhachau & Dist: Kutch.

1. The Board has issued CCA-Fresh valid up to dated: 04/10/2023 vide letter no GPCB/ HAZ-GEN-680/ID-65572/480066 dated: 28/12/2018. M/s. Ankleshwar Cleaner Process Technology Centre Pvt Ltd stands transferred to M/s. Detox India Private Limited, with condition that M/s. Detox India Private Limited, shall bound to comply with all the conditions subject to which it was granted to this industry originally.
2. The other condition of the CC&A order no: AWH-97750 issued vide letter No: GPCB/ HAZ-GEN-680/ID-65572/480066 dated: 28/12/2018 shall remain unchanged.
3. You are directed to comply with these conditions judiciously.

For and on behalf of GPCB

*D.M. Thaker*  
9/11/19

(D.M. Thaker)

Environmental Engineer

Unit head, Haz Waste Cell

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In exercise of the power conferred under section-25 of the Water (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution)-1981 and Authorization under rule 6(b) of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules 2016 & as amended from time to time framed under the Environment (Protection) Act-1986.

And whereas Board has received consolidated consent application Inward I.D.NO. 144207 dated 05/10/2018 for the amendment in Consolidated Consent and Authorization (CC & A) of this Board and under the provisions/rules of the aforesaid acts, Consents & Authorization are hereby granted as under

## CONSENTS AND AUTHORISATION:

(Under the provisions/rules of the aforesaid environmental acts)

To,

M/s Ankleshwar Cleaner Process Technology Centre Pvt Ltd,

Plot no/Survey no. 383,384,386P2,401,409/2,410,411,412/1,412/2,414 P2,416,418,178 & 179

Vill: Juna Katariya/Lakadiya,

Tal: Bhachau,

Dist: Kutch, East-370 150

### 1. Consent Order No: AWH – 97750, Date of Issue 14/12/2018.

The consents shall be valid up to 04/10/2023 for use of outlet for the discharge of trade effluent and emission due to operation of industrial plant for following activities at Plot no/Survey no. 383,384,386P2,401,409/2,410,411,412/1,412/2,414P2,416,418,178&179, Vill:Juna Katariya/Lakadiya, Tal: Bhachau, Dist: Kutch,East-370150.

Sr. No	Facility	Capacity	Survey No.
1.	Secured Landfill Site	Cell No.4: 3,55,000MT(In operation)	Plot no/Survey no. 383,384,386P2,401,409/2,410,411,412/1,412/2,414P2,416,418,178 & 179 Vill:Juna Katariya/Lakadiya, Tal: Bhachau, Dist: Kutch,East-370 150
2.	Forced Evaporation System	500KL/Day	
3.	Coal Crusher	10MT	
4.	Pre-Processing facility	120MT/Day	
5.	Ammonical Nitrogen stabilization plant	300KL/Day	
6.	VOC Stripper	150KL/Day	

### 2. SPECIFIC CONDITION

- 2.1 ACPTCL shall comply the submitted notarized undertaking dated 31/03/2018
- 2.2 In case of issue related to groundwater contamination or any other damage to environment in future, there shall be a joint responsibility and liability of both Saurashtra Enviro Projects Pvt. Ltd., and Ankleshwar Cleaner Process Technology Centre Pvt Ltd., for conducting assessment study and remediation as per CPCB guidelines.
- 2.3 In all circumstances, VOCs and high ammonical nitrogen containing stream shall be evaporated in spray dried.
- 2.4 Unit shall strictly adhere and comply with guidelines issued by the Central Pollution Control Board for Odour control.

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By R.P.A.D.

In exercise of the power conferred under section-25 of the Water (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution)-1981 and Authorization under rule 6(2) of the Hazardous & Other Waste (Management & Transboundary Movement) Rules-2016, framed under the Environmental (Protection) Act-1986. The board has granted the consent order no. PC/CCA-KUTCH-519/GPCB ID 11946/141682 Date 26/03/2013.

And whereas Board has received application inward No. **130423** dated 06/12/2017 for the **Renewal Consolidated Consent and Authorization (CC&A)** of this Board under the provisions / rules of the aforesaid Acts. Consents & Authorization are hereby granted as under:

### CONSENTS AND AUTHORISATION:

(Under the provisions /rules of the aforesaid environmental acts)

Tg.  
✓ Sabnam Enterprise,  
Plot No. 87,  
GIDC Anjar,  
Dist : Kutch 370 110

1. Consent Order No. AWH-91299 Date of Issue: 16/02/2018
2. The consent shall be valid up to 05/12/2022 for manufacture of the following products:

SR. NO.	PRODUCT	QUANTITY
1.	Lead Ingots from used Lead Acid batteries	75 MT/MONTH

### SUBJECT TO THE FOLLOWING SPECIFIC CONDITIONS:

- 2.1 You shall not carry out any activity which may attract the provision of EIA notification-2006.
- 2.2 You shall submit blood lead reports of workers within one-month time period
- 2.3 Ground water shall not be used for any industrial purpose.

### 3. CONDITIONS UNDER THE WATER ACT 1974:

- 3.1 The quantity of the industrial effluent to be generated from the manufacturing process and other ancillary industrial operations shall be NIL.
- 3.2 The quantity of Sewage effluent from the factory shall not exceed 0.250 KL/Day
- 3.3 Domestic effluent shall be disposed off through septic tank / soak pit system
- 3.4 The quality of industrial waste water shall conform to the following standards:

PARAMETER	PERMISSIBLE LIMIT
pH	6.5 to 8.5
Temperature	40°C

*Handwritten signature*

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Colour (Pt. Co. scale units)	100 units
Total suspended Solids	100 mg/L
Oil & Grease	10 mg/L
Ammonical Nitrogen	50 mg/L
BOD (5 Days at 20°C)	30 mg/L
COD	100 mg/L
Chlorides	600 mg/L
Sulphates	1000 mg/L
Total Dissolved Solids	2100 mg/L
Percent Sodium	60 %
Phenolic Compound	01 mg/L
Lead	0.1 mg/L
Copper	02 mg/L
Total Chromium	02 mg/L
Hexavalent Chromium	0.1 mg/L

3.5 The treated effluent conforming to the above standards shall be reused in scrubbing and there shall not be waste water discharge

3.6 Domestic effluent shall be disposed off through septic tank.

#### 4. CONDITIONS UNDER AIR ACT 1981:

4.1 The following shall be used as fuel in the furnace as following rates

Sr. no.	Name of Fuel	Quantity
1	Charcoal	400 Kg/Day

4.2 The applicant shall install & operate air pollution control system in order to achieve flue gas emission norms as prescribed below.

Sr. no.	Stack attached to	Stack height in Meters	Air Pollution Control System	Parameter	Permissible limit
1	Furnace Numbers - 2	35	Bag Filter and multi cyclone separator followed by water scrubber	PM SO <sub>2</sub> NOx	150 mg/Nm <sup>3</sup> 100 ppm 50 ppm

4.3 The shall be no process gas emission from the manufacturing and other ancillary activities

4.4 The concentration of the following parameters in the ambient air within the premises of the industry shall not exceed the limits specified hereunder as per National Ambient Air Quality Standards issued by Ministry of Environment and Forest dated 16<sup>th</sup> November-2009

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient air in µg/M <sup>3</sup>
1	Sulphur Dioxide (SO <sub>2</sub> )	Annual 24 Hours	50 80
2	Nitrogen Dioxide (NO <sub>2</sub> )	Annual 24 Hours	40 80
3	Particulate Matter (Size less than 10 µm) OR PM <sub>10</sub>	Annual 24 Hours	60 100
4	Particulate Matter (Size less than 2.5 µm) OR PM <sub>2.5</sub>	Annual 24 Hours	40 60

*Amkhy*

4.5 The applicant shall provide portholes, ladder, platform etc at chimney(s) for monitoring the air emissions and the same shall be open for inspection. The chimney(s) vents attached to various sources of emission shall be designed by numbers such as S-1, S-2, etc. and these shall be painted / displayed to facilitate identification.

4.6 The concentration of Noise in ambient air within the premises of industrial unit shall not exceed following levels

Between 6 A.M. to 10 P.M. 75 dB (A)

Between 10 P.M. to 6 A.M. 70 dB (A)

5. Authorization under Hazardous and Other Waste [Management & Transboundary Movement] Rules, 2016 & amended.

6. **Authorization Number: AWH- 90274 and shall valid up to 26/11/2022.**

6.1 Sabnam Enterprise, is hereby granted an authorization to operate facility for following hazardous wastes on the premises situated at Plot No 87, GIDC Anjar, Dist. Kutch 370 110

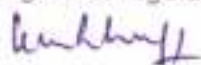
Sr. No.	Waste	Quantity per Annum	Category	Facility
1.	Used lead Acid batteries	150 T/ Month	Schedule-IV (No 17)	Reception, Storage, Transportation & Reuse for recovery of Lead Ingots
2.	Lead bearing residue	10 MT	I-9.1	Collection, storage, transportation and disposal at TSDF
3.	Discarded drums/ liners contaminated with hazardous chemicals waste and container	10 MT	I-33.3	Collection, Storage, decontamination, transportation and Disposal <b>OR</b> Collection, Storage, Transportation and selling to authorized decontamination facility

6.2 The authorization is granted to operate a facility for reception, collection, storage and transportation and ultimate disposal of Hazardous wastes by selling out to authorized decontamination facility, TSDF.

6.3 The authorization is subject to the conditions stated below and such other conditions as may be specified in the rules from time to time under the Environment (Protection) Act-1986

**6.4 GENERAL CONDITIONS OF AUTHORIZATION:**

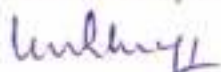
1. The authorized person shall comply with the provisions of the Environment (Protection) Act, 1986, and the rules made there under.
2. The authorization or its renewal shall be produced for inspection at the request of an officer authorized by the State Pollution Control Board.
3. The person authorized shall not rent, lend, sell, transfer or otherwise transport the hazardous and other wastes except what is permitted through this authorization.
4. Any unauthorized change in personnel, equipment or working conditions as mentioned in the application by the person authorized shall constitute a breach of his authorization.
5. The person authorized shall implement Emergency Response Procedure (ERP) for which this authorization is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time.



6. The person authorized shall comply with the provisions outlined in the Central Pollution Control Board guidelines on "Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Waste and Penalty"
7. It is the duty of the authorized person to take prior permission of the State Pollution Control Board to close down the facility.
8. The imported hazardous and other wastes shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation.
9. The record of consumption and fate of the imported hazardous and other wastes shall be maintained.
10. The hazardous and other waste which gets generated during recycling or reuse or recovery or pre-processing or utilization of imported hazardous or other wastes shall be treated and disposed of as per specific conditions of authorization.
11. The importer or exporter shall bear the cost of import or export and mitigation of damages if any.
12. An application for the renewal of an authorization shall be made as laid down under these Rules.
13. Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.
14. Annual return shall be filed by June 30th for the period ensuring 31st March of the year.

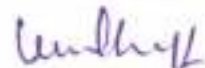
#### **7. GENERAL CONDITION:**

- 7.1 Unit shall develop green belt within premises as per the CPCB guidelines. However, if the adequate land is not available within premises, the unit shall tie up with local agencies like gram panchayat, school, social forestry office etc. for the plantation at suitable open land in nearby locality and submit an action plan of plantation for next three years to GPCB.
- 7.2 Adequate plantation shall be carried out all along the periphery of the industrial premises in such a way that the density of plantation is at least 1000 trees per acre of land and a green belt of 10 meters width is developed.
- 7.3 In case of change of ownership/management the name and address of the new owners/partners/directors/proprietor should immediately be intimated to the Board.
- 7.4 The applicant shall however, not without the prior consent of the Board bring into use any new or altered outlet for the discharge of effluent or gaseous emission or sewage waste from the proposed industrial plant. The applicant is required to make applications to this Board for this purpose in the prescribed forms under the provisions of the Water (Prevention and Control of Pollution) Act-1974, the Air (Prevention and Control of Pollution) Act-1981 and the Environment (Protection) Act-1986.
- 7.5 The overall noise level in and around the plant area shall be kept well within the standards by providing noise control measures including engineering control like acoustic insulation hoods, silencers, enclosures etc on all sources of noise generation. The ambient noise level shall conform to the standards prescribed under the Environment (Protection) Act, 1986 & Rules.
- 7.6 Applicant is required to comply with the manufacturing, Storage and Import of Hazardous Chemicals Rules-1989 framed under the Environment (Protection) Act-1986.
- 7.7 If it is established by any competent authority that the damage is caused due to their industrial activities to any person or his property in that case they are obliged to pay the compensation as determined by the competent authority.



- 7.8 Applicant shall have to comply with all the guidelines / Directive issued / being issued by MoEF&CC / CPCB / DoEF from time to time
- 7.9 Applicant shall not use/withdraw ground water either during construction and /or operation phase.
- 7.10 Environmental cell shall be setup and shall be responsible for the total Environmental management.
- 7.11 Monitoring in respect to Air, Water, Noise level shall be carried out and results shall be submitted to GPCB on quarterly basis.

For and on behalf of  
GUJARAT POLLUTION CONTROL BOARD



(P. J. Vachhani)

Senior Environment Engineer

NO: PC/ CCA- KUTCH- 513 /GPCB ID – 11946/ 447285

Date: 12/31/18

ISSUED TO:  
Sabnam Enterprise,  
Plot No. 87,  
GIDC Anjar,  
Dist : Kutch 370 110



**Regional Office – Kutch (East)**  
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**Email:- [ro-gpcb-kute@gujarat.gov.in](mailto:ro-gpcb-kute@gujarat.gov.in)**

In exercise of the power conferred under section-25 of the Waster (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution) Act-1981 and Authorization under rule 6(2) of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 framed under the E (P) Act-1986.

And whereas Board has received consolidated application no: 176383, dated 28/06/2020 for the fresh consolidated consent and authorization (CC & A) of this Board under the provision / rules of the aforesaid acts-rules. Consent & Authorization is hereby granted as under.

**CONSOLIDATED CONSENT AND AUTHORISATION:**

(Under the provision / rules of the aforesaid environmental acts)

**To,**  
**Aviation Corporation (PCB ID –63724),**  
**PLOT NO: S. No. 67/2/P1,**  
**Shikarpur- 370150**  
**TAL: Bhachau, DIST: Kutch.**

**1. Consent Order No: AWH -43501; Date of Issue: 21/10/2020.**

**2.** The consent shall be valid up to 27/06/2025 for the use of outlet for the discharge of trade effluent and emission due to operation of industrial plant for manufacture of following items/products at an above-mentioned address.

Sr No	Product	Quantity
1	Used Oil/ Waste Oil Reprocessing	300 MT/Month (Used Oil- 150 MT/Month & Waste Oil- 150 MT/Month)
2	Sodium Silicate	1500 MT/Month

Specific Condition
1. No ground water shall be withdrawn without prior approval from competent authority. 2. You shall not carry out any activity which may attract the applicability of EIA notification-2006 and its amendments. 3. Management of Solid Waste generated from industrial activities shall be as per Solid Waste Management Rules-2016 (solid waste as defined in Rule-3(46)). 4. As per provision of Rule-18 of Solid Waste Management Rules-2016 all industrial units using fuel and located within 100 km from the refused derived fuel (ROF) plant shall made an arrangement to replace at least five percent of their fuel requirement by refused derived fuel so produced. 5. Industry shall manage Solid Waste generated from industrial activities as per Solid Waste Management Rules- 2016 (Solid Waste as defined in Rule- 3(46)). 6. Industry shall comply with Plastic Waste Management Rules- 2018 & amended therefore. (if applicable) 7. You shall have to comply with Coal Handling guideline.



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8. You shall have to comply with Fly Ash Notification- 1999 and its amendments.																																						
3	Condition under the Water Act																																					
3.1	Source of Water: Tankers																																					
3.2	The quantity of industrial water consumption shall not exceed 07 KL/Day.																																					
3.3	The quantity of Domestic water consumption shall not exceed 02 KL/Day.																																					
3.4	The quantity of industrial waste water generated from manufacturing process & other ancillary operation shall not exceed 2.2 KL/Day.																																					
3.5	The quantity the Domestic waste water (sewage) shall not exceed 1.2 KL/Day.																																					
3.6	Industrial effluent from process plant, washing etc. shall be collected separately & treated into ETP adequately so that treated industrial effluent shall comply with following norms:																																					
	<table><tr><th>PARAMETER</th><th>PERMISSIBLE LIMIT</th></tr><tr><td>pH</td><td>6.5 to 8.5</td></tr><tr><td>Temperature</td><td>40°C</td></tr><tr><td>Color</td><td>100 Units</td></tr><tr><td>Suspended Solids</td><td>100 mg/l</td></tr><tr><td>Oil &amp; Grease</td><td>10 mg/l</td></tr><tr><td>Phenolic Compound</td><td>01 mg/l</td></tr><tr><td>Amonical Nitrogen</td><td>50 mg/l</td></tr><tr><td>BOD (03 days At 27° C)</td><td>30 mg/l</td></tr><tr><td>COD</td><td>100 mg/l</td></tr><tr><td>Chloride</td><td>600 mg/l</td></tr><tr><td>Sulphates</td><td>1000 mg/l</td></tr><tr><td>Total Dissolved Solids</td><td>2100 mg/l</td></tr><tr><td>Sulphides</td><td>02 mg/l</td></tr><tr><td>Percent Sodium</td><td>60%</td></tr><tr><td>Sodium Adsorption Ratio</td><td>26</td></tr></table>						PARAMETER	PERMISSIBLE LIMIT	pH	6.5 to 8.5	Temperature	40°C	Color	100 Units	Suspended Solids	100 mg/l	Oil & Grease	10 mg/l	Phenolic Compound	01 mg/l	Amonical Nitrogen	50 mg/l	BOD (03 days At 27° C)	30 mg/l	COD	100 mg/l	Chloride	600 mg/l	Sulphates	1000 mg/l	Total Dissolved Solids	2100 mg/l	Sulphides	02 mg/l	Percent Sodium	60%	Sodium Adsorption Ratio	26
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	Treated effluent confirming to the above standards shall be reuse in within plant only.																																					
3.7	Industry shall provide fixed pipeline with flow meter for reuse of treated effluent to achieve Zero Liquid Discharge.																																					
3.5	Sewage shall be disposed of through septic tank / soak pit system.																																					
4	Conditions under the Air Act																																					
4.1	The following shall be used as fuel.																																					
	<table><tr><td>Sr No</td><td>Fuel</td><td>Quantity</td></tr><tr><td>1</td><td>HSD</td><td>20 Lit/Hr.</td></tr><tr><td>2</td><td>LDO</td><td>290 Lit/Day</td></tr><tr><td>3</td><td>Fire Wood</td><td>08 MT/Day</td></tr><tr><td>4</td><td>Coal</td><td>05 MT/Day</td></tr></table>						Sr No	Fuel	Quantity	1	HSD	20 Lit/Hr.	2	LDO	290 Lit/Day	3	Fire Wood	08 MT/Day	4	Coal	05 MT/Day																	
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4.2	The flue gas emission through stack shall confirm to the following standards.																																					
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	2	Vessel (12 TPD)	11	with Cyclone Separator	SO2 NOx	100 PPM 50 PPM
	3	Furnace	30	Alkali Scrubber		
	4	DG Set (80 kVA) Stand by	11	--		
4.3	There shall be no process gas emission from manufacturing activities and other ancillary operations.					
4.4	The concentration of the following 11 parameters in the ambient air within the premises of the industry shall not exceed the limits specified hereunder as per National Ambient Air Quality Standards issued by MoEF & CC dated 16th November-2009.					
	Sr. No.	Pollutant	Time Weighted Average		Concentration in Ambient air in microgram/cum	
	1	Sulphur Dioxide (SO <sub>2</sub> )	Annual 24 Hours		50 80	
	2	Nitrogen Dioxide (NO <sub>2</sub> )	Annual 24 Hours		40 80	
	3	Particulate Matter (PM <sub>10</sub> )	Annual 24 Hours		60 100	
	4	Particulate Matter (PM <sub>2.5</sub> )	Annual 24 Hours		40 60	
4.5	The applicant shall provide portholes, ladder, platform etc at chimney(s) for monitoring the air emissions and the same shall be open for inspection to/and for use of Board's staff. The chimney(s) vents attached to various sources of emission shall be designed by numbers such as S-1, S-2, etc. and these shall be painted/ displayed to facilitate identification.					
4.6	The industry shall make adequate measures for control of noise levels from its own sources within the premises so as to maintain ambient air quality standards in respect of noise to less than 75dB(a) during day time and 70 dB(A) during night time. Daytime is reckoned in between 6 AM to 10 PM and nighttime is reckoned between 10 PM to 6 AM.					
4.7	<b><u>DG Sets Conditions:</u></b> The D.G. Set shall have acoustic enclosure and shall comply with the standards specified at Sr. no. 95 of Schedule-I of the rule-3 of E.P. Rules -1986 and Noise pollution level as per the Air Act-1981. <b><u>D.G. Sets standards:</u></b> The flue gas emission through stack attached to D.G. Sets shall conform to the following standards. a) The minimum height of stack to be provided with each of the generator set shall be $H=h+0.2(KVA)^{1/2}$ , where H=Total stack height in meter, h=height of the building in meters where or by the side of which the generator set is installed. b) Noise from DG set shall be controlled by providing an acoustic enclosure or by treating the room acoustically, at the user's end c) The acoustic enclosure or acoustic treatment of the room shall be designed for minimum 25 dB (A) insertion loss or for meeting the ambient noise standards, whichever is on the higher side (if the actual ambient noise is on the higher side, it may not be possible to check the performance of the acoustic enclosure/ acoustic treatment. Such circumstances the performance may be checked for noise reduction up to actual ambient noise level,					



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	<p>preferably, in the night time). The measurement for insertion loss may be done at different points at 0.5 m from the acoustic enclosure/room, and the averaged.</p> <p>d) The D.G. Set shall be provided with proper exhaust muffler with insertion loss of minimum 25 dB (A).</p> <p>e) All efforts shall be made to bring down the noise level due to the D.G. Set, outside the premises, within the ambient noise requirements by proper siting and control measures.</p> <p>f) Installation of a D.G. Sets must be strictly in compliance with the recommendations of the D.G. Set manufacturer.</p> <p>g) A proper routine and preventive maintenance procedure for the D G. Set should be set and followed in consultation with the DG Set manufacture which would help prevent noise levels of the DG Set from deteriorating with use.</p>																														
5	<b>Authorization under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 &amp; amended.</b>																														
5.1	<b>Authorization Number: AWH -43501 Date of Issue: 21/10/2020 and shall valid up to 27/06/2025.</b>																														
5.2	<p><b>M/s. Aviation Corporation (PCB ID –63724),</b> is hereby granted an authorization to operate facility for following hazardous wastes on the premises situated PLOT NO: S. No. 67/2/P1, Shikarpur– 370150, TAL: Bhachau, DIST: Kutch.</p> <table><tr><th>Sr. No</th><th>Waste</th><th>Quantity</th><th>Schedule-I</th><th>Facility</th></tr><tr><td>1</td><td>Used or spent Oil</td><td>1800 MT/yr.</td><td>5.1</td><td>Receipt, Collection, Storage, Transportation &amp; reused in process.</td></tr><tr><td>2</td><td>Oily waste</td><td>1800 MT/yr.</td><td>5.2</td><td>Receipt, Collection, Storage, Transportation &amp; reused in process.</td></tr><tr><td>2</td><td>Sludge from Wet Scrubber</td><td>05.0 MT/yr.</td><td>37.1</td><td>Collection, Storage, Transportation &amp; Disposed to TSDF site.</td></tr><tr><td>3</td><td>Sludge and filter contaminated with Oil</td><td>20.0 MT/yr.</td><td>3.3</td><td>Collection, Storage, Transportation &amp; Disposed to TSDF site.</td></tr><tr><td>4</td><td>Empty barrels/ containers/ liners contaminated with hazardous chemicals / wastes</td><td>04.00 M/yr.</td><td>33.1</td><td>Collection, Storage, Transportation &amp; disposed by selling it to registered recycler.</td></tr></table>	Sr. No	Waste	Quantity	Schedule-I	Facility	1	Used or spent Oil	1800 MT/yr.	5.1	Receipt, Collection, Storage, Transportation & reused in process.	2	Oily waste	1800 MT/yr.	5.2	Receipt, Collection, Storage, Transportation & reused in process.	2	Sludge from Wet Scrubber	05.0 MT/yr.	37.1	Collection, Storage, Transportation & Disposed to TSDF site.	3	Sludge and filter contaminated with Oil	20.0 MT/yr.	3.3	Collection, Storage, Transportation & Disposed to TSDF site.	4	Empty barrels/ containers/ liners contaminated with hazardous chemicals / wastes	04.00 M/yr.	33.1	Collection, Storage, Transportation & disposed by selling it to registered recycler.
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5.3	The authorization is granted to operate a facility for collection, storage within factory premises, transportation and ultimate disposal of Hazardous waste by selling it to registered recyclers.																														
5.4	Unit shall apply for authorization for other types of hazardous waste referring to the amended Rules.																														
5.5	The authorization is subject to the conditions stated below and such other conditions as may be specified in the rules from time to time under the Environment (Protection) Act-1986.																														
5.6	<b>Terms and conditions of authorization:-</b>																														
1.	The authorized person shall comply with the provisions of the Environment (Protection) Act, 1986, and the rules made there under.																														



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2.	The authorization or its renewal shall be produced for inspection at the request of an officer authorized by the State Pollution Control Board.
3.	The person authorized shall not rent, lend, sell, transfer or otherwise transport the hazardous and other wastes except what is permitted through this authorization.
4.	Any unauthorized change in personnel, equipment or working conditions as mentioned in the application by the person authorized shall constitute a breach of his authorization.
5.	The person authorized shall implement Emergency Response Procedure (ERP) for which this authorization is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time.
6.	The person authorized shall comply with the provisions outlined in the Central Pollution Control Board guidelines on “Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Waste and Penalty”.
7.	It is the duty of the authorized person to take prior permission of the State Pollution Control Board to close down the facility.
8.	The imported hazardous and other wastes shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation.
9.	The record of consumption and fate of the imported hazardous and other wastes shall be maintained.
10.	The hazardous and other waste which gets generated during recycling or reuse or recovery or pre-processing or utilization of imported hazardous or other wastes shall be treated and disposed of as per specific conditions of authorization.
11.	The importer or exporter shall bear the cost of import or export and mitigation of damages if any.
12.	An application for the renewal of an authorization shall be made as laid down under these Rules.
13.	Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.
14.	Annual return shall be filed by June 30th for the period ensuring 31st March of the year.
<b>5.7</b>	<b>General Conditions</b>
1	Any change in personnel, equipment or working conditions as mentioned in the consents form/order should immediately be intimated to this Board.
2	Applicant shall also comply with the general conditions given in annexure I.
3	The waste generator shall be totally responsible for (I.E. Collection, storage, transportation and ultimate disposal) of the wastes generated.
4	Records of waste generation, its management and annual return shall be submitted to Gujarat Pollution Control Board in Form - 4 by 31st January of every year.
5	In case of any accident, details of the same shall be submitted in Form - 5 to Gujarat Pollution Control Board.
6	As per “Public liability Insurance Act - 91” company shall get Insurance policy, if applicable.
7	Empty drums and containers of toxic and hazards material shall be treated as per guideline published for management & handling of discarded containers”. Records of the same shall be maintained and forwarded to Gujarat Pollution Control Board regularly.
8	In no case any kind of hazardous waste shall be imported without prior approval of appropriate authority.
9	In case of transport of hazardous waste to a facility for (I.E. Treatment, Storage and disposal) existing in a state other than the state where hazardous waste are generated, the occupier shall obtain “No Objection certificate” from the state pollution Control Board, the Committee of the



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	concerned state or Union territory Administration where the facility exists.
10	Unit shall take a)) concrete measures to show tangible results in waste generation reduction, avoidance, reuse and recycle. Action taken in this regards shall be submitted within 03 months and also along with Form 4.
11	Industry shall have to display the relevant information with regard to hazardous waste as indicated in the Hon Supreme Court's order in W.P. NO.65 of 1995 dated 14th October 2003.
12	Industry shall have to display online data outside the main factory gate with regard to quantity and nature of hazardous chemicals being handled in the plant, including wastewater and air emissions and solid hazardous waste generated within the factory premises.

**For and behalf of**  
**Gujarat Pollution Control Board**

**Regional Officer, Kutch(East)**



# GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar 382 010

Phone : (079) 23222425

(079) 23232152

Fax : (079) 23232155

Website : www.gpcb.gov.in

By-R.P.A.O.

In exercise of the power conferred under section-25 of the Water (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution)-1981 and Authorization Under Rule 8(2) of the Hazardous & other Waste (Management and Transboundary Movement, Rules 2016 framed under the Environmental Protection Act-1986.

And whereas board has received consolidated consent application letter No 120321 dated 17/04/2017 for the Consolidated Consent and Authorization (CC & A) of this Board under the provisions of rules of the aforesaid Acts. Consents & Authorization are hereby granted as under:

## CONSENT

(Under the provisions of rules of the aforesaid environmental acts)

To,

M/S. ARJMA PETROCHEM (ID-13588).

PLOT NO. 50.

GIDC, VARTOL

VARTOL-364001.

TAL-DIST-SHIVNAGAR.

1. Consent Order No. AWR-87122 date of issue: 13-07/2017.

2. The consents shall be valid up to 31/03/2022 for use of outlet for the discharge of effluent & emission due to operation of industrial plant for manufacture of the following items/products:

Sr. No.	Product	Capacity
1	Re- Refined used oil	125KL/Month

## 3. CONDITIONS UNDER WATER ACT 1974:-

3.1 The quantity of the industrial discharge shall not exceed 1.5 KL/day. Generated waste water will be evaporated in evaporation tank after primary treatment hence there shall be 'Zero Discharge' from the industry. The records regarding the generation of trade effluent, evaporation data etc shall be maintained in the form of a log-book & made available to the monitoring staff.

3.2 The quantity of the domestic waste water (sewage) shall not exceed 0.8 KL/day.

3.3 Sewage shall be disposed of through Septic tank/soak pit system.

## 4. CONDITIONS UNDER AIR ACT 1981:-

4.1 The following shall be used as fuel in the Furnaces respectively.

Sr. No.	Fuel	Quantity
1	Wood	3.0 Kg./Hrs

4.2 The applicant shall install & operate a pollution control system in order to achieve norms prescribed below.

4.3 The flue gas emission through stack shall conform to the following standards:

Sr.No.	Common attached to	Stack height in Meter	Air Pollution Control System	Parameter	Permissible Limit
1	Furnace(3Nos)	33	Cyclone separator	Particulate Matter SO <sub>2</sub> NO <sub>x</sub>	50 mg/NM <sup>3</sup> 100 ppm 50 ppm

4.4 There shall be no process emission from the manufacturing process as well as other ancillary process.

4.5 Stack monitoring facilities like port hole, platform/ladder etc., shall be provided with stack/vent chimney in order to facilitate sampling of gases being emitted in to the atmosphere.

4.6 The concentration of the following substances in the ambient air within the premises of this industry and at a distance of 10 meters from the source (other than the stack/vent with height of more than 9 meter from the ground level) shall not exceed the following levels:

*(Signature)*

Page 1 of 4

- 4.7 Ambient air quality within the premises of the industry shall conform to the following standards:-

PARAMETER	PERMISSIBLE LIMIT	PERMISSIBLE LIMIT
	Annual	24 hrs. Average
Particulate matter (TSP <sub>24</sub> )	60 Microgram /NM <sup>3</sup>	100 Microgram /NM <sup>3</sup>
Particulate matter (PM <sub>10</sub> )	40 Microgram /NM <sup>3</sup>	60 Microgram /NM <sup>3</sup>
SO <sub>2</sub>	50 Microgram /NM <sup>3</sup>	80 Microgram /NM <sup>3</sup>
Nox	40 Microgram /NM <sup>3</sup>	80 Microgram /NM <sup>3</sup>

- 4.8 All measures for the control of environmental pollution shall be provided before commencing production.

**5. GENERAL CONDITIONS:-**

- 5.1 Any change in operational, ecological or working conditions as mentioned in the Conditions for Award should immediately be intimated to this Board.
- 5.2 Applicant shall also comply with the general conditions given in annexure I.
- 5.3 Industry shall have to display on-site data outside the main factory gate with regard to quantity and nature of hazardous chemicals being handled in the Plant, including wastewater and air emissions and also of hazardous waste generated within the factory premises.
- 5.4 Industry shall have to display the relevant information with regard to hazardous waste as indicated in the Hon. Supreme order in w.p. no. 557 of 1995 dated 14th October 2003.
6. Authorization under Hazardous and Other Waste (Management and Transboundary Movement) Rules-2016 FORM 2 (See rule 5(2))

**FORM FOR GRANT OR RENEWAL OF AUTHORISATION BY STATE POLLUTION CONTROL BOARD TO THE OCCUPIERS, RECYCLERS, REPROCESSORS, REUSERS USER AND OPERATORS OF DISPOSAL FACILITIES**

- 6.1 Number of authorization: AWH-87122. Date of issue: 13/07/2017

M/s. AROMA PETROCHEM (ID-13688), is hereby granted an authorization to operate a facility for following hazardous wastes on the premises situated at PLOT NO. 60, G-DC, VARTEJ, VARTEJ-364001, Tal-Dist-Bhavnagar.

Sl. No.	Category of Hazardous Waste as per the Schedules I, II and III of these rules	Authorized mode of disposal or recycling or utilization or co-processing, etc.	Quantity (Ton/Annum)
1.	174.4	Collection, storage, transportation, disposal at TSDF site.	300 MT/Yr
2.	175.3	Collection, storage, transportation, disposal at TSDF site.	0.1 MT/Yr
3.	Sch-IV	Reception, Collection, storage, transportation, & Re-refining	1500 MT/Yr
4.	175.2	Collection, storage, transportation, disposal at TSDF site.	95 MT/Yr
5.	173.1	Collection, storage, transportation, decontamination	4.2 MT/Yr
6.	176.2	Collection, storage, disposal, incineration	0.2 MT/Yr

- 6.2 The authorization is granted to operate a facility for collection, storage within factory premises, transportation and Recycle

- 6.3 The authorization shall be valid up to 31/03/2022.

*[Signature]*



## GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar 382 010

Phone : (079) 23222425

(079) 23232152

Fax : (079) 23232156

Website : [www.gpcb.gov.in](http://www.gpcb.gov.in)

6.4 The authorization is subject to the conditions stated below and such other conditions as may be specified in the rules from time to time under the Environment (Protection) Act 1986.

### 7. TERMS AND CONDITIONS OF AUTHORISATION:

- The applicant shall comply with the provisions of the Environment (Protection) Act - 1986 and the rules made there under.
- The authorization shall be produced for inspection at the request of an officer authorized by the Gujarat Pollution Control Board.

#### B. General Conditions:

##### A. Conditions under Hazardous and other Wastes (M&TM) Rules-2016

- The Authorized person shall comply with the provisions of the Environment (Protection) Act, 1986, and the rules made there under.
- The Authorization or its renewal shall be produced for inspection at the request of an officer Authorized by the State Pollution Control Board.
- The person Authorized shall not haul, land, sell, transfer or otherwise transport the hazardous and other wastes except what is permitted through the authorization.
- Any unauthorized change in personnel, equipment or working conditions as mentioned in the application by the person authorized shall constitute a breach of the authorization.
- The person authorized shall implement Emergency Response Procedure (ERP) for which the authorization is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time.
- The person authorized shall comply with the provisions outlined in the Central Pollution Control Board guidelines on "Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Waste and Penalty".
- It is the duty of the authorized person to take prior permission of the State Pollution Control Board to close down the facility.
- The imported hazardous and other wastes shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation.
- The record of consumption and fate of the imported hazardous and other wastes shall be maintained.
- The hazardous and other waste which gets generated during recycling or reuse or recovery or post-processing or utilization of imported hazardous or other wastes shall be treated and disposed of as per specific conditions of authorization.
- The importer or exporter shall bear the cost of import or export and mitigation of damages if any.
- An application for the renewal of an authorization shall be made as laid down under these Rules.
- Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.
- Annual return shall be filed by June 30<sup>th</sup> for the period ensuing 31<sup>st</sup> March of the year.

##### B. Specific Conditions

- The authorized actual user of hazardous and other wastes shall maintain records of hazardous and other wastes purchased in a passbook issued by the State Pollution Control Board along with the authorization.
- Handing over of the hazardous and other wastes to the authorized actual user shall be only after making the entry into the passbook of the actual user.
- In case of renewal of authorization, a self-certified compliance report in respect of effluent emission standards and the conditions specified in the authorization for hazardous and other wastes shall be submitted to SPCB.

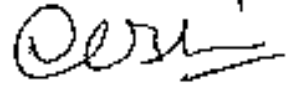
Page 3 of 4

**Clean Gujarat Green Gujarat**

ISO-9001-2008 & ISO-14001 - 2004 Certified Organisation

4. The occupier of the facility shall comply Standard operating procedure/ guidelines published by MoEF&CC or CPCB or GPCB from time to time.
5. Environmental safety provisions of effluent Management Rules-2016.
6. The treatment of Hazardous waste shall be carried out as per the waste Management hierarchy.

For and on behalf of  
GUJARAT POLLUTION CONTROL BOARD,



(Chirag Bhimani)  
Unit head

No. PCBCA/SIV-41610-10/86

Date.

Issued to:

✓ M/S. AROMA PETROCHEM (ID-13686),  
PLOT NO. 60,  
GIDC, VARTOL,  
VARTOL-364001,  
TAL-DIST-BHAVNAGAR.

Signature Not Verified

Digitally signed by BHIMANI  
CHIRAG  
Date: 2017.09.29 14:31:09 IST  
Reason: Secure Document  
Location: India

Page 4 of 4



# GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar 382 010

Phone : (079) 23222425

(079) 23232152

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Website : www.gpcb.gov.in

By R.F.A.D

In exercise of the power conferred under section-25 of the Water (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution)-1981 and Authorisation under Hazardous Waste (Management and Transboundary Movement) Rules'2016 framed under the Environmental (Protection) Act-1986.

And whereas Board has received consolidated consent application letter dated 02/11/2017 for the Consolidated Consent and Authorization (CC & A) of this Board under the provisions / rules of the aforesaid Acts. Consents & Authorization are hereby granted as under:

## CONSENTS AND AUTHORISATION:

(under the provisions /rules of the aforesaid environmental acts)

To;

JAWRAWALA PETROLEUM

PLOT NO. 200/33,

B/H KASHIRAM TEXTILE, NAROL,

AHMEDABAD-382405

1. Consent Order No.: AWH-90572 Date of Issue: 20/01/2018
2. The consents shall be valid up to 12/02/2024 for use of outlet for the discharge of trade effluent & emission due to operation of industrial plant for manufacture of the following items/products:

Sr. No	Name (Qty:MT/Month)	Existing Quantity	Proposed Quantity	Total Quantity
1	Re-Cycled Waste Oil	600KL/Month	-	600 KL/Month
2.	Re- refined used oil	400KL/Month	-	400KL/Month
3.	De Contamination,De toxification and Recycle/Reconditioning of Empty barrels (MS & Plastics)	20,000 No/Month	180,000 No/Month	2,00,000 No/Month
4.	Plastic Scrap Granules	100 MT/Month	1900 MT/Month	2000MT/Month
5.	MS Cut Barries & Sheets	-	3,000 MT/Month	3,000MT/Month

## Specific Condition

- 1) CCA Order no: AWH-61464 dated: 01/04/2014 shall considered as cancelled.
  - 2) Unit shall comply with CPCB guideline for Environment Sound Technology for waste oil/used oil Recycling and also SOP for decontamination of discarded containers/Barrels/drums.
  - 3) Unit shall explore the possibility of co-processing for incinerable Haz. Waste in cement industry & shall Submit the progress report for the same.
  - 4) Unit shall obtain necessary permission under the Plastic Waste Management Rules-2016.
3. **CONDITIONS UNDER THE WATER ACT:**
- 3.1 The quantity of the industrial effluent to be generated from the manufacturing process and other ancillary industrial operations shall not exceed 29,600 ltr/day. Out of which 2000 ltr/day treated effluent (Condensate) shall be reuse and 18,000 ltr/day treated effluent shall be evaporated in electricity operated evaporator & 11,600 Ltr/day treated effluent shall be incinerated. Thus there shall be No discharge of any industrial effluent within or outside unit.
- 3.2 The quantity of Sewage effluent from the industry shall not exceed 2000 Ltr/day.

- 3.3 Domestic effluent shall be discharged off through septic tank/soak pit system.
- 3.4 The directives issued by the Board from time in view of direction issued by the Honorable High Court Of Gujarat in the matter of S.C.A. 770/95 and any other shall have to be complies with.
4. **CONDITIONS UNDER THE AIR ACT:**
- 4.1 Following shall be used as fuel in Wood & LDO.

Sr.No.	Fuel	Existing Quantity	Proposed Quantity	Total Quantity
1	Wood (04 No) (Furnace)	400 Kg/day	-	400 Kg/day
2	LDO	35L/hour	20L/hr	55 L/hour

- 4.2 The applicant shall install & operate air pollution control system in order to achieve norms prescribed below
- 4.2.1 The flue gas emission through stack attached to boiler/furnace/heater shall conform to the following standards:

Stack No.	Stack attached to	Stack height in meter	Air Pollution Control System	Parameter	Permissible Limit
1.	Furnace(Existing)-3No	30 (Common Stack)	Scrubber & quencher	Particulate Matter SO <sub>2</sub> NO <sub>x</sub>	150 mg/Nm <sup>3</sup> 100 ppm 50 ppm
2.	Heating furnace (Proposed new)-1No Attached to single effect evaporator				
3.	Thermic fluid Heater	11			
4.	DG set (125 KVA)				

- 4.2.2 The Process gas emission through stack attached to boiler/furnace/heater shall conform to the following standards:

Stack No.	Stack attached to	Stack height in meter	Air Pollution Control System	Parameter	Permissible Limit
1.	Cative incinerator for hazardous waste (cap-500 kg/hr)	11	Alkali scrubber	Particulate Matter SO <sub>2</sub> NO <sub>x</sub> HCL cl <sub>2</sub> HF CO TOC	150 mg/Nm <sup>3</sup> 100 ppm 50 ppm 50 mg/Nm <sup>3</sup> 09 mg/Nm <sup>3</sup> 04 mg/Nm <sup>3</sup> 100 mg/Nm <sup>3</sup> 20 mg/Nm <sup>3</sup>



# GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar 382 010

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- 4.2.3 Ambient air quality within and outside the premises of the unit shall conform National Ambient Air Quality standards notified by MOEF vide notification dated 16/11/2009 and mainly to the following standards:-

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient air
1.	Sulphur Dioxide (SO <sub>2</sub> ), µg/m <sup>3</sup>	Annual 24 Hours	50 80
2.	Nitrogen Dioxide (NO <sub>2</sub> ), µg/m <sup>3</sup>	Annual 24 Hours	40 80
3.	Particulate Matter (Size less than 10 µm) OR PM <sub>10</sub> µg/m <sup>3</sup>	Annual 24 Hours	60 100
4.	Particulate Matter (Size less than 2.5 µm) OR PM <sub>2.5</sub> µg/m <sup>3</sup>	Annual 24 Hours	40 60

- 4.3 The applicant shall provide portholes, ladder, platform etc at chimney(s) for monitoring the air emissions and the same shall be open for inspection to and for use of Board's staff. The chimney(s) vents attached to various sources of emission shall be designed by numbers such as S-1, S-2, etc. and these shall be painted/displayed to facilitate identification.

- 4.4 The industry shall take adequate measures for control of noise levels from its own sources within the premises so as to maintain ambient air quality standards in respect of noise to less than 75dB(a) during day time and 70 dB (A) during night time. Daytime is reckoned in between 6 a.m. and 10 p.m. and nighttime is reckoned between 10 p.m. and 6 a.m.

- 4.5 The applicant shall provide proper ventilation and exhaust facilities so as to maintain healthy working atmosphere within the factory premises.

## 5. GENERAL CONDITIONS:-

- 5.1 Any change in personnel, equipment or working conditions as mentioned in the consents form/order should immediately be intimated to this Board.

Form for grant of authorisation for occupier or operator handling hazardous waste

## 6. AUTHORISATION FOR THE MANAGEMENT & HANDLING OF HAZARDOUS WASTES

Form-2 (See rule 6 (2))

- 6.1 Number of authorisation: AWH-90572 Date of Issue: 20/01/2018

- 6.1.1 Jawrawala Petroleum, is hereby granted an authorisation to operate facility for following hazardous wastes on the premises situated at PLOT NO.200/33-, B/H KASHIRAM TEXTILE, NAROL, AHMEDABAD-382405

Sr. No.	Waste	Quantity	Process Category	Facility and Final Disposal
1	ETP Waste	1.8 MT/y	35.3	Collection, Storage, Transportation, Disposal at TSDF-NECL Vadodara
2	Discarded Containers	2,00,000 nos./Month	33.1	Reception, Storage, Decontamination & Transportation

3	Used Oil	400KL/Month (4800 KLA)	5.1	Reception, Storage, reprocessing in your unit.
4	Spent Clay	120 MT/yr	4.5	Disposal by Captive incinerator/send to cement ind for co-processing
5	Filer& Filtered Material	0.84MT/yr	36.1	Disposal by Captive incinerator/send to cement ind for co-processing
6	Incineration ash	150 MT/yr	37.2	Collection, Storage, Transportation, Disposal at TSDF -NECL Vadodara
7	Olly Sludge	768 KL/yr	4.1	Disposal by Captive incinerator/send to cement ind for co-processing
8	Waste oil	600KL/Month (7200 KLA)	5.2	Reception, Storage, reprocessing in your unit.

6.1.2 The authorisation is granted to operate a facility for collection, storage, within the factory premises and as per 6.1.1

6.1.3 The authorisation shall be valid up to 12/02/2024.

6.1.4 The authorisation is subject to the conditions stated below and such other conditions as may be specified in the rules from time to time under the Environment (Protection) Act-1986.

**6.1.5 TERMS AND CONDITIONS OF AUTHORISATION**

- The applicant shall comply with the provisions of the Environment (Protection) Act - 1986 and the rules made there under.
- The authorisation shall be produced for inspection at the request of an officer authorized by the Gujarat Pollution Control Board.
- The persons authorized shall not rent, lend, sell, transfer or otherwise transport the hazardous wastes without obtaining prior permission of the Gujarat Pollution Control Board.
- Any unauthorized change in personnel, equipment or working conditions as mentioned in the authorisation order by the persons authorized shall constitute a breach of this authorisation.
- It is the duty of the authorised person to take prior permission of the Gujarat Pollution Control Board to close down the facility.
- An application for the renewal of an authorisation shall be made as laid down in rule (6) (ii).
- Industry shall have to manage waste oil, discarded containers etc as per Hazardous and Other Wastes (Management & T.M.) Rule-2016.
- Industry shall submit annual report by 30th June every year.

For and on behalf of  
Gujarat Pollution Control Board

  
Y.A. Tal  
Sr. Environmental Engineer

NO: GPCB/ABD/NL/CCA-98 A (3)/ID-11849/  
JAWRAWALA PETROLEUM  
PLOT NO. 200/33-  
B/H KASHIRAM TEXTILE, NAROL,  
AHMEDABAD-382405.



DETOX GROUP

**Saurashtra Enviro Projects Pvt. Ltd.**

**Integrated Common Hazardous Waste Management Facility**

# Certificate

Certificate No : 1200000023

*To Whomsoever it may concern*

*This is to certify that*

**ADANI PORTS & SPECIAL ECONOMIC ZONE LTD.**

PLOT NO.169/P,  
AT: NAVINLAL ISLAND,  
TAL:MUNDRA,

KUTCH

*is a valid member of*

**SAURASHTRA ENVIRO PROJECTS PVT. LTD.**

*for Integrated Common Hazardous Waste Management Facility.*

*This membership is valid for a period of*

**5 Years**

*Date of issue : 06.02.2019*

*Date of expiration : 05.02.2024*

*Place of issue : Surat*

*For, Saurashtra Enviro Projects Pvt. Ltd.*

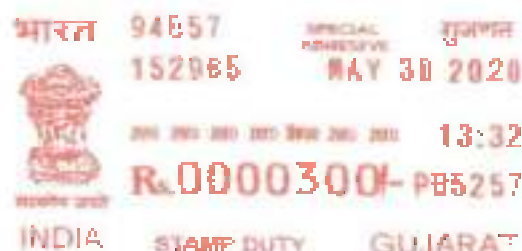
**Director**

**SUBJECT TO SURAT JURISDICTION**

Corporate Office : Detox House, Opp. Gujarat Samachar Press, Udhna Darwaja, Ring Road, Surat - 395 002. (Guj.)  
p. +91 261 2351248, 2346181 f. +91 261 2354068  
e. info@seplindia.com w. www.detoxgroup.in  
CIN :- U51100GJ2006PTC047689

Purchaser's Name APSEZ, Mundra  
 Address Mundra  
 Value Rs. 3.00  
 In Words Three hundred  
 License No. Gujarat/Ahmedabad/10/2006/3211

AXIS BANK LTD.  
 ADANI PORT, MUNDRA-370421.  
 GUJ/SOS/AUTHIAV/101/2006



## Service Agreement

This Service Agreement (hereinafter referred to as the "Agreement"), is made and entered into at Ahmedabad on this 20<sup>th</sup> May, 2020

### By and between

Adani Ports And Special Economic Zone Limited, a Company incorporated under the Companies Act, 1956 having CIN No. L63090GJ1998PLC034182 and its Registered Office at Adani House, Mithakhali Six Roads, Navrangpura, Ahmedabad and Corporate office at Adani Corporate House Shantigram S C Highway P.O. Ahmedabad-382421, and its port office situated at Adani Port, Navamal Island Mundra -370421 District Kutch, Gujarat (hereinafter referred to as the "APSEZL or the First Party" or "the Generator", which expression shall, unless repugnant to the context of meaning thereof, be deemed to mean and include its successors in business and assigns) represented herein by its duly constituted attorney Mr. Avinash Rai (CEO- APSEZ Mundra & Tuna Ports) who is authorized to do so by position he holds at/of the First Part.

And

Ambuja Cements Limited, a Company incorporated under the Indian Companies Act, 1956, having CIN No. L26942GJ1981PLC004717 and its Registered Office at P.O. Ambuja Nagar, Taluka - Kodinar, Amreli, District - Gir Somnath, Gujarat - 362715 having its division/ unit/ section as "Geocycle" that provides specialized services for thermal destruction or recovery of hazardous non Hazardous waste material in cement kilns (hereinafter referred to as the "Second Party/ACL," which expression shall, unless repugnant to the context, mean and include its successors and assigns) represented herein by its duly constituted attorney Mr. S Ramamo (MCH- West & South) who is authorized to do so by position he holds at/of the Other Part.

APSEZL and ACL shall be collectively addressed / referred to as "the Parties" and individually as "Party" herein after in this Agreement.

WHEREAS, First Party, is in the business of Port and SEZ Operations and its Plants are situated at Mundra, Kutch, Gujarat (hereinafter referred to as the First Party's "Manufacturing Units") and is in search of disposal of (i) Contaminated Culture waste (Cat. 33.2), (ii) Pig Waste (Cat. 3.1) and (iii) FTP Sludge (Cat. 35.3) and (iv) Sorted MSW- Non Hazardous (which are generated at First Party's Manufacturing Units during its production process (hereinafter referred to as the "Waste Material"), which is categorized as Hazardous Waste as per Hazardous and Other Wastes (Management and Transboundary Movement) Rules 2016.



*S. Ramamo*

*Avinash Rai*



First party also generates non-recyclable sorted municipal solid waste i.e. dry plastic waste (hereinafter referred to as the "Waste Material"), which is categorized as Non-Hazardous Waste.

AND WHEREAS, Second Party is in the business of manufacture and sale of different types and grades of cement and has the capability to dispose the waste materials in an environment friendly manner in the cement kiln process having high temperature and long residence time (hereinafter referred to as "Co-Processing") while simultaneously producing cement of desired quality.

AND WHEREAS, Geocycle is a business unit of ACL that provides specialized services for thermal destruction or recovery of hazardous/non hazardous waste material in cement kilns.

AND WHEREAS First Party has approached Second Party for evaluating the feasibility of safe disposal of the Waste Material which is generated at its Segregation Plant, in an environment-friendly manner and based on the evaluation report, the Second Party has offered to Co-Process the Waste Material generated by First Party's Segregation Plant in the Cement Kiln at its Ambuja Cements Limited, at P.O. Ambuja Nagar, Taluka - Kodinar, Amreli, District - Gir Sumnath, Gujarat - 362715 (hereinafter referred to as the "Cement Plant").

AND WHEREAS, First Party and Second Party have agreed that Second Party shall provide the services of Co- Processing the Waste Material in the Cement Kiln at its Ambuja Cement Plant (hereinafter referred to as the "Services"), subject to First Party and Second Party obtaining all statutory clearances, consents, no objection certificate, writings and confirmations as may be applicable from various authorities and Government Agencies for the said purpose.

NOW, THEREFORE, for and in consideration of the foregoing premises and of the mutual covenant herein after stipulated, the Parties hereto, one with the other, do hereby agree as follows:

## **1.0 Execution of Services**

### **1.1 Scope**

The Second Party shall during the Term of the Agreement (as set out in Clause 7 herein below), provide the Services i.e. Co-Processing of all the consignments of Waste Material of the First Party, delivered to the Cement Plant of the Second Party, which conform to the specification set out in Annexure A attached to the Agreement and which does not contain any of the items listed in the banned item list as set out in Annexure B attached to the Agreement.

### **1.2 Packaging and Labeling**

Prior to shipment of any consignment of Waste Material to Second Party's Plant for the provision of the Services, the First Party shall comply with the following conditions:

- 1.2.1 Arrange to pack the Waste Material in Double layered/High Density Poly Ethylene (HDPE) bags locked properly with plastic locks/properly sealed packed cartons/Bulk/Loose/Baled form (Baling should not be done through metallic wires) - (Change as per requirement) to avoid any leakages, overall weight of the packing should not be more than 300 X 300 X 300 MM.
- 1.2.2 Label every authorized vehicle (closed container type for transporting Haz Waste) loaded with Waste Material in the format set out in Annexure C attached to the Agreement specifying name of waste, quantity of waste, particle size of waste, size of packaging, Type of waste ("Hazardous/Other Waste") in bold letters both in English and Local Language and with other relevant identification as stipulated under applicable laws.
- 1.2.3 Provide the copies of Health & Safety Data Sheet (in the format as set out in Annexure G) with each consignment of Waste Material.



*ben*





First Party on the basis of Health & Safety Data Sheet, provided by First Party as set out in Annexure G attached to the Agreement. The costs, risks, liability related to unloading, bundling and storage of Waste Material in the Cement Plant during the acceptance process shall be with the First Party. However the cost of unloading, handling and storage during acceptance process has been built into the Service Charges and the First Party need not pay the same separately.

- 1.3.9 The stores department of the Second Party shall issue acceptance receipt to the First Party within eight (8) days from the date of delivery of Waste Material consignments by the First Party at the Cement Plant of Second Party. If the Second Party delays issuance of such acceptance receipt beyond eight (8) days from the date of delivery of consignments of Waste Material by the First Party, it shall be deemed that Second Party has accepted the consignment of Waste Material along with its risk and liability on and from the end of the eighth (8) day. The Waste Material acceptance receipt issued by stores in charge at the Second Party's Cement Plant shall be the conclusive documentary proof evidencing the acceptance of any consignment of Waste Material by the Second Party for the provision of the Services.

#### 1.4 Non-Conforming Waste Material

- 1.4.1 First Party declares and confirms that all the consignment of the Waste Material delivered at the storage area(s) of the Cement Plant of the Second Party pursuant to the Agreement shall
- 1.4.1.1 Conform to the specifications as set out in Annexure A attached to the Agreement
  - 1.4.1.2 Be packed and labeled as per the clause 1.2 hereof
  - 1.4.1.3 Not contain any of the items listed in the banned item list as set out in Annexure B attached to the Agreement.
- 1.4.2 In case, Second Party is in receipt of any consignment that contains banned items or materials other than agreed between the parties as mentioned in Annexure A and/or the requirement under clause 1.2.2 (Packaging & labeling), then Second Party shall be entitled to refuse the acceptance of such consignment and shall intimate the same to First Party within 24 hrs of the receipt of consignment at Second Party's Plant and First Party shall arrange to transport that consignment at its own cost, expense and risk within 48 hrs from the time of intimation from Second Party on the refusal of acceptance of such consignment. If First Party fails to evacuate such rejected consignment of non-conforming Waste Material as stated above within 1 week, it shall be liable and pay to Second Party liquidated damages at the rate of Rs. 500/- per ton for each day of delay (take approval for removal from RSH for 1 plant/NSH for Pan India) in its evacuation from Second Party's Plant. On delay in evacuation of more than 10 days, without prejudice to its rights under Law Second Party shall have the right to further terminate this Agreement.
- 1.4.3 In case if the Waste Material is not conforming to the specifications, as mentioned in Annexure A and/or the requirement under clause 1.2.2 (Packaging & labeling), both the parties shall discuss in order to arrive at a solution with respect to Co-processing that consignment, provided the additional costs towards the same shall be borne by First Party.

#### 1.5 General Responsibilities

- 1.5.1 First Party shall provide all relevant information relating to safe handling and storage practices of the Waste Material, provide reasonable assistance such as supervision required for safe handling and storage of the Waste Material and the inspection and confirmation of the suitability of the storage arrangement made by Second Party to store the Waste Material.
- 1.5.2 First Party shall be solely responsible for ensuring that all precautionary measures are complied with, to avoid any fire, explosion or accident during the loading, transportation and



*Handwritten signature*



delivery of the Waste Material from the First Party's distribution centre to the storage area(s) of Cement Plant of Second Party for the provision of the Services.

- 1.5.3 First Party shall be responsible for the compliance of all statutory regulations and guidelines as applicable to its employees, agents or representatives engaged in loading, storage and handling of Waste Material at the First Party's plant and for onward dispatch to the Cement Plant of the Second Party.
- 1.5.4 Second Party shall be responsible for the compliance of all statutory regulations and guidelines as applicable to its employees, agents or representatives engaged in unloading, storage, handling and Co-processing of Waste Material at its Cement Plant.
- 1.5.5 Second Party shall be responsible to arrange for all tools, tackles, equipment and laboratory facilities necessary to provide the Services.
- 1.5.6 First Party shall be responsible to depute its representatives and senior executives to attend the meetings and answer any queries raised by Second Party relating to the Waste Material.
- 1.5.7 Second Party shall permit the First Party's designated persons to inspect the Co-Processing of the Waste Material at the Cement Plant, provided that First Party shall give a prior intimation in writing of such inspection to the Second Party.
- 1.5.8 First Party shall have in force and effect and shall maintain at its own cost such policy & policies of insurance as applicable, with a reputable authorized insurer which gives First Party adequate insurance cover in respect of any liability that may arise/ damage that may be caused to person/ property of First Party, Second Party & its contractors and any Third Party.
- 1.5.9 Second Party shall have in force and effect and shall maintain at its own cost such policy or policies of insurance as applicable, with a reputable authorized insurer which gives Second Party adequate insurance cover in respect of any liability that may arise or damage that may be caused to person or property of Second Party, First Party and third party.
- 1.5.10 In the event the Second Party is required to comply with statutory regulations and guidelines framed by the concerned authorities or Government Agency relating to emission monitoring for demonstrating the performance of Co-processing of the Waste Material pursuant to the Agreement, the same shall be complied with by the Second Party in consultation with the First Party. Provided, the reasonable costs for the same shall be borne by the First Party.

## 2.0 CERTIFICATE OF CO - PROCESSING

Second Party shall at the beginning of each month during the term of this agreement, issue to First Party Certificate of Co-Processing for the Waste Material received for Co-Processing during previous month in the format set out in Annexure I attached to the Agreement.

## 3.0 SERVICE CHARGES AND PAYMENT TERMS

In consideration of the Second Party providing the Services, the First Party shall pay to the Second Party co processing charges in the following manner:

- 3.1 First Party shall pay to Second Party, Service Charges towards Co-processing at Rs. 5000/- (Rs Five Thousand Only/-) per Ton of Cotton Waste & Rs. 5000/- (Rs Five Thousand Only/-) per Ton of Pig Waste Rs. 5000/- (Rs Five Thousand Only/-) per Ton of EIP Sludge and Rs 10/MT for Sorted MSW- Non-hazardous all are exclusive of any transportation cost.
- 3.2 Second Party shall issue an invoice on monthly basis with relevant supporting documents on First Party against Co-Processing services rendered to First Party on the basis of quantity received during previous month.



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- 3.3 The charges stated in clause 3.1 above shall be exclusive of all applicable taxes and duties. Applicable tax at the rate of 18 % (OR as per the latest Govt. norms) of the total service charge will be charged.
- 3.4 First Party shall make advance payment towards the proforma invoice as against dispatch planning. The Second Party will issue actual invoice on monthly basis based on material received in a particular month. In case of delay in any differential outstanding payments (with reference to advance payment made) beyond 10 days an interest at the rate of 18 % per annum shall be chargeable on the delayed payment.
- 3.5 If there is any dispute about any invoice amount, First Party shall be entitled to dispute the invoice amount within 5 days after receipt of invoice. If First Party does not raise any dispute, it is presumed that the same is acceptable and First Party shall be liable to make any differential payment (with respect to advance payment made) in respect of same within a period of 10 days from date of issue of invoice by Second Party.
- 3.6 All payment for co-processing charges, additional service charges, transportation charges, if any, and interest on overdue payments shall be made either by electronic fund transfer or by Crossed Cheque drawn in favor of "Ambuja Cements Limited" payable at Mumbai.

#### 4. TAXES AND DUTIES

The Parties agree that all taxes, levies, imposts, deductions, charges, duties or withholdings which are assessed, levied, imposed or collected by any Government Central or State or authority and any taxes or levies arising in connection with the Agreement (other than income tax payable by Second Party) shall be included in the debit note issued by Second Party for co-processing charges and other charges, if any and shall be payable by First Party in addition to the co-processing charges and other charges, if any. The First Party agrees to provide the relevant certificate in respect of the income tax deduction at source on the amounts to be paid towards co-processing charges to the Second Party.

Without prejudice to generality of foregoing, First Party shall be responsible for the payment of the stamp duty applicable to the Agreement. Notwithstanding the foregoing, the Parties agree that they shall use their best efforts to obtain exemptions from the payment of any taxes from the concerned Government agency or authority as may be available under applicable laws.

#### 5. STATUTORY COMPLIANCE

- 5.1 First Party shall be responsible for the following regulatory compliances under applicable laws:
- obtain statutory registrations, clearances, license no objection certificate, writings and confirmations from the concerned authorities and Government agencies, file returns, if required, relating to the loading, transportation and delivery of the Waste Material to the Cement Plant of the Second Party.
  - Pay all applicable taxes, cesses, duties or other levies on (i) the supply of Waste Material to Second Party and (ii) transportation of Waste Material from First Party's Manufacturing Plant to the Second Party's Cement Plant.
- 5.2 Second Party shall be responsible for the following regulatory compliances under applicable laws:
- obtain statutory registrations, clearances, license, no objection certificate, writings and confirmations, if required, from concerned authorities and Government Agencies for the provision of the Services to the First Party. File returns with the concerned authorities or Government agencies, if required, relating to the provision of the Services.
  - Pay all applicable taxes, cesses, duties or other levies on the Services.

#### Representations and Warranties of APSEZL

APSEZL covenants, represents and warrants to ACL that:



- I. it is in good standing and that it has full authority and all rights necessary to enter into this Agreement and to perform its obligations hereunder according to the terms thereof;
- II. this Agreement is a legal, valid, binding and enforceable in accordance with the terms hereof;
- III. by entering into this Agreement, it is not in breach or future shall not be in breach of any contractual obligation against any third party;
- IV. the person signing this Agreement, on its behalf, has been duly authorized by the APSEZL to execute this Agreement;
- V. it represents that it shall not dispatch any item listed in banned item list as set out in Annexure B to this Agreement.

## 6. CONFIDENTIALITY OF INFORMATION

- 6.1 All information given by one Party to the other, pursuant to this Agreement in tangible form, which is specifically marked as confidential as well as all intangible information which is specifically conveyed as confidential in writing within 7 days of disclosure of such information, shall be deemed to be "Confidential Information" for the purpose of this Agreement.
- 6.2 The Parties agree that the Confidential Information which has been or will be disclosed by or on behalf of the other Party will be received by the recipient Party in confidence and will be used only for performance under and in accordance with this Agreement.
- 6.3 Each Party acknowledges and agrees that all Confidential Information constitutes valuable, special and unique assets of the business of disclosing Party. Accordingly, the Parties agree that, in the event of any breach of this clause, in addition to any other remedies at law or in equity, the Parties shall be entitled to equitable relief, including injunctive relief and specific performance.
- 6.4 The confidentiality obligations of the Parties shall not apply to the following exceptions:
  - (a) any information which, either Party can demonstrate to the reasonable satisfaction of the disclosing Party, as already available in the public domain;
  - (b) any information which, either Party can demonstrate to the reasonable satisfaction of the disclosing Party, that such information is already available with them from a third party without any corresponding confidentiality obligations;
  - (c) any information which, either Party can demonstrate to the reasonable satisfaction of the disclosing Party, that such information has been originally developed by them without using the Confidential Information;
  - (d) any disclosure which may reasonably be required for the compliance of statutory obligations or for the purposes of legal proceedings.
- 6.5 Any publicity in connection with the Agreement by either Party shall be subject to the prior consent of the other Party.
- 6.6 Upon termination of this Agreement, each Party shall return to the other Party all confidential information (without retaining copies thereof) provided for the purposes of this Agreement.

## 7. TERM

- 7.1 That this Agreement shall be effective from its Effective Date i.e. date of signing and shall remain valid and binding on the Parties up to 31.12.22 inclusive of the both dates unless earlier terminated pursuant to terms herein below.
- 7.2 Thereafter, both the parties, at its option, may extend the validity of the contract for a further period of months/year on same term and conditions or on the term and conditions as may be mutually agreed between the Parties.



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## 8. TERMINATION OF AGREEMENT

8.1 Each Party may terminate this Agreement in the following events:-

- a) In case of breach of the terms and conditions of the Agreement by either of the Parties, the other Party, may give a written notice of Thirty (30) days to such defaulting Party, demanding it to remedy such breach. If the defaulting Party fails to remedy the breach within the notice period then the other Party shall have the right to terminate this Agreement with immediate effect.
- b) If either Party goes into liquidation or is ordered to be wound up by any court of law, the other Party shall have the right to terminate this agreement with immediate effect.
- c) Any Party herein may terminate this Agreement in case of Business exigencies, which shall be confirmed in a written document, executed by parties.

Upon termination of the Agreement, each Party shall endeavor to deliver to the other Party all documents and materials belonging to the other Party that may be in each Party's possession or under each Party's control. Provided the Second Party shall have the right to withhold all documents and materials belonging to First Party in the custody of Second Party, until such time all of Second Party's dues and/or invoices towards the co-processing charges, additional services charges, transportation charges, costs, if any, and interest on overdue payment incurred up to the date of termination have been settled by the First Party against the production of such invoices evidencing proof for such dues by Second Party.

8.2 Even otherwise either Party shall be entitled to terminate this Agreement by giving 60 days prior written notice to the other party without specifying any reasons for the same.

## 9. EFFECT OF TERMINATION

9.1 The rights, duties and responsibilities of each Party shall continue to be in full force and effect during the period of notice till the date of termination including the obligation of Second Party to complete the unfinished portion of the Services and the obligation of First Party to settle/pay all dues and/or invoices for the Services completed by the Second Party till the date of termination and/or expenses incurred till the date of termination by the Second Party;

9.2 Neither Party shall be liable to the other pursuant to such termination for compensation, reimbursement or damages on account of the loss of prospective business or profits or on account of expenditures, investments, lease or commitments or for any reason whatsoever arising out of such termination as set forth in clause 8 above, which is consequential in nature.

## 10. DISPUTE RESOLUTION:

10.1 Parties shall first use their best efforts to settle amicably any dispute arising out of or in connection with this Agreement. Party raising the dispute shall address to the other Party a notice requesting a negotiation of the dispute within ten (10) days of notification. The dispute shall then be referred for resolution between authorized representatives of Parties to be nominated by them who shall attempt to resolve such dispute by negotiation, and document any settlement that may be agreed, within a further period of thirty (30) days.

10.2 If authorised representative are unable to resolve the dispute within thirty (30) days through negotiation, all disputes, controversies and conflicts ("Disputes") arising out of this Agreement or in connection with this Agreement shall be referred for arbitration in terms of the Arbitration and Conciliation Act, 1996 ("Act") or any amendments thereof.



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10.3 The place of arbitration shall be at Ahmedabad and the language used in the arbitral proceedings shall be English. Arbitration shall be conducted by a mutually agreed and appointed sole arbitrator. The arbitral award shall be in writing and subject to the provisions of the Act, shall be final and binding on each Party and shall be enforceable in any court of competent jurisdiction.

10.4 Pending the submission to arbitration and thereafter, till the Arbitrator or the Arbitral Tribunal renders the award or decision, the Parties shall, except in the event of termination of this Agreement or in the event of any interim order/award is granted under the afore-stated Act, continue to perform their obligations under this Agreement.

## 11. GOVERNING LAW AND JURISDICTION

This Agreement shall be governed exclusively by the laws of India. Court of Ahmedabad shall have exclusive jurisdiction to the extent permitted under the applicable provision of law.

## 12. AMENDMENT

Any amendment and / or variation to the Agreement shall be mutually agreed by the Parties in writing and executed by or on behalf of each of the Parties hereto.

## 11. SEVERABILITY

If at any time during the term of the Agreement, all or any of the clauses of the Agreement is or becomes illegal, invalid or unenforceable in any respect or declared null and void or illegal under the applicable laws, the same shall not affect or impair the legality, validity or enforceability of any other provisions of the Agreement.

## 12. FORCE MAJEURE.

Force Majeure means any unforeseen event or circumstance that is beyond the reasonable control of either Party, which event cannot by exercise of reasonable diligence be prevented or caused to be prevented, and which adversely affects such Party's performance of its duties and obligations or enjoyment of its rights under this Agreement. Neither Party shall be considered in default in the performance of its obligation under the Agreement, if such performance is prevented or delayed on account of war, civil commotion, strike, epidemics, pandemics, accidents, fires, unprecedented floods, earth quake or because of promulgation of any law or regulations by the Government, unforeseen breakdowns, operational and maintenance stoppages at the First Party Manufacturing Plant or the Second Party's Cement Plant or on account of any other Acts of God. At the time of occurrence of a force majeure condition, the affected Party shall give a notice in writing with documentary proof within Fifteen (15) days from the date of occurrence of the force majeure condition indicating the cause of force majeure condition and the period for which the force majeure condition was likely to subsist. The Parties shall resume to the performance of their respective obligations after the force Majeure condition comes to an end and this agreement shall suitably be extended proportionate to the period of such Force Majeure condition. In the event the affected Party is prevented from fulfilling its obligation under the Agreement owing to the force majeure condition continuing for more than Thirty (30) days, both Parties shall consult each other regarding the continuation of the Agreement including early termination as set forth in clause 8 above. Parties shall not be entitled to any kind of damages in case of termination due to such Force Majeure situation.



### 13. SUSPENSION

Second Party may suspend Services upon prior written notice to First Party, if First Party fails to:

- (a) make timely payment against invoices raised for co-processing charges beyond Sixty (60) days from the normal date of invoice,
- (b) evacuate the rejected consignment of non conforming Waste Material from the Second Party's Cement Plant within the Ten (10) days period as stated in clause 1.4 above or
- (c) deliver Waste Material as per the Delivery schedule set out in Annexure D.

Notwithstanding whatever is contained herein, in case if Parties could not resolve the issue regarding to non evacuation (as afore mentioned in Clause 13), by mutual consultation within 2 days then, Second party shall have option to terminate this agreement forthwith, Such termination shall be without prejudice to any other rights under Law, available to Second Party.

### 14. INDEMNITY

First Party shall indemnify, defend and hold harmless Second Party and its directors, employees and agents from and against any and all claims, demands, fines, losses, damages, costs, penalties, expenses, actions, suits or proceedings, injuries, monetary liability on account of injury to/ death of any person, costs of response to any governmental inquiry, liability for loss of or damage to property or for loss or damage arising from attachments, liens or claims of materials, men or laborers, and cost of response to Governmental enquiries, reasonable attorney and consulting fees and costs relating to any of the foregoing ("Claims"), arising from First Party's performance of the Agreement or resulting from First Party's acts or omissions or from First Party's tender of Waste Material or from First Party's breach of the Agreement. The foregoing indemnification shall not apply to the extent such Claims are the result of Second Party's gross negligence, willful default, acts or omissions or statutory non compliance or from Second Party's breach of the Agreement.

Second Party shall indemnify, defend and hold harmless First Party and its directors, employees and agents from and against any and all claims, demands, fines, losses, damages, costs, penalties, expenses, actions, suits or proceedings, injuries, monetary liability on account of injury to/ death of any person, costs of response to any governmental inquiry, liability for loss of or damage to property or for loss or damage arising from attachments, liens or claims of materials, men or laborers, and cost of response to Governmental enquiries, reasonable attorney and consulting fees and costs relating to any of the foregoing ("Claims"), arising from Second Party's performance of the Agreement or resulting from Second Party's acts or omissions or from Second Party's breach of the Agreement. The foregoing indemnification shall not apply to the extent such Claims are the result of First Party's gross negligence, willful default, acts or omissions or statutory non compliance or from First Party's breach of the Agreement.

### 15. NON WAIVER

Any delay or omission on the part of each Party in exercising any rights provided under applicable laws or under the Agreement shall not impair such rights or operate as a waiver thereof. The partial exercise of any right provided under applicable laws or under the Agreement shall not preclude any other or further exercise thereof or the exercise of any other rights under the Agreement.



*del*



**16. VALIDITY**

If at any time during the term of the Agreement, all or any of clause(s) of the Agreement is or becomes illegal, invalid or unenforceable in any respect under the applicable laws, the same shall not affect or impair the legality, validity or enforceability of any other provisions of the Agreement.

**17. ASSIGNMENT**

Neither Party shall have the right to assign or transfer its rights and obligations under the Agreement to any third party or person without the prior written consent of the other Party.

**18. SURVIVAL**

Upon termination or expiry of the Agreement Clauses 3 (Service Charges and Payment Terms), Clauses 4 (Taxes and Duties), Clauses 5 (Statutory Compliances), 6 (Confidentiality of Information), 9 (Effects of Termination), 14 (Indemnity) and 20 (Jurisdiction) will survive such termination or expiry and continue to bind the Parties.

**19. NOTICE**

Unless otherwise provided in the Agreement, any notice, report or other communications given or made under or in connection with the matters contemplated by or arising from the Agreement, shall be deemed to have been duly given or made if sent by personal delivery or registered post or speed post or by facsimile transmission or upon receipted delivery at the address of the relevant Party at the addresses mentioned above.

**20. ANTI BRIBERY & CORRUPTION DIRECTIVES (ABCD)**

APSEZL is aware that ACL has instituted a whistleblower policy to promote the highest standards of professionalism, honesty, integrity and ethical behavior within the organization. APSEZL declares that it has not paid or agreed to pay any favor either in cash or kind to any of the officials of ACL, either directly or indirectly to secure this Agreement and further undertakes to promptly inform ACL if any such demand is made in future by any officials either directly or indirectly. APSEZL is also aware that if it is found indulged in any of fraudulent, unfair or unethical practices, APSEZL shall be liable for such action as per the prevailing law including termination of this Agreement by concurrent notice. Please see Annexure – I in this regard.

**21. RELATIONSHIP OF PARTIES**

Nothing contained in the Agreement shall be construed as the engagement of Second Party as an agent or partner of First Party. The relationship between the Parties shall be principal to principal, it being clearly understood that it is a "contract for services" and not a "contract of services" and does not create and shall not be deemed to create any partnership, joint venture or a principal agent relationship between the Second Party and First Party. Further First Party shall not be entitled to by act, word, deed or otherwise make any statement on behalf of Second Party or in any manner bind Second Party or hold out or represent that Second Party is representing or acting as agent or partner of the First Party.

**22. NON EXCLUSIVE ENGAGEMENT**

First Party hereby grants to Second Party a non-exclusive right, on the terms and conditions contained herein, to provide the Services. Nothing herein contained shall prevent or prohibit First Party from engaging other Parties for the provision of the Services. It is clearly understood between the Parties hereto that Second Party shall also on their part be at liberty to



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be engaged by other manufacturers who generate waste material in the process of manufacturing finished products for the provision of the Services.

## 23. HEADINGS

The paragraph headings contained in the Agreement are for the convenience of the Parties and shall not affect the meaning and interpretation of the Agreement.

## 24. ENTIRE AGREEMENT

The Agreement along with its annexure embodies the entire understanding between the Parties hereto and supersedes all previous correspondence, agreements and understanding, if any. This agreement shall be executed simultaneously in Two (2) counterpart originals, but shall, nevertheless together constitute one and the same instrument.

IN WITNESS WHEREOF this Agreement is executed in two counterparts on the day and year first above written. Each Party hereto shall preserve one counterpart of the Agreement.

SIGNED AND DELIVERED for and on behalf of

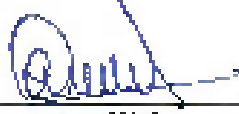
**Adani Ports And Special Economic Zone Limited**, by the hand of its authorized signatory,

  
\_\_\_\_\_

Sh. Avinash Rai (CEO)



in the presence of:

1.   
\_\_\_\_\_  
Signature of Witness 1,

Chirasesing Rajput  
(Name of Witness 1)

2.   
\_\_\_\_\_  
Signature of Witness 2,

Dhanesh Tank  
(Name of Witness 2)

SIGNED AND DELIVERED for and on behalf of

**Ambuja Cements Limited**, by the hand of its authorized signatory,

  
\_\_\_\_\_



S. RAMARAO

in the presence of:

1. \_\_\_\_\_  
Signature of Witness 1,

\_\_\_\_\_  
(Name of Witness 1)

2. \_\_\_\_\_  
Signature of Witness 2,

\_\_\_\_\_  
(Name of Witness 2)



## ANNEXURE A

### Results of analysis of samples sent by First Party to R&D of Second Party

#### 1. Waste Material Specifications: Waste Materials (as received)

Components	Contaminated Cotton Waste	Pig Waste	FITP Sludge	Sorted MSW
% Moisture	6.4	15.86	6.65	7.22
NCV (Kcal/Kg) (CIBB)	4810	5522	2568	4133
% S	0.68	0.25	2.79	0.012
% Cl	0.87	0.21	0.39	0.65

#### Note:

- Waste should be properly sealed and packed in bags as mentioned under Clause 1.2 (Packaging and labeling hereof).
- Waste should be consistent in terms of quality and similar to the samples send for testing to our lab.
- The above specified values other than moisture content can vary with in the +/- 10 % range.



*[Handwritten Signature]*



## ANNEXURE B List of Banned Items

Waste Material dispatched by First Party's Manufacturing Plant to the Second Party's Cement Plant shall not contain following items that are in the banned item list of Second Party for Co-processing.

- Radioactive waste
- Asbestos-containing waste
- Explosives and ammunition / weapons
- Anatomical medical waste
- Electronic fraction of electrical and electronic waste (e-waste)
- Whole batteries as a targeted material stream
- Waste of unknown or unpredictable composition, including unsorted municipal waste

## ANNEXURE C

### Format for labeling of the Hazardous and other Waste bags/individual containers

#### FORM B (See rules 17 (1) and 18 (2))

#### LABELLING OF CONTAINERS OF HAZARDOUS AND OTHER WASTE

Handle with care

Waste category and characteristics as per Part C of Schedules II and III of these rules Total quantity ..... Physical State of the waste (Solid/Semi-solid/Liquid).	Incompatible wastes and substances ..... Date of storage .....
Sender's name and address Phone ..... E-mail ..... Tel. and Fax No. .... Contact person ..... In case of emergency please Contact .....	Receiver's name and address Phone ..... E-mail ..... Tel. and Fax No. .... Contact person .....

**Note:**

1. Background colour of label - Fluorescent yellow.
2. The word, 'HAZARDOUS WASTES' and 'HANDLE WITH CARE' to be prominent and written in red, in Hindi, English and in vernacular language.
3. The word 'DANGEROUS WASTES' to be written prominently in orange, in Hindi, English and in vernacular language.
4. Label should be of non-washable material and weather proof.



*[Handwritten Signature]*



## ANNEXURE D

### Quantity & Delivery Schedule

First Party, during the term of the agreement, shall deliver the following quantities of Waste Material to ACL's Cement Plant on yearly basis.

**Contaminated Cotton Waste : 150 MTPA**

**Pig Waste : 15 MTPA**

**ETP Sludge : 10 MTPA**

**Sorted MSW: 450 MTPA**

First Party, during the term of the agreement, shall deliver the Waste Material to the Second Party's Cement Plant on monthly basis as per the mutually agreed delivery schedule. The delivery schedule of the month will be prepared by the party's through mutual consent and will be finalized before 20<sup>th</sup> of the earlier month.

In case of any change or modification required in the agreed monthly delivery schedule of a particular month by either party, the same shall be brought to the notice of other party at least seven days in advance or as mutually agreed.



## ANNEXURE E

### Guidelines for Transportation of Hazardous Waste\*\*

First Party shall ensure the following during Transportation of the Waste material:

1. Transport Vehicle used for transporting the Waste Material should have valid authorization for transportation.
2. Transporter /driver shall be licensed for collection and transportation of the Waste Material
3. Properly sealed and labeled containers/bags of the Waste Material should only be loaded into the Transport vehicle and there should not be any indications of potential hazards (e.g. elevated temperature, barrel expansion, smoke, spillage, leaks);
4. Transport vehicle should be clean, fit for use and all safety equipment should be operational and easily accessible.
5. Transport vehicle used for transportation of waste material shall be marked with an emergency information panel and should be easily identifiable (number plate)
6. Only the compatible waste materials should be transported together
7. Transporter / driver shall carry 4/5 (Four/Five as the case may be) copies of manifest and shall be guided on the proper movement of the manifest documents.
8. Transporter/driver should be provided with relevant information in Form 11 (Transport Emergency (TREM) Card) of Hazardous and other Wastes (Handling and Transboundary Movement) Rules 2016, regarding the Hazardous nature of the waste and measures to be taken in case of any emergency
9. Logistics should be clearly defined for minimizing OH & safety risks
10. All relevant legal requirements for transportation should be fulfilled
11. Suitable specific emergency response procedures / crisis management plan and equipment should be in place and driver and cleaner should be trained accordingly.

*\*\* Please note that the above mentioned Guidelines for Transportation of Waste Material, does not relieve First Party from the applicable statutory provisions and regulations relating to Transportation of Hazardous Waste such as Motor Vehicles Rules, 1989 and CPCB guidelines for Transportation of hazardous waste.*



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## ANNEXURE F

### Protocol for Receipt of Waste Material (Hazardous waste)

The following procedures shall be followed when receiving Waste Material at the Cement Plant of Second Party:

- Transporter will report to the Second Party's security gate for delivery of the Waste Material at storage area(s) of Second Party's designated Cement Plant.
  - Second Party's security officer shall inform the concerned officer of the designated Cement Plant.
  - Second Party's Cement Plant officer will undertake following activities:-
- (a) Receive all relevant documents from the First Party's Transporter including:
- (i) Delivery document
  - (ii) Certificate from the First Party specifying conformance to the waste specifications.
  - (iii) Invoice indicating zero payment by second party
  - (iv) Health & Safety Data Sheet of each of the material
  - (v) Manifest Form (7-copies as the case may be) and other necessary documents as per the statutory requirements.
  - (vi) Any other document mutually agreed between the parties.
- (b) Second Party shall arrange and record the weight of the Transport vehicle on the weight bridge installed at the plant before and after unloading of the Waste Material at the designated storage area.
- (c) Second Party shall make necessary arrangements for unloading of the Waste Material at the designated storage area(s) and shall arrange to store the consignment of Waste Material the designated storage area, as per the date on which the consignment is delivered to the cement plant and shall also record the no. of bags, date of delivery, consignment no., truck no., etc. in the inventory sheet as set out in Annexure H attached to the Agreement.
- (d) Second Party shall arrange to conduct inspection and sampling of the Waste Material as required and report to the First Party whether the Waste Material is conforming to specifications list in Annexure A and Annexure B with in eight (8) days of receipt of Waste Material.
- (e) In case Waste Material is not properly sealed/ packed as set out in clause 1.2 (Packaging/labeling), Second Party shall inform the same to First Party and both the parties shall discuss and arrive at solution for safe handling and disposal of waste material.
- (f) Second Party shall keep the storage area locked with appropriate surveillance by the security.
- (g) To attend any emergency situation, the Second Party shall maintain a copy of the risk assessment and crisis management plan with its security officer and also with its concerned officer.
- (h) Second Party shall ensure the proper movement of the manifest form at each stage as set out in Hazardous and Other Wastes (Management & Transboundary Movement) Rules 2016.
- (i) Second Party shall submit returns to the Authorities in the Form 4 as set out in Hazardous and Other Wastes (Management & Transboundary Movement) Rules 2016 and the format for the same is attached with this Agreement as Annexure J.



*[Handwritten signature]*



**ANNEXURE G  
(Health & Safety Data Sheet)  
Contaminated Cotton Waste**

Gecycle		Customer / Waste Qualification Form		HEALTH & SAFETY																	
NOTE: It is requested to fill all contents of this document. Some parts may be not relevant or not needed for a given AFR. Indicate this accordingly.																					
Designation: Contaminated Cotton & Rags		Industry of origin: S&E & Ports (Terminal)		Safety data sheet:																	
Available: <input checked="" type="checkbox"/> Not available: <input type="checkbox"/>																					
Hazard Identification																					
<table border="1"> <tr> <td>Flammable</td> <td>Corrosive</td> <td>Oxidizing</td> <td>Health hazard</td> <td>Acute toxicity</td> <td>Serious health hazard</td> <td>Environmentally damaging</td> <td>Hazardous to the environment</td> </tr> <tr> <td>Explosive</td> <td>Environmentally damaging</td> <td>Hazardous to the environment</td> <td>Hazardous to the environment</td> <td>Hazardous to the environment</td> <td>Hazardous to the environment</td> <td>Hazardous to the environment</td> <td>Hazardous to the environment</td> </tr> </table>						Flammable	Corrosive	Oxidizing	Health hazard	Acute toxicity	Serious health hazard	Environmentally damaging	Hazardous to the environment	Explosive	Environmentally damaging	Hazardous to the environment	Hazardous to the environment	Hazardous to the environment	Hazardous to the environment	Hazardous to the environment	Hazardous to the environment
Flammable	Corrosive	Oxidizing	Health hazard	Acute toxicity	Serious health hazard	Environmentally damaging	Hazardous to the environment														
Explosive	Environmentally damaging	Hazardous to the environment	Hazardous to the environment	Hazardous to the environment	Hazardous to the environment	Hazardous to the environment	Hazardous to the environment														
Probability of being a Health hazard (according to the Occupational Exposure Limits via a specific Route of Entry)																					
Probability of entering CRI	High		Medium		Low																
	Exposure is continuous or recurring		Exposure is occasional or infrequent		Exposure is occasional or infrequent																
By eye contact	Low		Not Applicable		Not Applicable																
By skin contact	Low		Not Applicable		Not Applicable																
By inhalation	Low		Not Applicable		Not Applicable																
By ingestion	Low		Not Applicable		Not Applicable																
Probability of hazardous reactions																					
with 2, 3, 4, 5	Formation of Toxic vapor		Ignition could occur		Explosion could occur																
Air & water temperature	Low		Low		Low																
Under high pressure	Low		Low		Low																
When exposed to fire	Low		Low		Low																
When exposed to heat	Low		Low		Low																
When exposed to light	Low		Low		Low																
Other	Not Applicable		Not Applicable		Not Applicable																
Comments	The material is cotton clothes contaminated with oil. It is general hazard and harmful to eyes, skin and if inhaled. The material is mild alkaline in nature.																				
First Aid Instructions																					
Appropriate measures	On a new telephone from 112																				
Inappropriate measures	Not any																				
Substance name	The following information is for the use of the user of the product																				
Specific risks / instructions	None																				
Safe use instructions																					
Clean use instructions	Clean the product with water																				
Storage instructions	Store the product in a dry place																				
Disposal instructions	Do not dispose of the product in the environment																				
Comments	The material is cotton clothes contaminated with oil. It is general hazard and harmful to eyes, skin and if inhaled. The material is mild alkaline in nature.																				
Special Personal protection (additional to standard PPE)																					
Control	<input checked="" type="checkbox"/> Worker wear	<input checked="" type="checkbox"/> Eye Protection	<input checked="" type="checkbox"/> Safety glasses	<input checked="" type="checkbox"/> Respiratory	<input checked="" type="checkbox"/> Protective clothes																
Face Protection	<input checked="" type="checkbox"/> Safety glasses	<input checked="" type="checkbox"/> Hand	<input checked="" type="checkbox"/> Hand gloves	<input checked="" type="checkbox"/> Other	<input checked="" type="checkbox"/> Other																
First aid																					
Appropriate measures	Wash with plenty of water for 15 minutes. If irritation persist consult physician immediately. Remove contaminated clothing, wash the area with mild soap and running water if itching persist consult the physician immediately. If the person is a fish prod, if respiratory distressed consult the physician immediately. If ingested consult the physician immediately.																				
Inappropriate measures	Not any																				
Affixant (to be completed by waste generator)																					
To the best of my knowledge, I certify that the waste / AFR delivered to LafargeHolcim / Gecycle conforms to the above description, and that all information required by law is in this profile is accurate and complete.																					
Date: 08/08/2020	Name: _____		Position: _____		Signature: _____																



*Handwritten signature*



# Pig Waste



















geocycle		WASTE PROFILE		HEALTH & SAFETY	
Waste Name		Pig Waste		Industry of origin	
				Ports & SEZ	
Material safety data sheet					
Available		Not available			
Hazard Identification					
Flammable	<input type="checkbox"/>	Irritant	<input type="checkbox"/>	By eye contact	<input type="checkbox"/>
Corrosive	<input type="checkbox"/>	Harmful	<input type="checkbox"/>	By skin contact	<input type="checkbox"/>
Reactive	<input type="checkbox"/>	Toxic	<input type="checkbox"/>	By inhalation	<input type="checkbox"/>
Respirable	<input type="checkbox"/>	Carcinogen	<input type="checkbox"/>	By ingestion	<input type="checkbox"/>
Comments:					
Personal protection					
Acid resistant clothes		<input type="checkbox"/>	Safety gloves	<input type="checkbox"/>	Safety helmet
Full protection mask		<input type="checkbox"/>	Respirator	<input type="checkbox"/>	Safety Goggles
Comments					
Use all mandatory PPE's					
First aid					
In case of eye contact	wash the eyes with water for 15 minutes, and if irritation persist consult the doctor				
In case of skin contact	Remove contaminated clothing and wash the area with mild soap and water, if itching/irritation persist consult the doctor				
In case of Inhalation	transfer the person to fresh air, and if respiratory discomfort persist consult the doctor immediately				
In case of Ingestion	consult the doctor				
Any specific Antidote	not any				
Fire instruction					
Extinguisher Type	water/DCP type extinguisher				
Inappropriate measures	not any				
Specific risks / instructions	not any				
Spill instructions					
EMERGENCY NUMBERS	Mr. Kalpesh Kottari : 8980015248 :: Mr. H P Mawrya 9882072044				
Clean-up procedures	collect the material with soft broom in bags				
Recovery procedures	collect the material in bags				
Disposal procedures	co processing in cement kiln				
Contact in urgent cases	as mentioned above				
Transport					
Hazard code	Transport code		Waste code		3.1
Comments : This material have good heat value and having more than 100 flash point					



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# FTP Sludge

globe cycle		Customer / Waste Qualification Form		HEALTH & SAFETY	
NOTE: It is important to fill all sections of this document. Some points may be not relevant or not known for a given APP, indicate this accordingly.					
Instruction		All cells, with drop down menu's, and relevant checkboxes (search in color) need to be completed on this sheet - some data are optional			
Safety data sheet				Not applicable	
Hazard Identification (This info is based on hazard knowledge and not necessarily Legal / regulatory specification)					
 Flammable N	 Combustible Y	 Oxidizing N	 Health hazard N	 Acute Toxicity Hazard N	 Chronic toxicity Hazard N
 Corrosive N	 Environment Y	 Liable to spontaneous combustion N	 Contact with water and releasing gases N	 Contact with water and releasing toxic gases N	 Explosive N
 Explosive N	 Highly explosive N	 Infectious N	 Radioactive N	 Hazardous to the environment N	 Hazardous to the environment N
Probable Consequence of exposure via a specific Route of Entry					
Consequence	High		Medium		Low
	Disability / One or more fatalities	Serious illness - absent for longer than 7	Serious illness - absent for longer than 7	Minor illness - No absence or absent for 7	
By skin contact	Health hazard	Health hazard	Health hazard	Health hazard	Health hazard
By inhalation	Health hazard	Health hazard	Health hazard	Health hazard	Health hazard
By ingestion	Health hazard	Health hazard	Health hazard	Health hazard	Health hazard
Probability of hazardous reactions					
At high temperature	Formation of Toxic gases	Ignition / Flash point	Explosion / could occur	Physical reaction occur	
Under high pressure	Not Applicable	Not Applicable	Not Applicable	Not Applicable	
When exposed to Water	Not Applicable	Not Applicable	Not Applicable	Not Applicable	
When exposed to Air	Not Applicable	Not Applicable	Not Applicable	Not Applicable	
When exposed to Acid / Base	Not Applicable	Not Applicable	Not Applicable	Not Applicable	
Other	Not Applicable	Not Applicable	Not Applicable	Not Applicable	
Comments: Information included in this sheet is provided as information only and not a guarantee. This information is purely based on the judgement.					
Fire instructions					
Appropriate measures	To avoid fire source				
Inappropriate measures	Use of fire extinguishing information				
Available fire fighting equipment	Water				
Special instructions	Excluded from Health				
Spill instructions					
Clean-up procedures	Can be collected easily				
Recovery procedures	Collection in drums / big bags				
Disposal procedures	Disposal in special PGB container				
Storage instructions	In closed tank				
Special Personal protection (additional to standard size PPE)					
Clothing	N	Eye Protection	Y	Gloves	Respiratory
Footwear	N	Hand	Y	Gloves	Other
First aid					
Appropriate measures	First aid kit and first aid kit				
Inappropriate measures	No first aid kit without working				
Affirmation to be completed by waste generator					
To the best of my knowledge, I certify that the waste / APP delivered to Latsarpartida / Globe cycle conforms to the above description, and that all information represented by herewith in this profile is precise and complete.					
Date: 2023/01/01					
Name: Elvira Jara			Position: CEO		Signature:



*Handwritten signature*



# Sorted MSW

geocycle Waste Management Solutions		WASTE PROFILE		HEALTH & SAFETY	
Waste Name	Mixed Solid	Industry of origin/Parts			
Material safety data sheet					
Available	<input checked="" type="checkbox"/>	Not available	<input type="checkbox"/>		
Hazard Identification					
Flammable	<input type="checkbox"/>	Irritant	<input checked="" type="checkbox"/>	By eye contact	<input checked="" type="checkbox"/>
Corrosive	<input type="checkbox"/>	Harmful	<input type="checkbox"/>	By skin contact	<input checked="" type="checkbox"/>
Reactive	<input type="checkbox"/>	Toxic	<input type="checkbox"/>	By inhalation	<input checked="" type="checkbox"/>
Respirable	<input type="checkbox"/>	Carcinogen	<input type="checkbox"/>	By ingestion	<input checked="" type="checkbox"/>
Comments:	The material is sorted paper and plastic waste from dust with no odour. It is general irritant and harmful to eyes, skin and if inhaled.				
Personal protection					
Acid resistant clothes	<input type="checkbox"/>	Safety gloves	<input checked="" type="checkbox"/>	Safety helmet	<input checked="" type="checkbox"/>
Full protection mask	<input type="checkbox"/>	Respirator	<input checked="" type="checkbox"/>	Safety Goggles	<input checked="" type="checkbox"/>
Comments:	Wear PPE like safety gloves, respirator, helmet and safety goggles along with other mandatory PPE as it has moderate odour.				
First Aid					
In case of eye contact	wash with plenty of water for 15 minutes, if irritation persist consult physician immediately				
In case of skin contact	remove contaminated clothing, wash the area with mild soap and running water if itching persist consult the physician immediately				
In case of Inhalation	shift the person to a fresh area, if respiratory discomfort persist consult the physician immediately				
In case of Ingestion	If ingested consult the physician immediately				
Any specific Antidote	not any				
Fire Fighting					
Extinguisher Type	DCP type extinguisher/water type				
Inappropriate measures	not any				
Specific risks / instructions	not any				
Spill Instructions					
EMERGENCY NUMBER	Mr. Shalish Parmar - 9099082003, Mr. Prashant Saxena - 9885566088				
Clean-up procedures	clean the area with hard broom				
Recovery procedures	collect the material in bags with shovel				
Disposal procedures	co processing in cement kiln				
Contact in urgent cases	as mentioned above				
Transport					
Hazard code	Transport code		Waste code		
Comments: The material is slight acidic in nature having no odour. While Handling wear safety goggles, respirator, safety shoes and helmet.					



## ANNEXURE H

### Inventory List - Format for maintaining records of Waste Material

#### FORM 3

[See rules 6(5), 13(7), 14(6), 15(5) and 20(4)]

#### FORMAT FOR MAINTAINING RECORDS OF HAZARDOUS AND OTHER WASTES

1. Name and address of the facility :
2. Date of issuance of authorisation and its reference number :
3. Description of hazardous and other wastes handled (Generated or Received)

Date	Type of waste with category as per Schedules I, II and III of these rules	Total quantity (Metric Tonnes)	Method of Storage	Destined to or received from

\* Fill up above table separately for indigenous and imported waste.

4. Date wise description of management of hazardous and other wastes including products sent and to whom in case of recyclers or pre-processor or utiliser.
5. Date of environmental monitoring (as per authorisation or guidelines of Central Pollution Control Board):

Signature of occupier

Date .....

Place.....



*Handwritten signature*



## ANNEXURE 1

### CERTIFICATE OF CO-PROCESSING



## Certificate of Co-Processing

Issued To: Adani Ports And Special Economic Zone Limited

Invoice No:.....

Date: 31/05/2020

This is to certify that we have taken receipt of the following quantities of Contaminated Cotton Waste, Pig Waste & ETP Sludge, Sorted MSW sent by Adani Ports And Special Economic Zone Limited for Pre and / Or Co-processing in our Cement Kiln during the period 01/05/2020 to 31/05/2020. The same would be safely and completely disposed off within 90 days of receipt and thereafter will not exist.

Waste Name: Contaminated Cotton Waste

Quantity (Tons): .....

Waste Name: Pig Waste

Quantity (Tons): .....

Waste Name: ETP Sludge

Quantity (Tons): .....

Waste Name: Sorted MSW

Quantity (Tons): .....

Authorized Signatory

Amhuja Nagar Cement works



## ANNEXURE J- Format of Form 4

### FORM 4

[See rules 6(3), 12(8), 18(6) and 20 (2)]

### FORM FOR FILING ANNUAL RETURNS

[To be submitted to State Pollution Control Board by 30<sup>th</sup> day of June of every year for the preceding period April to March]

1. Name and address of facility:
2. Authorisation No. and Date of issue:
3. Name of the authorised person and full address with telephone, fax number and e-mail:
4. Production during the year (product wise), wherever applicable

#### Part A. To be filled by hazardous waste generators

1. Total quantity of waste generated category wise
2. Quantity dispatched:
  - (i) to disposal facility
  - (ii) to recycler or co-processors or pre-processor
  - (iii) others
3. Quantity utilised in-house, if any -
4. Quantity in storage at the end of the year -

#### Part B. To be filled by Treatment, storage and disposal facility operators

1. Total quantity received -
2. Quantity in stock at the beginning of the year -
3. Quantity treated -
4. Quantity disposed in landfills as such and after treatment -
5. Quantity incinerated (if applicable) -
6. Quantity processed other than specified above -
7. Quantity in storage at the end of the year

#### Part C. To be filled by recyclers or co-processors or other users

1. Quantity of waste received during the year -
  - (i) domestic sources
  - (ii) imported (if applicable)
2. Quantity in stock at the beginning of the year -
3. Quantity recycled or co-processed or used -
4. Quantity of products dispatched (wherever applicable) -
5. Quantity of waste generated
6. Quantity of waste disposed
7. Quantity re-reported (wherever applicable)
8. Quantity in storage at the end of the year -

Signature.....

Place.....

Signature of the Owner/Operator of the disposal facility



ANNEXURE - K  
Health and Safety Policy of ACL



**Ambuja  
Cement**



## HEALTH & SAFETY POLICY

Ambuja Cements Limited is an industry leader in the building materials industry.

We conduct our business in a manner that creates a healthy and safe environment for all stakeholders - our employees, contractors, communities and customers - built on a sound health and safety culture.

Health and Safety is our core value. We believe in visible leadership and personal accountability for Health and Safety at all levels and throughout our organization.

Nothing we do is worth getting hurt for.

### Our Commitment

We will:

- Conduct our business with a goal of zero harm.
- Provide safe, healthy and secure work conditions for employees and contractors.
- Maintain a global Health and Safety Management System designed to continuously improve our performance and actively minimize risk in our business.
- Comply with applicable legal, regulatory, industry and corporate requirements.
- Communicate openly with all stakeholders on relevant health and safety issues.
- Empower all employees and contractors to stop any unsafe work.



Date of Issue: 21<sup>st</sup> February 2020

*Neeraj Akhoury*  
**Neeraj Akhoury**  
Managing Director & CEO





## H&S Rules

<p><b>Ambuja Cement</b></p> <p></p> <p><b>Health &amp; Safety Rules</b></p> <p><b>Rule 1</b> I assess and control risks before starting any task.</p> <p><b>Rule 2</b> I only perform activities for which I am authorized.</p> <p><b>Rule 3</b> I never override or misuse health and safety devices, and I always use the required PPE.</p> <p><b>Rule 4</b> I do not work under the influence of alcohol or drugs.</p> <p><b>Rule 5</b> I report all incidents.</p> <p>Living by these rules is a condition of employment.</p>	<p><b>Ambuja Cement</b></p> <p></p> <p><b>स्वास्थ्य और सुरक्षा नियम</b></p> <p><b>नियम 1</b> मैं कार्य शुरू करने से पहले में जोखिमों का आकलन और नियंत्रण करता/करती हूँ।</p> <p><b>नियम 2</b> मैं केवल इन गतिविधियों को करता/करती हूँ जिनके लिए मैं अधिकृत हूँ।</p> <p><b>नियम 3</b> मैं कभी भी स्वास्थ्य और सुरक्षा संबंधी उपकरणों का उत्प्रेषण या दुरुपयोग नहीं करता/करती हूँ तथा सदैव आवश्यक रूप से निजी सुरक्षा संबंधी उपकरणों का इस्तेमाल करता/करती हूँ।</p> <p><b>नियम 4</b> मैं नशे की शराब या मादक पदार्थों के लहों में कार्य नहीं करता/करती हूँ।</p> <p><b>नियम 5</b> मैं सभी हादसों को रिपोर्ट करता/करती हूँ।</p> <p>इन नियमों का सक्रिय रूप से पालन करना रोजगार की एक शर्त है।</p>
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**Ambuja Cement**

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## ANNEXURE – I.

### Anti Bribery & Corruption Directives (ABCD) of Ambuja Cement Limited

#### 1. Prohibition of Corrupt Payments

First Party affirms that it has not and agrees that it will not (in connection with Services under this Contract or in connection with any other business involving Second Party) make, offer, promise, agree to make or authorize any payment or transfer of anything of value, directly or indirectly to:

- (i) any Government Official (defined hereunder);
- (ii) any political party, party official or candidate;
- (iii) any person while knowing or having reason to know that all or a portion of the value will be offered, given or promised, directly or indirectly, to anyone described in items (i) or (ii) above;
- (iv) any owner, director, employee, representative/agent of any actual/potential customer of Second Party;
- (v) any director, employee, representative or agent of Company or any of its affiliates; or
- (vi) any other person or entity if such payment or transfer would violate the laws of the country in which it is made or the FCPA or the laws of any other relevant jurisdiction as applicable.

It is the intent of the parties that no payments or transfers of value shall be made which have the purpose or effect of public or commercial bribery, acceptance of or acquiescence in extortion, kickbacks or other unlawful or improper means of obtaining business or any improper advantage.

#### 2. Anti-Corruption Policy

First Party acknowledges that it has been provided with a copy of Second Party's Anti-Bribery and Corruption Directive, confirms its understanding of the directives established by that document, and agrees to comply with that policy in connection with its work for Company.

#### 3. Audit Rights

Second Party shall be allowed reasonable access to First Party's books, records and other documentation related to this Contract or First Party's transaction with Company and shall have the right to audit First Party on a periodic basis.

#### 4. Cooperation on Disputes

First Party shall cooperate with Company in regard to any inquiry, dispute or controversy related to a suspected or alleged violation of the Foreign Corrupt Practices Act (FCPA), if applicable, Anti Bribery & Corruption Directive (ABCD) and all the applicable related statutory compliances in which Second Party may become involved and of which First Party may have knowledge. Such cooperation shall include disclosure of relevant documents and financial information, and interviews of First Party's personnel. Such obligation shall continue after the expiration or termination of this Contract.

#### 5. Use of Third Parties (Sub-Contractor)

First Party shall not use any other party, individual or entity to provide any part of the Services that the First Party is required to provide under this Contract, without the express prior written approval of Second Party.

First Party hereby affirms that it shall obtain an assurance from each of such Sub-Contractors that he/she will comply with all the applicable statutory compliances, FCPA, if applicable, Second Party's Code of Conduct and the ABCD, and will take no action that might cause



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Second Party to be in violation of such laws and policies. All contracts/agreements between First Party and Third Parties will be subject to review by Second Party. Any subcontracting third party is subject to due diligence under Second Party's due diligence procedures before being approved.

Notwithstanding whatever is contained herein Second Party shall not have privity with such Sub-Contractor(s) and shall not in any way be responsible to such Sub Contractor(s) or their activities.

#### **6. Termination in case of violation**

Notwithstanding any other provision of this Contract, this Contract shall terminate immediately and without notice, for cause, and shall become null and void, without effect or further liability or obligation on the part of Second Party, upon the occurrence of any of the following circumstances:

1. Violation of Law: This Contract, the relationship created hereby or the performance of any service by First Party hereunder is determined by Second Party or by a competent authority of the United States or India to be in violation of or contrary to the TCPA, if applicable, or any law, decree, rule, order, regulation or prohibition of India:

2. Corrupt Payments: First Party's representations, warranties, and covenants in connection with the ABCD are inaccurate or misleading, or have been breached, or Second Party learns of circumstances that give it reason to believe that such representations, warranties and covenants are or may be inaccurate, misleading, or breached. In any such case no further amounts shall be due to First Party pursuant to this Contract, First Party shall not be entitled to receive, and hereby waives rights to, any termination payment or compensation of any kind because of termination or nonrenewal of this Contract, and First Party agrees that any enhancements in the value of First Party's goodwill as a result of its relationship with Second Party will inure to the benefit of Second Party.

#### **7. Annual Certification and Agreement to Report Violations**

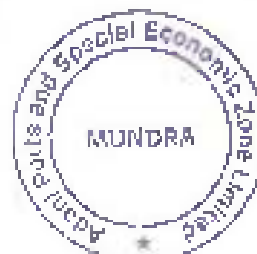
First Party agrees that it will, at the request of Second Party, and at least annually, certify in the below provided format (Format Of Annual Certification As Per The Anti-Bribery And Corruption Directive of Ambuja Cements Limited) a that it has not, and to its knowledge no other person, including but not limited to every owner, director, employee, representative and agent of First Party has made, offered to make, agreed to make, or authorized any payment, loan, donation or gift of money or anything else of value, directly or indirectly, to or for the benefit of any Government Official, political party, party official or candidate, in order to obtain or retain business, or secure any improper advantage. First Party further agrees that, if it should learn of information regarding any such actual or suspected payment or offer in connection with Second Party's business, First Party will immediately contact us at email: [ecf@ethicalview.com](mailto:ecf@ethicalview.com) or toll free helpline 1800 209 1005 or Online: [www.integrity.lafargeholcim.com](http://www.integrity.lafargeholcim.com) fax - 91 (22) 66459796 or post box no. 25, H.O Pune 411001 of such knowledge or suspicion.

#### **8. Definition - (Government Official**

"Government Official" means any officer or employee of any government or any department, agency or instrumentality thereof, or of any government-owned or government-controlled corporation or any public international organization, or any person acting in an official capacity for or on behalf of any such government or department, agency, instrumentality, corporation or a public international organization.



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**FORMAT OF ANNUAL CERTIFICATION AS PER THE ANTI-BRIBERY AND  
CORRUPTION DIRECTIVE OF AMBULIA CEMENTS LIMITED**

The undersigned hereby acknowledges:

- Second Party has established and implemented the Anti-Bribery and Corruption Directive, together with internal controls reasonably designed to achieve compliance with the applicable laws;
- The undersigned has received, read, and understands Second Party's ABC Directive;
- The undersigned agrees, unconditionally, to comply with all the terms and conditions of Second Party's ABC Directive and with the laws and regulations of the country in which the undersigned operates; and
- The undersigned understands that violation of Second Party's ABC Directive may result in termination of the undersigned's business relationship with Second Party and potential criminal prosecution.

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Printed Name*



A handwritten signature in black ink, appearing to be "Ad".



# CERTIFICATE OF REGISTRATION



**DISTROMED KUTCHH SERVICES PVT. LTD.**

**Common Bio Medical Waste Treatment Facility**

Office : 3-Swaminarayan Vanijya Sankul, Nr. Divya Bhaskar Office, Hospital Road, Bhuj (Kutchh) - 370 001.

Cell : 99251 26126 E-mail : distromedkth14@gmail.com

Facility : Survey No. 42/1/1, Village : Ratiya, Ta. & Dist.: Bhuj (Kutchh).

**FACILITY PROVIDER FOR TREATMENT AND  
DISPOSAL OF BIO MEDICAL WASTE**

Authorised by **Gujarat Pollution Control Board**

*Is hereby Issued to :*

**Hosp./Dr.** ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.  
MUNDRA DIST : KUTCH

**Registration No. :** KTH-356

**Validity up to :** 01/04/2020 TO 31/03/2021

*Bio Medical Waste collection, transportation, treatment and disposal as per*

*Notification No. : So-630 Dated : 20/07/1998 by Ministry of*

*Forest & Environment - Govt. of India*

For, **DISTROMED KUTCHH SERVICES PVT. LTD.**

*This is conditional certificate : On non payment of disposal charge, this certificate will be invalid*

# CERTIFICATE OF REGISTRATION



**DISTROMED KUTCHH SERVICES PVT. LTD.**

**Common Bio Medical Waste Treatment Facility**

Office : 3-Swaminarayan Vanijya Sankul, Nr. Divya Bhaskar Office, Hospital Road, Bhuj (Kutchh) - 370 001.

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Facility : Survey No. 42/1/1, Village : Ratiya, Ta. & Dist.: Bhuj (Kutchh).

**FACILITY PROVIDER FOR TREATMENT AND  
DISPOSAL OF BIO MEDICAL WASTE**

Authorised by **Gujarat Pollution Control Board**

*Is hereby Issued to :*

**Hosp./Dr.** ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD. WEST BASIN  
MUNDRA DIST : KUTCH

**Registration No. :** KTH-390

**Validity up to :** 01/04/2020 TO 31/03/2021

*Bio Medical Waste collection, transportation, treatment and disposal as per*

*Notification No. : So-630 Dated : 20/07/1998 by Ministry of*

*Forest & Environment - Govt. of India*

For, **DISTROMED KUTCHH SERVICES PVT. LTD.**

*This is conditional certificate : On non payment of disposal charge, this certificate will be invalid*

# **Annexure – 8**



## ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

### MOCK DRILL REPORT

Date	:	19.02.2021
Time	:	11:15 AM
Location	:	South Base New Railway Building
Type/Text of the Scenario	:	Smoke observed from electrical Panel at 1 <sup>st</sup> floor of Railway Building.

#### INTRODUCTION:

Pantry Boy Mr. Husain Alli was observed Smoke came out from electrical Panel at 1<sup>st</sup> floor of Railway Building .Immediately he informed to Incident Controller Mr. Subhash Ishore. IC immediately rushed to the incident spot and observed the scenario of incident. IC immediately informed to Electrical, POC, and railway building yard control room. & Mr. Sunil Shivrain – Yard controller informed to OHC, Fire, Safety & Security respectively.

#### LOCATION (WITH PHOTOGRAPH):









## ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

### MOCK DRILL REPORT

#### SEQUENCE OF EVENTS WITH PHOTOGRAPHS:

	
First Responder Informed to Incident Controller	Received call from first Responder by Incident Controller
	
CO2 FE was used by 1 <sup>st</sup> responder to extinguish fire	After emergency declared building was evacuated



## ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

### MOCK DRILL REPORT

	
<p><b>Security Team Reached at Site</b></p>	<p><b>Ambulance Reached at Site</b></p>
	
<p><b>Security team cordoned up the emergency area</b></p>	<p><b>Incident controller share about emergency</b></p>
	
<p><b>Head count was carried out by security team</b></p>	<p><b>Briefing by IC Mr. Subhash Ishore</b></p>



## ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

### MOCK DRILL REPORT

	
De-Briefing by Observer Mr. O P Sharma	Vote of Thanks By Mr. O P Sharma

#### RESPONSE TIME:

#	Description	Exact Time
1.	First responder informed to Incident Controller	: 11:15 AM
2.	Incident controller comes on site	: 11:16 AM
3.	Declaration of Emergency	: 11:16 AM
4.	Security team reaching time at incident point	: 11:21 AM
5.	Fire Tender reaching time at incident Point	: NA
6.	Ambulance reaching time at incident Point	: 11:26 AM
7.	Departure of Ambulance with patient	: NA
8.	Ambulance reached at OHC	: NA
9.	First person at Assembly Point	: 11:17AM
10.	Last person at Assembly Point	: 11:19 AM
11.	Maintenance/ Rescue Arrangement at site	: 11:17 AM
12.	Corporate Affairs team reaching on site	: NA
13.	Liaoning officer reached at site	: NA
14.	Audibility of the scenario on PA system	: NA
15.	Termination of Emergency	: 11:30 AM

**Note: For more than one assembly point, please mention details for point 10 & 11.**



## ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

### MOCK DRILL REPORT

#### COMMUNICATION & ACTIONS:

Action By	Information To / Action By	Remarks
First Responder	Information given to incident controller about situation/ scenario.	
Site Incident Controller	Assess the site and immediately called to electrical authorised person and simultaneously inform to POC, fire, Security for handle the emergency situation.	
Concern Department /Area In-charge	Inform to POC, Security, Fire, Medical, Safety etc.	
Operation	Operation team reached at incident spot as on priority basis.	
Corporate Affairs	NA	
HR/ Admin	NA	
Safety	Discuss to mitigate catastrophic effects with incident controller and ask for any add or services required like PPE's,	
OHC	OHC team response was quick. Ambulance reached with paramedical staff at site, immediate reported to IC about to understand any incidents.	
Security Control Room	Reached at site and reported to incident controller, immediately barricade the area and ensure evacuation of people from the spot.	
Fire Control Room Inform	Fire team not reached at incidents location	



## ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

### MOCK DRILL REPORT

#### COMMUNICATION TO MUTUAL AID GROUP

(IF REQUIRED, AS AND WHEN MUTUAL AID IS CALLED) – Not Required.

#### RESPONSE TIME PERFORMANCE OF ACTION

Agency	Standard Time	Performance	Rating (Max. 9/ Block)	
			+VE Marks	-VE Marks
Ambulance	12 Min	6 Min	9	
Safety	10 Min	8 Min	9	
Fire Services	10 Min	8 Min	9	

#### A. PERFORMANCE OF OHS & F SERVICES & RESCUE SERVICES

Performance	Performance	Rating (Max. 3 per Block)	
		+VE Marks	-VE Marks
Turn out/ response time of Fire Team	Fire team was not reached at site within response time due to tender was engaged for extinguish fire in outer location.	3	
Turn out/ response time of OHC Team	OHC team & Ambulance reached at site within benchmark of response time.	3	
Turn out/ response time of Safety Team and in coordination with incident controller mobilisation of personnel and resources.	Response time of Safety team is within benchmark and will coordinate with incident controller for mobilisation of personnel, resources, PPE's etc.	3	
Firefighting at the site	Not Required	3	
Medical attention at the site	Reported to incident Controller about to understand any incidents.	3	



## ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

### MOCK DRILL REPORT

#### B. PERFORMANCE OF MAINTENANCE DEPARTMENT

Performance	Performance	Rating (Max. 3 per Block)	
		+VE Marks	-VE Marks
Power shut down/ cut off	E & I Team confirm with incident controller about the requirement of power supply.	3	
Immediate arrangements at the site	MCP was operated but not working during an emergency.	2	1
Mobilizing of personnel and resources	Maintenance team reached at site with tool kit and appropriate PPEs.	3	
Office activities being carried out at the site	Not required.	3	
Clearing debris	NA	3	
Other arrangement at required to meet emergency	Provided as required by incident controller and support team.	3	

#### C. PERFORMANCE OF SECURITY SERVICES

Performance	Performance Rating	Rating (Max. 3 per Block)	
		+VE Marks	-VE Marks
Turnout of Security	Security team reached within time and reported to incident controller.	3	
Performance of security guards	Security guards evacuated people from building and head count was done at assembly point.	3	
Prevent unwanted / unauthorized entry into this area	Security officers restrict the entry of unauthorized persons / also ensure that vehicles do not enter at incident	3	



## ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

### MOCK DRILL REPORT

	spot.		
Area cordoned off	Area barricaded by security guard.	3	
Closer of gates	NA	3	
Providing security coverage at main gate and directing concern person to the site	Security guard was guided to emergency vehicle for scene.	3	

#### **D. PERFORMANCE OF OPERATION/ CONCERN DEPARTMENT**

Performance	Performance Rating	Rating (Max. 3 per Block)	
		+VE Marks	-VE Marks
Immediately pass the communication message through VHF / other available media to subordinates & emergency response team.	Communication / Information on emergency conveyed to all concern by incident controller through VHF, Mobile etc.	3	
Stopping of operation / like critical operations first & on priority basis	All office work stopped by incident controller.	3	
Emergency response of particular department at site	Response time of concern department found adequate. Communication is good with all emergency team.	3	
Support for evacuation of people at site and head count along with HR/ Admin	Evacuation done by 1 <sup>st</sup> Floor warden & Security Team & ensure about head count at assembly point.	2	1
Availability and response of emergency kit / equipment / Other.	Not required.	3	
Audibility of the scenario on PA System by Persons	Communication done through mobile and verbal.	2	1



## **ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED**

### **MOCK DRILL REPORT**

#### **Good Observations:**

1. Medical & Security team response was quick.
2. All people are observed with mask.
3. Communication / Information on emergency conveyed to all concern by incident controller.
4. Immediately stop the office work and start to evacuate the building.
5. Head count was done at assembly point by security team and also ensure the availability of strength of manpower at that present scenario.

#### **Observer: Mr O.P. Sharma**

1. Emergency assembly point was displayed with print paper. It should displayed in proper visible signage at designated place.
2. Emergency contact number was not displayed at building area.
3. MCP was operated but not working during an emergency.
4. No PA system was available in Railway building.
5. Response of employee was very casual.



## ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

### MOCK DRILL REPORT

#### Overall rating

Marks from 95 to 100 - Excellent

**Marks from 90 to 95 - Very Good**

Marks below 90 - Needs Improvement

**VOTE OF THANKS:** Mr.O.P. Sharma shared observed points at assembly point to the workers and thanked OHS, Fire, OHC, Security and Maintenance team for their immediate response.

#### SUPPORTING STAFF:

Drill Organized By	: Mr. Shubash Ishore
Drill guided By	: Mr. Rana Bambhaniya / Mr. Amin Kumar Sethi
Exercise Performance Assessor	: Mr. Shubash Ishore
Site incident controller	: Mr. Subhash Ishore
Report prepared By	: Mr. Amin Kumar Sethi
Report reviewed By	: Mr. Manan Bhatt



## ADANI PORTS & SPECIAL ECONOMIC ZONE LIMITED

### MOCK DRILL REPORT

#### COMPLIANCE REPORT FOR MOCK DRILL

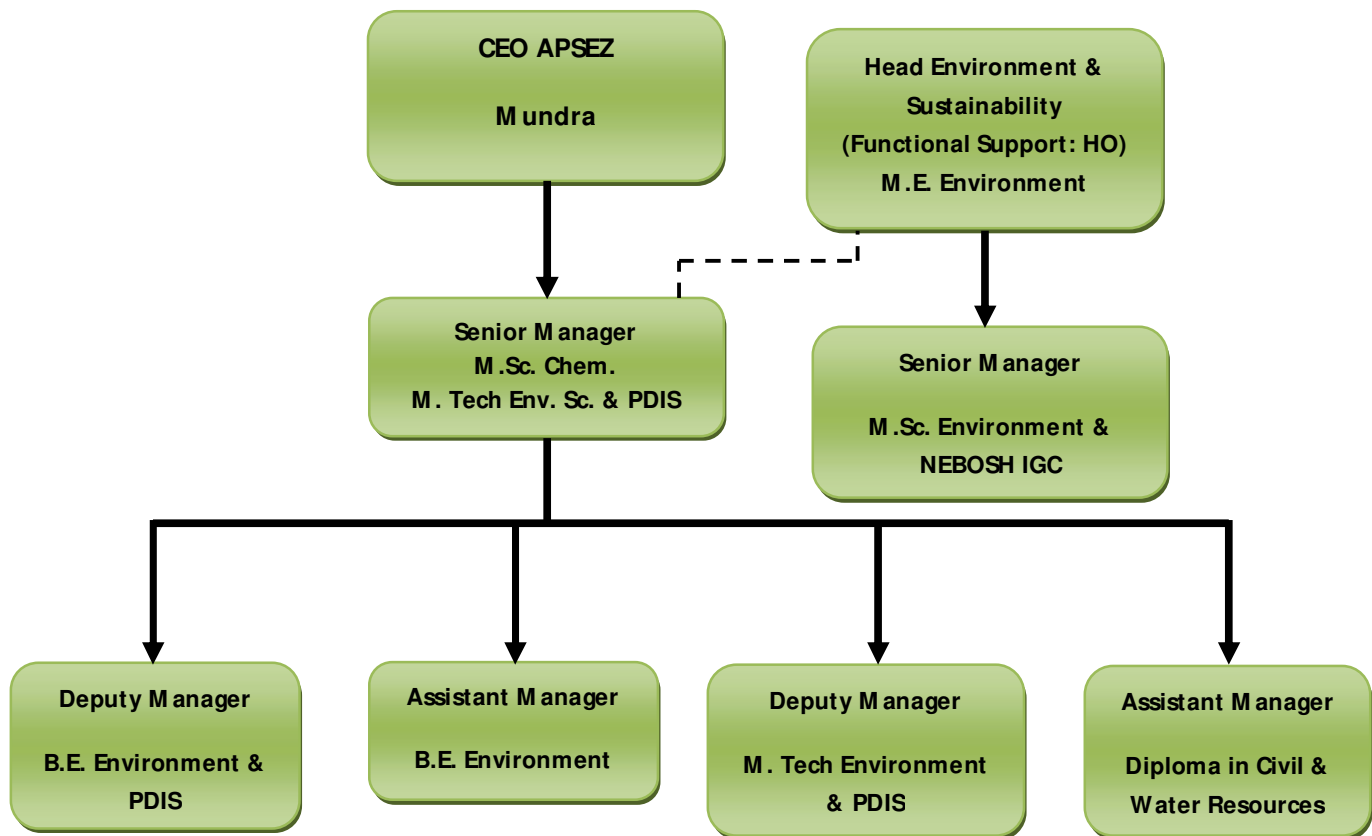
**Plant/ Facilities** : Railway Building

**Date of Mock Drill** : 19.02.2021

#	Recommendations	Action Taken/ Date	Date of Completion
1	Emergency assembly point was displayed with print paper <b>it should be proper visible signage.</b>	Railway	
2	Emergency contact number was displayed at railway building. <b>It should be proper visible signage.</b>	Railway	
3	MCP was operated but not working during an emergency . <b>It should be working and monitor as per schedule of checking.</b>	ES – ACMTPL Fire Services	
4	PA system was not available at railway building. <b>PA system need to be kept at railway building for better communication if in case of emergency.</b>	Railway- Operation	
5	Response of employee was very casual. <b>Emergency response training should be impart for Railway Services.</b>	Railway- Operation	

# **Annexure – 9**

**Organogram of Environment Management Cell, APSEZ, Mundra**



# **Annexure – 10**

### **Cost of Environmental Protection Measures**

Sr. No.	Activity	Cost incurred (INR in Lacs)			Budgeted Cost (INR in Lacs)
		20 18 – 19	20 19 – 20	2020 – 21	2020 – 21
1.	Environmental Study / Audit and Consultancy	6.7	0.33	6.2	51.0
2.	Legal & Statutory Expenses	4.42	0.84	10.58	11.0
3.	Environmental Monitoring Services	20.36	21.74	19.17	30.0
4.	Hazardous / Non Hazardous Waste Management & Disposal	95.72	108.43	83.55	119.8
5.	Environment Days Celebration and Advertisement / Business development	0.28	1.5	5.3	10.0
6.	Treatment and Disposal of Bio-Medical Waste	1.21	1.62	2.09	1.68
7.	Mangrove Plantation, Monitoring & Conservation	47.0	Nil	32.59	32.59
8.	Other Horticulture Expenses	579.32	734.18	689	733
9.	O&M of Sewage Treatment Plant and Effluent Treatment Plant (including STP, ETP of Port & SEZ & Common Effluent Treatment Plant)	144.29	110.18	148.49	160.08
10.	Expenditure of Environment Dept. (Apart from above head)	109.28	105.13	89.11	107.44
<b>Total</b>		<b>1008.58</b>	<b>1083.95</b>	<b>1086.08</b>	<b>1256.59</b>

# **Annexure – 11**



## ગુજરાત પ્રદુષણ નિયંત્રણ બોર્ડ

પ્રાદેશિક કચેરી : કચ્છ (પૂર્વ)

દિનદિવાલ પોર્ટ ટ્રસ્ટનું વહીવટ મકાન રૂમ નં. ૨૧૫, ૨૧૬, ૨૧૭, બીજો માળ,  
સેક્ટર નં. ૮, ગાંધીધામ-૩૭૦૨૦૧, કચ્છ. ફોન : ૦૨૮૩૬-૨૩૦૮૨૮

### તપાસ માટે દાખલ થવાની સૂચના (નોટીસ)

પાણી અધિનિયમ ૧૯૭૪ ની કલમ - ૨૩, હવા અધિનિયમ ૧૯૮૧ ની કલમ - ૨૪ અને પર્યાવરણ (સુરક્ષા) અધિનિયમ - ૧૯૮૬ ની કલમ-૧૦ હેઠળ બાયો-મેડીકલ-વેસ્ટ નિયમ-૨૦૧૭ હેઠળ અમોને મળેલ સત્તાની રૂએ અમો નીચે સહી કરનાર અમોને જરૂરી લાગે તેની સહાય લઈને તમામ સમયે નીચેના હેતુઓ માટે આપની જગ્યામાં દાખલ થવાનો અને તપાસ કરવાનો અધિકાર ધરાવીએ છીએ.

- (૧) અમોને સોંપેલા રાજ્ય બોર્ડ/કેન્દ્ર સરકારના કાર્ય બજાવવાના હેતુ માટે
- (૨) આવા કોઈ કાર્યો બજાવવાના છે કે કેમ અને તેમ હોય તો કઈ રીતે બજાવવાના છે અથવા આ અધિનિયમ અથવા તે હેઠળ કરેલા નિયમોની અથવા આ અધિનિયમ હેઠળ બજાવેલી કોઈ નોટીસની, કરેલા કોઈ હુકમની, આદેશની અથવા આપેલા કોઈ અધિકાર પત્રની કોઈ જોગવાઈનું પાલન કરવામાં આવી રહ્યું છે કે પાલન કરવામાં આવ્યું છે કે કેમ તે નક્કી કરવાના હેતુ માટે.
- (૩) કોઈ સાધન સામગ્રી, ઔદ્યોગિક પ્લાન્ટ રેકર્ડ, રજીસ્ટર, દસ્તાવેજ અથવા અન્ય કોઈ મહત્વની વસ્તુની તપાસ કરવા અને તેની કસોટી કરવાના હેતુ માટે અથવા જે જગ્યામાં તેને એમ માનવાને કારણ હોય કે આ કાયદા કે તે હેઠળ કરેલા નિયમો મુજબ કોઈ ગુનો કરવામાં આવ્યો છે, અથવા થવાની તૈયારીમાં છે, તેવી કોઈ જગ્યાની ઝડપી લેવા માટે અને તેને એમ માનવાને કારણ હોય કે આ કાયદા કે તે હેઠળ કરેલ નિયમો હેઠળ કરેલ શિક્ષાપાત્ર કોઈ ગુનો કર્યાનો પુરાવો, તેવા સાધન સામગ્રી ઔદ્યોગિક પ્લાન્ટ, રેકર્ડ, રજીસ્ટર, દસ્તાવેજ અથવા અન્ય મહત્વની વસ્તુ કબજે લેવા માટે અને નીચે જણાવેલ સમયે દાખલ થઈએ છીએ. IP : 17739

ઉદ્યોગ/.....માં દાખલ થવાનો સમય : સવારના / સાંજના 13:00.....તા. 17 / 03 / 20 21  
અમારી સાથે સહાય માટે નીચેની વ્યક્તિઓ પણ છે.

૧. Zeel Adhikari (AEE)

૨. \_\_\_\_\_

૩. \_\_\_\_\_

પ્રતિ,

M/s Adani Port & Special Economic Zone

Plot No. 1691 P

At Narmad Island, Narmada

નકલ મળેલ છે.

આ સૂચના (નોટીસ) મેળવનારની સહી

સહી :

અધિકારીનું નામ : Hrush Patel

હોદ્દો : AEE

Mr. Bhagvat Sharma  
(Sr. Manager)

# **Annexure – 12**

## Chiragsing Rajput

---

**From:** Azharuddin Kazi  
**Sent:** Tuesday, September 22, 2020 1:11 PM  
**To:** Chiragsing Rajput  
**Subject:** FW: Mangrove conservation plan

---

**From:** Shalin Shah  
**Sent:** Tuesday, September 22, 2020 1:00 PM  
**To:** Azharuddin Kazi <Azharuddin.Kazi@adani.com>  
**Cc:** Haresh Bhatt <Haresh.Bhatt@adani.com>  
**Subject:** FW: Mangrove conservation plan

For necessary record and compliance.

Shalin

---

**From:** S. M. Saiyad, IFS ( Director, Env.) [<mailto:direnv@gujarat.gov.in>]  
**Sent:** 22 September 2020 12:51  
**To:** Shalin Shah  
**Cc:** [ashokchauhan1971@gmail.com](mailto:ashokchauhan1971@gmail.com); gaurangbhatt22  
**Subject:** Mangrove conservation plan

**\*CAUTION:** This mail has originated from outside Adani. Please exercise caution with links and attachments.\*

*Respected Sir,*

As decided in 45<sup>th</sup> meeting of the Gujarat Coastal Zone Management Authority (GCZMA) was held on 04-10-2019 under chairmanship of Dr. Rajiv Kumar Gupta, IAS, Additional Chief Secretary, Forests & Environment Department and Chairman, GCZMA in the Committee Room, Forests and Environment Department, Gandhinagar .

The Authority has approved Adani Port and SEZ Ltd. mangrove conservation plan with following conditions:

1. The APSEZL shall carry out annual compliance monitoring of the mangrove conservation area.
2. The APSEZL shall explore the possibility for taking necessary adequate measures to reduce the erosion near Bocha island.
3. The approval of mangrove conservation plan shall not be considered as any permission under CRZ Notification for dredging activity.
4. There should not be blockage of any drainage line and free flow of water is to be maintained, as flushing of mangrove areas is very essential.
5. The APSEZL shall carry out mangrove monitoring every two years and submit the data to Forest Department/GCZMA and MOEF&CC, GOI

You are directed to comply the above mentioned conditions.

Thanking You,

With regards,

**S. M . Saiyad, IFS**

**Director (Environment) & Member Secretary**

**Gujarat Coastal Zone Management Authority**

Forest & Environment Department

Sachivalaya, Gandhinagar

Tel: 079-23252660

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# **Annexure – 13**

**Report on Comprehensive and Integrated plan for  
preservation and conservation of mangroves and associated  
creeks in and around the Adani Ports and Special Economic  
Zone Ltd., Mundra, Gujarat**



**Submitted to**

**M/s Adani Ports and Special Economic Zone Ltd  
Mundra**

**Prepared by**

**National Centre for Sustainable Coastal Management  
Ministry of Environment, Forest and Climate Change  
Chennai**

**March, 2021**

## Progress report on Monitoring of mangrove distribution in creeks in and around APSEZ and shoreline changes in Bocha island

### 1. Introduction

The northern Gulf of Kachchh in the western coast of India has extensive formation of mangrove. Ministry of Environment, Forest and Climate Change have accorded Environmental Clearance (EC) vide Letter No. F.No.10-138/2008-IA.III dt. 15<sup>th</sup> July, 2014 & 12<sup>th</sup> February, 2020 to M/s Adani Ports and Special Economic Zone Ltd (APSEZ), to set up a multi-product SEZ at Mundra, Kachchh, Gujarat. The project involves development of SEZ in a notified SEZ area of 8481.2784 ha.

While according Environmental Clearance (EC) to the project, the MoEF&CC have stipulated General and Special conditions in their Environment Clearance. Further inline to the MoEF&CC final order, vide F.No.10-47/2008-IA.III dtd 18<sup>th</sup> Sept. 2015 which also contained special conditions, two of which (sr. no iv and v of the order) are as follows:

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

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

### 2. Compliance to the EC conditions

Accordingly, Adani Ports and Special Economic Zone Limited (APSEZ) had requested the National Centre for Sustainable Coastal Management (NCSCM) for preparation of Comprehensive and Integrated plan for preservation and conservation of mangroves and associated creeks. The components of plan are analysis of mangrove health by comparing the coverage between 2011 and 2016, bathymetry of creeks, socio-economics of villages adjoining creeks of APSEZ. One of the key recommendations is monitoring of coverage of mangrove in the late 2019 and comparing its extent of distribution with the data reported

in 2016-17. As per reported in the Conservation plan there has been overall increase in mangrove area by 246 ha in 2016-17 in the creeks in and around APSEZ compared to 2011 indicating existence of near healthy conditions for growth of the mangroves. It was recommended that the trend of mangrove cover needs to be studied in Jan/March 2020 using satellite images of late 2019 and if the trend continues, only monitoring is needed. The Conservation plan was submitted to the Gujarat Coastal Zone Management Authority and in its meeting held in October, 2019, then plan was approved as per their email dt 22<sup>nd</sup> Sept 2020. The major recommendation relating to mangroves that were specified in the conservation plan are as follows:

2.1. There has been overall increase in mangrove area by 246 ha in 2016-17 in the creeks in and around APSEZ compared to 2011 indicating existence of near healthy conditions for growth of the mangroves. No action is needed at present except at Navinal creek, Bocha island and off Bocha creek. The trend of mangrove cover needs to be studied in Jan/March 2020 using satellite images of late 2019 and if the trend continues, only monitoring needed. The tidal range in the mangroves is also to be observed annually using tide poles to ensure that the flow of tidal water remains same as observed in April 2017 during the field study.

If degradation of mangroves to the extent of 10% due to inadequate seawater is observed in Kotdi and Baradimata creeks, initially the mouth areas need to be made free from silt. If tidal flow does not improve after one year and if the extended banks are noticed which might be due to siltation, silt need to be removed on the banks where there are no mangrove roots. If the tidal conditions still do not improve after one year, the interior parts of the creeks need to be dredged in a phased manner from 0.5 m to 1 m. Otherwise, the monitoring of mangrove needs to be carried out once in two years and whenever, degradation is noticed the above strategy needs to be implemented.

2.2. In the Navinal creek, if degradation of mangroves or reduction of mangrove cover by even 10% is noticed in 2020 due to decrease in tide water flow, dredging of Navinal creek from beyond port operation areas up to 4.5 km to increase the depth by 1 m in a phased manner must be taken up to facilitate increased tidal water flow into the mangrove areas of Bocha island. Otherwise, the monitoring of mangrove needs to be carried out once in two years and whenever, degradation is noticed the above strategy needs to be implemented.

The authority suggested to undertake compliance monitoring of the mangrove conservation area to comply the above recommendations and study the health of mangroves in creeks. Accordingly, APSEZ has requested NCSCM to monitor the mangrove coverage using the satellite images of 2019 and also to check the extent of shoreline changes in the eroding areas of Bocha Island which led to loss of about 5.33 ha of dense mangroves between 2011 and 2016-17.

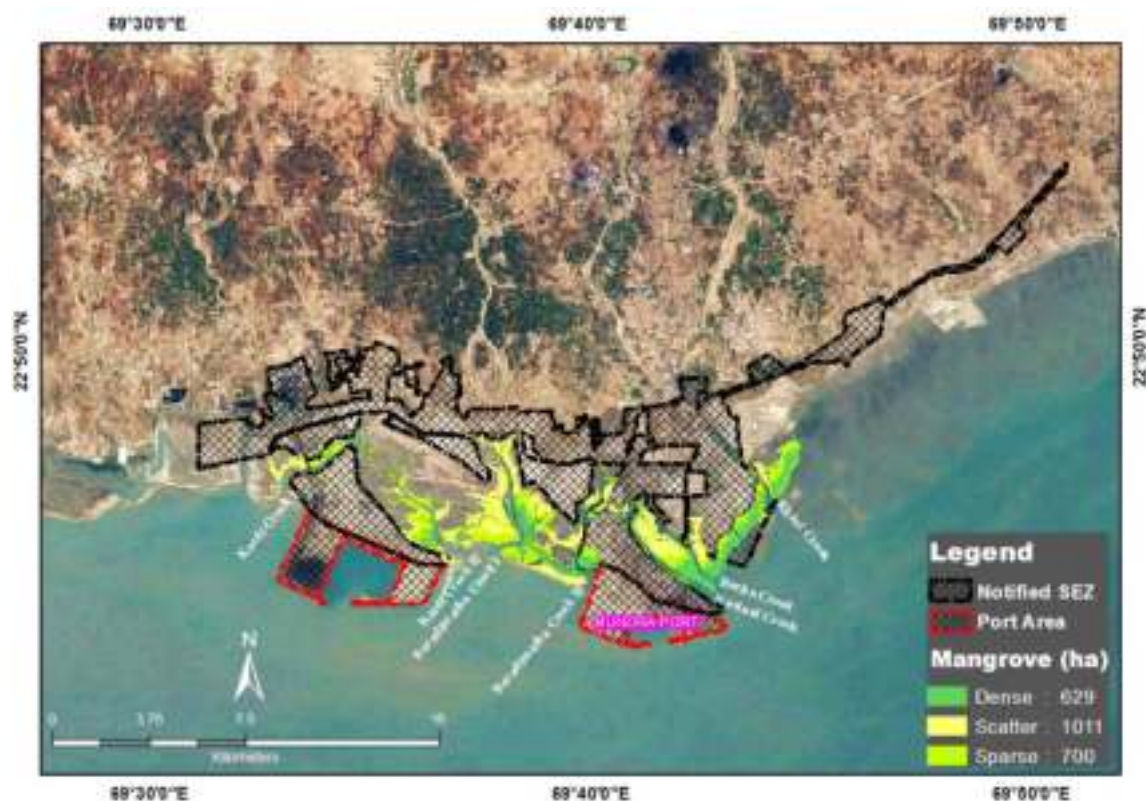
### 3. Scope of work

In order to comply with above recommendations relating to assessment of health of mangroves and also to assess the coastal erosion following activities are proposed:

- i. Procurement of high-resolution satellite images of late 2019/Jan 2020 and prepare GIS based maps on distribution of mangroves in creeks of APSEZ. Field validation of mangrove data collected (subject to COVID-19 conditions prevailing in the country)
- ii. Comparative analysis on variation of mangrove coverage between 2016/17 and late 2019 using GIS techniques and drawl of inference on health of mangroves.
- iii. Determination of shoreline changes at the reported eroding shoreline of Bocha island by comparing shoreline of 2016/17 with 2019.

### 4. Proposed Tasks

- i. In the Conservation plan prepared for creeks and mangroves of APSEZ, it was observed that there has been overall increase in mangrove area by 246 ha in 2016-17 in the creeks in and around APSEZ compared to 2011 indicating existence of near healthy conditions for growth of the mangroves. The extent of mangrove cover will be mapped in the creeks Kotdi (I & II), Baradimatha (I & II), Navinal, Bocha and Khari creeks using High resolution satellite images of late 2019. These creeks have been indicated in Fig.1.



**Fig.1. APSEZ area, creeks and mangrove formation along the creeks**

- ii. Change detection analysis using GIS tool will be carried out for Bocha Island to determine and mangroves will be categorized as scattered, sparse and dense. *{While categorizing mangroves in terms of their density, they have been classified as dense (mangrove plants both tall and stunted with gap between one tree and another being 2 m and less), sparse (shrubs with distance between patches being more than 2 m but less than 5 m) and scattered (shrubs with distance between patches being more than 5 m)}*. The changes from one category to other will be indicated as quantitative data along with locations in the GIS map.
- iii. Determination of shoreline changes in eroding areas of Bocha Island by comparing the shoreline of March, 2017 with shoreline as found in the satellite images of Sept. 2019 to understand the extent of increase/decrease of erosion and corroborating with underlying oceanographic parameters that cause erosion.

## 5. Tasks Completed

### 5.1. Tidal observations in the creeks in and around APSEZ

The technical personnel of APSEZ carried out the tidal observations at locations similar to 2017 in Kotdi, Baradimata, Navinal, Bocha and Khari creeks under the guidance of NCSCM. A Google earth image showing the locations where tidal observations made in December 2020 is placed in Fig.2. These observations made in a 24 hrs tide cycle using tide poles in December, 2020.

The observed tide levels are given in Annex 1. A comparison of tide levels recorded between April, 2017 and December, 2020 is given in Table 1.

**Table 1. Comparison of tide levels between April, 2017 and December, 2020 in creeks in and around APSEZ**

Creek	2017 (values in meters)			2020 (values in meters)		
	Max	Min	Range	Max	Min	Range
Kotdi I L 1	5.63	3.16	2.47	5.84	2.94	2.90
Kotdi I L 2	5.45	2.17	3.28	5.81	2.81	3.00
Kotdi II	5.60	2.98	2.62	6.08	1.38	4.70
Baradimata I L 1	4.83	3.59	1.24	6.08	2.88	3.20
Baradimata II L 1	5.55	4.01	1.54	5.90	0.50	5.40
Baradimata II L 2	4.89	0.53	4.36	6.11	3.41	2.70
Navinal L 1	5.21	3.42	1.79	6.01	3.41	2.60
Navinal L 2	5.20	3.76	1.44	6.18	1.98	4.20
Navinal L 3	5.18	3.54	1.64	6.10	1.14	4.96
Bocha L 1	5.81	2.99	2.82	6.16	1.06	5.10
Bocha L 2	5.75	3.87	1.88	6.03	2.53	3.50
Bocha L 3	5.75	3.44	2.31	5.88	1.48	4.40
Khari L 1	6.15	4.07	2.08	6.01	1.71	4.30



Figure 2: Google image showing locations of tide observations

As the tides primarily follow lunar cycle of the year, there are natural variations in tidal ranges among months in a year. An analysis tide values at selected locations (indicated as L in table 1) reveals existence of higher tidal ranges at most of the locations in 2020 compared to the year 2017. Though such variations are attributed year to year variation in high tide levels in a 19 year lunch cycle, it also indicates prevalence of good tidal ranges in the observed locations revealing normal flow of tides around the observed locations. A comparison of mangrove health with tidal observations through a general inference of availability of tidal water all along the creeks leading to presence of mangroves in categories mostly to the level of 2017, a few locational changes in mangrove categories were observed viz., from dense to sparse and scatter and vice versa. These changes have been described in the respective sections below.

## 5.2. Procurement of High Resolution satellite imagery

Enquiries were made with National Remote Sensing Centre (NRSC) who are the only authorized distributor of satellite images in India, for availability of high resolution satellite imagery especially multi-spectral images similar to the images used to study the mangrove distribution i.e., 0.6m PAN and 2.0 m multispectral data from World view 2 foreign satellite. NRSC has intimated that a procurement procedure for e-purchase of images acquired by foreign satellite is being evolved and it would take considerable time to finalise the procedure. Further, NRSC also informed that no Indian satellite has facility for capturing 2.5m multi-spectral image data. As there are uncertainties in the acquisition of the images from World view 2 satellites during the period of progress report preparation, an effort has been made to use freely available open source Google earth images which is a merged product of 0.65 PAN and 2.5m Multi-spectral data. It has limitations as it is not a digital data and the mangroves details are obtained from Google earth images by directly digitizing from the computer screen. There could be possible error of less than 10 % in mangrove categorization (as dense, sparse and scatter) and also extent of total coverage in terms of hectare. The methodology adopted to map the distribution of mangroves is similar to the method mentioned in the Conservation plan report except the source of satellite image. The present report on mangrove distribution is based on Google images of March, 2017 and Sep 2019, as cloud free images are available only for these dates.

## 5.3. Monitoring on distribution of mangroves in creeks in and around APSEZ to assess their health conditions

### 5.3.1. Overall assessment

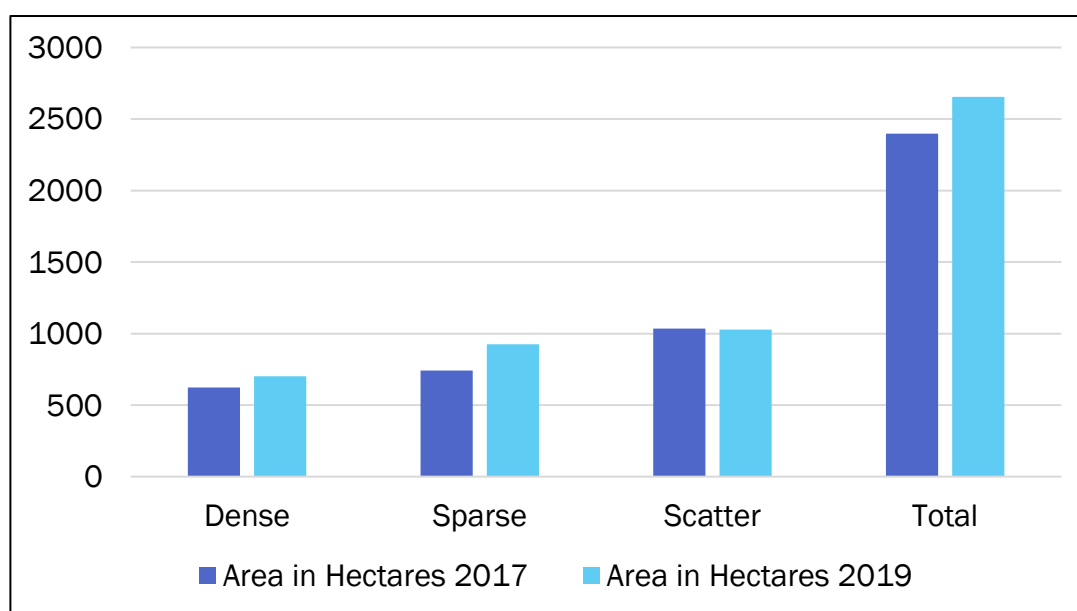
The Kotdi, Baradimata, Navinal, Bocha and Khari creeks experience high tidal ranges up to 6m and with average tidal range of 2 to 4.5m which varies annually. The creeks have mangrove formation due to muddy substratum and the mangroves are tide fed and tidal flow in to the mangroves occurs only during high tide. This makes the mangroves as inter-tidal one and any change of tidal conditions in the creeks affect the growth and distribution of mangroves.

Distribution of mangroves in Kotdi, Baradimata, Navinal, Bocha and Khari creeks and also in Bocha island was studied using Google earth images (2017 March and 2019 Sep). The data obtained for 2017 i.e., 2398 ha was compared with data reported for 2016 (Dec) - 2017 (Jan & Feb) i.e., 2340 ha in the Conservation plan submitted earlier. The Google earth showed a marginal difference of + 58 ha (compared to earlier 2016-17 data) which shows 2.4% higher and the difference can be considered as insignificant.

Further for both the start year (2017 March) and the end year (Sep.2019) Google earth image was used as a source and therefore, the results will be quite acceptable for assessment. With regard to overall health of mangroves in the creeks in and around APSEZ, it was found that there was an increase of mangrove cover between March 2017 and Sep 2019 to an extent of 256 ha which is about 10.7% increase in mangroves. It reveals that the mangrove and the tidal system in the creeks remained undisturbed over this period (Table 1 and Figs.1 to 3). Analysis of data between categories indicated that there was an increase in dense mangroves and also conversion of scattered to sparse which also shows that the growth of mangroves in a progressive direction (Table 2 and Figs 3 to 5).

**Table 2: Data on distribution of various categories of mangroves in the creeks in and around APSEZ in 2017 and 2019**

Category	Area in Hectares	
	2017	2019
Dense	623	701
Sparse	741	925
Scatter	1034	1028
<b>Total</b>	<b>2398</b>	<b>2654</b>



**Figure 3: Comparison of various categories of mangroves in creeks of APSEZ between 2017 and 2019**



Figure.4. Google earth image showing GIS output on distribution of various categories of mangroves in March 2017



Figure 5: Google earth image showing GIS output on distribution of various categories of mangroves in March 2019

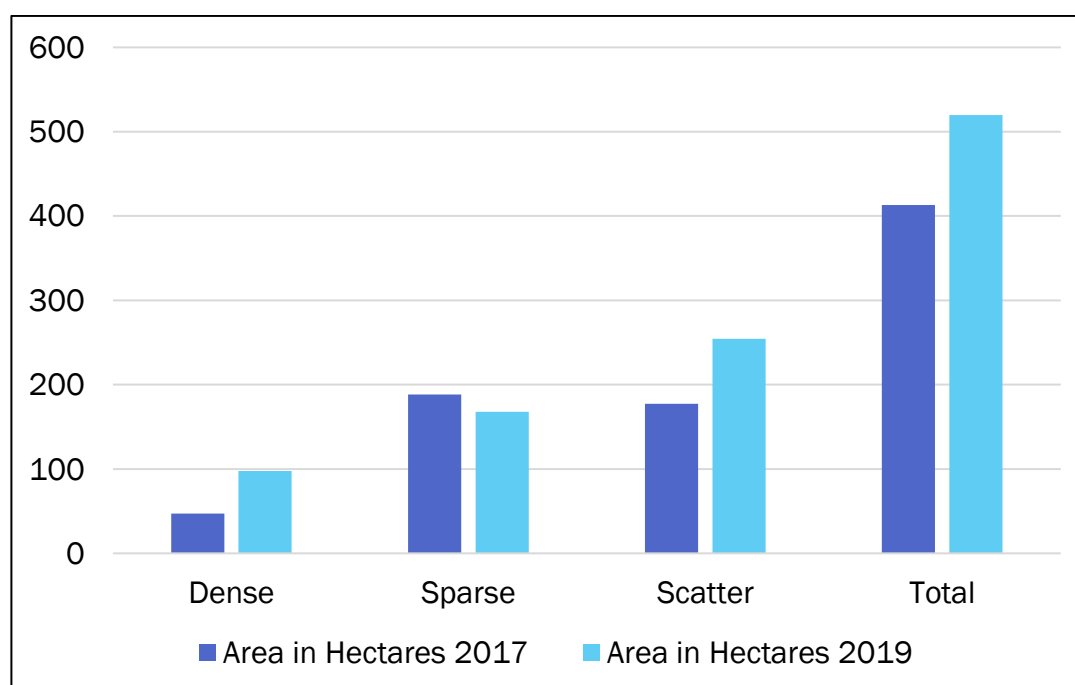
### 5.3.2. Creek wise assessment

#### a. Kotdi creek

The Kotdi creek with two mouths, named as Kotdi I on the western end of South Port of Adani and Kotdi II east of Kotdi I experience tidal flow up to 4.5 km in Kotdi I and up to 7.4 km in Kotdi II during high tide periods. The tidal range observed in 2020 is 2.9 to 4.7m. During the period of study, the creek showed significant growth of all categories of mangroves and the overall increase in Sep 2019 compared to March, 2017 was to the extent of 106.86 ha which is about 25.9%. It is also worth noting that dense mangroves have increased by 106.5% (Table 3 and Fig.6 to 8). While the sparse category marginally decreased to the extent of 20.8 ha, the scatter ones increased by 77.3 ha. (Table 3 Figs 6 to 8). The results reveal good tidal flow in the creeks of Kotdi during the period of investigation and the mangroves are generally in good health condition. Marginal decrease of sparse category and increase of area of scatter are mainly due to transitional changes which are natural in mangrove distribution.

**Table 3. Distribution of mangroves in Kotdi creek system in 2017 and 2019**

Category	Area in Hectares	
	2017	2019
Dense	47.25	97.59
Sparse	188.50	167.70
Scatter	177.20	254.52
Total	412.95	519.81



**Figure 6: Comparison of mangrove distribution between 2017 and 2019 in Kotdi creek system.**



Figure 7: Distribution of mangroves in 2017 in Kotdi creek system.



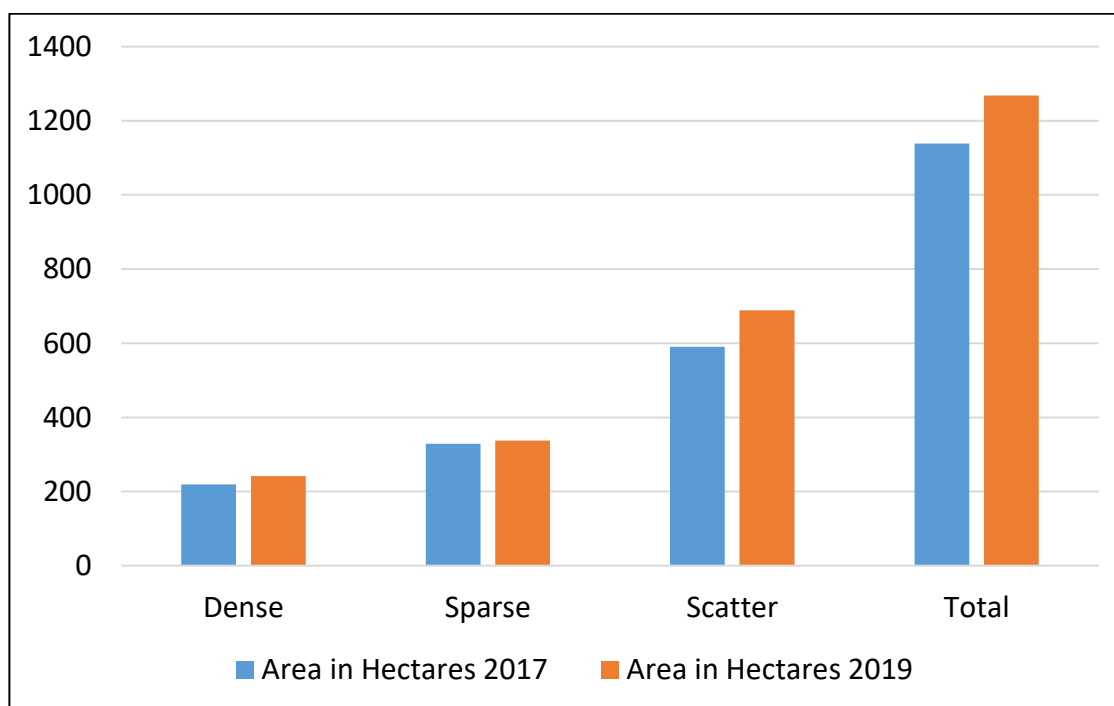
Figure 8. Distribution of mangroves in 2019 in Kotdi creek system.

## b. Baradimata Creek

The creek has been one of the well tide influenced creeks and as of 2020, the creek experienced a tidal range of 2.7 to 5m and the high tide penetrates approximately up to 6.15 km from its mouth. The creek too remains uninfluenced by human interventions except navigation by fishing community from the nearby villages. The health of the mangroves was assessed between 2017 and 2019 and the results are shown in Table 4 and Figs.9 to 11. It has showed overall improvement in mangrove coverage to the extent of 129.47 ha (11.3% increase) mostly with formation of new mangroves in the form of sparse mangroves with minor inter-conversion in categories of sparse to dense (Table 4 and Figs.9 to 11).

**Table 4: Data on various categories of mangroves in the years 2017 and 2019 in Baradimatha creek system**

Category	Area in Hectares	
	2017	2019
Dense	218.90	241.41
Sparse	328.83	337
Scatter	590.60	689.01
Total	1138.33	1267.80



**Figure 9: Comparative data on various categories of mangroves in 2017 and 2019 at Baradimata creek.**



Figure 10: Distribution of mangroves at Baradimata creek in 2017 shown in Google earth image



Figure 11: Distribution of mangroves at Baradimata creek in 2019 shown in Google earth image

As the data on mangrove distribution has shown an increased trend between the years especially improvement to higher categories (i.e., from scattered to sparse and further to dense) and also formation of new mangroves, it could be inferred that the mangroves in the creek are in healthy conditions with normal tidal flow.

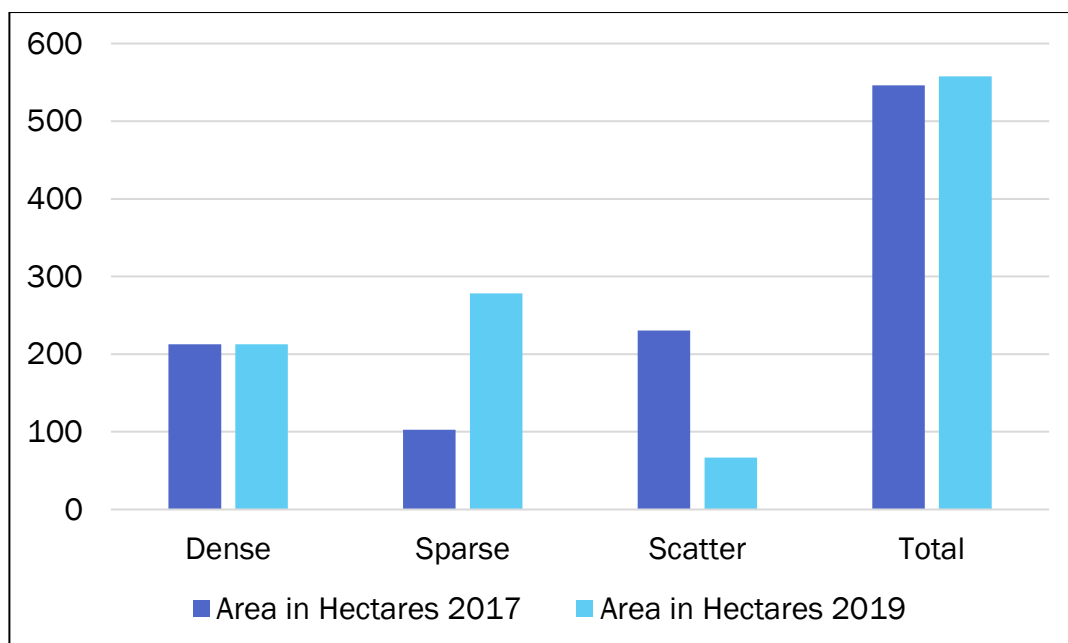
### c. Navinal and Bocha creeks including Bocha island

The creek system is complex with Navinal creek situated abutting to Adani Port and the eastern Bocha creek connecting to Navinal creek in the north leading to formation of Bocha island which has substantial dense mangroves. The mouth of creeks has good tidal inflow especially in Navinal creek as its mouth forms entry to the Port. The Navinal creek becomes narrow towards north and flows eastward to connect with Bocha creek (Fig.1). The creeks have fair to good growth of mangroves on their bank with dense mangroves in the Bocha island and the Figs.12 to 14 show distribution of mangroves in 2017 and 2019 respectively.

The data on distribution of various categories of mangroves have been shown in Table 5 and Fig.12. The mangroves of the creek system have almost remained at 2017 level with marginal increase of 11.43 ha which is an increase of 2.1%. At pre-pages the recommendation made in the conservation plan has been mentioned. Accordingly, if there has been a decrease in mangroves less than 10% to the 2017 level, then the tidal flow in the creeks needs to be studied to check reduction in tidal flow, as the tidal flow is the key parameters for survival and growth of mangroves. As the present data has shown an increase of 2.1% cover of mangroves in the Navinal-Bocha island and Bocha creek system, in general, overall mangrove health is normal with usual tidal flow.

**Table 5: Data on distribution of mangroves in 2017 and 2019 in Navinal Bocha creek system**

	Area in Hectares	
	2017	2019
Dense	212.90	212.6
Sparse	102.75	278.4
Scatter	230.44	66.2
Total	546.09	557.52



**Figure 12: Comparison on distribution of mangroves between 2017 and 2019 in Navinal Bocha creek system**

Though, the overall increase in mangrove in the Navinal-Bocha creek system shows prevalence of normal conditions, specific attention was drawn in the case of Navinal creek in the Conservation due to formation of sand spits. It was postulated that continued growth of sand spit across the creek might reduce tidal flow in future which may affect the growth of the mangroves. In this regard, it is pertinent to draw the following recommendations for mangroves in Navinal creek in the Conservation plan:

*Sand/silt spits were observed on the banks of Navinal creek and some of them were extending close to Bocha island. If such spits continue to grow, they may obstruct tidal flow leading to reduced tidal water supply to the northern banks of Navinal creek and the Bocha island. Therefore, assessment of the health of mangroves should also be carried out along the Navinal creek in Jan/Mar 2020. If the health of the mangroves either remains at the current condition or improves, the situation should be monitored once in every two years using high resolution satellite images. If there are signs of degradation of mangroves due to decrease of flow of tidal waters in the interior parts of the Navinal creek, Bocha island that are fed by tidal waters of Navinal creek, then it would be necessary to deepen the Navinal creek to facilitate movement of tidal water"*

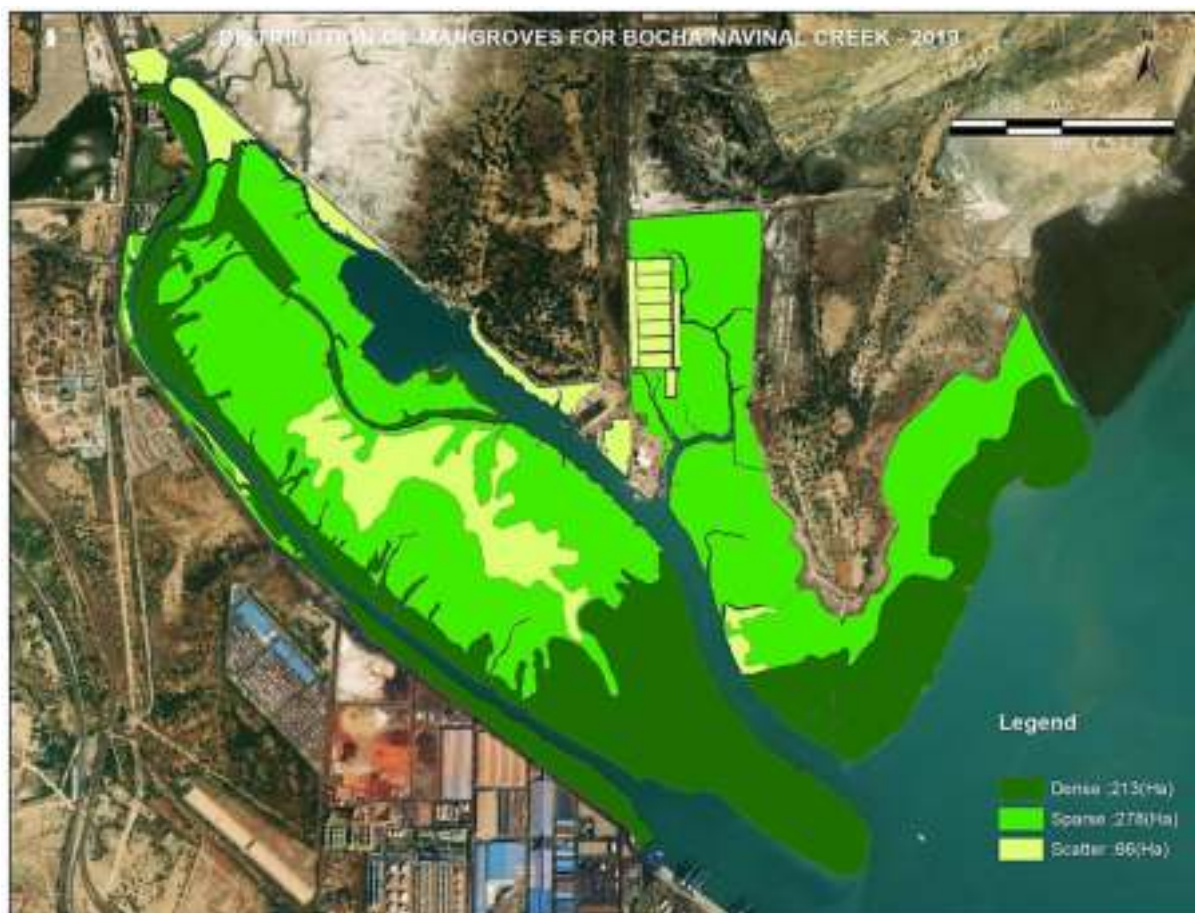
As there was a specific recommendation on Navinal creek, comparison of mangrove categories between 2017 and 2019 was made using mangrove distribution depicted in Figs 13 and 14. It was observed that while the southern side of Navinal bank adjoining Adani port where tidal range is high (~5 m) the scattered mangroves of 2017 grew well to become dense. However, in the northern side, the dense mangroves at the landward side of creek bank, few patches of dense mangroves have turned to sparse and scatter. On analysis of tidal values in the deeper northern part of the creek, it was found that the location which is a junction of a branch of Bocha creek showed in a tidal range of 2.6m

(6.01 m during peak high tide and 3.4 m during peak low tide) in 2020 compared to 1.8m in 2017 at same location (measured in 2017 while preparing the Conservation plan) which indicates a good tidal flow in the creek. Conversion of mangrove from dense to sparse in Navinal from 2017 to 2019 despite such good tidal flow is not clear.

In order to understand the causes, it is necessary to measure tide at closer intervals (every 300m) in this mangrove change section of Navinal creek till the meeting point of Bocha creek during the next monitoring cycle. This may indicate locational change of tidal range and also influence of tide from Bocha creek at the meeting point.



Figure 13: Distribution of various categories of mangroves overlaid in Google earth image of Navinal and Bocha creek system for the year 2017



**Figure 14: Distribution of various categories of mangroves overlaid in Google earth image of Navinal and Bocha creek system for the year 2019**

The change analysis performed using GIS overlay techniques to understand inter-conversion among Dense, Sparse and Scattered indicates there is a net loss of dense mangroves to the extent of 2.83 ha which has mostly occurred at the tip of the Bocha island and also along the coast east of Bocha creek (Table 6 and Figs 15 and 16). Loss of dense mangroves around the tip of Bocha island to the extent of 5.33 ha between 2011 and 2016-17 was reported in the Conservation plan. From the present results, it is evident that the erosion has been continuing around the tip of the Bocha island resulting in the loss of dense mangroves.

**Table 6: Data on inter-conversion of mangrove categories from 2017 to 2019**

Category	Area in Hectares				
	Dense in 2019	Sparse in 2019	Scatter in 2019	Gain/Loss	Total 2017
Dense in 2017	206.06	1.94	2.06	2.83	212.90
Sparse in 2017	0.74	52.42	49.69	-0.10	102.75
Scatter in 2017	5.56	89.31	135.59	-0.01	230.44
Gain/Loss	0.19	134.73	-120.72		
Total 2019	212.55	278.40	66.62		



Figure 15: Result of change analysis from 2017 to 2019 on categories of mangroves in Navinal-Bocha creek system overlaid on Google earth image

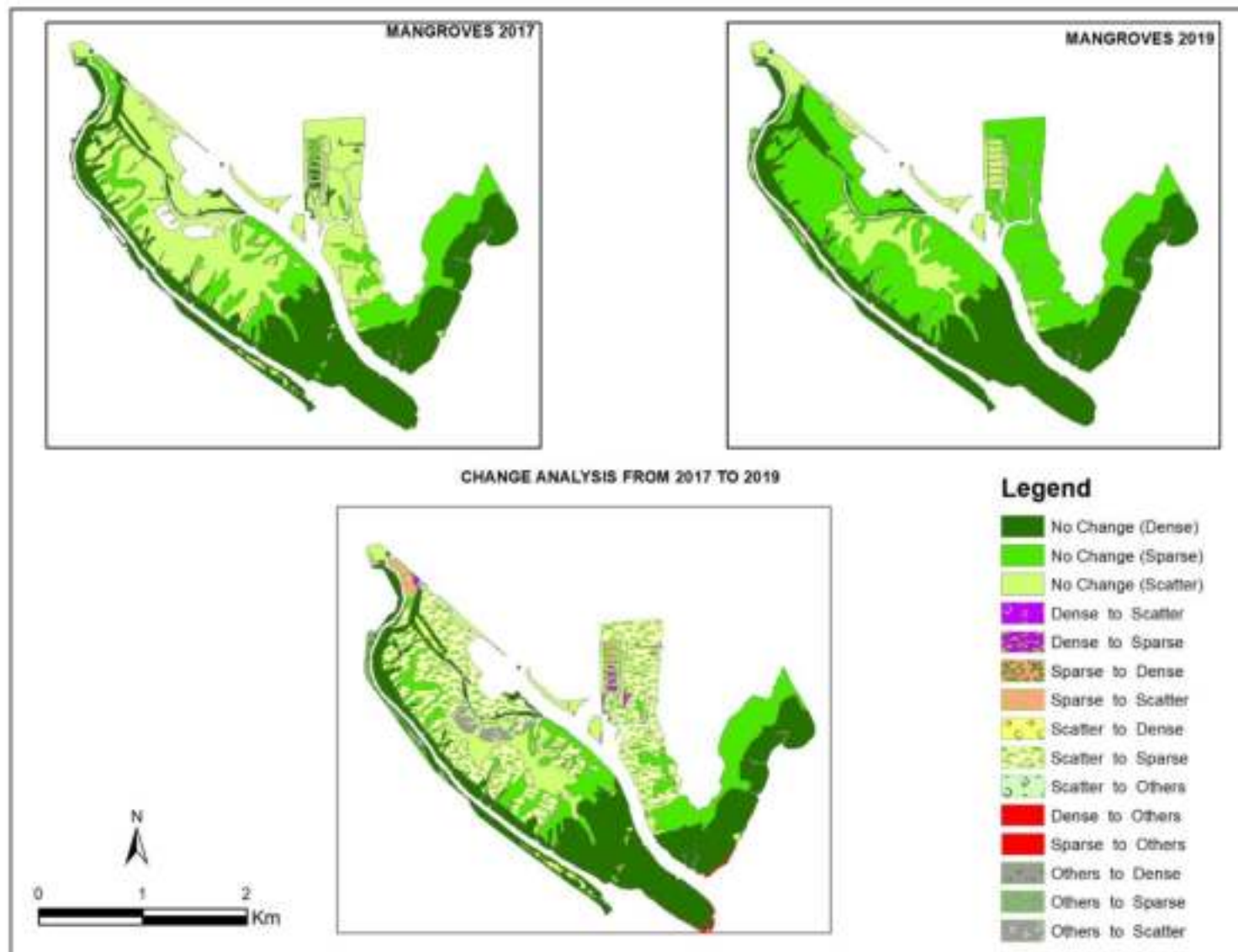


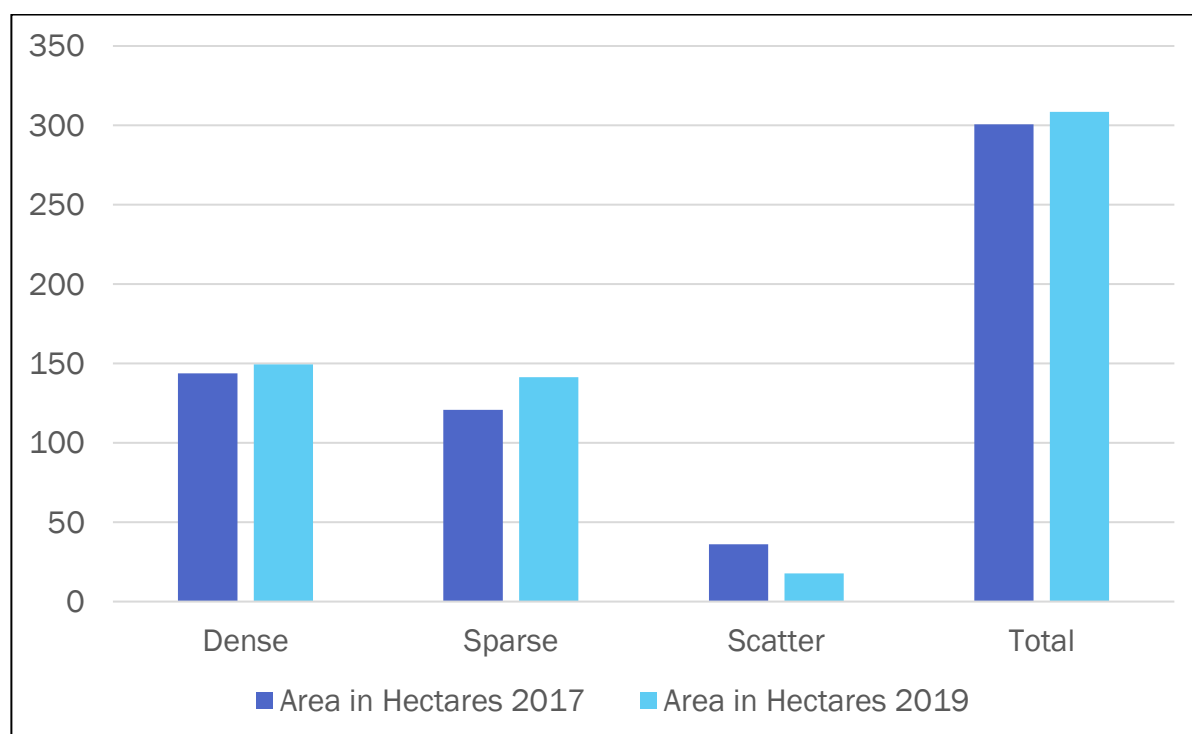
Figure 16: Mangrove layers of 2017 and 2019 and the overlaid results

### Khari creek

The creek experiences normal tidal flow with settlements located in the northern part of the creek (Junabunder village). Distribution of mangroves between March, 2017 and Sep 2019 has been studied and the data is given in Table.7 and Fig.17. and categories of mangroves are indicated in Figs18 & 19. The data indicates there is a marginal increase of mangroves to the extent of 7.87 ha which 2.62% compared to 2017 level. The minor decrease in scatter category is due to its conversion to both dense and sparse. This is a normal process of changes in mangroves due to annual variation in tidal regimes. Since there has been an increase of 2.62% of mangroves compared to 2017 level, the mangroves are in normal conditions and the decrease in scatter may be due to conversion to higher category namely sparse.

**Table 7: Distribution of various categories of mangroves in 2017 and 2019 in Khari creek**

Category	Area in Hectares	
	2017	2019
Dense	143.71	149.46
Sparse	120.83	141.28
Scatter	36.14	17.80
Total	300.68	308.55



**Figure 17: Comparison of mangroves in 2017 and 2019 in Khari creek**



Figure 18: GIS based map showing distribution of mangroves in March,2017in Khari creek.



Figure 19: GIS based map showing distribution of mangroves in Sep.2019 in Khari creek

## 6. Erosion at Bocha Island

In the Conservation plan prepared in 2017, it was indicated that erosion is prevalent around the Bocha island leading loss of about 30m of coastline along with 5.33 ha of dense mangroves between 2011 and 2017 (Feb). A solution with alternative was also suggested in the Conservation plan to control the erosion. One of the main reasons attributed for the cause of erosion occurrence of strong tidal currents along the Bocha creek side of the island. Prevalence of high current was due to shallowness of the mouth of Bocha creek, which acts as barrier and deflects the tidal current to the island shore.

However, in order to check whether any natural process has nullified erosion around the Bocha island, attempt has been made to study the erosion rate from 2017 March and 2020 March using the Google image. The results have been shown in Fig.19 which indicates continued erosion at the site rate of 10 to 16 m/yr with loss of about 2 ha of dense mangroves. This re-emphasizes the need to implement the solution of deepening the submerged portion of the mouth of Bocha island to dampen the current.

The Conservation plan had already suggested two solutions to mitigate the erosion, which will be carried out after taking approvals from the concerned authorities. APSEZ has already initiated the process of obtaining required approvals to execute the first solution of deepening the mouth of Bocha creek and same will be implemented and monitored for erosion to decide the future course of actions required, if any.

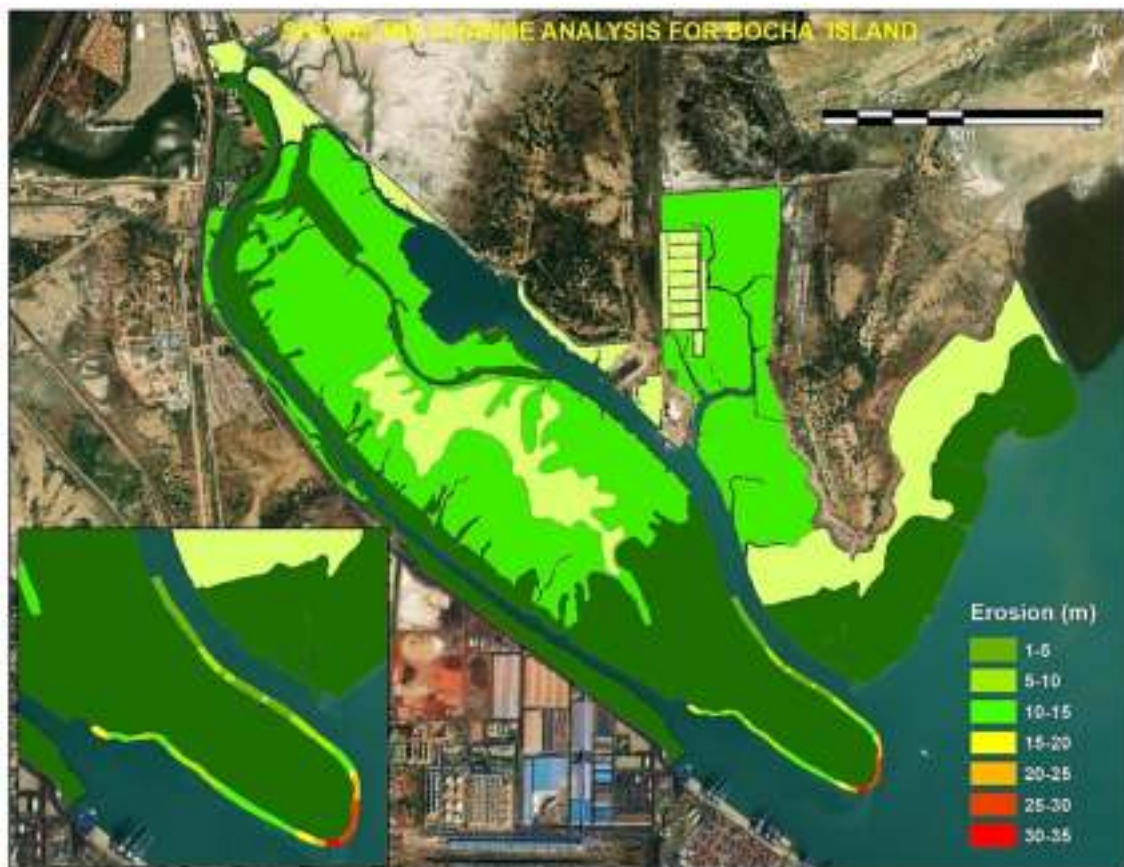


Figure 19: Rate of erosion around the mouth of Bocha island between 2017 and 2019

## 7. Summary

Based on the results obtained by comparing distribution of mangroves between 2017 (March) and Sep 2019 using Google earth images, following inferences could be drawn:

- (a) Overall health of mangroves in the creeks in and around APSEZ was assessed comparing Google earth images of 2017 with 2019 and it is observed that there was an increase in mangrove cover between March 2017 and September 2019 to the extent of 256 ha, which is about 10.7%. This suggests that the mangrove and the tidal system in the creeks remain undisturbed over this period.
- (b) The observed tidal ranges indicate that the creeks experience normal tidal ranges, adequate for the growth of mangroves.
- (c) While Kotdi creeks have shown significant increase in dense mangrove cover, it remained unchanged/ marginal increase in Baradimata creek, Navinal-Bocha island - Bocha creek system and Khari creek.
- (d) At Navinal creek, which had shown formation of sand spits from western bank to east, has shown good growth of mangroves in the southern sector. However, in the northern sector, the dense mangroves on the landward edge of western part of the creek was observed to be converted to sparse mangroves, occurring in patches. However, good tidal flow at the far end of the creek is noticed, it is recommended to measure tide at closer intervals (every 300m) in the sections of Navinal Creek upto the meeting point at Bocha creek during the next monitoring period. This may indicate locational change of tidal range and also impact of sand spits on the tidal regime from the middle to the northern end of the creek. Alternatively Drone survey with appropriate speed and elevation may also be considered in the subsequent survey(s) at both high and low tides to determine the extent of tidal water reaching along this part of bank of the creek along with the residence time.
- (e) Erosion around the Bocha island has been continuing at the rate of 10 – 16m/yr requiring urgent action. The Conservation plan had already suggested two solutions to mitigate erosion, which will be undertaken after taking approvals from the concerned authorities. APSEZ has already initiated the process of obtaining required approvals to execute the deepening the mouth of Bocha creek, as a first step and same will be implemented and monitored for erosion to decide the future course of actions required, if any.

Table 8. Observations of tide levels in the creeks in and around APSEZ

Location - 1 KOTADI CREEK 1-L2	2020	2017
LATITUDE / LONGITUDE	22° 47' 29.66"N 69° 33' 44.84"E	22° 47' 28.99" 69° 33' 42.20"
Max.	5.81	5.45
Min.	2.81	2.17
Mean	4.51	4.18

Location - 2 KOTADI CREEK 1-L1	2020	2017
LATITUDE / LONGITUDE	22° 48' 0.57"N 69° 34' 25.23"E	22° 48' 04.43" 69° 34' 28.97"
Max.	5.84	5.63
Min.	2.94	3.16
Mean	4.33	4.59

Location - 3 KOTADI CREEK-2	2020	2017
LATITUDE / LONGITUDE	22° 46' 36.45"N 69° 36' 26.25"E	22° 46' 36.77" 69° 36' 27.59"
Max.	6.08	5.60
Min.	1.38	2.98
Mean	3.24	4.78

Location - 4 BARADIMATA CREEK 1	2020	2017
LATITUDE / LONGITUDE	22° 48' 3.76"N 69° 38' 8.78"E	22° 48' 14.54" 69° 38' 22.09"
Max.	6.08	4.83
Min.	2.88	3.59
Mean	4.42	4.24

Location - 5 BARADIMATA CREEK2-L1	2020	2017
LATITUDE / LONGITUDE	22° 46' 2.65"N 69° 39' 56.80"E	22° 46' 01.30" 69° 39' 57.24"
Max.	5.90	5.50
Min.	0.50	4.01
Mean	3.46	5.01

Location - 6 BARADIMATA CREEK2-L2	2020	2017
LATITUDE / LONGITUDE	22° 47' 29.85"N 69° 40' 21.45"E	22° 47' 30.01" 69° 40' 21.83"
Max.	6.11	4.89
Min.	3.41	0.53
Mean	4.86	3.05

Location – 7 NAVINAL CREEK-L1	2020	2017
LATITUDE / LONGITUDE	22° 46' 47.51"N 69° 40' 59.09"E	22° 46' 47.49'' 69° 40' 57.78''
Max.	6.01	5.21
Min.	3.41	3.42
Mean	4.58	4.52

Location – 8 NAVINAL CREEK-L2	2020	2017
LATITUDE / LONGITUDE	22° 45' 44.89"N 69° 41' 19.88"E	22° 45' 43.39'' 69° 41' 20.61''
Max.	6.18	5.20
Min.	1.98	3.76
Mean	3.80	4.74

Location – 9 BOCHA CREEK-L2	2020	2017
LATITUDE / LONGITUDE	22° 45' 58.52"N 69° 41' 36.13"E	22° 46' 47.49'' 69° 40' 57.78''
Max.	6.03	5.75
Min.	2.53	3.87
Mean	4.33	4.97

Location – 10 BOCHA CREEK-L1	2020	2017
LATITUDE / LONGITUDE	22° 45' 43.20"N 69° 42' 22.22"E	22° 45' 47.21'' 69° 42' 16.87''
Max.	6.16	5.81
Min.	1.06	2.99
Mean	3.58	4.91

Location – 11 BOCHA CREEK-L3	2020	2017
LATITUDE / LONGITUDE	22° 45' 12.33"N 69° 42' 41.88"E	22° 44' 09.38'' 69° 43' 02.58''
Max.	5.88	5.75
Min.	1.48	3.44
Mean	3.62	4.89

Location – 12 KHARI CREEK	2020	2017
LATITUDE / LONGITUDE	22° 47' 39.13"N 69° 43' 27.00"E	22° 47' 46.53'' 69° 43' 26.82''
Max.	6.01	6.15
Min.	1.71	4.07
Mean	3.77	5.43

Location – 13: NAVINAL CREEK-L3	2020	2017
LATITUDE / LONGITUDE	22° 43' 57.58"N 69° 42' 30.60"E	22° 44' 09.38'' 69° 43' 02.58''
Max.	6.10	5.18
Min.	1.14	3.54
Mean	3.66	4.63

# **Annexure – 14**

## **ALGAL REMOVAL WORK FROM MANGROVE AREAS**

Creek area is regularly observed for checking algal encrustations. On the mangrove recruits & where the algal encrustation is found to be substantial, it is removed manually by deployment with required manpower. This operation is performed during the low tide conditions. The main object is to provide better growing condition for the growth of mangroves. Periodically, spread of *Prosopis* sp towards the mangrove areas is also observed as this species will compete with mangrove plants for growth.

Mangroves nursery is developed in a creek behind IOCL & 50,000 Nos. of new saplings are planted in creek area.

Reference photographs of activities undertaken as per given guidelines,

### **A) Removal of algal encrustations & preventing the spread of *Prosopis*:**



**B) Latitude & Longitude details of the location for removal of algal encrustations:**



**C) Development of Nursery & Plantation of Mangroves:**

