Bhagwat Swaroop Sharma

From: Bhagwat Swaroop Sharma
Sent: Wednesday, November 30, 2022 7:30 PM
To: eccompliance-guj@gov.in; iro.gandhingr-mefcc@gov.in
Cc: ec-rdw.cpcb@gov.in; ro-gpcb-kute@gujarat.gov.in; ms-gpcb@gujarat.gov.in; mefcc.ia3@gmail.com; monitoring-ec@nic.in; direnv@gujarat.gov.in; Snehal Jariwala
Subject: Half Yearly EC Compliance Report WFDP Submission for Period April'22 to Sept.'22
Attachments: 2009 - EC Compliance Report AprIL'22 to Sep'22_WFDP APSEZ Mundra.pdf

adani

Ports and Logistics

APSEZL/EnvCell/2022-23/078

To
The Inspector General of Forest / Scientist C,
Integrated Regional Office (IRO),
Ministry of Environment, Forest and Climate Change,
Aranya Bhawan, A Wing, Room No. 409,
Near CH 3 Circle, Sector – 10A,
Gandhinagar – 382007.
E-mail: eccompliance-guj@gov.in, iro.gandhingr-mefcc@gov.in

Sub : Half yearly Compliance report for Environment and CRZ Clearance for "Water Fron Project at Mundra, Dist. Kutch, Gujarat.

Ref : i) Environment and CRZ clearance granted to M/s Adani Ports & SEZ Limited vide l January, 2009 and 19th January, 2009 bearing MoEF letter No. 10-47/2008- IA.III.
ii) Environment and CRZ clearance Extension order granted to Water Front Develop Mundra in Kutchh District (Gujarat) vide letter dated 7th October, 2015 bearing MoE 47/2008- IA.III.
iii) MoEF&CC's Order dated 18.09.2015

Dear Sir,

Please refer to the above cited reference for the said subject matter. In connection to the same, it copy of the compliance report for the Environmental and CRZ Clearance for the period o September 2022 is being submitted through soft copy (e-mail communication & CD).

Kindly consider above submission and acknowledge.

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

Thanks & Regards,

Bhagwat Swaroop Sharma
Sr. Manager - Environment
Mundra & Tuna port

Adani Ports & Special Economic Zone Ltd.

Environment Cell | 1st floor | Adani House | Mundra Kutch | 370421 | Gujarat | India
Mob +91 6357231713 | Ext. 52474 | www.adani.com

adani

Ports and Logistics

APSEZL/EnvCell/2022-23/078 **Date:** 21.11.2022

To
The Inspector General of Forest / Scientist C,
Integrated Regional Office (IRO),
Ministry of Environment, Forest and Climate Change,
Aranya Bhawan, A Wing, Room No. 409,
Near CH 3 Circle, Sector – 10A,
Gandhinagar – 382007.
E-mail: eccompliance-guj@gov.in, iro.gandhingr-mefcc@gov.in

Sub : Half yearly Compliance report for Environment and CRZ Clearance for "Water Front Development Project at Mundra, Dist. Kutch, Gujarat.

Ref : i) Environment and CRZ clearance granted to M/s Adani Ports & SEZ Limited vide letter dated 12th January, 2009 and 19th January, 2009 bearing MoEF letter No. 10-47/2008- IA.III.
ii) Environment and CRZ clearance Extension order granted to Water Front Development Project at Mundra in Kutchh District (Gujarat) vide letter dated 7th October, 2015 bearing MoEF letter No. 10-47/2008- IA.III.
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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 April-2022 to September 2022 is being submitted through soft copy (e-mail communication & CD).

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

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) The Zonal Officer, Regional Office, CPCB – Western Region, Parivesh Bhawan, Opp. VMC Ward Office No. 10, Subhanpura, Vadodara – 390023.
3) The Member Secretary, GPCB – Head Office, Paryavaran Bhavan, Sector 10 A, Gandhi Nagar – 382010.
4) The Director, Forests & Environment Department, Block – 14, 8th floor, Sachivalaya, Gandhi Nagar – 382010.
5) The Regional Officer, Regional Office GPCB (Kutch-East), Gandhidham – 370201.

Adani Ports and Special Economic Zone Ltd
Adani House,
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Mundra, Kutch 370 421
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Environmental Clearance Compliance Report

Waterfront Development Project, Mundra, Dist. Kutch, Gujarat

Adani Ports and SEZ Limited Mundra, Kutch

For the period of
April-2022 to September-2022

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adani Ports and Logistics	**Adani Ports and Special Economic Zone Limited, Mundra.**	**From : Apr'22** **To : Sep'22**
Status of the conditions stipulated in Environment and CRZ Clearance		

Compliance Report of Environmental and CRZ Clearance

adani Ports and Logistics	Adani Ports and Special Economic Zone Limited, Mundra.	From : Apr'22 To : Sep'22

Status of the conditions stipulated in Environment and CRZ Clearance

The name of the company was changed from **"Mundra Port and Special Economic Zone Limited"** to **"Adani Ports and Special Economic Zone Limited"** on 6th January, 2012.

Activities/facilities approved, major components completed and proposed future activities as per Environment and CRZ Clearance are as below:

Description (Type of Facility or Berth)	Approved Berths or Length as per Environmental & CRZ Clearance	So far Developed and In Operation
	Nos. of Berths or Length	Nos. of Berths
Multipurpose	4 (550 m + 2 Berths)	4
Container	16 (2680 m + 2000 m)	7 (2110 m)
Ro-Ro	2	-
Coal	6	4
Dry-Bulk Cargo	5	-
Liquid/POL	9*	-
LNG	2	Developed and operated by GSPC LNG Limited as per separate permissions obtained and NOC given by APSEZ
Light & Heavy Engineering	2	-
Port Craft	1 (330 m)	-
Shipyard	2	-

* Liquefied Petroleum Gas (LPG) Terminal has been developed by M/s. Mundra LPG Terminal Pvt. Ltd. under Waterfront Development Project of Adani Ports and SEZ Limited and LPG is being handled at existing Multipurpose Terminal APSEZ. M/s. Mundra LPG Terminal Pvt. Ltd is 100% subsidiary of APSEZ.

In addition to above berths or facilities, following components were also approved.

1. Dredging Quantity: 210 Mm^3. Overall dredging to the tune of 123 Mm^3 is completed till date.
2. Back-up area, back-up facilities like railway line, rail sidings, rail truck loading, open paved areas, associated buildings, utilities, amenities, etc. and connectivity to rail and road corridor for each port were approved and majority of them are constructed and in operation. Remaining facilities will be developed based on future requirements.
3. Seawater intake channel and outfall channel for power plants, desalination plants (47 MLD is operational out of 300 MLD) and other industrial requirements approved and is already in operation.

adani Ports and Logistics	**Adani Ports and Special Economic Zone Limited, Mundra.**	**From : Apr'22** **To : Sep'22**
Status of the conditions stipulated in Environment and CRZ Clearance		

Note:

- APSEZ has applied for EC & CRZ Clearance for expansion of Waterfront Development Project vide dated 7th March, 2019.
- MoEF&CC has issued Terms of Reference (ToR) vide Ref. – F. No. 10-24/2019-IA-III dated 17th May, 2019 and it is further amended on 27th Sep, 2019 & 10th April, 2020.

Half yearly Compliance report for Environment and CRZ Clearance for the project "Water Front Development Project (WFDP) at Mundra, Dist. Kachchh, Gujarat of M/s. Adani Ports and SEZ Limited"

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022
Specific Conditions		
i	No existing mangroves shall be destroyed during construction / operation of the Project.	Complied. **<u>Conservation of mangroves:</u>** • In and around APSEZ, approx. 1800 ha. Mangrove area was identified by NIO in an EIA report prepared the year 1998. • 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). • It may be noted that the entire area of 1254 ha is not covered with mangroves. • 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. As per MoEF&CC directive, APSEZ entrusted NCSCM to demarcate mangroves in and around APSEZ area. As per their study, mangrove cover in and around APSEZ was over 2340 ha. The analysis of the comparison between 2011 and 2016-17 has shown an overall growth of 246 ha. 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&CC for their examination and recommendation vide (with a copy to MoEF&CC vide letter dated 04.06.2018 & reminder letter vide dated 4th Jan, 2019). Presentation on the findings of the report was made to GCZMA committee on 4th October 2019 and the recommendation for the same has been received vide email dtd 22nd Sept, 2020 with conditions, which was submitted as a part of half yearly EC compliance report for the period Oct'20 to Mar'21.

<table>
<tr><th>Sr. No.</th><th>Conditions as per clearance letter</th><th>Compliance Status as on 30-09-2022</th></tr>
<tr><td></td><td></td><td>As a part of GCZMA recommendations and NCSCM mangrove conservation action plan, APSEZ has undertaken following activities.
<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>• APSEZ entrusted NCSCM, Chennai to carry out Monitoring of mangrove distribution in creeks in and around APSEZ and shoreline changes in Bocha island.
• 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 & 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%.
• 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.
• Hence, there is an overall growth of mangroves in creeks in and around APSEZ, Mundra is 502 Ha between 2011 and 2019.
• The cost of the said study was INR 23.56 Lacs incurred by APSEZ.</td></tr>
<tr><td>2.</td><td>Tidal observation in creeks in and around APSEZ</td><td>• APSEZ carried out the tidal observations at locations similar to 2017 in Kotdi, Baradimata, Navinal, Bocha and Khari creeks under the guidance of NCSCM.
• The observed tidal ranges indicate that the creeks experience normal tidal ranges, adequate for the growth of mangroves.
• The cost of the said activity was INR 1.0 Lacs.</td></tr>
<tr><td>3.</td><td>Removal of Algal and Prosopis growth from mangrove areas</td><td>• Algal and Prosopis growth monitoring was done in and around mangrove area and algal encrustation was</td></tr>
</table>
</td></tr>
</table>

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022		
				found in some of the mangrove areas, which has been removed manually. • The cost of the said activity was INR 2.8 Lacs. The details of Removal of Algal and Prosopis growth from mangrove areas was submitted during the last compliance period Oct'21 to Mar'22.
		4.	Awareness of mangroves importance in surrounding communities	• Adani Foundation – CSR Arm of Adani group has done awareness camps/activities created in the community regarding importance of mangroves. • Celebrated the International Mangrove Day for the Conservation of the Mangrove Ecosystem every year on 26th July, • Adani Foundation provides good Quality dry and green fodder to 29 Villages. Project is covering total 33072 Cattels / 2747 farmers and hence enhancing cattle productivity during last FY 2022-23 (Till Sep'22). • Awareness of mangroves importance in surrounding communities & Fodder support - The expenditure for fodder supporting activities was approx. 200.89 Lacs during FY 2022-23 (Till Sep'22), which was incurred by APSEZ. • 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 Grassland development in Siracha – 85 Acre & Zarpara – 25 Acre done which resulted in total production of 82 ton. • 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. • APSEZ has celebrated the International Day for the Conservation of the Mangrove Ecosystem on July 26th to raise awareness of the importance of mangrove ecosystems as "a unique, special and vulnerable ecosystem".

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022
		<table><tr><td></td><td></td><td>The photographs of celebration are attached as **Annexure-11.** • Refer CSR report attached as **Annexure – 1**.</td></tr></table> Details of activities done as a part of GCZMA recommendations and NCSCM mangrove conservation action plan were submitted as a part of half yearly EC compliance report for the period Oct'20 to Mar'21. To comply with the GCZMA recommendations regarding mangrove monitoring at every 2 years, APSEZ awarded work order vide order no. 4802018994, dated 29/07/2022 to the NCSCM, Chennai for mangrove mapping in and around APSEZ, Mundra. The cost of said work is 23.77 Lacs, which will be paid by APSEZ.
ii	There shall be no filling up of the creek and reclamation of the creeks.	Complied. **<u>Conservation of creeks:</u>** • The prominent creek system (main creeks and small branches of creeks) in and around APSEZ are: (1) Kotdi (2) Baradimata (3) Navinal (4) Bocha (5) Mundra (Oldest port (Juna Bandar) leading to Bhukhi river). • All above creek mouths are open allowing free flow of water in to the creeks and surrounding areas and there is no filling or reclamation of any creek area. • This aspect is also confirmed from the recent study of NCSCM in 2017-18, which highlights the bathymetry data of the entire coast around APSEZ. • From the bathymetry data it can be concluded that there are sufficient depths at the creek mouths and all creek mouths are open allowing flushing of water. • APSEZ has so far constructed 19 culverts having total length of approx. 1100 m with total cost of INR 20 Crores. Three RCC Bridges have also been constructed over Kotdi creek with total length of 230 m and cost of INR 10 Crores. Photographs showing the same were submitted along with half yearly compliance report for the period Apr'17 to Sep'17. • Please refer condition no. i of EC & CRZ compliance report for further details.
iii	The Project proponent shall comply with all the	Complied.

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022
	Orders/directions of the Honorable High Court of Gujarat and Supreme Court in the matter.	There are three ongoing matters pending (Two pending at High Court and other pending at Supreme Court). Details of status of legal cases is attached as **Annexure-2**.
iv	Adequate safety measures for the offshore structure and ship navigation shall be taken in view of the High Current in the area.	Complied. The hydrodynamic study for the waterfront area has been carried out by HR Wallingford, a maritime design expert. As per the recommendations in their report, the following safety measures are implemented. 1. The alignment of the berth has been kept in line with the current flow in order to reduce the effect of current on vessels moored alongside. 2. The breasting dolphins have been designed in such a configuration so as to provide appropriate lead to the vessels mooring ropes. 3. The berth being in line with the current flow will facilitate Pilotage operation and provide better maneuverability of vessels. 4. The strength of the berth structure has been calculated to absorb the energy transferred to fenders while berthing of tanker vessels at the terminal. 5. Navigational buoys and lead lights marking the channel and clearing distance off the breakwater are installed. 6. The strength of the fenders at the berth and the SWL of the bollards / winches are sufficient to absorb the forces of vessels alongside keeping in mind the monsoon weather conditions. 7. Sufficient depths are maintained at all times to ensure 10% UKC at the time of berthing / un-berthing. 8. The capstans / winches / bollards are of adequate strength with respect to the vessels being handled. 9. The berth has been designed at an appropriate distance from the existing berths at MMPT-1 in order to safely allow berthing / un-berthing of vessels at MMPT-1 with vessels berthed at the South Port tanker terminal. 10. Berths have been planned close to the breakwater as there is a reduced strength of current along the coastline.
v	The shore line changes in the area shall be and monitored periodically the report submitted every 6	Complied. Shore line change aspect has been studied in detail as part of following two studies;

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022
	months to Regional Office Bhopal.	• Bathymetry & Topography study, preparation of plan for protection of creeks/ mangrove area including buffer zone, mapping of co-ordinates, running length, HTL, CRZ boundary. • A Regional Impact Assessment study to identify impacts of all the existing as well as proposed project activities in Mundra region. As per the outcome of these studies, no erosion is observed on the coast of the project area. As part of the Regional Impact Assessment study, the possible changes in shoreline that may occur due to the proposed developments in 10 km area on either side of the waterfront development project have been predicted. It has been inferred from the modelling study that the shift in the shoreline will be less than 0.5 m/year, which reconfirms that the APSEZ facility would pose insignificant impact on the Mundra shoreline. Accretion is observed at South port and at West port due to approved reclamation activities. Based on the study outcome, it is recommended to map the coastal morphology (shoreline change) at least once in three years. APSEZ has already awarded work to the agency namely M/s. Gujarat Institute of Desert Ecology, Bhuj for carrying out Shoreline Change Assessment Study for Mundra region vide P.O. No. 4802013270 dated 30.03.2022. The cost of said study is INR 17.39 Lacs. The said study is under progress. However, shoreline change study was carried out by M/s. Chola MS, Chennai (NABET accredited consultant) as a part of Waterfront Development Project – Expansion EIA study. The summary of the said study are as below. To estimate the shoreline change due to the earlier approved waterfront development plan, a historical shoreline change assessment has been undertaken using the satellite imagery for a period of 2008 to 2018. In order to avoid any major errors in estimating the shoreline, the satellite data for similar tidal condition was considered for 2008, 2013 and

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022
		2018. AMBUR Methodology was used to study the historical analysis 10 km radius stretch of shoreline on either side of the APSEZ project boundary has been considered for assessing the historical shoreline change scenario. The baseline shoreline change assessment depicts the influence of both natural causes and also possible changes in the shore due to various development activities in the study area during the designated period. For the purpose of this study, shoreline on left side of APSEZ is termed as West Side Shoreline and that of the right side as East Side Shoreline for ease of recognition. The maximum accretion and erosion rate of the west side shoreline over a period of 10 years during the year 2008 – 2018 are observed to be 4.78 m/yr and 1.93 m/yr respectively. The maximum accretion and erosion rate of the east side shoreline over a period of 10 years during the year 2008 – 2018 are observed to be 05 m/yr and 0.82 m/yr respectively. Please refer **Annexure – B** (Compliance of MoEF&CC Order dated 18th Sep, 2015) for further details regarding the mentioned studies.
vi	The recommendations of the risk assessment shall be implemented; any change in the design of the project shall come before the committee for seeking necessary approval.	Complied. Risk Assessment was carried out at the time of preparation of the EIA report for the Liquid Berths and LNG terminal. However, it may be noted that liquid berths are not yet developed. Hence recommendations of Risk Assessment will be implemented once the liquid berths & pipelines are developed by APSEZ. The LNG terminal is constructed by GSPC LNG Ltd. and a separate Environment and CRZ clearance is obtained by them. Please refer general condition no ix below for details regarding the same. LPG is being handled from the existing multipurpose terminal. A detailed risk assessment study as per MoEF&CC letter no. F. No. 10-47/2008-IA-III dated 31st May, 2016 was carried out

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022
		by iFluids Engineering for handling as well as storage activities. Recommendations of the risk assessment have been implemented as part of the construction activity and details of the same were submitted along with half yearly compliance report for the period Oct'18 to Mar'19. Reports of the same were submitted to MoEF & CC along with half yearly compliance report for the period Apr'17 to Sep'17.Implantation report of risk assessment study during operation phase was submitted along with half yearly compliance report for the period Oct'19 to Mar'20. There are no other activities which attract requirement of Risk Assessment.
vii	Mangrove plantation of 200 ha to be done in consultation with GEER / GEC of Forest Department, a detailed plan shall be submitted within six months from the date of receipt of this letter.	Complied. APSEZ has consulted Gujarat Institute of Desert Ecology (GUIDE) as they are one of the authorized agencies of Dept. of Forest & Env., Govt. of Gujarat for carrying out mangrove afforestation. GUIDE has completed mangrove plantation in an area of 200 ha at Jakhau, Gujarat during the year 2012-13. Copy of the mangrove plantation completion certificate was submitted along with EC compliance report for the period Apr'18 to Sep'18. Total expenditure for the said work was INR 40 lakh. To enhance the marine biodiversity, till date APSEZ has carried out mangrove afforestation in 3140 ha. area across the coast of Gujarat. Total expenditure for the same till date is INR 847.8 lakh. Details on Mangroves afforestation & Green belt development carried out by APSEZ till Sep'22 is annexed as **Annexure – 3**. 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. During current FY 2021-22, 03 ha area coastal stretches have been planted with mangrove species. Total 16 Ha. multi-

<table>
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<tr><td></td><td></td><td>species mangrove plantation has been carried out till March-22 association with M/s. GUIDE, Gujarat. Current year 4 Hector plantation is in progress which will be resulted in 20 Hector.

Please refer attached Annexure – 1 for CSR activity report carried out by Adani Foundation.</td></tr>
<tr><td>viii</td><td>It shall be ensured that during construction and post construction of the proposed jetty the movement of fishermen vessel of the local communities are not interfered with.</td><td>Complied.

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, so far APSEZ has provided seven (7) access roads instead of four (4). Total length of all the approach roads is approx. 23 Kms and expenditure involved is Rs. 637 Lacs. There is no hindrance to the movement of fisherman boats.

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.

Education
Community Health
Rural Infrastructure
Sustainability Livelihood

Brief information about activities in the main four persuasions is mentioned below. Activities carried out for the same are summarized as below.

<table>
<tr><th>Area</th><th>Activity</th></tr>
<tr><td>Community Health</td><td>

Mobile Heath Care Units and Rural Clinics
09 Rural Clinics
06 villages of Mundra, 02 villages of Anjar & 01 village Mandvi block has benefited by rural clinic service.
Total Patients Benefitted FY 22-23 up to Sep 22:-10059 (direct & indirect).
5 financially challenged patients has been supported with Dialysis treatment at 108 Times which added day in their Life.

</td></tr>
</table>
</td></tr>
</table>

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022	
			Health camp: • Specialty camps, Eye checkup camps, Blood donation camp, Anti-tobacco awareness camp, TB screening, and other are conducted in core villages as well as in labour colonies. • Specialty health(Gynec , Pediatric eye specialty health camp) :- 04 camp – 903 Patients. • General health camp :- 05 camp -1041 Patients Awareness Session • Health & Hygiene for School Students- - 432 Students. • Malnourished Child and Adolescent Girl- 108 Child and Girls. • Blood Donation camp was held at various location on the Occasion of Respected Chairman sir's birthday on 24th June. • Total 590800 CC quantity of Blood had been donated by 1088 Employees. • 30 villages covered, with 94 types of general and lifesaving medicines through Mobile healthcare unit • 872 –Economically Challenged patients have been supported for operation, OPD, IPD, Medicines and lab-test. • For Preventive health care General and multispecialty camps Pediatric camp, General Health camps in 9 villages and Super specialist camp which benefitted more than 1944 patients of Mundra Taluka. •
		Sustainable Livelihood – Fisher folk, Agriculture & Women	• Government scheme Awareness session was held in association with Fisheries department Bhuj to facilitate pagadiya fishermen by providing fishing kits to seven Fishermen. The coordination was made by Adani Foundation to process application. • To promote Natural farming Adani Foundation has originated cow-based farming initiative with interconnected techniques which can increase farmer yield. • Survey and identification of farmers to adopt Natural farming-Total 950 Farmers were selected ascriteriain first phase of the Project. • 257 Farmers have started to preparing Jiva Mrut & Gaukrupa Amrutam Bio-fertilizer and using in agricrop. Series of Training is arranged by ATMA and Adani Foundation. • Adani Foundation has also provided 7.31 lacs kg Dry Fodder and 23.59 lacs kg Green fodder in 29 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. 200.89 Lacs during FY 2022-23 till Sep'22. • Adani Foundation provides Good Quality dry and green fodder to 29 Villages. Project is covering total 33072 Cattels / 2747 farmers and hence enhancing cattle productivity. Dry Fodder 731230 Kg Green –2359204 Kg.

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022	
			• Fodder Cultivation- To made fodder sustain villages - 100 Acre Gauchar land of Zarpara and 25 Acre in Siracha village is being cultivated for the same. • With the support of Gauchar Seva Samiti Grassland development in Siracha-40 Acre & Zarpara 165 Acre done which resulted in total production 82 ton. • To protect Cattles against Bovine Brucellosis zoonotic disease, Awareness and vaccination program is ongoing with Kutch fodder fruit & Forest development trust (KFFT) in our 11 Villages. In end of the year 100 percentage female calves will be benefitted by this initiative. • Current year for the dates Packaging and Marketing, KKPC Started to sell 10 Kg capacity packaging Box. The company has been set up with 237 Farmers shareholders. Half year Turn Over of the company is 7.18 lacs • Skill Development and Income Generation –Adani Foundation is working with 15 Self-help group and supporting to develop entrepreneur skills to become self-reliant, sourcing more than 500 women to absorb in various job.
		Education	• Conduct Baseline assessment & Utthan Sahayak Start teaching to progressive learner. 96 students Mainstreamed from progressive Learner this year. 730 students mainstreamed last year. • Provided facility for preparing JNV and NMMS examination. 898 number of students participated for JNV and NMMS. • Mental and Physical Cognitive Education with Joy full learning activities to 2.5- to 6-year-old children. Provide Nutritional Food Facilities. Capacity Building program for Balwadi teachers. • Total 82 Active SHG Group – 834 women are engaged with Adani Foundation for Savings activity. Among 15 SHG groups are involved in income generation. We facilitate them capacity building training for quality, Marketing Finance and team work to made them self-sustain. • Saheli Swa Sahay Juth have completed order of 10,000 sanitary pad from District Health Department. • Tejasvini SHG has received order of 3000 traditional dress preparation worth 3.25 Lacks. • Sonal Saheli Women SHG had supplied 1000 KG washing powder to Adani port & Willmar. • 507 underprivileged students of Fisherman & Maldhari communities underprivileged from 8 villages taking education at the Adani Vidya Mandir school. • Celebration of various days is villages school.
		Rural Infrastructure & Environmental Sustainability	Adani foundation designed and build various structure and provide service in the Health, Education, agriculture and sustainable livelihood area. **<u>WORK COMPLETED</u>** • 25 RRWHS structure have been completed

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022	
			• 201 Bore-well recharging activity is completed. • Percolation well Recharging work at Bhadiya & Mota Kandgra village. • Sluice gate Construction to Control Flood during Flooding at Khoydivadi Vistar Bhujpur. • Pond Beatification and Bund Strengthening at Bhujpur village. • commissioning of Community Training Centre at Shekhadiya. • Two Pond Deepening at Zarpara under Amrut Sarovar Yojna. JCB & Hitachi Machine Support for Pre-Moonson activities. Repairing and Maintenance work of Approach at Luni, Bavdi and Navinal Fishermen Bandar. **Work in Progress.** • Development of Vegetable Market Development at Mundra with 128 Stall Work in Progress. • Pond Pipe Line Work at Pranshla vadi vistar Zarpara village. • Sluice gate Construction & Pipe line work to Control Flood during Flooding at Pranshlavadi Vistar Zarpara. • Check dam Restrengthening and Road restoration at Bharudiya village • Development of Cricket Ground at Hatdi Village. • Renovation and repairing work Community Center , Mundra. • Renovation and Road repairing work at All Fishermen Vasahat. **ENVIRONMENT SUSTAINABILITY PROJECTS** • **Miyawaki Forest Development, Nana Kapaya** - Plantation of 5880 saplings of different 42 species is completed which will result in dense forest within 2 years • **Smruti Van** – Plantation more than 47,000 sapling with more than 115 species through Miyawaki methodology. • **Ecosystem Restoration, Guneri** – Grassland ecosystem restoration and mangrove conservation in 40 Ha area over a period of 4 years. The drone survey conducted in Aug 2022 to assess the annual phase wise growth of ongoing activities. • **Multi-Species Mangrove Park** - Adani Foundation at Mundra's initiated multi-species plantation of mangroves in Kutch 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. During current FY 2021-22, 03 ha area coastal stretches have been planted with mangrove species. Total 16 Ha. multi-species mangrove plantation has been carried out till March-22 association with M/s. GUIDE, Gujarat. Current year 4 Hector plantation is in progress which will be resulted in 20 Hector. • Mangroves Biodiversity Park within one year

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022	
			• **Home biogas** - Under Gram Utthan Project, Adani Foundation is supporting home biogas to farmers to Uthhan Villages phase wise. Current year supported 360 home biogas system in Dhrub, Zarpara and Navinal Villages • As per SORI use of biogas each farmer can save Rs.23400/year. Total 360 farmers can save Rs.8424000/- in a year. **Water Conservation Projects** – ✓ Large number of water harvesting structure (18 Nos. of check dams in coordination with salinity department) and Augmentation of 3 check dams ✓ Ground recharge activities (pond deepening work for more than 56 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 145 Nos. (40 Nos current year) which is having 10,000 litre storage which is sufficient for one year drinking water purpose for 5 people family. ✓ Recharge Bore well 201 Nos (12 Nos current yr) which is best ever option to direct recharge the soil. ✓ Drip Irrigation approx. 1156 Farmers benefitted in coordination with Gujrat Green Revolution Company till date ✓ 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. ✓ Check dam gate valve construction at Bhujpur which controlled more than 350 MCFT water to go into sea and get recharged current year. ✓ Pond Pipe line work at Prasla Vistar Zarpara which increase recharge capacity more than 25% in 100 hector area.
		Skill Development	Over the previous 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. **ASDC, Mundra** • **Youth Employment:-** Adani Foundation is committed for youth employment with imparting technical and Non-Technical Training for Fisherfolk Youth and started Electrical ,Welder ad Masson work training under Adani Skill Development Centre. • 35 Youth get employed in GPVC, AWL, MSPVL and KCL WinTech and Other CFS. • 194-Fisherfolk men and women were supported with skilled and unskilled Job and Contract work in various APSEZ Department. **ASDC and Thermax Foundation Done MoU**

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022
		• ASDC and Thermax Foundation Jointly Organised , Skill Development training program for " Dhrab Village youth", In 1st phase completed Domestic Data Entry Operator training with 50 students (25 girls and 25 boys) • Chief Guest of this program was Mr. Anees Shaikh-Head ,ER& Administration , Thermax, Ashlambhai Turk-Dhrab Village Sarpanch remained present • CSR head Thermax Ms. Sujata Deshpande has joined from Pune and given motivation and best wishes for training. • **Skill Development and Income Generation –**Adani Foundation is working with 15 Self help group and supporting to develop entrepreneur skills to become self reliant, sourcing more than 500 women to absorb in various job –this will give them identity, confidence and right to speak in any decision for home, village and working area. **ASDC, Bhuj** ✓ **Soft Launching of Self Employed Tailor – Outreach Batch at Meghpar:** Soft Launched Self-Employed Tailor Batch at Meghpar (Out-reach). Total 25 candidates are enrolled. ✓ **Soft Launch of General Duty Assistant Batch:** Soft launched General Duty Assistant Batch with 30 candidates under DDU-GKY scheme as per instruction by GLPC. ✓ **Soft Launch of Entrepreneurship Development Program:** Soft Launch of Entrepreneurship Development Program Training at Centre under CED with 30 candidates. ✓ **Soft Launch of FL Training under Special Project** Launching Special Project Jointly with KMVS NGO for FSW (Female Sex Worker) Financial Literacy training Inaugurated on 22-07-2022. Total 37 women participant. ✓ MOU with Kachchh District Education Office. In this MOU we will provide training of Digital Literacy and Basic Functional English in Kachchh District Schools. As per MOU Kachchh District Education Office will provide minimum 5000 candidates to us for training (Adani Skill Development Centre). ✓ During FY 2022-23 till Sep'22, Total 1836 people trained in various trainings to enhance socio economic development. Please refer **Annexure – 1** for full details of CSR activities carried out by Adani Foundation in the Mundra region. Budget for CSR Activity for the FY 2022-23 is to the tune of

<table>
<tr><th>Sr. No.</th><th>Conditions as per clearance letter</th><th>Compliance Status as on 30-09-2022</th></tr>
<tr><td></td><td></td><td>INR 1317.36 lakh. Out of which, Approx. INR 495.65 lakh are spent during current the compliance period (Till Sept' 2022).</td></tr>
<tr><td>ix</td><td>Relocation of the fishermen community if any shall be done strictly in accordance with the norms prescribed by the State Government.</td><td>Not Applicable

The project was conceptualized in such a way that there are no fishermen settlements in the project proposal. Hence there is no relocation of fishermen communities required.</td></tr>
<tr><td>x</td><td>Marine ecology monitoring shall be done regularly during construction of breakwater and dredging /disposal operation.</td><td>Complied.

Constructions as well as maintenance dredging operations are ongoing activities. Marine monitoring is being carried out once in a month by NABL and MoEF&CC accredited agency namely M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi. Summary of the same for duration from Apr'22 to Sep'22 is mentioned below.

Total Sampling Locations & frequency: 09 Nos.
(Frequency: Once a month)

<table>
<tr><th rowspan="2">Parameter</th><th rowspan="2">Unit</th><th colspan="3">Surface</th><th colspan="3">Bottom</th></tr>
<tr><th>Min</th><th>Max</th><th>Average</th><th>Min</th><th>Max</th><th>Average</th></tr>
<tr><td>pH</td><td>--</td><td>8.04</td><td>8.31</td><td>8.21</td><td>7.92</td><td>8.16</td><td>8.07</td></tr>
<tr><td>TSS</td><td>mg/L</td><td>94</td><td>156</td><td>126.28</td><td>78</td><td>132</td><td>107.94</td></tr>
<tr><td>BOD (3 Days @ 27 °C)</td><td>mg/L</td><td>2.4</td><td>6.02</td><td>2.89</td><td>BDL(MDL:1.0)</td><td>BDL(MDL:1.0)</td><td>BDL(MDL:1.0)</td></tr>
<tr><td>DO</td><td>mg/L</td><td>5.85</td><td>6.27</td><td>6.08</td><td>5.7</td><td>6.17</td><td>5.91</td></tr>
<tr><td>Salinity</td><td>ppt</td><td>35.06</td><td>35.74</td><td>35.34</td><td>35.68</td><td>36.92</td><td>35.93</td></tr>
<tr><td>TDS</td><td>mg/L</td><td>35810</td><td>36942</td><td>36246</td><td>35984</td><td>37624</td><td>36751</td></tr>
</table>
*BDL – Below Detection Limit
*MDL – Minimum Detection Limit

Please refer Annexure – 4 for detailed analysis reports. Approx. INR 6.37 Lakh is spent for all environmental monitoring activities during the FY 2022-23 till Sep'22 for overall APSEZ, Mundra.

Marine monitoring for west port area is being carried out by M/s. Adani Power (Mundra) Limited (Pre-monsoon & Post-monsoon) through NABL accredited and MoEF&CC</td></tr>
</table>

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022
		authorized agency namely M/s. UniStar Environment & Research Labs Pvt. Ltd. Monitoring reports are also enclosed as **Annexure – 4**. Summary of ecological parameters of M/s. Adani Power (Mundra) Limited is given below: **PLANKTON DIVERSITY:** Sampling was carried out at 5 stations near west port area. At each station, water samples were collected from surface and bottom waters. During the sampling period June 2022. The phytoplankton population in the coastal waters of APMuL, Mundra was diverse and represented with a total of 41 phytoplankton genera belonging to diatoms (34 genera) and dinoflagellates (7 genera). The phytoplankton abundance in the study region was ranged from 114 to 228 cells×10^2/L. The highest phytoplankton abundance was observed at Station 2 in surface (228 cells×10^2/L) and then at Station 5 in surface water (189 cells×10^2/L). The lowest phytoplankton abundance (114 cells×10^2/L) was observed at Station 3 in bottom water. The study shows that the marine water around was enriched with the diverse phytoplankton population. **BENTHIC DIVERSITY:** In the sub-tidal region, the high macrobenthos abundance and biomass were reported at station 3 (500 no/m^2) and Station 5 (1.54 g/m^2) respectively. The lowest abundance (225 no/m^2) and biomass (0.76 g/m^2) was recorded at station 1. The more abundance of macrobenthic communities suggests the stable and enriched substratum supports their growth. In turn benthic macrofauna could support the benthic feeder fish population in this region. In the Intertidal region The sandy substratum with low organic matter affects the occurrence of the microbenthic community. Low macrobenthos biomass was measured (0.10 g/m^2 to 0.14 g/m^2) in the intertidal region at the APMuL. The lowest density of macrobenthic organisms was reported at station IT-3 (LW) (75 no/m^2), whereas the highest density was reported at Station IT-2 (HW) (125 no/m^2).
xi	Regular Monitoring of air quality shall be done in the settlement areas around the Project site and	Complied. Ambient Air Quality and Noise monitoring are being carried out by NABL accredited and MoEF&CC authorized agency

<table>
<tr><th>Sr. No.</th><th>Conditions as per clearance letter</th><th>Compliance Status as on 30-09-2022</th></tr>
<tr><td></td><td>appropriate safeguard measures shall be taken.</td><td>namely M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi. Summary of the same for duration from Apr'22 to Sep'22 is mentioned below:

Air sampling locations & frequency: 12 nos. (twice a week including surrounding villages) & Noise sampling locations & frequency: 9 nos. (once in a month)

<table>
<tr><th>Parameter</th><th>Unit</th><th>Min</th><th>Max</th><th>Average</th><th>Perm. Limit$</th></tr>
<tr><td></td><td colspan="5">AAQM</td></tr>
<tr><td>PM_{10}</td><td>µg/m^3</td><td>15.50</td><td>89.73</td><td>67.73</td><td>100</td></tr>
<tr><td>$PM_{2.5}$</td><td>µg/m^3</td><td>7.10</td><td>53.62</td><td>30.29</td><td>60</td></tr>
<tr><td>SO_2</td><td>µg/m^3</td><td>4.24</td><td>41.48</td><td>21.06</td><td>80</td></tr>
<tr><td>NO_2</td><td>µg/m^3</td><td>6.15</td><td>48.52</td><td>26.27</td><td>80</td></tr>
<tr><th>Noise</th><th>Unit</th><th>Leq Min</th><th>Leq Max</th><th>Leq Ave.</th><th>Leq Perm. Limit*</th></tr>
<tr><td>Day Time</td><td>dB(A)</td><td>53.65</td><td>70.8</td><td>64.91</td><td>75</td></tr>
<tr><td>Night Time</td><td>dB(A)</td><td>50.98</td><td>67.8</td><td>60.06</td><td>70</td></tr>
</table>
$ as per NAAQ standards, 2009
* as per CC&A granted by GPCB
Values recorded confirms to the stipulated standards.

Please refer Annexure – 4 for detailed analysis reports. Approx. INR 6.37 Lakh is spent for all environmental monitoring activities during the FY 2022-23 till Sep'2022 for overall APSEZ, Mundra.

Ambient air quality monitoring in surrounding villages is being carried out by M/s. Adani Power (Mundra) Limited, Mundra through NABL accredited and MoEF&CC authorized agency namely M/s. UniStar Environment & Research Labs Pvt. Ltd. and monitoring reports of the same are also enclosed in Annexure – 4.

Following safeguard measures are taken for abatement of dust / fugitive emissions.

• Regular water sprinkling on road and other open area
• Regular cleaning of roads through mechanized equipment
• Dry fog Dust Suppression System (DSS) in hopper, transfer towers and conveyor belts
• Use of water mist canon
• Closed type conveyor belts</td></tr>
</table>

<table>
<tr><th>Sr. No.</th><th>Conditions as per clearance letter</th><th>Compliance Status as on 30-09-2022</th></tr>
<tr><td></td><td></td><td>

Regular sprinkling on coal heaps with mechanized system
Covering other types of dry bulk cargo heaps
Installation of wind breaking wall
Development of greenbelt along the periphery of the storage yards/back up area
Mechanized handling system for coal and other dry bulk cargo
Wagon loading and truck loading through closed silo

</td></tr>
<tr><td>xii</td><td>Sewage arising in the Port area shall be disposed off after adequate treatment to conform to the standards stipulated by Gujarat State Pollution Control Board and shall be utilized / recycled for Gardening, Plantation and Irrigation.</td><td>
Complied.

Entire quantity of sewage generated is being treated in designated ETP / STP and treated sewage is used for Horticulture purposes.

<table>
<tr><th>Location</th><th>Capacity</th><th>Quantity of Treated Water (Avg. from Apr'22 to Sep'22)</th><th>Type of ETP / STP</th></tr>
<tr><td>LT</td><td>265 KLD</td><td>106 KLD</td><td>Activated Sludge</td></tr>
<tr><td>West Port</td><td>55 KLD</td><td>14.75 KLD</td><td>FAB</td></tr>
</table>

Third party analysis of the treated water is being carried out once in a month at ETP & twice in a month at West Port by NABL and MoEF&CC accredited agency namely M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi. Summary of the same for duration from Apr'22 to Sep'22 is mentioned below.

<table>
<tr><th>Parameter</th><th>Unit</th><th>Min</th><th>Max</th><th>Average</th><th>Perm. Limit$</th></tr>
<tr><td colspan="6">Industrial Effluent / Sewage (For ETP)</td></tr>
<tr><td>pH</td><td>--</td><td>7.14</td><td>7.46</td><td>7.32</td><td>6.5 – 8.5</td></tr>
<tr><td>TSS</td><td>mg/L</td><td>36</td><td>46</td><td>41.67</td><td>100</td></tr>
<tr><td>TDS</td><td>mg/L</td><td>1462</td><td>1524</td><td>1496</td><td>2100</td></tr>
<tr><td>COD</td><td>mg/L</td><td>72.6</td><td>89.1</td><td>82.63</td><td>100</td></tr>
<tr><td>BOD (3 Days @ 27°C)</td><td>mg/L</td><td>20</td><td>25</td><td>22.83</td><td>30</td></tr>
<tr><td>Ammonical Nitrogen as NH_3-N</td><td>mg/L</td><td>22.2</td><td>28.6</td><td>25.23</td><td>50</td></tr>
<tr><td colspan="6">Domestic Sewage (For STP)</td></tr>
</table>
</td></tr>
</table>

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022
		<table><tr><td>**pH**</td><td>--</td><td>7.12</td><td>7.56</td><td>7.35</td><td>6.5 – 9.0</td></tr><tr><td>**TSS**</td><td>mg/L</td><td>18</td><td>30</td><td>24</td><td>100</td></tr><tr><td>**BOD (3 Days @ 27 °C)**</td><td>mg/L</td><td>14</td><td>20</td><td>17.33</td><td>30</td></tr><tr><td>**Residual Chlorine**</td><td>ppm</td><td>0.52</td><td>0.87</td><td>0.69</td><td>--</td></tr><tr><td>**Fecal Coliform**</td><td>MPN/ 100 ml</td><td>33</td><td>90</td><td>52.5</td><td><1000</td></tr></table> $ as per CC&A granted by GPCB Values recorded confirms to the stipulated standards. Please refer **Annexure – 4** for detailed analysis reports. Approx. INR 6.37 Lakh is spent for all environmental monitoring activities during the FY 2022-23 till Sep'22 for overall APSEZ Mundra. It is also noted that GPCB is doing regular site inspection along with wastewater sampling and analysis. The last GPCB sample analysis reports were submitted during half yearly EC Compliance report for the period of Apr'21 to Sep'21 which shows all the parameters are well within the permissible limit.
xiii	Adequate Plantation shall be carried out along the roads of the Port premises and a green belt shall be developed.	Complied. APSEZ has developed its own "Dept. of Horticulture" which is taking measures/ steps for terrestrial greening as well as mangrove plantation. The species such as *Ficus Infectoria, Ficus religiosa, Terminalia arjuna, Cocos nucifera, Washingtonia fillifera, Casurina spp., Azadirachta Indica, Eucalyptus spp., Jatropha curacus, Ficus bengalensis, Subabool spp., Casia fistula, Date Palm* and *Delonix regia* are grown within APSEZ area. Within the port areas approx. 194.63 hectare of greenbelt having 5,06,542 trees with the density of 2603 trees per hectare is developed till date within port premises. So, far APSEZ has developed 486.19 ha. area as greenbelt with plantation of more than 9.5 Lacs saplings within the APSEZ area. Please refer **Annexure – 3** for further details regarding greenbelt development, mangrove afforestation and updated

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022
		green belt development plan. The spent budget of Horticulture Department for the period of financial year 2022-23 is INR 913 lacs. Out of which, Approx. INR 490 lakh are spent during the current compliance period Apr'22 to Sep'22.
xiv	There shall be no withdrawal of Ground Water in CRZ area for this Project.	Complied. APSEZ does not draw any ground water for the water requirement. Present source of water for various project activities is desalination plant of APSEZ and/or water through Gujarat Water Infrastructure Limited (GWIL). Average water consumption for entire APSEZ area is 4.23 MLD during compliance period i.e. Apr'22 to Sep'22.
xv	Specific arrangements for rain water harvesting shall be made in the Project design and the rain water so harvested shall be optimally utilized. Details in this regard shall be furnished to this Ministry's Regional Office at Bhopal within 3 months.	Complied. Groundwater recharge cannot be done at the project site since the entire project is in the intertidal / sub tidal areas. Rainwater within project area is managed through storm water drainage. We have installed Rainwater 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 current monsoon Approx. 5.56 ML of rainwater has been recharged to increase the ground water table. We have also connected roof top rainwater 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. However, Adani Foundation – CSR arm of Adani Group has carried out rainwater harvesting activities in the nearby villages for benefit of the locals. 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

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022
		monitoring of all water harvesting structures had been taken up. 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. 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 increased in coastal belt of Mundra as per Government Figures. **Our water conservation work is as below.** • Large number of water harvesting structure (18 Nos. of check dams in coordination with salinity department) and Augmentation of 3 check dams • Ground recharge activities (pond deepening work for more than 56 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 145 Nos. (40 Nos. current FY 2022-23) which is having 10,000 litre storage which is sufficient for one year drinking water purpose for 5 people family. • Recharge Borewell 201 Nos (12 Nos. current FY 2022-23) which is best ever option to. • Drip Irrigation approx. 1156 Farmers benefitted in coordination with Gujrat Green Revolution Company till date. • 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. • Pond Pipe line work at Prasla Vistar Zarpara which increase recharge capacity more than 25% in 100 hector area. • Check dam gate valve construction at Bhujpur which controlled more than 350 MCFT water to go into sea and get recharged current year. • Luni Pond Bund Repairing Work is completed. 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.

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022
		Please refer **Annexure – 1** for full details of CSR activities carried out by Adani Foundation in the Kutch region.
xvi	Land Reclamation shall be carried out only to the extent that it is essential for this Project.	Complied. Out of approved reclamation area of 1138 ha for west port, 695 ha area is reclaimed and out of approved reclamation area of 700 ha for south port, 665 ha area is reclaimed. Details of the same were submitted along with last compliance report submission for the period Apr'17 to Sep'17 and there is no further change.
xvii	No Product other than those permissible in the Coastal Regulation Zone Notification, 1991 shall be stored in the Coastal Regulation Zone area.	Complied. No products other than those permissible in the CRZ Notification 1991 are stored in the CRZ area.
General Conditions		
i	Construction of Proposed structures, if any in the Coastal Regulation Zone area shall be undertaken meticulously confirming to the existing Central/local rules and regulations including Coastal Regulation Zone Notification 1991 and its amendments. All the construction designs/ drawings relating to the proposed construction activities must have approvals of the concerned State Government Departments/ Agencies.	Complied. All construction activities are carried out confirming to the existing rules and regulation and as per the CRZ notification. Further, the requisite permissions from Gujarat Maritime Board (GMB), for carrying out construction activities are taken from time to time. Details of the same are mentioned below: • Permission for starting construction work for South port vide letter no GMB/N/PVT/711/870 dated 26.02.2009 • Permission for starting construction work for West port vide letter no GMB/N/PVT/711/871 dated 26.02.2009 The copies of these letters were submitted as part of the compliance report submission for the period Apr'16 to Sep'16. The project has been developed as per Consent to Establish (CtE) and Consent to Operate (CtO) granted by SPCB. The present in-force CtE & CtO are mentioned below.

S. No.	Permission	Project	Ref. No. / Order No.	Valid till
1	CtE – Amendment	LPG Terminal	PC/CCA-KUTCH-	03.10.25

<table>
<tr><th>Sr. No.</th><th>Conditions as per clearance letter</th><th>Compliance Status as on 30-09-2022</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td></td><td></td><td></td><td>1437/PCB ID-53331/473995</td><td></td></tr>
<tr><td>2</td><td>CtE – Amendment</td><td>WFDP</td><td>17739 / 15618</td><td>18.05.27</td></tr>
<tr><td>3</td><td>CtO - Fresh</td><td>LPG Terminal</td><td>AWH-103906</td><td>27.06.24</td></tr>
<tr><td>4</td><td>CtE – Amendment</td><td>LPG Terminal</td><td>PC/CCA-KUTCH-1437/GPCB ID-53331/587015</td><td>01.03.26</td></tr>
<tr><td>5</td><td>CC&A - Amendment</td><td>LPG Terminal</td><td>PC/CCA-KUTCH-1437/GPCB ID-53331/595228</td><td>27.06.24</td></tr>
<tr><td>6</td><td>CC&A - Renewal</td><td>West Port – WFDP</td><td>AWH-113458</td><td>01.02.27</td></tr>
<tr><td>7</td><td>CC&A – Renewal</td><td>Mundra Port Terminal</td><td>AWH-117045</td><td>20.11.26</td></tr>
</table>

The permissions mentioned above (Sr. 1 to 6) were submitted along with earlier compliance report submission. The permission copies (Sr. No. 7) were submitted in last compliance report submission for the period of Oct'21 to Mar'22.
</td></tr>
<tr><td>ii</td><td>Adequate provision for infrastructure facilities such as water supply, fuel, sanitation etc. shall be ensured for construction workers during the construction phase of the project so as to avoid felling of trees/mangroves and pollution of water and the surroundings.</td><td>Not applicable

Most of the construction labours reside in the nearby villages where all basic facilities are easily available. There are no housing requirements for labours inside the project area.</td></tr>
<tr><td>iii</td><td>The project authorities must make necessary arrangements for disposal of solid wastes and for the treatment of effluents by providing a proper wastewater treatment plant outside the CRZ area. The quality of treated effluents, solid waste, and noise level etc. must conform to the standards laid down by the</td><td>Complied.

Monitoring of environmental attributes viz. Air, Water, Noise, Soil, etc. is being carried out on regular basis by NABL and MoEF&CC accredited agency namely M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi and Approx. INR 6.37 Lakh is spent for all environmental monitoring activities during the FY 2022-23 till Sep'22 for overall APSEZ, Mundra.

Please refer Specific Conditions no. x, xi & xii for further details regarding environmental monitoring.</td></tr>
</table>

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022
	competent authorities including the Central/ State Pollution Control Board and the Union Ministry of Environment and Forests under the Environment (Protection) Act, 1986, whichever are more stringent.	**Liquid Effluent & Sewage** – It is being treated at decentralized treatment plants and treated water confirming the stipulated norms is being utilized for horticulture purposes within APSEZ. Please refer specific condition no xii above for details regarding the same. **Waste Management** – APSEZ has adopted 5R concept for environmentally sound management of different types of solid & liquid wastes. Please refer below details about management of each type of waste. **Non-Hazardous Solid Waste**: A well-established system for segregation of dry & wet waste is in place. All wet waste (Organic waste) is being segregated & 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). APSEZ, Mundra is certified for Zero Waste to Landfill management system (ZWTL MS 2020) by TUVRheinland India Pvt. Ltd. (valid up to 31.05.2024). Details of the same were submitted as as part of compliance report submission for the duration of Apr'21 to Sep'21. **Hazardous & Other Waste:** • 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. • E – Waste & Used Batteries are being sold to GPCB registered recyclers namely M/s. Galaxy Recycling, Rajkot and Sabnam Enterprise, Kutch respectively. • Solid Hazardous Waste is being disposed through co-processing / incineration through common facility i.e. M/s.

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022
		Saurashtra Enviro Projects Pvt. Ltd., Bhachau, Safe Enviro Private Limited, Bharuch and/or cement industries of Ambuja Cement Ltd., Kodinar. Used/Waste Oil is being sold to GPCB authorized recyclers / re-processors namely M/s. Western India Petro Chem Ind - Bhavnagar, Aviation Corporation - Kutch & Aroma Petrochem - Bhavnagar. It is also being reused within organization for lubrication purpose. • Discarded drums / barrels are being sold to authorized decontamination facility i.e. M/s. Jawrawala Petroleum, Ahmedabad. It is also being reused within organization for filling hazardous waste. • Solid hazardous waste i.e. Tank bottom sludge is being sold to authorized recycler namely M/s. Mundra Oil Pvt. Ltd., Mundra for recycling. • Expired paint materials is being disposed by incineration through common facility i.e. M/s. Saurashtra Enviro Projects Pvt. Ltd., Bhachau. • 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 compliance period, there was no disposal of downgrade chemicals. • 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. Western India Petro Chem Ind - Bhavnagar, Aviation Corporation - Kutch & Aroma Petrochem – Bhavnagar and water is sent to ETP for further treatment. However during the compliance period, there was no received or disposal of Slope Oil. • Horticulture waste is collected from various green belt areas and it is using for making of manure and manure is being utilizing in horticulture purpose within plant premises. Details of permissions / agreements of hazardous waste authorized vendors were submitted along with pervious half yearly EC Compliance Reports. And there is no further change.

<table>
<tr><th>Sr. No.</th><th>Conditions as per clearance letter</th><th>Compliance Status as on 30-09-2022</th></tr>
<tr><td></td><td></td><td>The following table summarizes the waste management practice (from Apr'22 to Sep'22) for different types of wastes at APSEZ:
<table>
<tr><th>Type of Waste</th><th>Quantity in MT</th><th>Disposal method</th></tr>
<tr><td colspan="3">Hazardous Waste</td></tr>
<tr><td>Pig Waste</td><td>5.93</td><td rowspan="3">Co-processing at cement industries</td></tr>
<tr><td>ETP Sludge</td><td>1.91</td></tr>
<tr><td>Oily Cotton waste</td><td>53.03</td></tr>
<tr><td>Used / Spent Oil</td><td>74.13</td><td>Sell to registered recycler</td></tr>
<tr><td>Glass Wool</td><td>24.09</td><td>Send to Authorized common TSDF</td></tr>
<tr><td colspan="3">Other Waste</td></tr>
<tr><td>Bio Medical Waste</td><td>4.02</td><td>To approved CBWTF Site</td></tr>
<tr><td>E-Waste</td><td>58.49</td><td>Sell to register recycler</td></tr>
<tr><td colspan="3">Non-Hazardous Waste</td></tr>
<tr><td>Recyclables Dry Waste / Scrap</td><td>1583.1</td><td>After recovery sent for recycling / Reuse within premises</td></tr>
<tr><td>Non-Recyclable Dry Waste (RDF)</td><td>314.16</td><td>Co-processing at Cement Industries</td></tr>
<tr><td>Wet Waste (Food waste + Organic waste)</td><td>431.96</td><td>Converted to Manure for Horticulture use / Biogas for cooking purpose</td></tr>
<tr><td>Horticulture Waste</td><td>397</td><td>Used for making of manure and utilize for horticulture purpose</td></tr>
</table></td></tr>
<tr><td>iv</td><td>The Proponent shall obtain the requisite consents for discharge of effluents and emissions under the Water (Prevention and Control of pollution) Act, 1974 and the Air (Prevention and Control of pollution) Act, 1981 from the Gujarat Pollution Control Board before commissioning of the Project and copy of each of these shall be sent to this Ministry.</td><td>Complied.

All construction activities were carried out confirming to the existing rules and regulation and as per the CRZ notification.

Please refer General condition no. i for permission granted from state pollution control board regarding the same.</td></tr>
<tr><td>v</td><td>The sand dunes, corals, and mangroves, if any, on the</td><td>Complied</td></tr>
</table>

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022
	site shall not be disturbed in any way.	There are no sand dunes and corals at the project site. 1254 ha area identified as potential mangrove conservation is being conserved and there is no disturbance to the mangroves in this area. Please refer specific condition no i above for details regarding the same.
vi	A copy of the clearance letter will be marked to the concerned Panchayat / Local NGO, if any from whom any suggestions /representations has been received while processing the proposal.	Complied. Copy of the clearance letter was marked to the concerned panchayats. A typical proof of the same submitted to Mundra village Panchayat on 21.03.2009 was submitted as a part of compliance report submission for the period Apr'16 to Sep'16.
vii	The funds earmarked for environment protection measures shall be maintained in a separate account and there shall be no diversion of these funds for any other purpose. A year wise expenditure on environmental safeguards shall be reported to this Ministry's Regional Office at Bhopal and the State Pollution Control Board.	Complied. Separate budget for the Environment protection measures is earmarked every year. All environment and horticulture activities are considered at corporate level and budget allocation is done accordingly. All the expenses are recorded in advanced accounting system of the organization. Budget for environmental management measures (including horticulture) for the FY 2022-23 is to the tune of INR 1414.23 lakh. Out of which, Approx. INR 757.85 lakh are spent during the year 2022-23 (till Sep'22). Detailed breakup of the expenditures for the past 3 years is attached as **Annexure – 5**. Details regarding the past six compliance report submissions are mentioned below: **Sr. no. / Compliance period / Date of submission** 1 / Apr'19 to Sep'19 / 28.11.2019 2 / Oct'19 to Mar'20 / 20.05.2020 3 / Apr'20 to Sep'20 / 26.11.2020 4 / Oct'20 to Mar'21 / 25.05.2021 5 / Apr'21 to Sep'21 / 30.11.2021 6 / Oct'21 to Mar'22 / 30.05.2022
viii	Full support shall be extended to the Officers of	Complied

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022
	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.	APSEZ is always extending full support to the regulatory authorities during their visit to the project site. All necessary documents are submitted as per the request of the visiting authorities. Last visit of Regional Office, GPCB was done on 09.04.2021 for West Port APSEZL has submitted the reply to the site visit report vide letter dated 12.04.2021. Details of the same were submitted as part of compliance report submission for the duration of Apr'21 to Sep'21. As well as visit of Regional Office, GPCB was done on 23.03.2022 for Main port & APSEZL has submitted the reply vide letter dated 05.04.2022. Details of the same are attached as **Annexure – 6**. Inline to the compliance certification process of Environment Clearance condition of Waterfront Development Plan, RO, MoEF&CC Bhopal had visited the site on 27th & 28th January, 2020 for compliance verification. APSEZ provided all requisite information and documents required by the Regional Officer MoEF&CC). During the said compliance verification visit and as per the compliance certification received, there was no major non-compliance observed. Inline to the compliance certification process of Consent to Operates of existing facilities developed under Waterfront Development Plan, RO, GPCB, Gandhidham had visited the site on 17th March, 2021 for compliance verification. APSEZ provided all requisite information and documents required by the Regional Officer GPCB). During the said compliance verification visit and as per the compliance certification received, there was no non-compliance observed. Inline to the compliance of MoEF&CC Order dated 18th September, 2015, Joint Review Committee (JRC) comprising officials from various competent authorities visited the APSEZ, Mundra from 1st to 3rd September, 2021 to monitor the progress of implementation of the conditions stipulated in the order. APSEZ provided all requisite information and documents required by the JRC. As per the report received by MoEF&CC vide dated 01.12.2021, there was no non-

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022
		compliance observed.
ix	In case of deviation or alteration in the Project including the implementing agency, a fresh reference shall be made to this Ministry for modification in the clearance conditions or imposition of new ones for ensuring environmental protection.	Complied. LNG terminal was initially approved under the Waterfront Development Project. However the same has been developed by GSPC LNG Ltd. for which, separate EC and CRZ clearance has already been obtained from MoEF&CC by them. Copy of the same was submitted along with compliance report submission for the period Oct'16 to Mar'17. LPG terminal was initially approved under the Waterfront Development Project of Adani Ports and SEZ Limited and the same has been developed by M/s. Mundra LPG Terminal Pvt. Ltd., which is 100% subsidiary of APSEZ. Details of the same were submitted along with half yearly compliance report for the period Oct'17 to Mar'18.
x	The 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 and agreed.
xi	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.	Complied As part of the directions given by MoEF&CC vide order dated 18th Sep, 2015, following studies were proposed. • Bathymetry & Topography study, preparation of plan for protection of creeks/ mangrove area including buffer zone, mapping of co-ordinates, running length, HTL, CRZ boundary. • A Regional Impact Assessment study to identify impacts of all the existing as well as proposed project activities in Mundra region. Please refer **Annexure – B** for further details regarding the mentioned studies.
xii	The project proponent shall advertise at least in two local newspapers widely circulated in the region around the Project, one of	Complied. The original copy of the EC and CRZ clearance was obtained on 10.03.2009 and advertisement (containing informing that the EC and CRZ clearance is accorded to the proposed project

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022
	which shall be in the vernacular language of 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 the website of the Ministry of Environment & Forest at http://www.envfornic.in. The advertisement shall be made within 7 days from the date of issue of the clearance letter and a copy of the same shall be forwarded to the Regional Office of this Ministry at Bhopal.	and a copy of clearance letter is available with the SPCB and may also be seen at the website of MoEF&CC) was given in The Indian Express newspaper dated 18.03.2009. Copy of the same was submitted along with compliance report submission for the period Apr'16 to Sep'16.
xiii	The Project proponent shall inform the Regional Office at Bhopal 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.	Complied. APSEZ had informed the Regional Office of MoEF&CC at Bhopal as well as MoEF&CC, New Delhi regarding the date of financial closure and the date of start of land development work vide letter sent in August, 2009.
xiv	Any appeal against this environmental clearance shall lie with the National Environment Appellate Authority, if preferred, within period of 30 days as prescribed under section 11 of the National Environment Appellate Act, 1997.	Point noted and agreed. This EC and CRZ clearance was challenged in National Environment Appellate Authority. In this matter, Order has also been passed in favour of APSEZ. Copy of the same was submitted along with compliance report submission for the period Oct'16 to Mar'17.

Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022
4.	The above mentioned stipulations will be enforced among others under the Water (Prevention & Control of Pollution) Act 1974, the Air (Prevention & Control of Pollution) Act 1981, the Environment (Protection) Act 1986, the Hazardous chemicals (Manufacture, Storage & Import) Rules 1989, the Coastal Regulation Zone Notification 1991 and its subsequent amendments and the Public Liability Insurance Act 1991 and the rules made there under from time to time. The project proponent shall ensure that the proposal complies with the provisions of the approved Coastal Zone Management Plan of Gujarat state and the supreme court's order dated 18 April, 1996 in the writ petition No. 664 of 1993 to the extent the same are applicable to this proposal.	Point noted and Agreed APSEZ is being complied all the conditions said rules and regulations mentioned in EC point no. 4. APSEZ has valid insurance policy under PLI act 1991 as below. 1. APSEZ – Liquid Terminal: Valid till 31.03.2023 2. Mundra LPG Terminal Pvt. Ltd.: Valid till 31.03.2023 The updated/renewed PLI policy of Mundra LPG Terminal Pvt. Ltd is attached as **Annexure – 7**. Valid PLI Policy of APSEZ - Liquid Terminal was submitted along with last half yearly EC compliance report for the period Oct'21 to Mar'22.

Compliance Status of CRZ Recommendation given by GCZMA for the Waterfront Development Project

ANNEXURE – A

CRZ Recommendation Compliance Report of WFDP

Sr. No.	Specific Conditions	Compliance Status as on 30-09-2022
Specific Conditions		
1	The provisions of the CRZ notification of 1991 and subsequent amendments issued from time to time shall be strictly adhered to by the MPSEZL. No activity in contradiction to the provisions of the CRZ Notification shall be carried out by the MPSEZL.	Complied. All construction and operation activities are being carried out in line with the CRZ recommendation and permissions granted.
2	All necessary permissions from different Government Departments/ agencies shall be obtained by the MPSEZL before commencing any activities.	Complied. Necessary permissions from competent authority have been obtained before commencing any the activities. Please refer condition no. i & iv of General Conditions of the EC & CRZ Clearance above.
3	All major creeks shall be protected and no reclamation shall be done in these creeks and entire development along the creek shall be done after carrying out detailed engineering with an objective of environmental protection including protection of all major creeks to ensure adequate free flow of water and drainage of rain water during rainy seasons.	Complied. All major creeks within the APSEZ area are protected. Please refer specific condition no iii of the EC and CRZ clearance for details regarding this point.
4	The project proponent shall conserve the 1254 ha. of area as committed and proposed in their master plan and shall carry out plantation of various mangrove species in the said area.	Complied. Mangrove conservation area of 1254 Ha is conserved as proposed in the master plan. Please refer specific condition no i of the EC and CRZ clearance for details regarding this point.
5	Massive mangroves plantation activity in at least 300 ha. area shall be carried out within a time frame of 5 years as committed by the project proponent. This would be in addition to the earlier commitment	Complied. Mangrove plantation is already completed during the year 2012-13. Please refer specific condition no. vii of the EC and CRZ clearance for further details.

	for 1200 ha. of mangroves plantation.	
6	All major creeks shall be protected and no reclamation shall be done in these creeks and entire development along the creek shall be done after carrying out detailed engineering with an objective of environmental protection including protection of all major creeks to ensure adequate free flow of water and drainage of rain water during rainy seasons.	Complied. No effluent or sewage is discharged in to the CRZ area. Please refer specific condition no xii of the EC and CRZ clearance for details regarding this point.
7	All the recommendations and suggestions given by NIO in their Environment Impact Assessment report for conservation / protection and betterment of environment shall be implemented strictly by MPSEZL.	Complied. Compliance report of environmental management plan and mitigation measures proposed as part of the EIA report is attached as **Annexure – 8**.
8	The construction and operational activities as well as dredging and reclamation activities shall be carried out in such a way that there is no negative impact on mangroves and other coastal /marine habitat except the proposed approx. 63 ha of area for which the compensation (300 ha.) is proposed.	Complied. All construction and operation activities as well as dredging and reclamation activities are being carried out as per the approvals. 1254 ha area identified as mangrove conservation area is being conserved by APSEZ. Please refer specific condition no i of the EC and CRZ clearance for details regarding this point.
9	The construction activities and dredging shall be carried out under the supervision/monitoring of the NIO or any such institute of repute.	Complied. Construction activities are carried out as per EIA study carried out by NIO with all mitigative measures as suggested. Requisite permissions are taken from competent authorities such as GMB and GPCB. Site visits are being carried out by govt. officers from time to time to ensure compliance of the conditions stipulated in respective permissions. No capital dredging activities are carried out during the Apr'22 to Sep'22 period.

		Please refer condition no. i, iv & viii of General Conditions of the EC & CRZ Clearance above.
10	The dredge material generated during capital dredging shall be used only for reclamation and that to be generated during maintenance dredging shall be disposed of at the place identified by NIO/CWPRS/WAPCOS through appropriate modeling and it shall be ensured that it does not create any negative impacts.	Complied. Entire quantity of dredged material is used for reclamation activities only; no disposal is carried out in the sea. No capital dredging activities are carried out during the Apr'22 to Sep'22 period.
11	Necessary measures including the shore protection activities shall be undertaken to ensure that there are no erosion in surrounding area due to the proposed activities.	Complied. All dredging and reclamation activities are carried out as per EC and CRZ Clearance and no erosion is observed. For further details regarding the shoreline change study for the Mundra region, please refer specific condition no v of the EC and CRZ clearance.
12	The alignment of the jetties/berths and other structures shall be done after conducting the detailed modeling to ensure that there are no erosion and accretion in the region due to proposed activities.	Complied. Detailed hydrodynamic modeling was carried out by NIO during preparation of the EIA report. All construction activities are being carried out as per the outcome/recommendations of the modeling report. However, a detailed shoreline change assessment study is also carried out. Please refer specific condition no v of the EC and CRZ clearance for further details.
13	The MPSEZL shall contribute financially for any common study or project that may be proposed by this department for environment management / conservation / improvement for the Gulf of Kutchh.	Complied. There are two studies prescribed by MoEF&CC. For further details regarding the same, please refer general condition no xi of the EC and CRZ clearance.
14	The construction debris and /or any other type of waste shall not be disposed of into the sea, creek or in the CRZ areas. The construction is over and shall be disposed off in low	Complied. All construction and operation activities as well as dredging and reclamation activities are being carried out as per the EIA report prepared by NIO.

	lying areas in consultation with NIO, NEERI or any such institute of repute.	The construction debris, if any, is being used for area development outside CRZ area. For details about management of other types of wastes, please refer general condition no. iii of the EC and CRZ clearance.
15	The construction camps shall be located outside the CRZ area and the construction labour shall be provided with the necessary amenities, including sanitation, water supply and fuel and it shall be ensured that the environmental conditions are not deteriorated by the construction labors.	Compiled. Please refer general condition no ii of the EC and CRZ clearance for further details.
16	The MPSEZL shall regularly update their Local Oil Spill Contingency and Disaster Management Plan in consonance with the National Oil Spill and Disaster Contingency Plan and shall submit the same to this Department after having it vetted through the Indian Coast Guard.	Compiled. Disaster Management Plan is updated regularly and the updated DMP was submitted as a part of compliance report for the period Apr'16 to Sep'16. On Site Emergency Response Plan and Crisis Management Plan is in place and implemented. There is no further change. The updated Onsite emergency plan was submitted during the compliance period of Oct'21 to Mar'22. 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 30.07.2022 is in place and implemented. The latest Oil spill contingency response plan is enclosed as **Annexure-9.** . 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) is prepared in accordance with the NOSDCP.

		Latest Regional Level Pollution Response exercise **"SWACHCHH SAMUDRA-NW 2022"** was carried out by Indian Coast Guard on 12th April, 2022 at Vadinar, Gujarat. All participants from various Oil Handling Agencies and Stakeholders (ICG, RELIANCE, ESBTL, OOCL, APSEZ, BORL, VOTL (NAYARA) were participated in this exercise. Details of the same is attached as **Annexure-10**.
17	The MPSEZL shall participate and contribute for the Vessel Traffic Management System to be developed for the Gulf of Kutchh being developed.	Complied. A VTMS service for Gulf of Kutch is operated by Directorate General of Lighthouses and Lightships (DGLL), Govt. of India. 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 vtsmanagergulfofkutch @ yahoo.com and vtsgok@yahoo.com. Mundra port has subscribed and taking VTMS feed from Kandla from link www.vts.gov.in.
18	The MPSEZL shall bear the cost of external agency that may be appointed by this Department for supervision/monitoring of proposed activities and the environmental impacts of the proposed activities.	Complied. There are two studies prescribed by MoEF&CC. For further details regarding the same, please refer general condition no xi of the EC and CRZ clearance.

Annexure – B
Compliance Status of MoEF & CC Order dated 18.09.2015

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

Status of the conditions stipulated in Environment and CRZ Clearance

Sr. No.	Condition	Compliance Status as on 31-03-2022
i	The proposal of extension of the validity of environmental clearance granted to the North Port vide letter dated 12.01.2009 will be considered separately at later stage.	Point Noted & Complied After receipt of this order, so far APSEZ has not done any application to MoEF&CC for the proposed North port. The expansion of Waterfront Development plan has been proposed excluding North Port area.
ii	Bocha island, ecologically sensitive geomorphological features and areas in the island and creeks around the island will be declared as conservation zone action plan for its conservation must be prepared. M/s. APSEZ should provide necessary financial assistance for this purpose.	Complied This reply covers condition no ii, iv and v. Based on the MoEF&CC directions, 1. APSEZ, vide letter dtd. 19th October 2015 had requested GCZMA, for consideration of project for finalization of ToR for NCSCM. 2. Project was considered on 28th GCZMA meeting, scheduled on 22nd April 2016, where ToR was discussed and agreed, upon. 3. APSEZ, vide its letter dtd. 25th April 2016, submitted the proposal to GCZMA along with Scope of work, as submitted by NCSCM. 4. Service Order was issued to NCSCM vide SO dtd. 29th Aug 2016. Cost of the study as per the NCSCM proposal was 315 Lakh and 100% of payment has already paid to NCSCM. 5. NCSCM has carried out number of site surveys during the period, February 2017 – April 2018 as per the defined scope 6. The study report was submitted to GCZMA (with a copy to MoEF&CC vide letter dated 04.06.2018) for their consideration and recommendation if any. 7. A reminder letter was submitted to GCZMA vide letter dated 4th Jan 2019. Details of above chronology were submitted along with half yearly compliance report for the period Apr'19 to Sep'19.
iv	A comprehensive and integrated 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.	The site survey carried out by NCSCM includes: 1. Bathymetry survey of creeks 2. Topography survey of intertidal areas 3. Mangrove survey (health and area demarcation) 4. Sampling of soil and water for analysis of physico-chemical and biological parameters 5. Tide and currents data collection (including residence time of tidal water) 6. Focus Group Discussions with the community in the close vicinity of the project area In addition to the site surveys, NCSCM has procured satellite images for analysis of mangrove cover. The data collected (through site surveys and analysis of satellite maps) was used as input for mathematical modelling. The modelling studies were carried out to understand the impacts of the development activities. Based on the outcome of the modelling studies the necessary conservation plan for protection of creeks and mangrove areas is prepared. Based on the final study report, outcome is summarized in to following points : 1. There is no obstruction to any water stream (creeks / branches of creeks / rivers) 2. Presently, mangrove cover in and around APSEZ is over 2596 ha. There was substantial growth in mangrove cover to the tune of 502 ha (comparison between 2011 and 2019) 3. Mundra has undergone substantial development during this tenure. Hence it can be interpreted that the infrastructure development has not left any adverse impacts on ecology. NCSCM study same was submitted to the GCZMA on 04.06.2018. Details of the same

were 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&CC for their examination and recommendation vide (with a copy to MoEF&CC vide letter dated 04.06.2018 & reminder letter vide dated 4th Jan, 2019). Presentation on the findings of the report was made to GCZMA committee on 4th October 2019 and the recommendation for the same has been received vide email dtd 22nd Sept, 2020 with conditions. Details of the same were submitted as a part of half yearly EC compliance report for the period Oct'20 to Mar'21.

As a part of GCZMA recommendations and NCSCM mangrove conservation action plan, APSEZ has undertaken following activities.

Sr. No.	Recommendations	Compliance
1.	Mangrove mapping and monitoring in and around APSEZ	• APSEZ entrusted NCSCM, Chennai to carry out Monitoring of mangrove distribution in creeks in and around APSEZ and shoreline changes in Bocha island. • 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 & 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%. • 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. • Hence, there is an overall growth of mangroves in creeks in and around APSEZ, Mundra is 502 Ha between 2011 and 2019. • The cost of the said study was INR 23.56 Lacs incurred by APSEZ.
			2.	Tidal observation in creeks in and around APSEZ	• APSEZ carried out the tidal observations at locations similar to 2017 in Kotdi, Baradimata, Navinal, Bocha and Khari creeks under the guidance of NCSCM. • The observed tidal ranges indicate that the creeks experience normal tidal ranges, adequate for the growth of mangroves. • The cost of the said activity was INR 1.0 Lacs.
			3.	Removal of Algal and Prosopis growth from mangrove areas	• 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. • The cost of the said activity was INR 2.8 Lacs. The details of Removal of Algal and Prosopis growth from mangrove areas was submitted during the

				last compliance period Oct'21 to Mar'22.
		4.	Awareness of mangroves importance in surrounding communities	• Adani Foundation – CSR Arm of Adani group has done awareness camps/activities created in the community regarding importance of mangroves. • Celebrated the International Mangrove Day for the Conservation of the Mangrove Ecosystem every year on 26th July, • Adani Foundation provides good Quality dry and green fodder to 29 Villages. Project is covering total 33072 Cattels / 2747 farmers and hence enhancing cattle productivity during last FY 2022-23 (Till Sep'22). • Awareness of mangroves importance in surrounding communities & Fodder support - The expenditure for fodder supporting activities was approx. 200.89 Lacs during FY 2022-23 (Till Sep'22), which was incurred by APSEZ. • 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 Grassland development in Siracha – 85 Acre & Zarpara – 25 Acre done which resulted in total production of 82 ton. • 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. • APSEZ has celebrated the International Day for the Conservation of the Mangrove Ecosystem on July 26th to raise awareness of the importance of mangrove ecosystems as "a unique, special and vulnerable ecosystem". The photographs of celebration are attached as **Annexure-11.** • Refer CSR report attached as **Annexure – 1**.

Details of activities done as a part of GCZMA recommendations and NCSCM mangrove conservation action plan were submitted as a part of half yearly EC compliance report for the period Oct'20 to Mar'21.

CZMP of Kutch region has been finalized and published on GCZMA website in the Month of Feb-2022. NCSCM has issued final authorized maps for HTL and CRZ Boundary prepared in line with approved CZMP of Gujarat State as per CRZ Notification, 2011. The details of the maps were submitted during the last compliance period Oct'21 to Mar'22.

To comply with the GCZMA recommendations regarding mangrove monitoring at every 2 years, APSEZ awarded work order vide order no. 4802018994, dated 29/07/2022 to the NCSCM, Chennai for mangrove mapping in and

<table>
<tr><td></td><td></td><td>around APSEZ, Mundra. The cost of said work is 23.77 Lacs, which will be paid by APSEZ.</td></tr>
<tr><td>iii</td><td>The violations of specific condition of all the ECs and CRZ clearances, if any, will be examined and proceeded with the provisions of EP Act, 1986 independently.</td><td>Complied

During the said site visits from various regulatory authorities and as per the compliance certification received, there was no non-compliance observed.
<table>
<tr><th>Sr. No.</th><th>Authority</th><th>Date of Visit</th><th>Purpose of Visit</th></tr>
<tr><td>1</td><td>RO, MoEF&CC, Bhopal</td><td>21st – 22nd Dec, 2016</td><td>EC Compliance Certification of WFDP</td></tr>
<tr><td>2</td><td>RO, MoEF&CC, Bhopal</td><td>3rd May, 2018</td><td>EC Compliance Certification of WFDP & MSEZ</td></tr>
<tr><td>3</td><td>RO, MoEF&CC, Bhopal</td><td>3rd & 4th Sep, 2019</td><td>Compliance of the order of the Hon'ble HIGH COURT of Gujarat vide letter dated 22nd Aug. 2019 w.r.t. compliance verification of MoEF&CC order dated 18th Sep, 2015.</td></tr>
<tr><td>4</td><td>RO, MoEF&CC, Bhopal</td><td>27th & 28th Jan, 2020</td><td>EC Compliance Certification of WFDP</td></tr>
<tr><td>5</td><td>SPCB, Gandhinagar</td><td>17th March, 2021</td><td>CC&A Compliance Certification of existing facilities developed under WFDP</td></tr>
<tr><td>6</td><td>Joint Review Committee</td><td>1st to 3rd Sep, 2021</td><td>Compliance of the order of the Hon'ble HIGH COURT of Gujarat vide letter dated 22nd Aug. 2019 w.r.t. compliance verification of MoEF&CC order dated 18th Sep, 2015.</td></tr>
<tr><td>7</td><td>NEERI, Nagpur</td><td>23rd & 24th May 2022.</td><td>EC Compliance verification of MSEZ. Copy of last site visit compliance verification report is attached as Annexure – 12.</td></tr>
</table></td></tr>
</table>

		It may also be noted that GPCB, Regional Office does regular site visit of APSEZ area and no non-compliance observed. Last visit of Regional Office, GPCB was done on 09.04.2021 for West Port APSEZL has submitted the reply to the site visit report vide letter dated 12.04.2021. Details of the same were submitted as part of compliance report submission for the duration of Apr'21 to Sep'21. Last visit of Regional Office, GPCB was done on 23.03.2022 for Main port and APSEZL has submitted the reply report vide letter dated 05.04.2022. Details of the same are attached as **Annexure – 6**.
vi	There will be no development in the area restricted by the High court of Gujarat. APSEZ shall abide by the outcome of the PIL 12 of 2011 and other relevant cases.	Complied The order passed by Hon' ble high court in context of PIL 12 of 2011 vide dated 10th Nov 2011. Subject PIL has been disposed off by Hon'ble High Court vide their order dated 17.04.2015 and now there is no restriction on development in the subject area. The order reads as *"In view of the aforesaid discussion, we do not find any merit in this writ petition. This writ petition fails and is accordingly dismissed. No order as to cost."* Copy of the order was submitted along with half yearly EC Compliance report for the period Apr'18 to Sep'18. Considering the above status and in line to submission of compliance of all the directions under this order, this condition is closed.
vii	APSEZ will submit specific action plan to protect the livelihood of fishermen along with budget.	Complied. Adani Foundation (AF) is the CSR arm of the Adani Group actively working for upliftment of the communities in the surroundings of various project sites of Adani Group. AF has prepared a specific action plan to protect livelihood of fishermen at Mundra.

		Various initiatives, as stated below are discussed in detail in the report namely "Silent Transformation of Fisher folk at Mundra". Said report also includes the information related to the planned expenses to the tune of approx. 13.5 Cr. INR for various initiatives for the next five years (2016 – 2021) (Budget details provided in Page No. 68 of report). Copy of the same is already submitted to MoEF&CC vide our letter dated 10.09.2016. Till, Sep'22 approx. 12.31 Cr. INR, has already been invested fisherfolk livelihood. Further, details regarding the expenditure incurred against the commitment are attached as **Annexure – 13**. APSEZ is carrying out various initiatives specific to the Fisherfolk community which includes: • **Vidya Deep Yojana** Developing school preparedness programme and empowering balwadis at fisherfolk settlement Under this scheme, 4 balwadis at different settlement has been constructed This programme include nutrition food, hygiene, awareness of health, cleanliness, discipline, regularity and development of basic age appropriate conception • **Vidya Sahay Yojana – Scholarship Support** All basic education supportive facilities have been created to promote education in fisher folk community. • **Adani Vidya Mandir** Children of the family with the income of salary less than 1.5 lac/annum are admitted School focusses on nutrition food, uniform and other services to the children for free. • **Fisherman Approach in SEZ** After due consultative process, APSEZ has provided 7 fishermen access roads for to approach to the sea for fishing activity. • **Machhimar Arogya Yojana** The Fisher folk communities are disposed to several water and air abided diseased due to exposure to unhygienic working conditions. Frequently Special Health care Camps are organized at Vasahat. Our Mobile health care unit van regularly visit fisher folk settlements • **Machhimar Kaushalya Vardhan Yojana**

		Based on need assessment a number of trades were introduced through the Adani Skill Development Centre in Mundra, where in fisher folk youth could join and get a number of technical and non-technical training • **Machhimar Sadhan Sahay Yojana** Fishing material support was provided by AF at Mundra as per the requests of Pagadiya fishermen. According to their needs, fishing nets, ropes, buoys, ice boxes, crates, weighing scales, anchors, solar lights etc., were provided • **Machhimar Awas Yojana** Shelters, equipped with basic facilities of a toilet and pure drinking water have been constructed for living while fishing and to provide a healthy and hygienic residence. • **Machhimar Shudhh Jal Yojana** This scheme of providing potable water has helped in reducing the drudgery of women and contributed largely towards general wellbeing • **Sughad Yojana** Toilets for men and women are constructed at all three Vasahats.Infrastructure was accompanied with continuous awareness campaign on hygiene sanitation and use of toilets in particular. • **Machhimar Akshay kiran Yojana** Solar street lights at each settlement have been installed. For fish landing shed and school extension room have been fitted with solar invertor allowing late evening video shows for awareness and fish sorting work at ease. • **Machhimar Suraksha Yojana** Distance Alarm Transmission System – DATS' project was introduced in order to promote safety of the fishermen. Forced to be at sea to earn their livelihood puts the lives of many fishermen at risk • **Machhimar Ajivika Uparjan Yojana** Mangrove plantation in the area as means of alternate income generating activity for the fisher folk community during the non-fishing months. During the non-fishing months, the fishermen under usual circumstances were benefited by other alternate economic activity to sustain them. • **Bandar Svachhata Yojana** Waste bins have been provided for proper collection and segregation of waste. Further, 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.

- Education
- Community Health
- Rural Infrastructure
- Sustainability Livelihood

Brief information about activities in the main four persuasions is mentioned below. Activities carried out for the same are summarized as below.

Area	Activity
Community Health	• Mobile Heath Care Units and Rural Clinics • 09 Rural Clinics • 06 villages of Mundra, 02 villages of Anjar & 01 village Mandvi block has benefited by rural clinic service. • Total Patients Benefitted FY 22-23 up to Sep 22:-10059 (direct & indirect). • 5 financially challenged patients has been supported with Dialysis treatment at 108 Times which added day in their Life. **Health camp:** • Specialty camps, Eye checkup camps, Blood donation camp, Anti-tobacco awareness camp, TB screening, and other are conducted in core villages as well as in labour colonies. • Specialty health(Gynec , Pediatric eye specialty health camp) :- 04 camp – 903 Patients. • General health camp :- 05 camp -1041 Patients Awareness Session • Health & Hygiene for School Students- -432 Students. • Malnourished Child and Adolescent Girl-108 Child and Girls. • Blood Donation camp was held at various location on the Occasion of Respected Chairman sir's birthday on 24th June. • Total 590800 CC quantity of Blood had been donated by 1088 Employees. • 30 villages covered, with 94 types of general and lifesaving medicines through Mobile healthcare unit • 872 –Economically Challenged patients have been supported for operation, OPD, IPD, Medicines and lab-test.

				• For Preventive health care General and multispecialty camps Pediatric camp, General Health camps in 9 villages and Super specialist camp which benefitted more than 1944 patients of Mundra Taluka. •
			Sustainable Livelihood – Fisher folk, Agriculture & Women	• Government scheme Awareness session was held in association with Fisheries department Bhuj to facilitate pagadiya fishermen by providing fishing kits to seven Fishermen. The coordination was made by Adani Foundation to process application. • To promote Natural farming Adani Foundation has originated cow-based farming initiative with interconnected techniques which can increase farmer yield. • Survey and identification of farmers to adopt Natural farming-Total 950 Farmers were selected ascriteriain first phase of the Project. • 257 Farmers have started to preparing Jiva Mrut & Gaukrupa Amrutam Bio-fertilizer and using in agricrop. Series of Training is arranged by ATMA and Adani Foundation. • Adani Foundation has also provided 7.31 lacs kg Dry Fodder and 23.59 lacs kg Green fodder in 29 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. 200.89 Lacs during FY 2022-23 till Sep'22. • Adani Foundation provides Good Quality dry and green fodder to 29 Villages. Project is covering total 33072 Cattels / 2747 farmers and hence enhancing cattle productivity. Dry Fodder 731230 Kg Green –2359204 Kg. • Fodder Cultivation- To made fodder sustain villages - 100 Acre Gauchar land of Zarpara and 25 Acre in Siracha village is being cultivated for the same. • With the support of Gauchar Seva Samiti Grassland development in Siracha-40 Acre & Zarpara 165 Acre done which resulted in total production 82 ton. • To protect Cattles against Bovine Brucellosis zoonotic disease, Awareness and vaccination program is ongoing with Kutch fodder fruit & Forest development trust (KFFT) in our 11 Villages. In end of the year 100 percentage female calves will be benefitted by this initiative.

			• Current year for the dates Packaging and Marketing, KKPC Started to sell 10 Kg capacity packaging Box. The company has been set up with 237 Farmers shareholders. Half year Turn Over of the company is 7.18 lacs • Skill Development and Income Generation –Adani Foundation is working with 15 Self-help group and supporting to develop entrepreneur skills to become self-reliant, sourcing more than 500 women to absorb in various job.
		Education	• Conduct Baseline assessment & Utthan Sahayak Start teaching to progressive learner. 96 students Mainstreamed from progressive Learner this year. 730 students mainstreamed last year. • Provided facility for preparing JNV and NMMS examination. 898 number of students participated for JNV and NMMS. • Mental and Physical Cognitive Education with Joy full learning activities to 2.5- to 6-year-old children. Provide Nutritional Food Facilities. Capacity Building program for Balwadi teachers. • Total 82 Active SHG Group – 834 women are engaged with Adani Foundation for Savings activity. Among 15 SHG groups are involved in income generation. We facilitate them capacity building training for quality, Marketing Finance and team work to made them self-sustain. • Saheli Swa Sahay Juth have completed order of 10,000 sanitary pad from District Health Department. • Tejasvini SHG has received order of 3000 traditional dress preparation worth 3.25 Lacks. • Sonal Saheli Women SHG had supplied 1000 KG washing powder to Adani port & Willmar. • 507 underprivileged students of Fisherman & Maldhari communities underprivileged from 8 villages taking education at the Adani Vidya Mandir school. • Celebration of various days is villages school.
		Rural Infrastructure & Environmental Sustainability	Adani foundation designed and build various structure and provide service in the Health, Education, agriculture and sustainable livelihood area. **WORK COMPLETED**

			• 25 RRWHS structure have been completed • 201 Bore-well recharging activity is completed. • Percolation well Recharging work at Bhadiya & Mota Kandgra village. • Sluice gate Construction to Control Flood during Flooding at Khoydivadi Vistar Bhujpur. • Pond Beatification and Bund Strengthening at Bhujpur village. • commissioning of Community Training Centre at Shekhadiya. • Two Pond Deepening at Zarpara under Amrut Sarovar Yojna. JCB & Hitachi Machine Support for Pre-Moonson activities. Repairing and Maintenance work of Approach at Luni, Bavdi and Navinal Fishermen Bandar. **Work in Progress.** • Development of Vegetable Market Development at Mundra with 128 Stall Work in Progress. • Pond Pipe Line Work at Pranshla vadi vistar Zarpara village. • Sluice gate Construction & Pipe line work to Control Flood during Flooding at Pranshlavadi Vistar Zarpara. • Check dam Restrengthening and Road restoration at Bharudiya village • Development of Cricket Ground at Hatdi Village. • Renovation and repairing work Community Center , Mundra. • Renovation and Road repairing work at All Fishermen Vasahat. **ENVIRONMENT SUSTAINABILITY PROJECTS** • **Miyawaki Forest Development, Nana Kapaya** - Plantation of 5880 saplings of different 42 species is completed which will result in dense forest within 2 years • **Smruti Van** – Plantation more than 47,000 sapling with more than 115 species through Miyawaki methodology. • **Ecosystem Restoration, Guneri** – Grassland ecosystem restoration and mangrove conservation in 40 Ha area over a period of 4 years. The drone survey conducted in Aug 2022 to assess the annual phase wise growth of ongoing activities. • **Multi-Species Mangrove Park** - Adani Foundation at Mundra's initiated multi-species plantation of mangroves in

			Kutch 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. During current FY 2021-22, 03 ha area coastal stretches have been planted with mangrove species. Total 16 Ha. multi-species mangrove plantation has been carried out till March-22 association with M/s. GUIDE, Gujarat. Current year 4 Hector plantation is in progress which will be resulted in 20 Hector. • Mangroves Biodiversity Park within one year • **Home biogas** - Under Gram Utthan Project, Adani Foundation is supporting home biogas to farmers to Uthhan Villages phase wise. Current year supported 360 home biogas system in Dhrub, Zarpara and Navinal Villages • As per SORI use of biogas each farmer can save Rs.23400/year. Total 360 farmers can save Rs.8424000/- in a year. **Water Conservation Projects** – ✓ Large number of water harvesting structure (18 Nos. of check dams in coordination with salinity department) and Augmentation of 3 check dams ✓ Ground recharge activities (pond deepening work for more than 56 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 145 Nos. (40 Nos current year) which is having 10,000 litre storage which is sufficient for one year drinking water purpose for 5 people family. ✓ Recharge Bore well 201 Nos (12 Nos current yr) which is best ever option to direct recharge the soil. ✓ Drip Irrigation approx. 1156 Farmers benefitted in coordination with Gujrat Green Revolution Company till date ✓ 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. ✓ Check dam gate valve construction at Bhujpur which controlled more than 350 MCFT water to go into sea and get recharged current year.

				✓ Pond Pipe line work at Prasla Vistar Zarpara which increase recharge capacity more than 25% in 100 hector area.
			Skill Development	Over the previous 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. **ASDC, Mundra** • **Youth Employment:-** Adani Foundation is committed for youth employment with imparting technical and Non-Technical Training for Fisherfolk Youth and started Electrical ,Welder ad Masson work training under Adani Skill Development Centre. • 35 Youth get employed in GPVC, AWL, MSPVL and KCL WinTech and Other CFS. • 194-Fisherfolk men and women were supported with skilled and unskilled Job and Contract work in various APSEZ Department. **ASDC and Thermax Foundation Done MoU** • ASDC and Thermax Foundation Jointly Organised , Skill Development training program for " Dhrab Village youth", In 1st phase completed Domestic Data Entry Operator training with 50 students (25 girls and 25 boys) • Chief Guest of this program was Mr. Anees Shaikh-Head ,ER& Administration , Thermax, Ashlambhai Turk-Dhrab Village Sarpanch remained present • CSR head Thermax Ms. Sujata Deshpande has joined from Pune and given motivation and best wishes for training. • **Skill Development and Income Generation –**Adani Foundation is working with 15 Self help group and supporting to develop entrepreneur skills to become self reliant, sourcing more than 500 women to absorb in various job –this will give them identity, confidence and right to speak in any decision for home, village and working area. **ASDC, Bhuj**

		✓ **Soft Launching of Self Employed Tailor – Outreach Batch at Meghpar:** Soft Launched Self-Employed Tailor Batch at Meghpar (Out-reach). Total 25 candidates are enrolled. ✓ **Soft Launch of General Duty Assistant Batch:** Soft launched General Duty Assistant Batch with 30 candidates under DDU-GKY scheme as per instruction by GLPC. ✓ **Soft Launch of Entrepreneurship Development Program:** Soft Launch of Entrepreneurship Development Program Training at Centre under CED with 30 candidates. ✓ **Soft Launch of FL Training under Special Project** Launching Special Project Jointly with KMVS NGO for FSW (Female Sex Worker) Financial Literacy training Inaugurated on 22-07-2022. Total 37 women participant. ✓ MOU with Kachchh District Education Office. In this MOU we will provide training of Digital Literacy and Basic Functional English in Kachchh District Schools. As per MOU Kachchh District Education Office will provide minimum 5000 candidates to us for training (Adani Skill Development Centre). ✓ During FY 2022-23 till Sep'22, Total 1836 people trained in various trainings to enhance socio economic development. Please refer **Annexure – 1** for full details of CSR activities carried out by Adani Foundation in the Mundra region. Budget for CSR Activity for the FY 2022-23 is to the tune of INR 1317.36 lakh. Out of which, Approx. INR 495.65 lakh are spent during the current compliance period Apr'22 to Sep'22. Till Mar'22, Adani Foundation has done total expenditure of INR 152.65 Cr. for CSR activities in Kutch region since its inception.
viii	APSEZ will voluntarily return the grazing land, if any, in their possession.	Point noted.

		All lands are acquired through proper procedure prescribed by State Government. However, APSEZ has agreed for voluntarily giving land back to Zarpara village for the purpose of Gauchar. Land has been identified in the presence and confirmation of Gram Panchayat. Necessary procedure has been initiated by APSEZ vide its letter dated 09th Aug 2012 with concerned revenue authority with respect to surrender of gauchar land at village Zarpara. Same has been taken up by revenue department for necessary procedure of transfer and is under process. Details of the same were submitted along with half yearly compliance report for the period Apr'19 to Sep'19. As per recommendations given in Joint Review Committee visit report dated 1st December 2021, APSEZ has approached M/s. Indian Grassland and Fodder Research Institute (IGFRI), Jhansi to get the consultancy work for enhancing / upscaling the forage production in Gauchar Land at Zarpara in 400 acres. Proposal received from IGFRI is attached as **Annexure – 14.**
ix x.	A regional strategic impact assessment report with a special focus on Mundra region will also be prepared. The cost towards these studies will also be borne by PP. In the subject matter of thermal power plant, the proposed regional strategic Impact assessment analysis will take In to account salinity aspect along with Its potential environmental Impact to suggest future corrective actions as well as the guiding tool on extension and addition of the capacities.	Complied This reply covers direction no ix and x. 1. APSEZ vide its letter dtd. 24th Feb 2014 has submitted draft ToR for preparation of CIA report to GCZMA for their approval. 2. GCZMA vide its letter dtd. 19th Dec 2014, has approved ToR for CIA. 3. Based on the ToR finalized by GCZMA (as per the instructions of MoEF&CC) for carrying out regional impact assessment study, APSEZ awarded the work to NABET accredited consultant M/s. Cholamandalam MS Risk Services Ltd. to carry out the studies, vide SO dtd 10th Feb 2016 as stated in these directions. 4. Primary baseline environmental monitoring data collection during March – June 2016

		and published secondary data on various environmental attributes have been considered for the study. 5. The study has been concluded and the final report was submitted to GCZMA and MoEF&CC for their consideration vide our letter dated 30.04.2018. 6. Reminder letter has been submitted to GCZMA for their comments and consideration vide letter dated 4th Jan 2019. Details of above chronology were submitted along with half yearly compliance report for the period Apr'19 to Sep'19. Total cost of the study is approx. INR 1.3 cr. which is financed by APSEZ. The stated study was carried out in following 3 phases • Baseline data collection and review of the past EIA reports and clearances issued to APSEZ. • Mathematical modelling and other technical studies for identification of potential impacts (for the year 2030) of the approved and existing project activities. • Development of macro level EMP for the phase wise implementation of actionable points. As part of the study, following modelling exercises / technical studies have been carried out to study the impacts on all environmental attributes: • Ambient air quality • Marine (Hydrodynamic, Thermal & Salinity dispersion, Sediment transport) • Noise level • Traffic assessment • Oil spill contingency plan • Water resource and salinity ingress • Land Use / Land Cover • Socioeconomic, Regional infrastructure

		• Waste management • Ecology, Bio diversity and Fisheries • Shoreline change assessment Preparation of these reports require extensive use of modelling software and study of the available information / research reports to assess the impacts on individual attribute of environment. Based on the modelling outcomes and findings of the technical studies, a macro level environment management plan is prepared. Inline to the present stage of the project, APSEZ is already complying, as per Environment Management Plan and further recommendations, applicable to APSEZ as mentioned in the EMP, wrt Traffic Management Plan, Ground water quality management, Salinity ingress programme, Air and Noise quality Management, Surface and Marine water quality management, Ecology and Biodiversity Management, Solid & Hazardous waste management, Socio-economic Management and Shoreline Management, will be implemented in phase wise manner as per the progress of development within the boundary limits of APSEZ. The final CIA Report was prepared inline to the ToR by Chola MS and the same was submitted to the GCZMA on 30.04.2018. Details of the same were submitted along with half yearly EC Compliance report for the period Apr'18 to Sep'18. Presentation on the findings of the report was made to GCZMA committee on 4th October 2019 and after detailed discussion, authority has decided to constitute committee to discuss the details of the report further. Reminder Letter vide dated 07.09.2020 & 10.03.2021 submitted to the GCZMA, Gandhinagar for further directives to present the findings of the CIA report in detail. Details

		were submitted as a part of half yearly EC compliance report for the period Oct'20 to Mar'21. Presentation done before GCZMA on 31.10.2021 and 16.02.2021 to discuss proposed EMP of CIA study in detail and way forward. GCZMA, Gandhinagar issued a letter to co-ordinate with various departments in the matter of CIA with Gujarat Pollution Control Board as Nodal Agency vide dated 12th July, 2022. APSEZ submitted the letter to GPCB for detailed deliberation and suitable action / way forward vide letter dated 20th July, 2022. The copy of acknowledgement is attached as **Annexure – 15.** However, APSEZ is already complying with the Environment Management Plan (applicable to APSEZ) suggested in Cumulative Impact Assessment report. The detailed compliance, applicable to APSEZ is attached as **Annexure – 16**.

Annexure – 1

adani
Foundation

CSR GUJRAT

Six Monthly Report 2022-23

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

Taking inspiration from the Gandhian philosophy of trusteeship, the Adani Foundation strives to create sustainable opportunities. It does so by facilitating quality education, enabling the youth with income-generating skills, promoting a healthy society by women empowerment and supporting infrastructure development.

With an aim to contribute to the holistic development of communities, the Adani Foundation is contributing to the global agenda of meeting Sustainable Development Goals (SDGs).

Adani Foundation Gujrat sites are catalyst for rural communities residing in villages of Kutch,, Surat and Bharuch District. AF has transformed thousands of lives by serving community to uplift their standard of living by performing CSR activities in various in terms of Infrastructure, Social development, Education, Agriculture, Women empowerment, Water conservation and management and empowering fishermen and Tribal community.

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CSR KUTCH

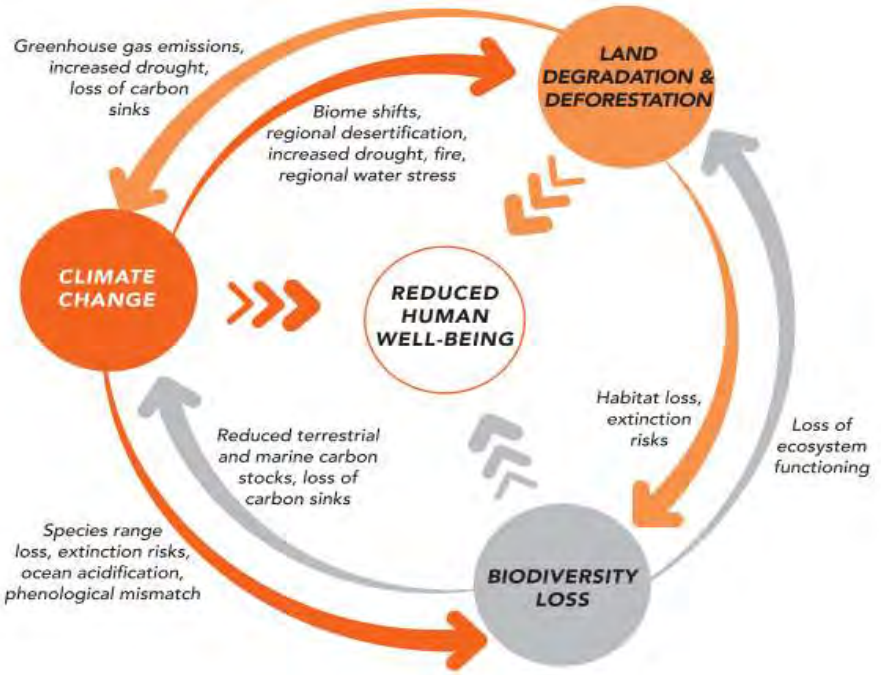
ENVIRONMENT SUSTAINABILITY

Environmental sustainability is the responsibility to conserve natural resources and protect global ecosystems to support health and wellbeing for present and future. These components are closely interrelated and mutually re-enforcing Under Corporate Environmental responsibility.

To make connections between human actions Environment & biological diversity found within a habitat and/or ecosystem, Adani Foundation executing various Project as Below

Biodiversity conservation: to preserve biodiversity and Natural Resources.

Regenerative capacity: Protect the depletion of natural resources and keep the harvest rate of renewable resources within the capacity of regeneration.



Environment Sustainability Projects : Ensuring ecological balance, protection of flora and fauna, terrestrial and coastal spices conservation, welfare, agro forestry, conservation of natural resources and maintaining quality of soil, air and water

REDUCING CARBON FOOTPRINT

1. Miyawaki – Nana Kapaya

Miyawaki- Dense Plantation is developed n year 2021-22 at Nana Kapaya Village in 2.0 acre land. Miyawaki plot is very close to sewage water tank so watering to plantation by the same.

As discussed with villagers and Adani Foundation, we proposed the close or dense plantation at site- called Miyawaki Types of Plantations with following **four major compartments** (45X20 meters approx.) and with following strategies:

1. Mixed Plantation dominant Drought Resistant Plants
2. Mixed Plantation dominant by Larger Leaves
3. Mixed Plantation dominant by Saline Resistant Plants
4. Mixed Plantation dominant by Medicinal Values.

Plantation of 5880 saplings of different 42 spices is completed which will resulted in dense forest due to good rain this year.

REDUCING CARBON FOOTPRINT

2. **Smritivan Memorial park**– Bhuj

Smritivan Memorial park is a unique initiative by Prime Minister in order to commemorate the death of about 13,805 people during this massive earthquake which had its epicenter in Bhuj District.

The memorial will occupy around 406 acres of space of the **Bhujia Dungar near Bhuj, Kutch** that will show people's **oppressive response to a natural disaster**.

Adani Foundation has supported for 47000 saplings in Smriti van @ 100 Las INR
In September 2022, Prime Minister had inaugurated smriti van which is the biggest Miyawaki Forest in Gujrat.

3. Mangroves Biodiversity Park

Mangroves are complex ecosystems that provide coastal bio-shield to habitats and societies from natural disasters. Important roles played by the mangroves are; stabilizing the coastline, protect water quality, reduce coastal flooding, reduce the effect of coastal cyclone, etc.

Mangroves are one of the productive ecosystems which contribute a number of ecosystem services to the nature as well as to human and are integral in the control of climate on the Earth.

With a vision to Enhance the diversity of mangrove and its associated species in suitable coastal region of Kachchh, which in turn would enhance 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 which in turn assist in improving the livelihood of the coastal populace. Further, the area will serve as a base model for researchers, knowledge center for students and promote awareness for conservation and management of mangroves for the benefit of human and the environment.

REDUCING CARBON FOOTPRINT

Total five mangrove species, such as Ceriops, Aegiceras and Rhizophora were selected which in turn enhanced the dependent faunal diversity of the area. Thereby, there will be an increase considerable biodiversity of the area. **The initial pilot trails were undertaken in an area of approximately 16 hector during the period between 2018 and 2021 with the active participation of local communities.** Current year 4 Hector plantation is in progress which will be resulted in 20 Hector Mangroves Biodiversity Park within one year

S. NO	Mangrove Associate	Life form
1	Suaeda Spp.	Herb
2	Porteresia coarctata	Herb
3	Opuntia elatior	Shrub
4	Sesuvium portulacastrum	Herb
5	Ipomoea biloba	Climber
6	Salvadora persica L.	Shrub
7	Urochondra setulosa	Herb




REDUCING CARBON FOOTPRINT

Sr. No	Species	Common Name
1.	Boleophthalmus dussumieri (Valenciennes, 1837)	Levti Mud Skipper
2.	Scartelaos histophorus (Valenciennes, 1837)	Walking goby
3.	Periophthalmus waltoni Koumans, 1941	Walton's mudskipper
4.	Austruca iranica (Pretzmann, 1971).	Arabian Fiddler Crab
5.	Austruca sindensis (Alcock, 1900)	Indus Fiddler Crab
6.	Austruca lactea (De Haan, 1835)	Milky Fiddler Crab
7.	Parasesarma plicatum (Latreille, 1803)	Mudflat crab
8.	Dotilla blanfordi Alcock, 1900	Sand bubbler crab
9.	Scylla serrata (Forskål, 1775)	Mud Crab
10.	Eurycarcinus orientalis A. Milne-Edwards, 1867	Violet Crab
11.	Pirenella cingulata (Gmelin, 1791)	Horn snail
12.	Telescopium telescopium (Linnaeus, 1758)	Telescope snail
13.	Mitrella blanda (G. B. Sowerby I, 1844)	Dove snail
14.	Bakawan rotundata (A. Adams, 1850)	Mangrove dweller
15.	Protapes cor (G. B. Sowerby II, 1853)	Venus clam
16.	Callista umbonella (Lamarck, 1818)	Striped venus clam
17	Solen digitalis Jousseaume, 1891	Razor clam

1. *Boleophthalmus dussumieri*

2. *Scartelaos histophorus*

3. *Periophthalmus waltoni*

4. *Austruca sindensis*

5. *Austruca lactea*

6. *Parasesarma plicatum*

REDUCING CARBON FOOTPRINT

4. Home biogas -

4,176 TONS OF ANIMAL MANURE TREATED

359,687 HOURS OF CLEAN COOKING;
9.3 TONS OF BIOGAS CREATED
325 TONS OF FIREWOOD REPLACED;
47,375 HOURS SAVED ON REDUCTION OF FIREWOOD &COLLECTION
1225 TONS CO2 EMISSION REDUCTION

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

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 periphery Villages.

Promotion of Natural Farming–Home biogas 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**.

Till date 225 farmers are utilizing it with satisfaction and considerable outcome by saving Average Rs. 23,400 for gas and fertilizer as well – with Economic benefit of Rs,52.65 Lacs.

135 Farmers are linked up with Gobardhan Yojana in which DRDA is providing Biogas with Rs. 5000 Contribution. Adani Foundation has worked as a facilitator between DRDA and Beneficiaries farmers in filling and submission of forms. Total 360 farmers are supported with Biogas as sustainable environment protection

REDUCING CARBON FOOTPRINT

5. Water Conservation Project

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 in coastal belt of Mundra as per Government Figures. Our water conservation work is as Below.

- Large number of water harvesting structure (18 Nos. of check dams in coordination with salinity department) and Augmentation of 3 check dams
- Ground recharge activities (pond deepening work for more than 56 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 145 Nos. **(40 Nos current year)** which is having 10,000 litre storage which is sufficient for one year drinking water purpose for 5 people family.
- Recharge Bore well 201 Nos **(12 Nos current yr)** which is best ever option to direct recharge the soil
- Drip Irrigation approx. 1156 Farmers benefitted in coordination with Gujrat Green Revolution Company till date
- 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.
- **Check dam gate valve construction at Bhujpur which controlled more than 350 MCFT water to go into sea and get recharged current year.**
- **Pond Pipe line work at Prasla Vistar Zarpara which increase recharge capacity more than 25% in 100 hector area.**

Water conservation and Management

Process Flow for Rooftop Rain Water Harvesting System

Social Survey & TDS mapping

Community Contribution

RRWHS

Impact

- Portable water at door step
- Cost saving for portable water
- Improved water quality with
- Creates water conservation awareness in rural community
- Improves standard of living of rural community

Total Target for 2022-23	40
RRWHS Constructed in Q1	25
Population Impacted	300+
Savings per household	15000+

TDS difference between Ground water and RRWHS water

REDUCING CARBON FOOTPRINT

6. Tree Plantation

Till the date 1,40,000 Tree have been planted at various Public places , Schools, GP and crematorium with their responsibility to nurture and maintain regularly.

For this passionate work our team Member Mr. Karshan Gadhvi was Felicited with Van Mitra Award by Forest department and Government of Gujarat.

EDUCATION PROJECT

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

EDUCATION: FREE AND COMPULSORY - 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, Bhadreshwar 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. **507 underprivileged students of Fisherman & Maldhari communities from 8 villages benefitted costfree education at the school**

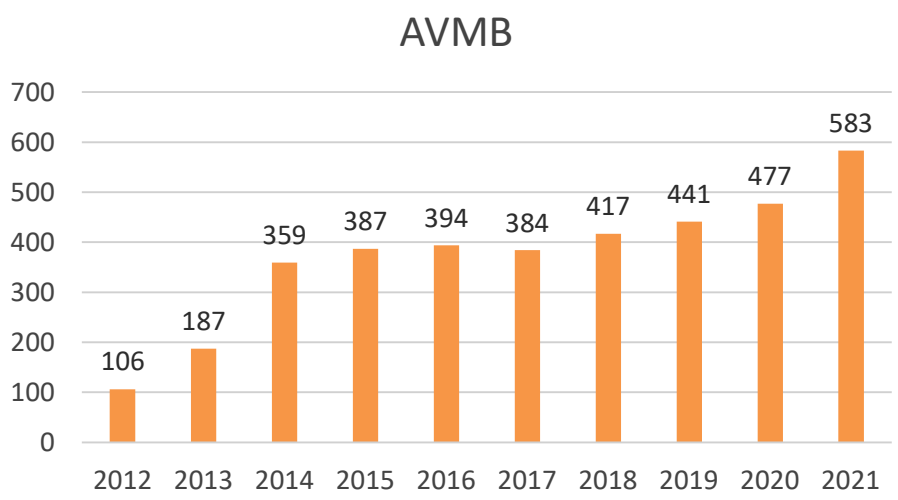
Teachers Day Celebration with facilitation of all teachers and awarded 5 best teachers in academics. District Education Officer Mr. Prajapati graced the occasion and motivated the staff.

EDUCATION PROJECT

Two milestone achievement in this six months

- Adani Vidya Mandir Bhadreshwar Gujrat Board Standard 10th Examination Result is 100%.
- NABET Certification received after rigorous process of documentation and audit committee visit.

Adani Vidya Mandir Bhadreshwar		
2021-22 (10th Board)		
NO	GRADE	STUDENTS
1	Above 80 %	3
2	60-80%	18
3	40-60%	10
	TOTAL	31
Result		100%



PROJECT UTTHAN

To provide learning exposure. Utthan project encourages students to gain knowledge and read books.

Along with reading, various competitions and exercises are conducted like reading, fluency, book reviews, vocab building to hone their reading skills.

Utthan believes in creating atmosphere for students which fulfills need of holistic learning of rural students who are devoid of advanced education.

Activities like movie showing and discussing its morale helps students to increase their analytical skills.

PROJECT UTTHAN

Total village covered	Total School	Total Students	Priya Vidhyarthi	Book issue by library	Language reach (English)	Mother's meet	IT on wheel	Students participate in summer camp	Competitive exam
33	59	9895	2600	41316	5221	4253	2101 (std.6to8)	5316	898 (JNV, NMMS & PSE)

૨૦૨૦-૨૧ના જિલ્લામાં તાલુકા વાઇઝ ગુણોત્સવના ગ્રેડ

તાલુકો	A+	A	B	C	D	કુલ
અબડાસા	૦૧	૨૮	૧૧૬	૨૬	૦૨	૧૭૩
અંજાર	૦૦	૦૫	૯૯	૨૫	૦૦	૧૨૯
ભચાઉ	૦૦	૦૨	૧૨૧	૪૬	૦૩	૧૭૨
ભુજ	૦૧	૧૪	૧૭૮	૧૩૮	૧૧	૩૪૨
ગાંધીધામ	૦૦	૦૫	૪૩	૦૭	૦૧	૫૬
લખપત	૦૦	૦૦	૫૩	૪૭	૦૭	૧૦૭
માંડવી	૦૦	૦૯	૧૨૫	૩૩	૦૦	૧૬૭
મુન્દ્રા	૦૦	૦૨	૮૩	૨૦	૦૦	૧૦૫
નખત્રાણા	૦૧	૨૦	૧૨૮	૨૧	૦૦	૧૭૦
રાપર	૦૦	૦૪	૧૮૦	૮૭	૨૭	૨૯૮
કુલ	૦૩	૮૯	૧૧૨૬	૪૫૦	૫૧	૧૭૧૯

૨૦૨૧-૨૨ના જિલ્લામાં તાલુકા વાઇઝ ગુણોત્સવના ગ્રેડ

તાલુકો	A+	A	B	C	D	કુલ
અબડાસા	૦૫	૧૫	૧૨૫	૨૫	૦૦	૧૭૦
અંજાર	૦૨	૧૬	૮૯	૨૦	૦૨	૧૨૯
ભચાઉ	૦૦	૦૮	૧૨૬	૩૪	૦૪	૧૭૨
ભુજ	૨૦	૫૮	૧૮૦	૭૭	૦૯	૩૪૪
ગાંધીધામ	૦૦	૦૭	૩૮	૧૧	૦૦	૫૬
લખપત	૦૧	૧૭	૬૩	૨૫	૦૨	૧૦૮
માંડવી	૦૬	૨૭	૧૦૭	૨૫	૦૧	૧૬૬
મુન્દ્રા	૧૪	૪૫	૩૯	૦૭	૦૦	૧૦૫
નખત્રાણા	૦૬	૩૪	૧૧૬	૧૪	૦૧	૧૭૧
રાપર	૦૩	૦૪	૧૬૦	૧૦૫	૨૨	૨૯૪
કુલ	૫૭	૨૩૧	૧૦૪૩	૩૪૩	૪૧	૧૭૧૫

- ✓ Government of Gujarat for strengthening the quality outcomes, launched a programe called Gunotsav, or 'Celebrating Quality'.
- ✓ Mundra - A+ : 14/105; in which 7/34 Utthan schools
- ✓ Increase gunotsav result in almost all schools.
- ✓ Teachers, Principals, SMC members & Village leaders appreciate effort of Utthan Sahayak

PROJECT UTTHAN

- ✓ MOU between DPEO, Kutch and Adani foundation for include new 17 schools – Total 59 Schools.
- ✓ Conduct Baseline assessment & Utthan Sahayak Start teaching to progressive learner. 96 students Mainstreamed from progressive Learner this year. 730 students mainstreamed last year.
- ✓ Promoting co-curricular activities.
- ✓ Students write Letter to Supermom on Mothers day.
- ✓ Creating joyful learning spaces: Smart TV & Software, Sports kit, Music kit & Book supports.
- ✓ All Utthan School Linked Up with Google Map
- ✓ Various day were celebrated by Utthan Sahayak like, Yoga day, Gurupurnima, Rakshabandhan, Sports day, Azadika Amrit Mahotsav. Children from all classes participated enthusiastically

WOMEN EMPOWERMENT PROJECT

"You can tell the condition of a nation by looking at the status of its women" – Women are central to the entire development process, be it in an individual family, village, state and to the whole nation.

The below mentioned figure shows determinants associated with the empowerment of women and these are the challenges for us as a CSR to work upon.

Adani Foundation is considering all parameters as a part of Empowerment.

- Education – Uthhan Project promotes girl child education, Creating awareness through various Govt schemes i.e. Vahali Dikri Yojana, Sukanya Samriddhi Yojana etc. till date covered more than 1200 girl child to get benefit out of it.
- Health and Nutrition – Home biogas is the best example of intervention of women health – 225 home biogas is supported to farmers which is good for lungs health
- Skill Development and Income Generation – Adani Foundation is working with 15 Self help group and supporting to develop entrepreneur skills to become self reliant, sourcing more than 500 women to absorb in various job – this will give them identity, confidence and right to speak in any decision for home, village and working area.
- Drinking Water and Sanitation – Total 145 Roof Top Rain Water Harvesting is supported for reducing hassle of the women to fetch the water as well as making clean water available.

UDAAN - MUNDRA

Dashboard (June - Sep) sustainable project revenue generated

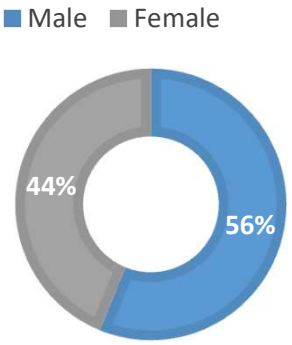
Total Institutes engaged 177

School	College	ITI	ASDC
125	45	2	5

Total Visitors

11464 participants

GENDER RATIO



Impact

INSPIRE TO ASPIRE

Igniting thoughts for the bright future.

INDUCING KNOWLEDGE

Widening of knowledge horizon.

UNFORGETABLE EXPERIENCE

Visitors get to observe and experience the operations on sites.

THOUGHT PROVOKING

Stimulating young minds to think out of the box.

ENCOURAGE TOWARDS GOAL

APSEZ existence proves that dreams come true if we convert them in GOALS.

INFUSE CREATIVITY

Students gets exposure which enable them to provoke ideas in them during visits.

Project Udaan

Under this project exposure tours are organised wherein school students are given a chance to visit the Adani Group facilities such as Adani Port, Adani Power and Adani Wilmar refinery at Mundra, Hazira, Dahanu, Kawai, Tirorda and Dhamra to get an insight into the large-scale business operations and thus get inspired to dream big in life. The exercise stimulates the young minds to dream big and help them become entrepreneurs, innovatores and achievers of tomorrow, and thus play an active role in the process of nation building

UDAAN - MUNDRA

Awards & Recognitions

10,000+ **Positive Feedbacks**

100+ **Mementos received**

55+ **Certificates received**

Adani Foundation, Udaan Project invited the members of self-finance School Association, Gujarat for an exposure visit. 90 participants were facilitated with extraordinary experience of Port, Power, Wilmar and Solar plants visit.

FARMERS SUSTAINABLE LIVELIHOOD PROJECTS

Promotion of Natural Farming

- To promote Natural farming Adani Foundation has originated cow based farming initiative with interconnected techniques which can increase farmer yield – our main objective is to improve quality of soil.

- **Implementation**
- Survey and identification of farmers to adopt Natural farming –Total **950 Farmers are selected as criteria – coordinated with ATMA for support of 10,800 INR per year by Direct Bank Transfer.**
- **135 farmers facilitated by DRDA Scheme – Gobardhan Yojana of Biogas with Contribution of Rs. 5000.**
- Water & Soil Testing- Most of Farm soil contain low organic carbon.
- Arranged Workshop & Hands on training for them which was conducted by Agri expert ,KVK and Progressive farmers with 1000+ farmers
- 325 Jivamrut unit have been set-up. Which is facilitated through with farmer Contribution.
- 257 Farmers have started to preparing JivaMrut & Gaukrupa Amrutam Bio-fertilizer and using in agri crop. Series of Training is arranged by ATMA and Adani Foundation

FARMERS SUSTAINABLE LIVELIHOOD PROJECTS

Prakrutik Sahkari Mandli

Formation of Shree Raj Shakti Prakrutik Kheti sahkari Mandali Limited Mangara and register Under Gujarat CO-operative SOCIETY act-1961 with 29 Members which is the First Organic Company of Registered across Kutch.

Objective

1.To promote natural Farming practices as group and individual

2.Value addition of Agri Produce and find out common Market to sell.

3.Set Up Cleaning, Grading Packaging and Processing Unit.

4. Established stall for input and output of Agri Produce ,Medicine ,Agri equipment.

5. Avail Agri machinery and equipment on rent to Farmers.

6.Facilittaion of Government Scheme.

7.Arrnged Exposure and Agri Training Program.

8. Laboratory et-up for soil and water Analysis

Shree Raj Mandli is planning to sale Organic Vegetables, Fruits, Grains, jevamrut and Mineral mixture. Rented Shredder Machine and preparation of bio mass is also next level planning of Mandli.

FARMERS SUSTAINABLE LIVELIHOOD PROJECTS

Farmer's Producer Organization

Kutch Kalpaturu Producer Company (KKPC) is established in the year of 2020 to address the challenges faced by the farmers, particularly to provide common platform for inputs & out put The company has been set up with 237 Farmers shareholders. Half year Turn Over of the company is 7.18 lacs

Vision –

Promotion of rural livelihood through sustainable & innovative agricultural and allied practices in the collective manner through Input and Out Support.

Mission:-

- Reduce Transaction cost per unit area through linking farmer with Kutch Kalpaturu Producer Company (KKPC) to Procure Input at reasonable prize.
- Imbibe Knowledge to adopt Modern Agri technology through training, Exposures and demonstration to Increase Production & Productivity.
- Enhance value of Agri produces and set up sustainable arrangement to sell their Produces.
- Sorting, grading and value addition for Proper Marketing of Agri Produces to fetch High value for the Betterment of farmers and shareholder in a sustainable way.
- Aware and Facilitation of Government Agriculture scheme over Farmers.
- Establishment of Agro Center at Various Village

WIP:-

In past six months KKPC worked for Date Packaging box, Milk Supply in Colonies and Shantivihar ,NB 21 Off suits Supply, Vegetable Seed Mineral Mixture and Cattle feed.

FARMERS SUSTAINABLE LIVELIHOOD PROJECTS

Pashudhan : " Fodder Support Programme, Individual Fodder Cultivation and Preventive Health Care

- Adani Foundation provides Good Quality dry and green fodder to 29 Villages. Project is covering total 14116 Cattels / AF Provide Dry and green Fodder to 29 Villages of our vicinity which covering 33072 cattle of 2747 farmers.

- Fodder Cultivation- To made fodder sustain villages - 100 Acre Gauchar land of Zarpara and 25 Acre in Siracha village is being cultivated for the same.

- To protect Cattles against Bovine Brucellosis zoonotic disease, Awareness and vaccination program is ongoing with Kutch fodder fruit & Forest development trust (KFFT) in our 11 Villages. In end of the year 100 percentage female calves will be benefitted by this initiative.

FARMERS SUSTAINABLE LIVELIHOOD PROJECTS

Pashudhan : 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 Grassland development in Siracha-40 Acre & Zarpara 165 Acre done which resulted in total production 82 ton.

Zarpara Gauchar Land Development will become the change maker model for other villages too. 165-acre land with Shorghum, Rajko, Maize, Zinzvo etc. different types of fodder due to this nutrition value of milk will be improved and average one liter milk quantity will be increased.
Average 2450 cattle get benefitted of green fodder for 65 days months which –which increase 0.5 litre milk quantity of 50% cattle
(1225 cattle x0.5 litre milk quantity Increase x 40 INR per litre = 1592000)

Apart that due to natural grazing Benefit save farmer cost to purchase Fodder .
(2450 cattle x 7kg /Day X 65 Days = Rs. 2786875

This Intervention could save Rs.4378875

Adani Foundation is planning to expand this model from 125 acre to 500 acre up to next year monsoon.

FISHERFOLK SUSTAINABLE LIVELIHOOD PROJECTS

❖ **Balwadi**

- Mental and Physical Cognitive Education with Joy full learning activities to 2.5- to 6-year-old children.
- Provide Nutritional Food Facilities.
- Capacity Building program for Balwadi teachers.

❖ **Vehicle Transportation Facilities**

Vehicle Transportation facilities to 25 school Going Children from Juan Bandar to Nearest Government School Education Kit Support
(Note Book , Guide, Etc) To Secondary and Higher secondary Fisherfolk students as Motivation

❖ Free education in Adani Vidya Mandir school.

❖ Due to This Efforts First generation of Fisherfolk Community get in the Main stream of education.

FISHERFOLK SUSTAINABLE LIVELIHOOD PROJECTS

- **Mangrove plantation** and Nursery development work has created a two facet impact by providing Livelihood to Fisherfolk during two months Fishing during Off season and developing **162** hector dense mangrove afforestation. **4430 Men days work** provide to 284 Fisherfolk of Luni ,Sekhdiya and Bhadreswar Villages.

- **Youth Employment :-** Adani Foundation is committed for youth employment with imparting technical and Non-Technical Training for Fisherfolk Youth and started Electrical ,Welder ad Masson work training under Adani Skill Development Centre.
  - **35** Youth get Employed in GPVC,AWL,MSPVL and KCL WinTech and Other CFS.
  - **194** - Fisherfolk men and women were supported with skilled and unskilled Job and Contract work in various APSEZ Department.
- **Government scheme** Awareness session was held in association with Fisheries department Bhuj to facilitate pagadiya fishermen by providing fishing kits to seven Fishermen. The coordination was made by Adani Foundation to process application.

FISHERFOLK SUSTAINABLE LIVELIHOOD PROJECTS

- Adani Foundation supports fisherfolk community by distributing Potable water to Luni, Bavdi and Randh Bandar on daily bases. Moreover Kutdi Zarpra, Vira bandar and Juna Bandar is also supported by Adani Foundation in association with Mundra Nagarpalika.

Sr. No	Vasaht name	Population	Quantity Of water
1	Luni Bandar	384	15000
2	Bavdi Bandar	476	20000
3	Ranbdh bandar	930	25000

WOMEN SUSTAINABLE LIVELIHOOD PROJECT

- Total 82 Active SHG Group – 834 women are engaged with Adani Foundation for Savings activity. Among 15 SHG groups are involved in income generation. We facilitate them capacity building training for quality, Marketing Finance and team work to made them self sustain.
- Saheli Swa Sahay Juth have completed order of 10,000 Sanitary pad from District Health Department.
- "Shradhha Saheli Sva sahay Juth" is won the tender to provide Catering service in Block level Government
- Tejasvini SHG has received order of 3000 traditional dress preparation worth 3.25 Lacks
- Sonal Saheli Women SHG had supplied 1000 KG washing powder to Adani port & Willmar.
- Meghdhanush Saheli group had opened a stall of eco friendly Ganpati and did sale of 55000 INR. They have also participated in "Sartha" Exhibition in which they did sale of 15000 INR.

WOMEN SUSTAINABLE LIVELIHOOD PROJECT

"Pragati" – 75 Stories of Empowered Women to Celebrate Azadi ka Amrut Mahotsav
Over the past two decades, Adani Foundation Mundra takes a privilege to showcase journey of women to uplift and encourage contribution in local business, services and small enterprises in nation building through this book.
The book was launched by Respected Chairman Sir Gautam Adani sir on 1st day of Auspicious Navratri Parv.

WOMEN SUSTAINABLE LIVELIHOOD PROJECT

Gram Bharti : Women Sustainable Livelihood Projects

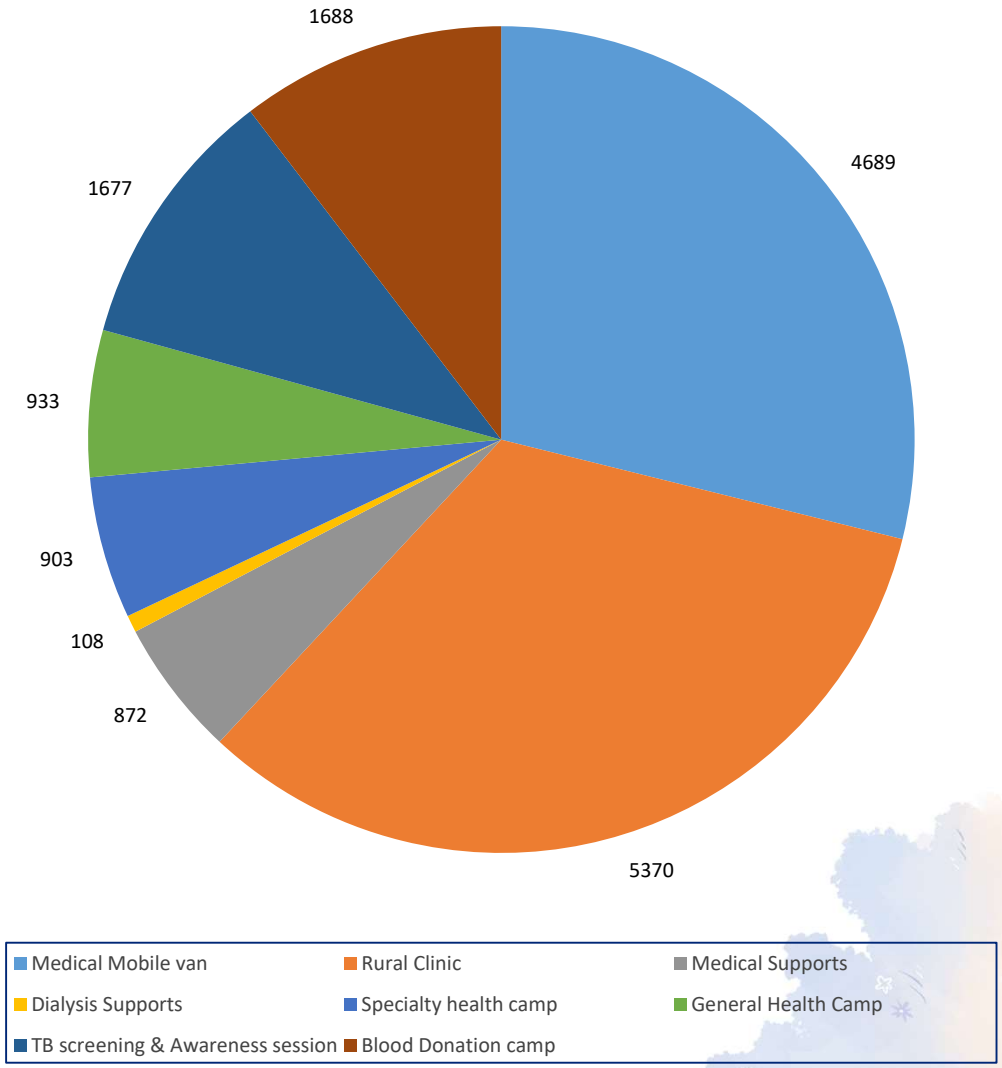
The SHG mela (exhibition cum sale) Gram Bharti, was planned between 26th to 28th September main reception lobby Adani Corporate House Ahmedabad. The inauguration session was on 26th September 2022 by Respected Chairman Gautam Adani sir with Mrs. Shilin Adani mam and Mr. Vasant Gadhavi sir.

From Mundra
Tejaswi Saheli SHG
Shraddha Saheli SHG
Pragpar Saheli SHG
Meghdhanush Saheli SHG
Radhe Saheli SHG
Umang Saheli SHG
Jyot Saheli SHG had participated with lots of enthusiasm and zeal.

Total Sale @ 3.2 Lacs with further order of Rs. 1.1 Lacs to Meghdhanush, Jyot and Pragpar Saheli Group.

COMMUNITY HEALTH

Health is the basic need for any individual and community Development considering various kind of Project are being executed as per the need and assessment to ensure good health for all citizen of Mundra villages. Like Mobile health van, Rural Clinics, support to dialysis patients and poor patients and health Camp Frequently and During disease outbreak.



COMMUNITY HEALTH

- The Adani Foundation runs Rural Clinic and Mobile health care Unit to render basic Medical Facilities to Interior Villages and Fishermen vasahat since 10 Year.
- Equipped with 94 types of general and life saving medicines with Potable ECG machine.
- **Rural Clinic**:- 09 Villages
  06 villages of Mundra block, 02 villages of Anjar block and 01 village of Mandvi block)
- **Mobile health care Unit:-** Covered 30 Villages.
- Total Patients Benefitted:- 10059.
- **Apart that Adani Foundation facilitates early diagnosis and screening for non communicable disease during MHCU & Rural clinic visit**

COMMUNITY HEALTH

Dialysis Support:-

Awareness camps are conducted in community for Prevention and Care against Kidney Stone followed by support for dialysis if more criticality is there. Patients are provided with dialysis support for months and years as per their needs and medical condition.

5 financially challenged patients has been supported with Dialysis treatment at 108 Times which added day in their Life.

Economically underprivileged Patients Support:-

Medical support is a service by foundation which includes, consultation, medicine, vaccination drives and immediate care to the needy patients **872** Patients from Mundra, Mandavi and Anjar Block are Benefitted at adani hospital.

National TB Elimination Programme (NTEP) aims to meet the ambitious goal, announced by the Honorable Prime Minister Shri. Narendra Modi, of ending the TB epidemic by 2025.

Adani foundation with APSEZ, APML, AWL and MSPVL HR department has started cluster based screening program to eliminate TB in labors under Dignity of workforce program. Adani Ports and SEZ Limited has initiated screening Total 3200 work force screened in first & Second phase with target of screening more than 10,000 workforce of all group businesses and SEZ Industries.

COMMUNITY HEALTH

Health camp

specialty camps , Eye checkup camps ,Blood donation camp, Anti-tobacco awareness camp, TB screening, and other are conducted in core villages as well as in labour colonies.

Specialty health(Gynec , Pediatric eye specialty health camp) :- 04 camp – 903 Patients.

General health camp :- 05 camp -1041 Patients

Awareness Session

1.Health & Hygiene for School Students- - 432 Students.

2. Malnourished Child and Adolescent Girl- 108 Child and Girls.

Blood Donation camp was held at various location on the Occasion of Respected Chairman sir's birthday on 24th June.

Total 590800 CC quantity of Blood had been donated by 1088 Employees.

Patients who are suspected with critical illness directed towards G.K General Hospital.

COMMUNITY INFRASTRUCTURE DEVELOPMENT

Adani Foundation has designed, planned and built a strong infrastructure to improve the Standard of Education, Health, Agriculture and Basic facilities for the betterment of Community.

All initiatives were fulfilled according to the official requests and demands of people of the community and the Gram Panchayat.

COMMUNITY INFRASTRUCTURE DEVELOPMENT

❖ **Work completed.**

1. Percolation well Recharging work at Bhadiya & Mota Kandgra village.
2. Sluice gate Construction to Control Flood during Flooding at Khoydivadi Vistar Bhujpur.
3. Pond Beatification and Bund Strengthening at Bhujpur village.
4. commissioning of Community Training Centre at Shekhadiya.
5. Two Pond Deepening at Zarpara under Amrut Sarovar Yojna.
6. JCB & Hitachi Machine Support for Pre-Moonson activities.
7. Repairing and Maintenance work of Approach at Luni, Bavdi and Navinal Fishermen Bandar.

❖ **Work in Progress.**

1. Development of Vegetable Market Development at Mundra with 128 Stall Work in Progress.
2. Pond Pipe Line Work at Pranshla vadi vistar Zarpara village.
3. Sluice gate Construction & Pipe line work to Control Flood during Flooding at Pranshlavadi Vistar Zarpara.
4. Check dam Restrengthening and Road restoration at Bharudiya village
5. Development of Cricket Ground at Hatdi Village.
6. Renovation and reaparing work Community Center , Mundra.
7. Renovation and Road reparing work at All Fishermen Vasahat.

ADANI SKILL DEVELOPMENT CENTRE

ASDC Bhuj - Total Centre Admissions FY 22 - 23

Courses	Female	Male	Total	Revenue Generated
Interview Skills	21	9	30	0
General Duty Assistant	21	7	28	1,93,714
Disaster Management	0	2	2	3,998
Basic Functional English	0	2	2	1,198
Beauty Therapist	2	0	2	3,998
Assistant Beauty Therapist	1	0	1	1,499
Self Employed Tailor	8	0	8	7,992
Digital Literacy	5	1	6	3,349
Domestic Data Entry Operator	0	1	1	4,720
Non Domain Employability Skills	21	8	29	0
Understanding Operating System	21	7	28	0
Entrepreneurship	23	7	30	20,800
Financial Literacy	45	1	46	0
Total	**168**	**45**	**213**	**2,41,268**

MOU with Kachchh District Education Office. In this MOU we will provide training of Digital Literacy and Basic Functional English in Kachchh District Schools. As per MOU Kachchh District Education Office will provide minimum 5000 candidates to us for training (Adani Skill Development Centre).

Courses	Total
Basic Functional English	1387
Digital Literacy	211
Total	**1598**

ADANI SKILL DEVELOPMENT CENTRE

Soft Launching of
Self Employed Tailor – Outreach Batch at Meghpar
Soft Launched Self-Employed Tailor Batch at Meghpar (Out-reach). Total 25 candidates are enrolled.

Soft Launch of General Duty Assistant Batch
Soft launched General Duty Assistant Batch with 30 candidates under DDU-GKY scheme as per instruction by GLPC.

Soft Launch of Entrepreneurship Development Program
Soft Launch of Entrepreneurship Development Program Training at Centre under CED with 30 candidates.

Soft Launch of FL Training under Special Project
Launching Special Project Jointly with KMVS NGO for FSW (Female Sex Worker) Financial Literacy training Inaugurated on 22-07-2022 Total 37 women participant

ADANI SKILL DEVELOPMENT CENTRE

ASDC Mundra

ASDC and Thermax Foundation Done MoU

- ASDC and Thermax Foundation Jointly Organised , Skill Development training program for " Dhrab Village youth"
- Today we have Inaugurated this training program at Dhrab Village . In 1st phase We are starting Domestic Data Entry Opertor training with 50 students (25 girls and 25 boys)
- Chief Guest of this program was Mr.Anees Shaikh- Head ,ER& Administration , Thermax,
- Ashlam bhai Turk- Dhrab Village Sarpanch
- Mavji Sir , Manhar Bhai & Deval Ben was presented from Adani Foundation.
- Mr. Jayesh was presented from Thermax Foundation.
- Mr. Sagar Kotak has done anchoring of this program.
- Mr.Praful Garoda has done all coordination of this program and setup the computer lab.
- Mr.Harshid and Raj also supported in this program.

Tie Ups with (Thermax Foundation, Empazer, Navin Group and DEO Kutch @ Rs.21.58 lacs.

Course Name	Total Admissions
Pedicurist and Manicurist	68
Self Employed Tailor	01
Assistant Electrician	30
Bar Bender and Steel Fixer	29
Meson General	29
Domestic Data Entry Operator	55
Junior Crane Operator	23
Interview Skills	32
Self Employed Tailor	30
Basic Functional English & Digital Literacy	1539
	1836

ADANI SKILL DEVELOPMENT CENTRE

ASDC Mundra

Success of completion of batch 1 of Pragati was celebrated today (29th April) at Adani House, Mundra in esteemed presence of Mr Vikram Tandon, Chief Human Resource Officer, Adani Group, Shri Vasant Gadhavi ,Executive Director, Adani Foundation and Mr Rakshit Shah, Executive Director, APSEZ. Other dignitaries who graced the occasion were Mr. Anil Kumar Kalaga, , Mr. Charles Douglas, CEO, Mundra and Tuna Ports, Jatin Trivedi, COO, Adani Skill Development Centre and all HR and Department heads of APSEZ, Power, Solar and Wilmar.

The event celebrated by distributing skill training certificate to 52 fisher folk students, who were trained under Mason and Assistant Electrician job roles under Adani Saksham. Event also included batch 2 launch ceremony by providing training kits to trainees.

All trainees got the privilege to meet Mr. Vikram Tandon and received words of encouragement and guidance from him for their bright future ahead. Highlight of the Project Pragati is All 52 students who underwent trainees got placed with decent income. This will transform not just their lives but also will gradually lead to socio economic shift in fisher folk community of Mundra, Kutch.

ADANI KANDLA BULK TERMINAL PVT LTD - TUNA

Fodder Support

Support of Dry & Green Fodder to Tuna and Rampar Village Gaushala Cattles during Scarcity which impacted on Cattle health and Milk Productivity ultimately Farmers Income as well. Total 643825 Kg green Fodder Supported for 900 Cattles of Tuna & Rampar.

Tree –Plantation

Total 200 Tree was planted and ensure responsibility for watering and Gurdning Public place and Schools Premises with involving Community and School students and sensitized to plant more trees and nurture.

Water at Fisherfolk settlement

Potable water (18 KL per Day) Distribution to Vira and Dhavlvaro Bandar through Water tanker Regularly which improve Hygiene and Health standard and reduce Women drudgery ,Cost and Time to get water by **Linkages through AKBTPL and GWIL daily bases.**

ADANI GREEN ENERGY LTD - ABDASA

Adani Solar Plant Bitta is under Adani Green Energy Limited. Adani Foundation is doing regular support of JCB during monsoon or any accident cases as and when required.

Apart from it Celebrated Chairperson's Birthday by distribution of school bags to the children taking admission in class 1 along with necessary books and Education Material. Which includes Bitta School, Nani Dhufi School and Moti Dhufi School.

SUPOSHAN

fortune Suposhan

A CSR initiative by Adani Wilmar Ltd.

SUPOSHAN

Activities	Beneficiary
Family counselling	1728
Anthropometry	4644
Focus Group Discussion	535
Cooking demo	43
Poshan Vatika	165
Plantation (Moringa, Papaya, Lemon etc.)	220
CMTC / NRC admission	04
CMTC / NRC discharge	04
New Pregnant women identified	148
Newborn Identified	114
No. of WASH Kit Distributed	03
Village level Events	68
No of Sanginis	23

SUCCESS STORY

Amrutaben desired to ask God for one thing, a new pushcart ! - Mundra

Jiluben is an elderly woman with physical limitations and a terrible economic state. She's been widowed for thirty years. Jiluben's son is 50 years old, unmarried and almost face continuously ill. while her daughter Amrutaben is divorced (she got married 20 years ago). Jiluben, who is 70 years old only has her daughter Amrutaben is working. Amrutaben used to use her old pushcart but it was heavy and too old for her to carry around everywhere, plus she didn't have enough money to buy a new one. Amrutaben only desired to ask God for one thing, a new pushcart ! because everything else she could take care of on her own despite such bad situation.

An employee of the Adani foundation have spoken with Sarpanch Hawaben about the work being done by the Foundation on support of people with disabilities. As soon as she informed & requested that to make visit at Jiluben house. Their pushcart needs were discussed by representative from the visited, verified all the necessary paperwork, and spoke with Jiluben and her family about government programs for widows and people with disabilities. And a week later the entire process was completed and the new pushcart was provided to them. She is now able to work promptly and help their family in overcoming this difficulty.

SUCCESS STORY

Only a teacher can turn the disability into a talent ! - Mundra

Challenges are what make life interesting. Overcoming them is what makes life meaningful". Halepotra sadiya studying in class 4 of Dhrub primary school is the SEN - special education needed .she is not able to see clearly through her eyes that is having the problem of vision by birth , she underwent 4 operations but have a great IQ level which never stopped her from learning new things. sadiya's parents never stopped her coming to school. she had a problem in basic maths ,gujarati reading and writing but within an year she worked continuously during her free time and now is able to read write and perform basic calculation. Her favourite hobby is learning new things , colouring and listening new rhymes from YouTube. she can now stand up in morning assembly and give her introduction in English . "only a teacher can turn the disability into a talent through hard work and self confidence". Her dream is to become a teacher.

SUCCESS STORY

Journey of Transformation in the Lives of Umarpada Tribal Women - Hazira

Umarpada is a Town and Taluka in Surat District of Gujarat. According to census 2011 there are 17,338 houses and 83,723 people living in the taluka. In terms of literacy, 58.56% of people in Umarpada Taluka are educated. From 2022 to 2023, the Adani Foundation's Hazira unit begin its CSR efforts in the Umarpada block as part of the Tribal Development Initiative. empowerment of women is One of the most significant aspects of this project. In Ghanawad village, most of the women used to do household work and often went into the forest and nearby villages for agriculture related work. They labour 8 to 10 hours and actually earn between Rs. 100 and Rs.130. This group, which is entirely made up of tribal people, also includes one of the oldest still-existing primitive tribes, the Kotwadiya community. Due to the majority of their hours being spent at work, they are unable to emphasise on the health and education of their child.

Ten potential SHGs have been uncovered by AF Hazira Team. A group of women were encountered and trained by the AF Hazira staff. In the initial batch, 35 tribal women were Trained in the production of papad, pickles, and masala. These women thought they could manage this business unit after ten days of training. With the help of the hygienic standards they have begun preparing pickles and papads in their own kitchens. They have partnerships with Surat-based businesses to supply their items to their canteen as well as local markets where they sell their products. They have a fixed source of additional income. They gather around and talk about one other's challenges in order to discover solutions as a group. The other villager's women have looked up to this group of women as a role model.

SUCCESS STORY

Impact of silage in Income of Maheshbhai - Dahej

Maheshbhai Haribhai Ahir lives in the Atali village of Dahej Taluka with his family. His primary source of income comes from the production and distribution of milk. His family has owned 3 cows and 23 buffaloes in addition to 5 acres of agricultural land. Twenty buffalos and two cows are currently lactating. This is the second generation of the family working in animal husbandry. In the summer, they suffer from a lack of green fodder due to irrigation systems being insufficient. There is plenty of green animal feed available during the rainy season. In order to produce milk, green feed is crucial.

Adani Foundation held farmer meetings in the village of Atali on January 18, 2012. Give details about making silage for animal feeding at this meeting. Making silage would solve the problem of summer time green fodder shortage. Maheshbhai received 10 50kg silage bags in March 2022. Silage feeding increased milk production by 2 litres per day (from current milk production 6 litres). In just 60 days, milk production has increased by a total of 120 litres, and income has increased by a total of Rs. 7200. Production of milk increased by 480 litres from the following year to 300 litres in 2021.

SUCCESS STORY

health care service is to save the lives !

Mohammad Sadik Turk, 16, of Dhrub arrived in critical condition because of pain in the area of his kidneys. The condition was treated as an intestinal problem by doctors. The specialists tried their best to treat him & offering variety of medications. Support him for his routine dialysis for six to eight months while paying attention to his condition. He no longer needs dialysis after complete therapy, but he still needs to regularly administer injections three times every month.

Many young children pass away each year from insufficient medical care and inability to pay for necessary treatments. As long as there is only one source of income for the family and everyone depends on him, it is hard to provide costs for those who are living below the poverty line. Although India has more than 50,000 patients who receive long term dialysis, it has only a thousand kidney specialists in the entire country. Furthermore, treatment can be expensive. In situation like this Foundation pays for the child's injections in light of his financial situation and wishes him a quick recovery and a long and healthy life. The main goal of the Adani Foundation's community health care service is to save the lives of children like Sadik.

SUCCESS STORY

Hope and Faith from the Mobile health Unit Justify!

Jorubha Bapubha Jadeja, age 70 of Hatadi village has been suffering severe weakness. He was short of Money and means of transportation to go to the hospital. thereafter waits for the Adani Foundation's mobile health care unit to arrive. A foundation initiative to provide primary facility at door by the mobile health care unit. Since everyone in the village is aware of this, they regularly choose to come here for primary health problems. After giving them basic care, transfer them to a hospital facility if required, and if not, doctors follow up with them until they recovered. Jorubha anticipated the arrival of the Mobile Unit of the Foundation in his village because he was unable to get to the hospital & he has faith in Mobile unit as he has earlier recovered from illness without visiting a hospital.

The prospect of meeting with a doctor gave them hope for improvement in his health. His health had become a little worse since it had been a few days. Jorubha entered worth of headache, nausea, and vomiting symptoms. His blood pressure was 168/90 mmHg at the moment, so he needed symptomatic and other necessary treatment. Along with medication, the doctor encourages him to take care of himself by avoiding unhealthy food that is fried or oily, applying salt sparingly, and engaging in light activity like walking. yoga. Doctor take ongoing telephone follow-up with Jorubha & providing them with the information they wanted. The mobile health unit returned on Friday to check blood pressure once more; it was 155/85mmHg. then Antihypertensive medication was started. Blood pressure is periodically checked every Friday and is continuously monitored after 20 days when it enters the usual range of 123/80 mmHg. Jorubha was delighted when he saw how much the doctor cared like his son and also how his health had improved. The Adani Foundation received blessing from him.

SUCCESS STORY

Suf Handicraft : Conserving "VIRASAT" of Decades

Parvati Ben's earliest memory of stitching delicate handicrafts is from when she was as little as 5-years-old. Since then, she has followed this art with an immense dedication that shows through her intricate and precise handiwork. Parvati is a resident of Pragpar-2 village. She lives in a house with 5 other people and is the sole breadwinner. Even so, Parvati is a humble, loving and welcoming individual.

Parvati Ben had been practising her intricate Suf handicraft all along, making scarves, table cloths, garments and more for her fellow villagers and the occasional visitors. Her artwork had consistently been worth more than what she sold it for- her only desire being that her art finds an expression, a space in the world, however small it may be. One day, Adani Foundation discovered this diligent, rigorous woman. Parvati Ben now works on projects brought to her by Adani Foundation and is hence able to sustain her entire family on her own. She has risen to be an aspirational figure, looked upon as a role model by her fellow village women. Parvati Ben is playing a major role in now setting up a federation for the village women across Mundra district to practise their handicraft work and earn a livelihood. But more than all the titles and positions, what Parvati Ben deems sacred is the sheer recognition of her art. All she ever wanted was to be known as an artist and now she is the voice of this very own art, inspiring dozens of women like her to become independent.

EVENTS

Support of Biogas kits on Earth Day

Participation Krishi Mela in presence of Central Agricultural minister

Utthan students prepared cards on Mother's Day

World Health Day celebrated by creating health awareness programs and schools and at Adani wilmar.

No Tobacco day celebrated by creating awareness to take preventive measures for workforce

Tree plantation at Zarpara village on 'Word Environment Day' in presence of SDM

International coastal clean-up day was celebrated in association with National Coast Guard department at mandavi with Cleanliness Drive.

The International Mangrove Day for the Conservation of the Mangrove Ecosystem is celebrated every year on **26th July**,

Teacher Day Celebration on 5th September in all Utthan School.

AWARDS

Adani Foundation received Diamond Award in participatory ground water management organized by Quality circle forum of India - QCFI

Jyoti ben tank received Award from Vice Precident in Amazing Indians Awards who is member of Prakrutik Sahkari Mandali supported by Adani Foundation which is matter of Proud

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નાયબ પશુપાલન નિયામકશ્રીની કચેરી,

આભાર સહ અભિનંદન પત્ર

Received appreciation letter from District Animal Welfare Depatent for commendable work for Cattles affected by Lumpy Virus

અદાણી ફાઉન્ડેશન દ્વારા સ્વતંત્રતા દિવસે ૧૭ શાળાઓમાં સ્પોર્ટસ અને મ્યુઝિક કીટનું વિતરણ

જળસંરક્ષણ ક્ષેત્રે અસામાન્ય કામગીરી બદલ સન્માન
અદાણી ફાઉન્ડેશનને જળશક્તિ મંત્રાલય તરફથી એવોર્ડ એનાયત

ભાસ્કર ન્યૂઝ | મુન્દ્રા

સમગ્ર જિલ્લામાં જળ સંરક્ષણ ક્ષેત્રે ઉત્કૃષ્ઠ કામગીરી બદલ અદાણી ફાઉન્ડેશન ને જળશક્તિ મંત્રાલય તરફથી એવોર્ડ વડે સન્માનિત કરાયું હતું.

29 માર્ચ 2022 ના રોજ નવી દિલ્હી સ્થિત પ્લેનરી હોલ ખાતે રાષ્ટ્રપતિ રામનાથ કોવિંદ ફૂડ પ્રોસેસીંગ ઉદ્યોગ ના રાજ્યકક્ષા ના મંત્રી ગજેન્દ્રસિંહ શેખાવત અને આદિ જાતિ બાબતોના મંત્રી બિશ્વેશ્વર ટુડુ ની ઉપસ્થતિમાં યોજાયેલ ત્રીજા નેશનલ વોટર … માં સ્વજલ પ્રોજેક્ટ અંતર્ગત રૂફટોપ રેઈન વોટર ના 115 યુનિટ સ્થાપિત કર્યા છે.31 કુવા 189 બોરવેલ રિચાર્જ ઉપરાંત 56 તળાવો ઉંડા … બાળકો ને અસર કરતા પાણી સંરક્ષણ ની દિશા માં કામ કર્યું છે.જેના પરિણામે ભૂગર્ભ જળના ટીડીએસ માં 19.6 ટકા નો ઘટાડો …

મુન્દ્રાના 7 ગામના 51 ખેડૂતોએ ગાય આધારિત ખેતી અપનાવી

અદાણી ફાઉન્ડેશન 5000 જેટલા કિસાનોને પ્રોત્સાહિત કરશે

ભાસ્કર ન્યૂઝ . મુન્દ્રા

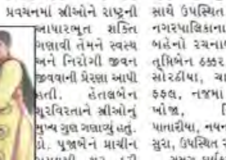
આધુનિક યુગ માં રાસાયણિક ખાતરમુક્ત આહાર મેળવવો એ માનવમાત્ર માટે પડકારરૂપ બન્યું છે ત્યારે મુન્દ્રા પંથકના સાત ગામના 51 ખેડૂતોએ ગાય આધારિત ખેતીનો પ્રારંભ કરી નવો રાહ ચીંધ્યો છે.

ખેડૂતો પોતાના આંગણે બે પ્રકારના ખાતરો ઉત્પન્ન કરી ગાય આધારિત ખેતી કરી શકે તે માટે સતત પ્રયત્નશીલ અદાણી ફાઉન્ડેશન દ્વારા એક દેશી ગાયથી 30 એકર જમીનમાં જીવામૃત ખેતી કરી શકાય જ્યારે સજીવ ખેતીમાં 30 ગાયોથી એક એકર માં પાક ઉગાડી શકાય તે અંગેની સમજ આપતાં ભૂમિપુત્રોને તે અંગેની રીતથી અવગત કર્યા હતા. હાલ અદાણી ગ્રુપના સહયોગ થી કિસાનોને ત્યાં મોડેલ ફાર્મ બનાવી ગાય આધારિત ખેતી શરૂ કરવામાં આવી છે અને આ પ્રોજેક્ટનો વિસ્તાર કરવા …

અદાણી ફાઉન્ડેશન આઈસીડીએસ અને ઈન્નરવ્હીલ કલબ ઓફ મુંદરાના સંયુક્ત ઉપક્રમે મહિલા દિવસની અનોખી ઉજવણી

મુંદરા (કચ્છ પત્રિકા) મુંદરા ખાતે આંતરરાષ્ટ્રીય મહિલા દિવસની અનોખી ઉજવણી કરવામાં આવી હતી. ઉપરોક્ત ત્રણેય સંસ્થાઓના સંયુક્ત ઉપક્રમે મહિલા દિન ઉત્સાહભેર ઉજવાયો હતો. આ પ્રસંગે સામાજિક પ્રવૃતિઓમાં ઉત્કૃષ્ટ યોગદાન આપનાર સન્નારીઓનું સન્માન કરવામાં આવ્યું હતું. મહિલાઓને સ્વાસ્થ્યની સુરક્ષા પ્રદાન કરતી હેલ્થ કીટનું વિતરણ કરવામાં આવ્યું હતું.

ઈન્નરવ્હીલ કલબના પ્રમુખ શ્રીમતી દિપ્તીબેન દિલીપભાઈ ગોર દ્વારા વિરાંગના ફોર્સના પોલીસ બહેનોનું સન્માન કરવામાં આવ્યું હતું.



… તેમની સમગ્ર ટીમે … હતું. ઈન્નરવ્હીલ કલબ તરફથી ડો. પૂજાબેન જોશી, આશાબેન ચાવડા, ગીતાબેન ઐયર, નીલીમાબેન મહેતા, મોહિનીબેન ચુડાસમા, ઉપસ્થિત રહ્યા હતા. ટીમ ઈન્નરવ્હીલે બહેનોની કાર્યશક્તિને બિરદાવી હતી.

… વક્તાઓ તરીકે રાષ્ટ્રસેવિકા સમિતા હેતલબેન ભટ્ટ તેમજ ડો. પૂજાબેન જોશી અને નગર પાલિકા કાઉન્સીલર મોહીનીબેન ચુડાસમા રહ્યા હતા. ત્રણેય બહેનોએ પોતાના પ્રવચનમાં સ્ત્રીઓને રાષ્ટ્રની આધારભૂત શક્તિ ગણાવી તેમને સ્વસ્થ અને નિરોગી જીવન જીવવાની પ્રેરણા આપી હતી. … ભારતીય સ્ત્રીઓનો ગૌરવાન્વિત ઈતિહાસનો ચિતાર આપેલો હતો. મોહિનીબેને આધુનિક સમયમાં નારીનું સમાજમાં સ્થાન એ વિષય પર વકતવ્ય આપેલ હતું.

… સાથે ઉપસ્થિત રહ્યા હતા. નગરપાલિકાના કાઉન્સીલર બહેનો રચનાબેન જોશી, તૃપ્તિબેન ઠક્કર, … ઉપસ્થિત રહ્યા હતા.

સમગ્ર કાર્યક્રમનું સંચાલન અદાણી ફાઉન્ડેશનના દેવલબેન ગઢવી અને જાગૃતિબેન જોશીએ કર્યું હતું. … બહોળી સંખ્યામાં બહેનો ઉપસ્થિત રહ્યા હતા.

તુર્ક મેડીકલ ટ્રસ્ટ ધ્રબ

મુંદરા પોર્ટની અદાણી વિલમાર કંપનીમાં વિશ્વ મેલેરિયા દિવસની ઉજવણી કરાઈ

મેલેરિયા કેવી રીતે ફેલાય છે?

મેલેરિયા અટકાવવા માટે શું કરવું જોઈએ

સાવચેતીઓ મેલેરિયા સામે રક્ષણ આપશે

PRESS NOTE

કચ્છમિત્ર

વિશ્વ મેલેરિયા દિવસ ઉજવણીએ મુંદરા પોર્ટ ખાતે યોજાયેલા કેમ્પમાં ઉપસ્થિતોને માહિતી આપતા આગેવાનો.

વાહકજન્ય રોગો અંગે સમજ આપી સંપૂર્ણ સારવાર પર ભાર મુકાયો

મુંદરા પોર્ટ ખાતે વિશ્વ મેલેરિયા દિવસ ઉજવણીએ જનરલ આરોગ્ય નિદાન કેમ્પ યોજાયો

કલ્પતરુ પ્રોજેક્ટ હેઠળ ૫૦ લાખ વૃક્ષોનું વાવેતર કરવાનું લક્ષ્ય

બોરાણામાં મુન્દ્રાની બ્રહ્માકુમારીઝ સંસ્થા દ્વારા ૧૧૦૦ રોપાંઓનું વાવેતર

। મુન્દ્રા । (સંદેશ બ્યૂરો)

મુન્દ્રા પ્રજાપિતા બ્રહ્માકુમારી ઈશ્વરીય વિશ્વવિદ્યાલય તેમજ અદાણી ફાઉન્ડેશનના સંયુક્ત ઉપક્રમે અદાણી ફાઉન્ડેશનના ચેરમેન ડૉ. પ્રીતિબેન અદાણીના ૫૮મા જન્મદિવસ નિમિત્તે બોરાણા ગામે વિસ્તરી માતાજી મંદિરના પરિસરમાં વૃક્ષારોપણ કાર્યક્રમનું આયોજન કરવામાં આવ્યું હતું, જેમાં મુન્દ્રા સેવા કેન્દ્રના ૫૦ જેટલા ભાઈ-બહેનોએ પરમાત્માની મધુર સ્મૃતિમાં ૧૧૦૦ જેટલા અલગ અલગ પ્રકારના રોપાંઓનું વાવેતર કર્યું હતું.

બ્રહ્માકુમારીઝ વિશ્વ વિદ્યાલય દ્વારા કલ્પતરુ પ્રોજેક્ટ હેઠળ ઓછામાં ઓછા ૫૦ લાખ વૃક્ષો વાવવાનો લક્ષ્યાંક નક્કી

કરવામાં આવેલ છે ત્યારે મુન્દ્રા સેવા કેન્દ્રના મુખ્ય સંચાલિકા રાજયોગિની બ્રહ્માકુમારી સુશીલાબેને આ આનંદના પ્રસંગે જીવનમાં પર્યાવરણના મહત્ત્વ પર પ્રકાશ પાડ્યો હતો. પ્રોજેક્ટ ઓફિસર કરસન ગઢવીએ સહયોગ આપી કાર્યક્રમને સફળ બનાવ્યો હતો.

મુન્દ્રામાં સક્ષમ દ્વારા રોજગારીની તરકો વધારતા માછીમાર યુવાનો

પ્રગતિની બેચ-૧ પૂર્ણ અને બેચ-૨નો પ્રારંભ કરવામાં આવ્યો

કચ્છની ૫૯ શાળાઓમાં 'ઇકો ફ્રેન્ડલી' રક્ષાબંધનની ઉજવણી

અદાણી ફાઉન્ડેશન પ્રકલ્પ ઉત્થાન પ્રોજેક્ટ અંતર્ગત વિવિધ દિવસોનો કરવામાં આવતી અનોખી રીતે ઉજવણી

। કચ્છ આજકાલ । ભુજ

ભારત તહેવારોનો દેશ છે. તેમાં અનેક તહેવારોની ઉજવણી થાય છે. આપણે ધાર્મિક, સામાજિક અને રાષ્ટ્રીય તહેવારો ઉજવીએ છીએ. તેમાં રક્ષાબંધન એ ભાઈ-બહેનનો ખુબ મહત્વનો તહેવાર માનવામાં આવે છે. અદાણી ફાઉન્ડેશન દ્વારા પ્રાથમિક શિક્ષણમાં ચાલતા ઉત્થાન પ્રોજેક્ટ અંતર્ગત પણ વિવિધ દિવસોનો અનોખી રીતે ઉજવણી કરવામાં આવે છે. આ વખતે ઉત્થાન શાળાઓમાં 'ઇકો ફ્રેન્ડલી' રક્ષાબંધનની ઉજવણી કરવાનું નક્કી કરવામાં આવ્યું હતું.

ઉત્થાનનાં વિદ્યાર્થીઓ રાખડીઓ તૈયાર કરીને એક છોડને બાંધીને તેનું આખા વર્ષ દરમિયાન તેની કાળજી લેશે તેવો સંકલ્પ લીધો હતો. જેમાં રક્ષાબંધન પ્રકૃતિની, પ્રકૃતિ દ્વારા અને પ્રકૃતિ માટે થીમ અંતર્ગત આયોજન કરવામાં આવ્યું હતું. મનુષ્ય જન્મે ત્યારથી તેને કોઈને કોઈ પ્રકારનો ભય તો રહેતો જ હોય છે, અને જ્યાં ભય હોય ત્યાં રક્ષા સ્વયંભુ પ્રગટ થતી હોય છે. પ્રકૃતિ થકી આપણે છીએ અને તે હશે તો જ આપણે રહીશું તેથી

તેની રક્ષા કરવી એ આપણી જવાબદારી છે. તે મુલ્ય બાળપણમાંથી જ વિકસે તે ખુબ જ અગત્યનું છે. શું રાખડી બાંધીને કોઈની રક્ષા ખરેખર થઈ શકે ખરી ? એ પ્રશ્નનો જવાબ આ રીતે રક્ષાબંધન ઉજવાય તો આપો આપ જ મળી જાય તેમ છે. ઉત્થાન પ્રોજેક્ટ અંતર્ગત બાળકોને વિવિધ ઉજવણી દ્વારા તહેવારો વિશે જાણવામાં ઉત્સાહ જાગે, શાળામાં આવી ઉજવણી થાય તો શિક્ષણમાં રસ જાગે અને શાળાનું વાતાવરણ ધમધમતું અને બાળકને ગમતું બને તે હેતુથી ઉજવણી કરવામાં આવી હતી. ઉત્થાન સહાયકોના માર્ગદર્શનમાં બાળકોએ 'ઇકો ફ્રેન્ડલી' રાખડીઓ બનાવવામાં આવી હતી. બાળકો પોતે સંપૂર્ણ રીતે તેમાં જોડાય અને તે પોતે રાખડી બનાવે તો તેનું મહત્વ ખુબ જ વધી જાય છે. બાળકનાં આવી પ્રવૃત્તિઓમાં જોડાવાથી તેમની વિચારશીલતા, સર્જનાત્મકતા અને સંવેદનશીલતા જેવા જરૂરી ગુણો વિકસે છે.

કચ્છ પત્રિકા

મુંદ્રામાં હોમ બાયોગેસ કીટનું વિતરણ કરી 'વર્લ્ડ અર્થ ડે' ઉજવાયો

'અર્થ ડે'ને સાર્થક કરતુ અદાણી ફાઉન્ડેશનનું સરાહનીય કદમ!

મુંદરા મધ્યે આયોજીત નેત્ર નિદાન કેમ્પમાં ૭૦ દર્દી

અદાણી ફાઉન્ડેશન ચોમાસામાં ટપકતી છત નીચે રહેતી આદિવાસી કન્યાઓની વ્હારે આવ્યું

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अदाणी फाउंडेशन द्वारा नियोजित उड़ान परियोजना के तहत

अदाणी हजीरा पोर्ट के शैक्षिक दौरे पर सूरत के छात्र

लोकतेज, सूरत। अदाणी समूह की सामाजिक विकास गतिविधियों के लिए अदाणी फाउंडेशन ने उड़ान प्रोजेक्ट अंतर्गत गुजरात के स्कूल कॉलेजों के छात्रों को गुजरात में संचालित अदाणी समूह के औद्योगिक प्रतिष्ठानों में

उपलब्ध सुविधाओं के स्वयं गुणवत्ता अध्ययन के लिए गुजरात सरकार के साथ समझौता ज्ञापन किया हुआ। इस प्रेरित होकर उड़ान प्रोजेक्ट ने अदानी फाउंडेशन की शुरुआत की है।

उड़ान परियोजना मार्च 2020 से कोविड-19 के कारण स्थगित कर दी गई थी जो अब फिर से शुरू हो गई है। उड़ान प्रोजेक्ट के तहत राज्य की पहली महिला विश्वविद्यालय वनिता विश्राम की 50 बीबीए छात्राओं ने अदाणी हजीरा पोर्ट का दौरा किया और यहां किए जा रहे कार्यों से दौरा किया और खाद्य तेल बनाने की प्रक्रिया को देखा। एक दिवसीय यात्रा के दौरान, छात्र जहाज को बंदरगाह और उससे जुड़ी व्यावसायिक गतिविधियों के साथ-साथ अदानी-विल्मर संयंत्र में खाद्य तेल के उत्पादन और वितरण को देखकर प्रसन्न हुए और कहा कि यह उनका पहला अनुभव था। उड़ान के दूसरे दिन, सोनगढ़ तालुका के आदिवासी इलाके में उकाई के

અદાણી ફાઉન્ડેશન દ્વારા હજીરા વિસ્તારમાં ત્રણ મીઠા પાણીના તળાવો તૈયાર કરવામાં આવ્યાં

અકસ્માત નિવારણ માટે રેલીંગ, વૃક્ષારોપણ સહિત અનેક લોકોપયોગી કાર્યો થઈ રહ્યાં છે

અદાણી ફાઉન્ડેશને નેત્રંગ તાલુકાના અંતરિયાળ વિસ્તારમાં પુસ્તકાલયની સ્થાપના કરી

ખબરદાર પ્રતિનિધિ, વાગરા, તા. ૦૯

(તસવીર : ઝફર ગડીમલ)

ગ્રામીણ વિસ્તારમાં સ્પર્ધાત્મક પરીક્ષાઓની તૈયારી કરતાં યુવાનોને ઘર આંગણે સુવિધા મળે એ આશયથી અદાણી ફાઉન્ડેશન, દહેજ દ્વારા ભરૂચના અંતરિયાળ થવા ગામમાં સંપૂર્ણ સુવિધાયુક્ત લાઈબ્રેરીની સ્થાપના કરી હતી. જેનું ઉદઘાટન હજીરા અને દહેજ અદાણી પોર્ટના સીઈઓ અનિલ કિશોર સિંહના હસ્તે સ્થાનિક આગેવાનોની હાજરીમાં કર્યું હતુ.નેત્રંગ તાલુકાના થવા અને આસપાસના ગામોના ૧૦૦થી વધુ વિદ્યાર્થીઓ સ્પર્ધાત્મક પરીક્ષામાં ભાગ લેતા હોય છે.પરંતુ આર્થિક સ્થિતિ અને વાંચન સામગ્રીની સુવિધાના અભાવે પરીક્ષાઓમાં ઉત્તમ પ્રદર્શન કરી શકતા ન હતા.જે બાબત ને ધ્યાને લઈ અદાણી ફાઉન્ડેશન દ્વારા સુવિધા સજ્જ લાયબ્રેરી બનાવવાનું નક્કી કરાયુ હતુ.ગામડાઓનું યુવાધન સ્પર્ધાત્મક પરીક્ષા ની તૈયારી સુપેરે કરી શકે એ માટે સંદર્ભ સાહિત્ય સાથે ની પુસ્તકાલયમાં ગુજરાતી,હિન્દી અને અંગ્રેજી ના પુસ્તકો ઉપલબ્ધ કરાવાયા છે.જેમાં અભ્યાસક્રમ ના પુસ્તકો ઉપરાંત જનરલ નોલેજ,મહાન વ્યક્તિઓના જીવનચરિત્ર, નવલકથાઓ અને અખબારો નો સમાવેશ કરાયો હતો.આજના લોકાર્પણ કાર્યક્રમ દરમિયાન અદાણી ફાઉન્ડેશન,દહેજ દ્વારા પુસ્તકાલયમાં વધુ પુસ્તકોની સાથે સમયાંતરે વિષય નિષ્ણાત વક્તા અને સલાહકારોની શિબિરનું પણ આયોજન કરવામાં આવશે ની જાહેરાત કરવામાં આવી હતી.અદાણી ફાઉન્ડેશનો ઉદ્દેશ્ય પરીક્ષાઓ પાસ કરનારા વિદ્યાર્થીઓને મદદરુપ થવાની સાથે સામાજિક સ્તર ઊંચું લાવવાનો છે.

Annexure – 2

Status of Legal Cases of APSEZ, Mundra:

S. No.	Case Detail (No., Parties to the Case, Filed at and on)	Case Brief (Matter)	Last Status	Current Status as on 31st Mar-22	Action Taken/Proposed
1	SLP 28788 of 2016 Pravinsinh Bhurabhai Chauhan Vs State of Gujarat & Others Petitioner 1. PRAVINSINGH BHURABHA CHAUHAN Respondent 2. State of Gujarat 3. APSEZ 4. MoEF&CC, New Delhi 5. MOC&I, New Delhi 6. Collector, Bhuj 7. Principal Secretary, Gujarat	• Public Interest Litigation was filed before the Hon'ble Gujarat High Court by Mr. Pravinsingh Bhurubha Chauhan alleging, presence of Sand dunes in the APSEZ project area. • APSEZ has submitted its representation that no Sand dunes are present in the project area and same was also verified during the site visit carried out by the Committee, constituted by Collector, Kutch on 25.07.2014 and by Regional Office of MoEF&CC, Bhopal on 25.09.2014. • Hon'ble High Court of Gujarat had dismissed the PIL filed by the Petitioner, vide their order dtd. 18.02.2015 stating that, "There is no need of constituting	**Lastly it was heard on 14th Sept 2018**	**Matter pending Hon'ble at Supreme Court.**	• APSEZ has already submitted as part of their submission to the Committee that there are no presence of "Sand dunes", in APSEZ area, inline to the authenticated maps & report available for this area. • The Committee visited Mundra on January 3 & 4, 2018 and the core issues to be examined by the Committee were (i) whether sand dunes are allotted in the forest land and whether APSEZL has destroyed/disturbed them and (ii) whether measurement of land was wrongly done? The Sunita Narain committee filed its report in the Hon'ble Supreme Court of India on 14.9.2018. • The Committee heard representations from both the parties and concluded that the term "Dhuva" is not synonymous with shifting

S. No.	Case Detail (No., Parties to the Case, Filed at and on)	Case Brief (Matter)	Last Status	Current Status as on 31st Mar-22	Action Taken/Proposed
		a new committee to look into the alleged violations as there is already a committee constituted by the ministry and a report by the same committee has also been submitted" • Later on Special Leave Petition was filed in Supreme Court by the Petitioner vide dated 26.10.2015 against the above said order of the Hon'ble High Court of Gujarat • In view of above, Hon'ble Supreme Court vide their order dated 23.08.2017, had requested the earlier formed Sunita Narayan Committee to relook in to this matter and submit their report. • Committee had visited the site on 3/4.01.2018 and has submitted their detailed report to Hon'ble Supreme Court.			sand dune. The Committee concluded that there is no incontrovertible evidence that Mor Dhuva was a sand dune and it cannot be said that M/s. APSEZL violated any conditions of the Environmental Clearance. With regards to the issue of measurement of land, the Committee stated that there was no credible evidence to show that Mor Dhuva was not part of the allotment to APSEZ and all measurements were done appropriately.

S. No.	Case Detail (No., Parties to the Case, Filed at and on)	Case Brief (Matter)	Last Status	Current Status as on 31st Mar-22	Action Taken/Proposed
		• Further, based on the findings of the report, the subject land is not classified as Sand dune and therefore allegations are not correct.			
2.	Kheti Vikas Seva Trust Vs UoI & Others CA 9124 of 2011	• The writ petition has been dismissed by the Gujarat High Court on 17th April 2015. • The Hon'ble Supreme Court of India on 18.3.2016 dismissed the appeal against the said order dated 17th April, 2015 of the Gujarat High Court. • However, an application filed by the petitioner alleging non-compliance of an order of the Gujarat HC dated 12th July 2011 prohibiting the cutting of mangroves and other forests during the pendency of the petition without permission of the state forest and environment	**The matter was listed on 10.3.2022. Next date is awaited**	**Matter pending at High Court**	• The committee of Mr. Claude Alvaris, Mr. Subrata Maity and Deputy Conservator of Forest, kachchh was appointed and the committee submitted its report on 7.6.2016. The committee suggested various measures like replanting of mangroves in 5333 ha area, GCZMA to re-examine the entire proposal of APSEZL in line with CRZ notification, measures to safeguard Bocha Island and annual uploading of satellite images by APSEZL. • APSEZL has challenged the recommendations of the committee stating that it has exceeded its terms of reference and APSEZL has already done mangrove reforestation and is in

S. No.	Case Detail (No., Parties to the Case, Filed at and on)	Case Brief (Matter)	Last Status	Current Status as on 31st Mar-22	Action Taken/Proposed
		department in relation to the writ petition is still pending.			compliance with the MoEF&CC direction dated 18.9.2015. the Sunita Narain Committee recommendations have already been captured in the EC conditions and the company is in compliance of the same. • Nos. of site visits carried out by regional office, MoEF&CC regarding EC compliance verification as below. a. 21st – 22nd Dec, 2016 b. 3rd May, 2018 c. 3rd & 4th Sep, 2019 d. 27th & 28th Jan, 2020 e. 1st to 3rd Sep, 2021 • As per the compliance certification received, there was no non-compliance observed.
3	Jusab Kasam Manjaliya Vs Union of India SPECIAL CIVIL APPLICATION NO. 5509 of 2019 Petitioner 1. JUSAB KASAM MANJALIYA	• Hon'ble HIGH COURT of Gujarat vide its order dated 22nd Aug. 2019 directed MoEF&CC, RO Bhopal to conduct a site visit of Adani Ports & Special economic Zone Mundra Kutch	**The matter is listed on 2.5.2022**	**Matter pending at High Court**	APSEZ submitted detailed compliance report to the MoEF&CC order dtd. 18th Sept 2015. • The replies of MoEF, State of Gujarat and APSEZL have been submitted. MoEF has

S. No.	Case Detail (No., Parties to the Case, Filed at and on)	Case Brief (Matter)	Last Status	Current Status as on 31st Mar-22	Action Taken/Proposed
	2. UMAR ALIMAMAD ABHLA MANJALIYA 3. ALIMAMAD ABHLA MANJALIYA 4. VIKRAMSINH MANUBHA PARMAR 5. HARSHYAMSINH RAJENDRASINH PARMAR 6. ABHLA MANJLIYA Respondents 1. UNION OF INDIA 2. State of Gujarat 3. Chairman GCZMA 4. GMB 5. NCSCM 6. APSEZ 7. GPCB	and submit compliance to the MoEF&CC order dtd. 18th Sept 2015. • In accordance with the above-cited directions/ communications, a site visit to the Adani Ports & Special economic Zone Mundra was undertaken during Sep 3-4, 2019 by Dr. HVC Cherry (Scientist D), Regional Office MOEF&CC Bhopal and detailed compliance of the order dtd 18th Sept 2015 was verified. • MoEF&CC has already submitted the inspection report to the Highcourt. • All the compliance to the 18th Sept 2015 was find in order.			clearly stated in its reply that a committee visited the site on September 3 and 4, 2019 and found that all the conditions of order dated 18.9.2015 are complied with by APSEZL. APSEZL submits a compliance report every 6 months and cumulative impact assessment plan till 2030 has been submitted by APSEZL. • Joint Review Committee (JRC) constituted by MoEF&CC carried out site visit dated 1st to 3rd Sep, 2021 regading compliance of MoEF&CC direction dated 18.09.2015 and as per its report submitted to MoEF&CC vide dated 1st Dec, 2021 all the compliance was find in order.

Annexure – 3

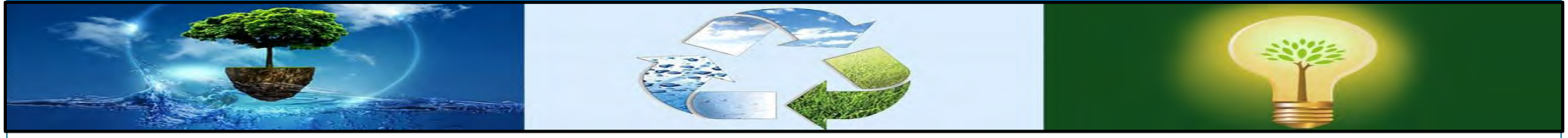
Details of Greenbelt Development at APSEZ, Mundra

Total Green Zone Detail Till Up to September – 2022					
LOCATION	**Area (In Ha.)**	**Trees (Nos.)**	**Palm (Nos.)**	**Shrubs (SQM)**	**Lawn (SQM)**
SV COLONY	71.66	34920.00	7962.00	69696.00	100646.00
PORT & NON SEZ	81.61	149359.00	19220.00	75061.78	62966.38
SEZ	116.60	227120.00	20489.00	220583.60	28162.03
MITAP	2.52	8168.00	33.00	3340.00	4036.00
WEST PORT	109.37	258252.00	70831.00	24612.00	22854.15
AGRI PARK	8.94	17244.00	1332.00	5400.00	2121.44
SOUTH PORT	14.45	27530.00	3470.00	3882.00	3327.26
SAMUDRA TOWNSHIP	57.27	63722.00	11834.00	23908.89	47520.07
PRODUCTIVE FARMING (VADALA FARM)	23.79	27976.00	0.00	0.00	0.00
TOTAL (APSEZL)	**486.19**	**814291.00**	**135171.00**	**426484.27**	**271633.33**
		Total Saplings: 949462.00 Nos.			

Details of Mangrove Afforestation done by APSEZ

Sl. no.	Location	District	Area (Ha)	Duration	Species	Implementation agency
1	Mundra Port	Kutch	24	-	Avicennia marina	Dr. Maity, Mangrove consultant of India
2	Mundra Port	Kutch	25	-	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)	Kutch	298	2011 - 2013	Avicennia marina	Forest Dept, Bhuj
6	Jangi Village (Bhachau)	Kutch	50	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	2014-15 & 2016-17	Avicennia marina & Bio diversity	GUIDE, Bhuj
9	Dandi Village	Navsari	800	2006 - 2011	Avicennia marina, Rhizophora mucronata, Ceriops tagal	GEC, Gandhinagar
10	Talaja Village	Bhavnagar	50	2011-12	Avicennia marina	Forest Dept, Talaja
11	Narmada Village	Bhavnagar	250	2014 - 2015	Avicennia marina	GEC, Gandhinagar
12	Malpur Village	Bharuch	200	2012-14	Avicennia marina	SAVE, Ahmedabad
13	Kantiyajal Village	Bharuch	50	2014-15	Avicennia marina	SAVE, Ahmedabad
14	Devla Village	Bharuch	150	210-16	Avicennia marina	SAVE, Ahmedabad
15	Village Tala Talav (Khambhat)	Anand	100	2015 - 2016	Avicennia marina	SAVE, Ahmedabad
16	Village Tala Talav (Khambhat)	Anand	38	2015 - 2016	Avicennia marina	GEC, Gandhinagar
17	Aliya Bet, Village Katpor (Hansot)	Bharuch	62	2017-18	Avicennia marina & Rhizophora spp.	GEC, Gandhinagar
18	Kukadsar-(Bhadeswar-Mundra)	Kutch	250	2021-22	Avicennia marina	Shreeji Enterprise
Total			**3140**			

Annexure – 4



"Half Yearly Environmental Monitoring Reports "

For,

adani
Ports and Logistics

M/S. ADANI PORTS & SPECIAL ECONOMIC ZONE LTD. (WFDP-West Port)

PLOT NO: - NAVINAL ISLAND, Village - MUNDRA, Tal. – Bhuj, DIST. - KUTCH - 370421.

Monitoring Period: April – 2022 to September - 2022

Submitted By

UniStar
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MoEF&CC (GOI) Recognized Environmental Laboratory under the EPA-1986 (12.01.2020 to17.03.2023) | QCI-NABET Accredited EIA Consultant Organization | GPCB Recognized Environmental Auditor (Schedule-II) | ISO 9001:2015 Certified Company | ISO 45001:2018 Certified Company

RESULTS OF STP OUTLET WATER

SR.NO.	TEST PARAMETERS	UNIT	WFDP WEST PORT STP OUTLET						GPCB Permissible Limit	TEST METHOD
			Apr-22		May-22		Jun-22			
			12-04-2022	25-04-2022	10-05-2022	30-05-2022	16-06-2022	28-06-2022		
1.	pH @ 25 ° C	--	7.28	7.56	7.33	7.29	7.14	7.28	6.5 to 9	APHA 23rd Ed.,2017,4500-H^+B
2.	Total Suspended Solids	mg/L	26	24	22	24	22	28	100	APHA 23rd Ed.,2017,2540 - D
3.	Biochemical Oxygen Demand (BOD) (5 days at 20 ° C)	mg/L	17	14	18	20	16	19	30	APHA 23rd Ed,2017,5210-B 5-6
4.	Residual chlorine	mg/L	0.7	0.7	0.77	0.57	0.87	0.69	0.5 Min.	APHA 23rd Ed.,2017,4500-Cl-B
5.	Fecal Coliform	MPN Index/100ml	33	50	40	34	50	70	1000	IS 1622: 1981

Mr. Nilesh Patel
Sr. Chemist

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RESULTS OF STP OUTLET WATER

SR.NO.	TEST PARAMETERS	UNIT	WFDP WEST PORT STP OUTLET						GPCB Permissible Limit	TEST METHOD
			Jul-22		Aug-22		Sep-22			
			15-07-2022	21-07-2022	06-08-2022	26-08-2022	15-09-2022	26-09-2022		
1.	pH @ 25 ° C	--	7.56	7.25	7.12	7.48	7.49	7.42	6.5 to 9	APHA 23rd Ed.,2017,4500-H^+B
2.	Total Suspended Solids	mg/L	18	20	22	24	28	30	100	APHA 23rd Ed.,2017,2540 -D
3.	Biochemical Oxygen Demand (BOD) (5 days at 20 ° C)	mg/L	14	18	16	19	17	20	30	APHA 23rd Ed,2017,5210-B 5-6
4.	Residual chlorine	mg/L	0.62	0.52	0.62	0.68	0.74	0.78	0.5 Min.	APHA 23rd Ed.,2017,4500-Cl-B
5.	Fecal Coliform	MPN Index/100ml	90	60	70	60	33	40	1000	IS 1622: 1981

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Results of Ambient Air Quality Monitoring

Name of Location		West Port – West Basin Main Gate						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
1.	07-04-2022	89.56	51.23	38.24	44.56	1.34	5.13	NOT DETECTED
2.	08-04-2022	84.57	47.86	40.25	38.97	1	4.12	NOT DETECTED
3.	11-04-2022	88.5	45.21	34.56	40.21	0.6	6.24	NOT DETECTED
4.	12-04-2022	83.41	36.85	37.85	44.56	1.2	4.63	NOT DETECTED
5.	18-04-2022	78.15	40.45	41.45	38.25	0.54	5.12	NOT DETECTED
6.	21-04-2022	89.25	42.34	39.25	37.65	0.94	7.25	NOT DETECTED
7.	25-04-2022	80.45	47.85	34.56	43.23	1.05	6.13	NOT DETECTED
8.	28-04-2022	86.14	40.23	37.23	45.67	0.7	4.44	NOT DETECTED
9.	02-05-2022	89.45	49.25	35.67	42.67	1.15	7.13	NOT DETECTED
10.	05-05-2022	86.78	44.56	32.45	40.15	1.6	5.15	NOT DETECTED
11.	09-05-2022	81.23	42.35	36.75	43.53	1.25	1.87	NOT DETECTED
12.	12-05-2022	79.85	37.85	34.52	41.25	1.0	2.64	NOT DETECTED
13.	16-05-2022	88.18	44.56	36.15	40.18	1.25	3.85	NOT DETECTED
14.	18-05-2022	84.56	47.5	32.45	37.92	1.0	2.98	NOT DETECTED
15.	23-05-2022	89.52	43.51	39.35	45.35	1.25	4.15	NOT DETECTED

Continue…

Name of Location		West Port – West Basin Main Gate						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
16.	26-05-2022	86.63	52.34	37.23	42.85	1.1	2.54	NOT DETECTED
17.	30-05-2022	88.92	47.43	38.15	43.23	1.0	4.85	NOT DETECTED
18.	02-06-2022	88.95	47.89	36.78	41.27	1.2	5.67	NOT DETECTED
19.	06-06-2022	84.23	50.23	34.57	40.18	1.45	6.2	NOT DETECTED
20.	09-06-2022	83.2	38.14	39.12	44.25	1.3	7.15	NOT DETECTED
21.	13-06-2022	80.16	45.67	38.76	44.18	1.21	5.67	NOT DETECTED
22.	15-06-2022	89.25	38.92	34.51	40.15	1.00	4.52	NOT DETECTED
23.	20-06-2022	79.34	35.69	38.92	43.25	1.4	6.78	NOT DETECTED
24.	23-06-2022	87.25	46.71	37.15	44.19	1.15	4.23	NOT DETECTED
25.	27-06-2022	82.56	49.18	34.51	40.15	1.25	6.12	NOT DETECTED
26.	29-06-2022	85.55	42.56	37.25	42.85	1.13	5.25	NOT DETECTED
27.	04-07-2022	81.23	27.45	21.34	23.45	0.04	3.15	NOT DETECTED
28.	07-07-2022	47.45	14.32	10.35	10.21	NOT DETECTED	NOT DETECTED	NOT DETECTED
29.	11-07-2022	43.45	15.34	9.24	11.11	NOT DETECTED	NOT DETECTED	NOT DETECTED
30.	14-07-2022	40.45	13.27	10.45	12.45	NOT DETECTED	NOT DETECTED	NOT DETECTED
31.	18-07-2022	47.67	15.19	9.23	12.1	NOT DETECTED	NOT DETECTED	NOT DETECTED

Continue…

Name of Location		West Port – West Basin Main Gate						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
32.	21-07-2022	46.89	13.28	10.24	13.23	NOT DETECTED	NOT DETECTED	NOT DETECTED
33.	25-07-2022	53.45	17.35	9.87	11.45	NOT DETECTED	NOT DETECTED	NOT DETECTED
34.	28-07-2022	42.36	13.22	10.67	12.89	NOT DETECTED	NOT DETECTED	NOT DETECTED
35.	01-08-2022	79.72	52.38	34.79	46.38	1.09	5.68	NOT DETECTED
36.	04-08-2022	83.37	48.57	36.48	39.64	1.38	7.38	NOT DETECTED
37.	08-08-2022	88.46	39.18	38.29	47.49	1.28	4.92	NOT DETECTED
38.	11-08-2022	73.93	42.95	31.84	38.3	1.16	4.18	NOT DETECTED
39.	15-08-2022	81.38	43.27	35.49	43.84	1.15	7.32	NOT DETECTED
40.	18-08-2022	87.29	53.62	29.47	37.38	1.24	6.21	NOT DETECTED
41.	22-08-2022	68.84	47.88	36.89	41.53	1.15	2.49	NOT DETECTED
42.	25-08-2022	76.53	46.38	34.57	47.26	1	6.27	NOT DETECTED
43.	29-08-2022	89.14	41.63	34.59	41.89	0.92	3.84	NOT DETECTED
44.	01-09-2022	83.48	38.58	23.4	29.36	1	4.69	NOT DETECTED
45.	05-09-2022	72.14	34.38	28.37	36.69	0.92	5.94	NOT DETECTED
46.	08-09-2022	69.63	28.94	26.88	33.57	1.1	3.14	NOT DETECTED
47.	12-09-2022	78.37	37.68	19.36	24.83	1	3.84	NOT DETECTED

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Name of Location		West Port – West Basin Main Gate						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
48.	15-09-2022	86.38	32.31	27.64	34.27	0.95	6.48	NOT DETECTED
49.	19-09-2022	74.43	42.97	31.38	39.85	1	6.83	NOT DETECTED
50.	22-09-2022	83.94	36.84	30.05	36.49	1.13	4.27	NOT DETECTED
51.	26-09-2022	81.69	29.72	22.61	31.28	0.09	5.83	NOT DETECTED
52.	29-09-2022	87.29	31.72	32.46	38.04	1.15	4.28	NOT DETECTED
Permissible Value as per NAAQMS		**100.0**	**60.0**	**80.0**	**80.0**	**2.0**	**---**	**5.0**
Test Method		**IS - 5182, Part-23**	**UERL/AIR/SOP/11**	**IS - 5182, Part - 2**	**IS - 5182, Part - 6**	**IS - 5182, Part - 10**	**Gas analyzer**	**IS – 5182, Part – 11**

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Results of Ambient Air Quality Monitoring

Name of Location		West Port – Horti Culture						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
1.	07-04-2022	84.57	35.23	31.23	39.23	0.67	1.76	NOT DETECTED
2.	08-04-2022	88.34	30.15	32.45	41.45	0.4	2.34	NOT DETECTED
3.	11-04-2022	82.56	45.67	25.44	34.56	0.75	3.1	NOT DETECTED
4.	12-04-2022	88.14	47.85	28.76	34.57	1.05	5.34	NOT DETECTED
5.	18-04-2022	79.54	38.95	30.12	36.35	1.14	3.65	NOT DETECTED
6.	21-04-2022	85.67	32.45	35.67	42.56	0.9	4.12	NOT DETECTED
7.	25-04-2022	88.12	42.34	33.15	40.25	0.54	2.75	NOT DETECTED
8.	28-04-2022	82.25	41.54	32.17	42.55	0.34	1.97	NOT DETECTED
9.	02-05-2022	86.56	39.15	35.12	41.76	0.85	3.12	NOT DETECTED
10.	05-05-2022	79.45	36.32	34.17	39.23	1.12	4.55	NOT DETECTED
11.	09-05-2022	86.23	33.25	30.16	25.76	1.0	1.78	NOT DETECTED
12.	12-05-2022	81.15	42.56	29.31	34.57	1.05	2.35	NOT DETECTED
13.	16-05-2022	89.43	47.15	34.21	40.24	0.07	4.15	NOT DETECTED
14.	18-05-2022	77.23	35.12	37.24	42.56	1.15	3.15	NOT DETECTED
15.	23-05-2022	86.14	45.24	33.84	39.21	1.0	1.78	NOT DETECTED

Continue…

Name of Location		West Port – Horti Culture						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
16.	26-05-2022	80.24	40.18	35.15	40.25	1.0	2.45	NOT DETECTED
17.	30-05-2022	87.73	37.35	31.29	37.35	1.15	3.12	NOT DETECTED
18.	02-06-2022	85.46	45.67	34.56	40.17	1.25	5.12	NOT DETECTED
19.	06-06-2022	75.34	39.23	31.66	35.69	1.00	4.16	NOT DETECTED
20.	09-06-2022	88.21	45.67	36.15	42.38	1.5	5.00	NOT DETECTED
21.	13-06-2022	79.26	41.23	37.13	42.15	0.5	4.89	NOT DETECTED
22.	15-06-2022	85.15	42.68	35.89	40.19	1.00	5.16	NOT DETECTED
23.	20-06-2022	83.26	39.45	32.45	37.85	1.25	4.94	NOT DETECTED
24.	23-06-2022	85.19	35.18	36.18	41.25	1.14	3.15	NOT DETECTED
25.	27-06-2022	89.34	44.75	35.92	40.18	1.00	5.00	NOT DETECTED
26.	29-06-2022	77.15	36.28	35.17	41.26	1.2	4.85	NOT DETECTED
27.	04-07-2022	71.45	22.34	18.34	21.34	0.05	2.45	NOT DETECTED
28.	07-07-2022	40.23	13.21	9.13	12.34	NOT DETECTED	NOT DETECTED	NOT DETECTED
29.	11-07-2022	36.78	11.25	8.56	10.24	NOT DETECTED	NOT DETECTED	NOT DETECTED
30.	14-07-2022	35.12	10.23	7.56	10.34	NOT DETECTED	NOT DETECTED	NOT DETECTED
31.	18-07-2022	43.25	13.45	7.25	9.23	NOT DETECTED	NOT DETECTED	NOT DETECTED

Continue…

Name of Location		West Port – Horti Culture						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
32.	21-07-2022	37.16	12.34	9.21	8.34	NOT DETECTED	NOT DETECTED	NOT DETECTED
33.	25-07-2022	44.56	13.25	8.34	10.35	NOT DETECTED	NOT DETECTED	NOT DETECTED
34.	28-07-2022	35.64	11.47	7.45	8.45	NOT DETECTED	NOT DETECTED	NOT DETECTED
35.	01-08-2022	88.63	46.64	34.1	46.16	0.91	2.57	NOT DETECTED
36.	04-08-2022	82.39	36.69	36.34	42.32	1	5.83	NOT DETECTED
37.	08-08-2022	73.89	31.36	28.53	34.64	0.89	3.2	NOT DETECTED
38.	11-08-2022	76.15	39.63	29.31	38.63	1.15	4.72	NOT DETECTED
39.	15-08-2022	84.75	43.9	37.69	47.38	0.07	2.14	NOT DETECTED
40.	18-08-2022	83.73	41.31	34.24	44.48	1.12	3.98	NOT DETECTED
41.	22-08-2022	74.96	49.77	29.78	37.57	0.95	2.79	NOT DETECTED
42.	25-08-2022	76.64	37.19	31.97	46.41	1.11	2.38	NOT DETECTED
43.	29-08-2022	84.42	43.82	28.47	34.43	1	5.71	NOT DETECTED
44.	01-09-2022	73.27	39.28	23.47	29.63	0.95	2.83	NOT DETECTED
45.	05-09-2022	68.53	32.79	31.35	36.46	1.12	4.76	NOT DETECTED
46.	08-09-2022	82.68	27.16	22.69	27.98	1.1	3.92	NOT DETECTED
47.	12-09-2022	79.16	31.38	24.28	31.27	0.95	5.39	NOT DETECTED

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Name of Location		West Port – Horti Culture						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
48.	15-09-2022	87.74	36.7	29.67	35.72	0.09	2.48	NOT DETECTED
49.	19-09-2022	71.58	33.32	32.61	38.74	0.92	3.26	NOT DETECTED
50.	22-09-2022	89.73	37.82	26.79	32.31	1.06	3.47	NOT DETECTED
51.	26-09-2022	83.72	29.64	27.26	34.48	1	3.84	NOT DETECTED
52.	29-09-2022	76.29	38.17	33.58	39.62	1.15	4.86	NOT DETECTED
Permissible Value as per NAAQMS		**100.0**	**60.0**	**80.0**	**80.0**	**2.0**	**---**	**5.0**
Test Method		**IS - 5182, Part-23**	**UERL/AIR/SOP/11**	**IS - 5182, Part - 2**	**IS - 5182, Part - 6**	**IS - 5182, Part - 10**	**Gas analyzer**	**IS – 5182, Part – 11**

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Results of Ambient Air Quality Monitoring

Name of Location		WEST PORT - PMC OFFICE						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
1.	07-04-2022	89.45	47.23	34.56	38.76	1.20	2.45	NOT DETECTED
2.	08-04-2022	84.56	35.21	28.91	34.51	0.67	5.43	NOT DETECTED
3.	11-04-2022	88.23	30.15	26.54	33.45	0.45	4.1	NOT DETECTED
4.	12-04-2022	79.85	42.15	31.45	38.97	0.98	6.7	NOT DETECTED
5.	18-04-2022	87.75	38.76	34.23	41.34	1.2	4.56	NOT DETECTED
6.	21-04-2022	82.42	44.75	38.93	43.25	0.65	2.34	NOT DETECTED
7.	25-04-2022	82.35	31.23	35.45	40.34	0.78	3.65	NOT DETECTED
8.	28-04-2022	89.15	37.8	36.12	42.56	0.45	2.75	NOT DETECTED
9.	02-05-2022	89.23	45.62	27.86	35.68	1.00	4.56	NOT DETECTED
10.	05-05-2022	85.45	41.45	33.45	37.12	1.15	2.89	NOT DETECTED
11.	09-05-2022	76.45	37.65	31.28	35.29	0.95	3.45	NOT DETECTED
12.	12-05-2022	83.89	45.21	27.57	34.58	1.15	5.12	NOT DETECTED
13.	16-05-2022	79.18	35.67	35.24	41.25	1.00	7.1	NOT DETECTED
14.	18-05-2022	81.56	38.21	36.21	40.82	1.25	4.53	NOT DETECTED
15.	23-05-2022	87.46	35.24	30.45	36.27	1.12	6.94	NOT DETECTED

Continue…

Name of Location		WEST PORT - PMC OFFICE						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
16.	26-05-2022	81.46	43.45	34.11	40.15	1.00	4.52	NOT DETECTED
17.	30-05-2022	77.65	41.21	37.12	41.28	1.35	6.15	NOT DETECTED
18.	02-06-2022	88.95	42.35	31.45	38.15	1.14	5.23	NOT DETECTED
19.	06-06-2022	84.56	37.19	36.25	40.27	1.00	3.48	NOT DETECTED
20.	09-06-2022	87.34	34.59	29.15	34.57	1.15	7.12	NOT DETECTED
21.	13-06-2022	86.57	36.12	30.15	35.25	1.14	6.28	NOT DETECTED
22.	15-06-2022	82.45	40.25	28.19	34.19	0.5	5.11	NOT DETECTED
23.	20-06-2022	78.54	31.78	34.21	39.12	1.00	7.45	NOT DETECTED
24.	23-06-2022	89.23	42.17	30.15	36.89	0.8	6.35	NOT DETECTED
25.	27-06-2022	75.35	39.45	32.19	37.15	1.11	3.59	NOT DETECTED
26.	29-06-2022	86.23	34.52	32.69	38.82	1.00	4.55	NOT DETECTED
27.	04-07-2022	76.23	25.78	22.14	24.56	0.08	4.12	NOT DETECTED
28.	07-07-2022	45.23	15.12	13.21	15.75	ND	ND	NOT DETECTED
29.	11-07-2022	45.67	13.67	11.45	13.23	ND	ND	NOT DETECTED
30.	14-07-2022	44.34	15.89	12.34	16.78	ND	ND	NOT DETECTED
31.	18-07-2022	51.23	18.25	11.26	13.45	ND	ND	NOT DETECTED

Continue…

Name of Location		WEST PORT - PMC OFFICE						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
32.	21-07-2022	44.23	16.75	12.67	15.42	NOT DETECTED	NOT DETECTED	NOT DETECTED
33.	25-07-2022	60.12	18.76	12.35	14.23	NOT DETECTED	NOT DETECTED	NOT DETECTED
34.	28-07-2022	44.56	15.23	11.34	15.27	NOT DETECTED	NOT DETECTED	NOT DETECTED
35.	01-08-2022	87.48	49.58	32.28	41.26	1.21	3.74	NOT DETECTED
36.	04-08-2022	86.97	38.2	29.65	38.47	1	3.05	NOT DETECTED
37.	08-08-2022	89.6	39.72	34.75	39.14	1.12	2.84	NOT DETECTED
38.	11-08-2022	85.83	42.67	31.58	43.68	0.97	4.39	NOT DETECTED
39.	15-08-2022	76.42	32.49	39.63	48.52	1.15	5.27	NOT DETECTED
40.	18-08-2022	80.76	41.85	37.48	42.74	1.23	5.94	NOT DETECTED
41.	22-08-2022	84.83	37.48	26.82	34.26	0.99	7.14	NOT DETECTED
42.	25-08-2022	74.67	46.28	33.69	43.39	1.29	5.73	NOT DETECTED
43.	29-08-2022	82.7	38.8	36.09	46.94	1	4.74	NOT DETECTED
44.	01-09-2022	78.16	36.38	27.16	32.61	0.95	2.68	NOT DETECTED
45.	05-09-2022	76.92	41.12	19.94	24.37	1.15	3.84	NOT DETECTED
46.	08-09-2022	86.36	32.73	27.82	35.53	1	3.57	NOT DETECTED
47.	12-09-2022	78.48	38.39	18.34	29.91	1	2.98	NOT DETECTED

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Name of Location		WEST PORT - PMC OFFICE						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
48.	15-09-2022	84.62	21.68	27.54	36.28	1.1	4.96	NOT DETECTED
49.	19-09-2022	72.35	33.28	33.75	39.78	1.15	3.46	NOT DETECTED
50.	22-09-2022	84.83	28.74	21.68	32.35	1.18	6.12	NOT DETECTED
51.	26-09-2022	78.92	34.53	28.24	37.25	1	4.64	NOT DETECTED
52.	29-09-2022	87.37	29.39	26.36	30.13	1.1	5.82	NOT DETECTED
Permissible Value as per NAAQMS		**100.0**	**60.0**	**80.0**	**80.0**	**2.0**	**---**	**5.0**
Test Method		**IS - 5182, Part-23**	**UERL/AIR/SOP/11**	**IS - 5182, Part - 2**	**IS - 5182, Part - 6**	**IS - 5182, Part - 10**	**Gas analyzer**	**IS – 5182, Part – 11**

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Jaivik S. Tandel
(Manager - Operations)

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CIN:U73100GJ2007PTC051463

Results of Ambient Air Quality Monitoring

Name of Location		LPG Terminal Substation						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
1.	07-04-2022	89.12	43.25	21.45	29.25	0.54	6.12	NOT DETECTED
2.	08-04-2022	82.4	37.92	24.63	31.26	0.9	5.34	NOT DETECTED
3.	11-04-2022	77.65	31.45	29.17	35.78	0.65	8.14	NOT DETECTED
4.	12-04-2022	86.45	46.78	15.44	25.67	1.00	6.45	NOT DETECTED
5.	18-04-2022	83.27	43.25	19.28	25.83	0.82	3.95	NOT DETECTED
6.	21-04-2022	89.34	38.72	25.23	33.89	0.08	3.56	NOT DETECTED
7.	25-04-2022	78.45	42.54	22.85	30.23	0.05	2.1	NOT DETECTED
8.	28-04-2022	81.26	37.25	28.54	37.45	1.00	5.25	NOT DETECTED
9.	02-05-2022	75.46	36.75	25.21	31.25	1.00	4.12	NOT DETECTED
10.	05-05-2022	87.12	31.25	23.18	29.87	0.85	3.7	NOT DETECTED
11.	09-05-2022	80.15	36.25	27.15	36.34	0.7	2.25	NOT DETECTED
12.	12-05-2022	84.56	43.56	26.12	35.12	0.5	5.12	NOT DETECTED
13.	16-05-2022	85.67	37.85	24.12	37.15	1.00	2.15	NOT DETECTED
14.	18-05-2022	79.86	41.25	25.15	31.19	1.15	3.18	NOT DETECTED
15.	23-05-2022	81.45	39.25	21.35	23.12	1.00	1.00	NOT DETECTED

Continue…

Name of Location		LPG Terminal Substation						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
16.	26-05-2022	79.34	35.18	23.17	30.15	1.25	4.15	NOT DETECTED
17.	30-05-2022	84.54	40.25	25.12	32.46	0.75	2.35	NOT DETECTED
18.	02-06-2022	84.56	35.12	28.95	34.45	1.23	5.0	NOT DETECTED
19.	06-06-2022	80.23	28.75	31.44	37.68	1.00	3.45	NOT DETECTED
20.	09-06-2022	84.53	35.67	29.15	34.56	1.00	2.00	NOT DETECTED
21.	13-06-2022	88.18	46.19	27.12	33.15	1.2	4.25	NOT DETECTED
22.	15-06-2022	86.75	37.85	29.45	35.12	1.00	3.15	NOT DETECTED
23.	20-06-2022	72.34	31.19	28.95	34.18	1.15	4.00	NOT DETECTED
24.	23-06-2022	85.24	32.19	26.72	33.17	1.00	4.12	NOT DETECTED
25.	27-06-2022	71.56	37.85	28.94	34.12	1.23	7.15	NOT DETECTED
26.	29-06-2022	87.54	32.19	27.89	32.68	1.00	5.15	NOT DETECTED
27.	04-07-2022	62.34	20.14	11.21	16.78	NOT DETECTED	NOT DETECTED	NOT DETECTED
28.	07-07-2022	34.56	11.25	9.23	12.34	NOT DETECTED	NOT DETECTED	NOT DETECTED
29.	11-07-2022	35.34	12.27	6.12	9.23	NOT DETECTED	NOT DETECTED	NOT DETECTED
30.	14-07-2022	36.78	11.45	7.45	9.15	NOT DETECTED	NOT DETECTED	NOT DETECTED
31.	18-07-2022	39.23	13.25	5.78	7.56	NOT DETECTED	NOT DETECTED	NOT DETECTED

Continue…

Name of Location		LPG Terminal Substation						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
32.	21-07-2022	35.67	12.43	7.13	9.23	NOT DETECTED	NOT DETECTED	NOT DETECTED
33.	25-07-2022	44.23	15.34	6.34	8.67	NOT DETECTED	NOT DETECTED	NOT DETECTED
34.	28-07-2022	40.21	13.28	5.21	9.15	NOT DETECTED	NOT DETECTED	NOT DETECTED
35.	01-08-2022	82.62	34.2	22.48	34.56	1.29	6.21	NOT DETECTED
36.	04-08-2022	78.56	34.87	26.61	32.39	1.25	4.84	NOT DETECTED
37.	08-08-2022	84.7	39.69	29.39	38.64	0.95	3.29	NOT DETECTED
38.	11-08-2022	87.39	46.26	20.22	28.1	1.05	7.63	NOT DETECTED
39.	15-08-2022	80.64	36.49	28.53	35.82	1.15	3.9	NOT DETECTED
40.	18-08-2022	85.5	47.83	27.94	34.78	1.23	4.78	NOT DETECTED
41.	22-08-2022	73.74	37.11	19.27	26.39	0.89	2.15	NOT DETECTED
42.	25-08-2022	89.71	30.57	28.35	39.06	1.11	6.3	NOT DETECTED
43.	29-08-2022	81.19	38.85	23.72	31.37	0.91	4.82	NOT DETECTED
44.	01-09-2022	77.28	29.47	17.68	28.39	1.00	5.83	NOT DETECTED
45.	05-09-2022	87.26	31.2	24.36	29.67	1.15	5.72	NOT DETECTED
46.	08-09-2022	83.28	36.75	27.95	34.27	1.00	4.29	NOT DETECTED
47.	12-09-2022	74.19	34.84	24.63	29.19	1.13	6.38	NOT DETECTED

Continue…

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Name of Location		LPG Terminal Substation						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
48.	15-09-2022	83.46	31.29	29.87	33.58	1.24	NOT DETECTED	NOT DETECTED
49.	19-09-2022	86.97	37.69	23.48	27.58	1.12	NOT DETECTED	NOT DETECTED
50.	22-09-2022	81.26	33.84	16.38	24.69	0.94	NOT DETECTED	NOT DETECTED
51.	26-09-2022	84.83	32.45	23.64	31.28	1.18	NOT DETECTED	NOT DETECTED
52.	29-09-2022	87.52	36.09	21.25	28.73	1.1	NOT DETECTED	NOT DETECTED
Permissible Value as per NAAQMS		**100.0**	**60.0**	**80.0**	**80.0**	**2.0**	**---**	**5.0**
Test Method		**IS - 5182, Part-23**	**UERL/AIR/SOP/11**	**IS - 5182, Part - 2**	**IS - 5182, Part - 6**	**IS - 5182, Part - 10**	**Gas analyzer**	**IS – 5182, Part – 11**

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Results of Ambient Air Quality Monitoring

Name of Location		Adani Guest House				
Sr. No.	Date of Monitoring	Parameter with Results				
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³
1.	07-04-2022	87.21	26.76	9.45	15.68	NOT DETECTED
2.	08-04-2022	82.34	23.45	11.23	17.45	--
3.	11-04-2022	88.54	30.5	15.12	21.36	--
4.	12-04-2022	76.2	21.26	12.51	19.56	--
5.	18-04-2022	71.94	18.45	14.23	22.58	--
6.	21-04-2022	84.56	23.68	11.85	17.95	--
7.	25-04-2022	89.35	30.15	15.23	21.45	--
8.	28-04-2022	75.24	24.17	13.85	20.16	--
9.	02-05-2022	73.45	23.18	13.45	18.23	--
10.	05-05-2022	80.15	30.15	14.12	19.21	--
11.	09-05-2022	86.14	33.25	10.67	15.34	--
12.	12-05-2022	75.94	26.75	14.56	18.23	--
13.	16-05-2022	82.45	30.18	17.82	22.15	--
14.	18-05-2022	70.15	35.68	15.23	20.44	--
15.	23-05-2022	84.56	29.15	14.28	19.15	--

Continue…

Name of Location		Adani Guest House				
Sr. No.	Date of Monitoring	Parameter with Results				
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³
16.	26-05-2022	72.34	36.23	17.19	21.84	--
17.	30-05-2022	87.15	30.06	13.45	18.25	--
18.	02-06-2022	67.12	25.44	9.12	15.67	--
19.	06-06-2022	83.45	32.15	12.45	18.95	--
20.	09-06-2022	71.23	28.15	11.18	16.54	--
21.	13-06-2022	67.85	25.46	15.28	21.35	--
22.	15-06-2022	74.23	28.74	11.44	16.73	--
23.	20-06-2022	67.25	25.19	10.25	14.56	--
24.	23-06-2022	62.18	22.11	15.25	22.35	--
25.	27-06-2022	73.25	27.89	10.89	16.32	--
26.	29-06-2022	64.15	22.45	14.15	20.15	--
27.	04-07-2022	56.78	17.23	5.67	8.78	NOT DETECTED
28.	07-07-2022	23.45	8.23	5.1	7.12	--
29.	11-07-2022	15.5	7.23	4.24	6.15	--
30.	14-07-2022	17.98	8.12	5.1	7.15	--
31.	18-07-2022	20.15	7.89	5.25	7.14	--

Continue...

Name of Location		Adani Guest House				
Sr. No.	Date of Monitoring	Parameter with Results				
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³
32.	21-07-2022	24.56	7.1	6.12	8.25	--
33.	25-07-2022	32.45	10.23	7.12	9.1	--
34.	28-07-2022	27.68	8.45	4.56	7.23	--
35.	01-08-2022	82.42	27.37	11.87	20.84	--
36.	04-08-2022	79.48	33.89	18.29	23.48	--
37.	08-08-2022	87.37	32.48	14.4	19.52	--
38.	11-08-2022	72.82	28.46	19.74	26.8	--
39.	15-08-2022	86.48	36.59	21.67	28.51	--
40.	18-08-2022	84.27	38.83	13.39	23.78	--
41.	22-08-2022	75.38	34.76	17.27	21.42	--
42.	25-08-2022	71.64	39	19.96	26.74	--
43.	29-08-2022	81.83	36.04	16.22	22.31	--
44.	01-09-2022	73.47	29.38	14.27	22.47	--
45.	05-09-2022	82.26	36.17	16.49	26.29	--
46.	08-09-2022	76.43	29.41	17.24	23.84	--
47.	12-09-2022	79.18	26.47	24.73	29.46	--

Continue…

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Name of Location		Adani Guest House				
Sr. No.	Date of Monitoring	Parameter with Results				
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³
48.	15-09-2022	85.79	34.48	26.91	32.39	--
49.	19-09-2022	83.28	36.15	21.29	27.93	--
50.	22-09-2022	77.28	38.82	23.63	28.1	--
51.	26-09-2022	76.36	36.19	17.36	24.39	--
52.	29-09-2022	89.14	33.28	21.69	27.36	--
Permissible Value as per NAAQMS		**100.0**	**60.0**	**80.0**	**80.0**	**2.0**
Test Method		**IS - 5182, Part- 23**	**UERL/AIR/ SOP/11**	**IS - 5182, Part - 2**	**IS - 5182, Part - 6**	**IS - 5182, Part - 10**

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Results of Noise Level Monitoring

Location Name		West Port – West Basin Main Gate					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Day Time					
		27-04-2022	10-05-2022	15-06-2022	02-07-2022	17-08-2022	19-09-2022
1	06:00 to 07:00	65.5	63.5	66.7	66.2	62.8	65.7
2	07:00 to 08:00	63.5	64.2	68.8	63.9	64.2	67.3
3	08:00 to 09:00	66.9	62.5	67.3	66.1	63.9	67.3
4	09:00 to 10:00	67.5	64.5	65.7	61.2	64.5	65.3
5	10:00 to 11:00	68.6	62.9	66.2	62.8	62.9	66.2
6	11:00 to 12:00	61.5	67.5	66.2	68.9	63	66.7
7	12:00 to 13:00	66.4	60.4	65.4	65.4	60.4	65.4
8	13:00 to 14:00	68.9	62.8	65.8	69.1	63.2	65.8
9	14:00 to 15:00	66.7	65.1	68.9	62.4	65.1	68.9
10	15:00 to 16:00	67.1	63.3	69.5	69.7	63.3	69.5
11	16:00 to 17:00	68.5	63.5	67.8	62.2	63.5	67.8
12	17:00 to 18:00	68.5	62.8	66.5	68.2	65.4	66.5
13	18:00 to 19:00	66.9	61.7	65.4	63.1	61.7	65.4
14	19:00 to 20:00	62.5	60.2	63.9	65.7	60.2	64.2
15	20:00 to 21:00	63.3	59.5	63.5	61.4	59.5	63.5
16	21:00 to 22:00	58.9	61.3	62.6	66.8	62.7	62.6
Day Time		<75 dB (A)					

Continue...

Location Name		West Port – West Basin Main Gate					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) – Night Time					
		27-04-2022	10-05-2022	15-06-2022	02-07-2022	17-08-2022	19-09-2022
1	22:00 to 23:00	58.5	60.3	63.2	63.2	60.6	61.6
2	23:00 to 24:00	56.5	59.5	62.5	63.8	58.7	59.7
3	24:00 to 01:00	57.2	59.8	61.4	64.1	59.8	60.3
4	01:00 to 02:00	55.5	60.3	62.5	61.9	60.3	61.8
5	02:00 to 03:00	55.2	58.5	60.4	62.4	59.5	60.8
6	03:00 to 04:00	54.1	57.3	60.5	63.9	57.3	58.4
7	04:00 to 05:00	59.5	59.2	60.5	60.4	59.2	60.2
8	05:00 to 06:00	60.2	60.5	62.8	62.3	61.8	63.7
Night Time		<70 dB (A)					

Test Method	IS: 9989 : 1981

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Results of Noise Level Monitoring

Location Name		West Port – Horti Culture					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Day Time					
		25-04-2022	12-05-2022	20-06-2022	04-07-2022	22-08-2022	22-09-2022
1	06:00 to 07:00	64.5	65.5	64.8	64.4	62.6	64.8
2	07:00 to 08:00	69.2	63.5	67.8	68.8	64.8	67.8
3	08:00 to 09:00	67.8	66.9	66.9	65.3	66.9	66.9
4	09:00 to 10:00	69.5	67.5	66.8	68.5	67.5	66.8
5	10:00 to 11:00	65.3	68.6	69.2	62.3	67.9	68.4
6	11:00 to 12:00	60.6	61.5	68.5	66.1	61.5	67.1
7	12:00 to 13:00	65.5	66.4	69.9	61.8	66.4	69.9
8	13:00 to 14:00	67.2	68.9	67.5	65.5	68.4	68.2
9	14:00 to 15:00	68.5	66.7	67.5	69.2	66.7	67.5
10	15:00 to 16:00	66.5	67.1	68.3	67.8	64.2	68.3
11	16:00 to 17:00	65.5	68.5	69.4	62.8	68.5	68.6
12	17:00 to 18:00	68.9	68.5	65.5	63.3	66.1	63.4
13	18:00 to 19:00	67.2	66.9	68.2	63.7	66.9	68.2
14	19:00 to 20:00	66.7	62.5	65.5	64.6	62.5	65.5
15	20:00 to 21:00	65.4	63.3	67.2	66.9	63.3	66.4
16	21:00 to 22:00	63.9	58.9	64.5	65.8	61.1	63.8
Day Time		<75 dB (A)					

Continue…

Location Name		West Port – Horti Culture					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Night Time					
		25-04-2022	12-05-2022	20-06-2022	04-07-2022	22-08-2022	22-09-2022
1	22:00 to 23:00	63.5	61.3	62.8	60.3	60.3	58.4
2	23:00 to 24:00	62.5	59.7	63.9	62.4	59.7	58.9
3	24:00 to 01:00	61.9	60.6	64.2	62.3	60.6	61.4
4	01:00 to 02:00	62.8	60.5	62.8	55.2	60.5	62.6
5	02:00 to 03:00	60.5	56.7	62.5	62.9	56.7	62.3
6	03:00 to 04:00	59.6	63.5	61.3	60.7	63.5	62.9
7	04:00 to 05:00	58.5	62.8	64.2	61.2	62.8	61.7
8	05:00 to 06:00	59.7	64.5	63.9	60.5	62.4	60.3
Night Time		<70 dB (A)					

Test Method	IS: 9989 : 1981

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Results of Noise Level Monitoring

Location Name		WEST PORT - PMC OFFICE					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Day Time					
		21-04-2022	13-05-2022	23-06-2022	15-07-2022	25-08-2022	26-09-2022
1	06:00 to 07:00	63.5	65.8	66.7	65.3	64.7	66.9
2	07:00 to 08:00	64.2	67.9	68.5	63.2	67.9	67.4
3	08:00 to 09:00	62.5	69.3	69.5	66.2	69.3	68.8
4	09:00 to 10:00	64.5	68.6	69.2	69.6	68.6	68.4
5	10:00 to 11:00	62.9	68.3	69.5	65.9	68.3	69.5
6	11:00 to 12:00	67.5	67.3	68.2	68.5	67.3	67.4
7	12:00 to 13:00	60.4	66.2	67.5	60.7	66.2	67.5
8	13:00 to 14:00	62.8	68.2	68.5	63.7	68.2	68.5
9	14:00 to 15:00	65.1	67.5	68	65.8	67.5	67.9
10	15:00 to 16:00	63.3	62.9	67.3	66.3	62.9	66.2
11	16:00 to 17:00	63.5	66.4	64.5	67.8	66.4	64.5
12	17:00 to 18:00	62.8	62.6	63.9	69.2	62.6	63.9
13	18:00 to 19:00	61.7	65.5	67.2	67.5	65.5	68.2
14	19:00 to 20:00	60.2	68.5	66.7	64.9	68.5	66
15	20:00 to 21:00	59.5	66.7	68.2	62.7	66.7	68.2
16	21:00 to 22:00	61.3	62.8	66.5	63.4	63.8	65.2
Day Time		<75 dB (A)					

Continue…

Location Name		WEST PORT - PMC OFFICE					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Night Time					
		21-04-2022	13-05-2022	23-06-2022	15-07-2022	25-08-2022	26-09-2022
1	22:00 to 23:00	61.5	63.5	61.8	59.6	61.9	60.4
2	23:00 to 24:00	62.5	62.5	64.5	60.3	63.8	62.4
3	24:00 to 01:00	62.3	61.9	63.9	63.5	61.9	60.5
4	01:00 to 02:00	62.3	62.8	64.5	62.4	62.8	63.8
5	02:00 to 03:00	61.6	60.5	63.2	60.2	61.1	62.8
6	03:00 to 04:00	58.6	59.6	62.4	64.2	59.6	58.7
7	04:00 to 05:00	64.4	58.5	60.8	58.2	59.3	58.4
8	05:00 to 06:00	61.8	59.7	61.2	62.1	60.2	61.6
Day Time		<70 dB (A)					

Test Method	IS: 9989 : 1981

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Results of Noise Level Monitoring

Location Name		LPG Terminal Substation					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Day Time					
		28-04-2022	09-05-2022	13-06-2022	14-07-2022	16-08-2022	15-09-2022
1	06:00 to 07:00	61.8	62.6	65.5	63.2	60.1	65.5
2	07:00 to 08:00	63.8	65.4	66.7	60.8	63.8	66.7
3	08:00 to 09:00	66.7	67.1	69.8	68.2	64.6	69.2
4	09:00 to 10:00	65.3	64.5	65.5	65.9	65.8	65.5
5	10:00 to 11:00	66.7	69.6	68.2	69.1	67.2	67.4
6	11:00 to 12:00	62.9	65.2	66.5	62.6	64.9	64.9
7	12:00 to 13:00	64.2	63.2	66.1	64.4	64.3	66.1
8	13:00 to 14:00	62.5	65.5	67.3	62.5	66.3	67.3
9	14:00 to 15:00	63.6	62.8	65.5	65.4	63.8	64.8
10	15:00 to 16:00	60.6	64.1	67.3	68.7	61.3	68.4
11	16:00 to 17:00	63.5	66.3	65.8	62.4	65.8	64.2
12	17:00 to 18:00	60.5	68.3	69.4	60.7	66.4	68.2
13	18:00 to 19:00	58.5	63.5	65.4	63.8	68.6	64.5
14	19:00 to 20:00	58.3	65.2	66.1	69.4	63.5	66.1
15	20:00 to 21:00	59.5	62.3	63.8	65.5	61.2	64.1
16	21:00 to 22:00	58.5	60.7	63.5	68.1	59.9	63.4
Day Time		<75 dB (A)					

Continue...

Location Name		LPG Terminal Substation					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) – Night Time					
		28-04-2022	09-05-2022	13-06-2022	14-07-2022	16-08-2022	15-09-2022
1	22:00 to 23:00	57.6	60.5	62.8	61.9	58.5	57.9
2	23:00 to 24:00	61.3	59.8	60.4	62.7	59.8	60.0
3	24:00 to 01:00	60.1	58.5	59.4	63.8	58.5	62.8
4	01:00 to 02:00	59.7	57.5	58.8	60.1	56.8	57.8
5	02:00 to 03:00	60.5	55.6	57.5	61.9	55.6	58.3
6	03:00 to 04:00	54.2	55.5	59.2	63.7	57.7	59.9
7	04:00 to 05:00	64.5	58.4	60.5	63.5	58.4	56.3
8	05:00 to 06:00	62.3	59.5	62.5	57.9	58.3	60.2
Night Time		<70 dB (A)					

Test Method	IS: 9989 : 1981

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Results of Noise Level Monitoring

Location Name		Adani Guest House					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Day Time					
		20-04-2022	25-05-2022	14-06-2022	25-07-2022	29-08-2022	30-09-2022
1	06:00 to 07:00	60.5	60.1	58.7	60.9	63.7	59.8
2	07:00 to 08:00	62.8	63.2	60.5	66.5	64.8	61.3
3	08:00 to 09:00	66.1	65.5	62.5	68.4	66.1	63.5
4	09:00 to 10:00	65.5	63	63.5	61.8	63.4	62.7
5	10:00 to 11:00	68.3	63.5	62.8	67.4	64.2	62.8
6	11:00 to 12:00	68.9	67	64.5	61.1	64.1	63.9
7	12:00 to 13:00	64.6	65.4	63.5	63.9	62.8	63.2
8	13:00 to 14:00	66.3	63.2	62.8	69.9	63.9	63.7
9	14:00 to 15:00	68.5	62.1	60.5	65.7	64.7	61.3
10	15:00 to 16:00	64.5	67.3	65.3	60.4	68.8	66.8
11	16:00 to 17:00	63.5	66.2	62.8	69.4	65.4	63.3
12	17:00 to 18:00	65.6	61	64.2	66.1	61.7	63
13	18:00 to 19:00	61.5	58.1	61.8	62.4	59.5	63.5
14	19:00 to 20:00	63.5	57.3	60.5	65.5	58.9	61.2
15	20:00 to 21:00	60.5	56.3	58.7	62.1	61.8	59
16	21:00 to 22:00	58.5	54.5	55.5	64.8	59.4	58.4
Day Time		<75 dB (A)					

Continue...

Location Name		Adani Guest House					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) – Night Time					
		20-04-2022	25-05-2022	14-06-2022	25-07-2022	29-08-2022	30-09-2022
1	22:00 to 23:00	57.12	56.9	54.2	55.3	60.9	61.3
2	23:00 to 24:00	56.34	59.7	55.1	56.7	58.5	59.7
3	24:00 to 01:00	54.87	53.1	54.5	55.8	56.9	55.5
4	01:00 to 02:00	59.71	56.4	53.8	54.2	54.3	56.9
5	02:00 to 03:00	52.34	53.9	54.5	60.5	58.7	59.4
6	03:00 to 04:00	50.98	56.7	55.2	51.4	58.3	60.3
7	04:00 to 05:00	56.23	59.9	54.5	54.5	60.1	58.4
8	05:00 to 06:00	57.32	60.2	57.5	55.4	59.6	62.7
Night Time		<70 dB (A)					

Test Method	IS: 9989 : 1981

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Results of Stack Monitoring

Sr. No.	Parameter	Unit	July – 2022		GPCB LIMIT	Method of Test
			D.G.Set No. S-1 (1500 KVA)	D.G.Set No. S-2 (1500 KVA)		
			15-07-2022	15-07-2022		
1	Particulate Matter	mg/Nm^3	20.34	19.4	**150**	**IS 11255 (Part - 1)**
2	Sulfur Dioxide as SO_2	ppm	16.78	15.34	**100**	**IS 11255 (Part - 2)**
3	Oxides of Nitrogen as NO_X	ppm	21.55	20.17	**50**	**IS 11255 (Part - 7)**

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CIN:U73100GJ2007PTC051463

Sr. No.	Parameter	Unit	Sep-22	GPCB LIMIT	Method of Test
			D.G. Set-1 (2000 KVA)		
			30-09-2022		
1	Particulate Matter	mg/Nm3	27.45	**150**	**IS 11255 (Part - 1)**
2	Sulphur Dioxide	ppm	11.34	**100**	**IS 11255 (Part - 2)**
3	Oxide of Nitrogen	ppm	22.67	**50**	**IS 11255 (Part - 7)**
4	Carbon Monoxide	mg/Nm3	4.2	--	**UERL/AIR/SOP/18**
5	Non Methyl Hydro Carbon	ppm	Not Detected	--	**UERL/AIR/SOP/27**

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Minimum Detection Limit

Ambient Air Quality Monitoring

Sr. No.	Test Parameter	Unit	MDL
1	Particulate Matter (PM10)	µg/m3	5 µg/m3
2	Particulate Matter (PM10)	µg/m3	5 µg/m3
3	Sulphur Dioxide (SO2)	µg/m3	4 µg/m3
4	Nitrogen Dioxide (NO2)	µg/m3	5 µg/m3
5	Carbon Monoxide (CO)	mg/m3	0.01 mg/m3
6	Ammonia (NH3)	µg/m3	5 µg/m3
7	Ozone (O3)	µg/m3	5 µg/m3
8	Lead (Pb)	µg/m3	0.5 µg/m3
9	Nickle (Ni)	ng/m3	1 ng/m3
10	Arsenic (As)	ng/m3	1 ng/m3
11	Benzene	µg/m3	1µg/m3
12	Benzo(o)Pyrene	ng/m3	0.1 ng/m3
14	Hydro Carbon	µg/m3	1 µg/m3

Stack Emission Monitoring

Sr. No.	Test Parameter	Unit	MDL
1	Suspended particulate matter	mg/Nm3	2 mg/Nm3
2	Sulphur Dioxide SOX	mg/Nm3	4 mg/Nm3
3	Oxides of Nitrogen NOX	mg/Nm3	5 mg/Nm3

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STP Outlet			
Sr. No.	**Test Parameter**	**Unit**	**MDL**
1	pH @ 25 ° C	--	2
2	Total Suspended Solids	mg/L	4
3	Biochemical Oxygen Demand (BOD) (5 days at 20 ° C)	mg/L	1
4	Residual chlorine	mg/L	0.1
5	Fecal Coliform	mg/L	<2

ETP Outlet			
Sr. No.	**Test Parameter**	**Unit**	**MDL**
1	Colour	Pt. Co. Scale	5
2	pH @ 27 ° C	--	2
3	Temperature	0C	5
4	Total Suspended Solids	mg/L	4
5	Total Dissolved Solids	mg/L	4
6	COD	mg/L	2
7	BOD (3 days at 27 ^{0}C)	mg/L	1
8	Chloride (as Cl)	mg/L	1
9	Oil & Grease	mg/L	2
10	Sulphate (as SO_4)	mg/L	1
11	Ammonical Nitrogen	mg/L	2

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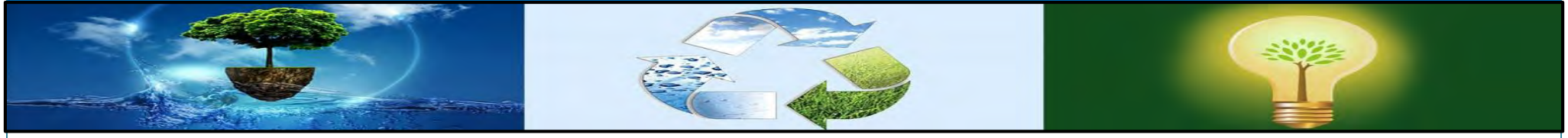
CIN:U73100GJ2007PTC051463

12	Phenolic Compound	mg/L	0.1
13	Copper as Cu	mg/L	0.05
14	Lead as Pb	mg/L	0.01
15	Sulphide as S	mg/L	0.05
16	Cadmium as Cd	mg/L	0.003
17	Fluoride as F	mg/L	0.2
18	Residual Chlorine	mg/L	0.1
19	Percent Sodium	%	--
20	Sodium Absorption ratio	--	--



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Monitoring Period: April – 2022 to September - 2022

Submitted By

UniStar
Environment and Research Labs Pvt. Ltd.

UniStar Environment & Research Labs Pvt. Ltd.

White House, Near GIDC Office, Char Rasta, Vapi, Gujarat, India – 396195

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	APRIL-2022		MAY-2022		JUNE-2022		JULY-2022		AUGUST-2022		SEPTEMBER-2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1.	pH	--	8.16	8.07	8.12	7.98	8.24	8.04	8.18	8.08	8.22	8.13	8.19	8.14	IS 3025 (Part11)1983
2.	Temperature	°C	30.1	30	30.2	30.1	30.3	30.2	30.1	30	30.1	30	30.2	30	IS 3025 (Part 9)1984
3.	Total Suspended Solids	mg/L	124	116	128	114	128	114	132	122	140	124	154	132	APHA 23rd Ed.,2017,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	2.4	BDL	2.6	BDL	2.5	BDL	2.6	BDL	2.8	BDL	2.6	BDL	IS 3025(Part 44)1993Amd.01
5.	Dissolved Oxygen	mg/L	6.07	5.87	6.12	5.92	6.02	5.82	6.17	5.96	6.17	5.96	6.05	5.85	APHA 23rd Ed.,2017,4500-O, B
6.	Salinity	ppt	35.24	35.68	35.32	35.81	35.42	35.94	35.64	36.02	35.56	35.98	35.48	35.94	By Calculation
7.	Oil & Grease	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	IS 3025(Part39) 1991, Amd. 2
8.	Nitrate as NO_3	µmol/L	2.33	2.15	2.49	2.32	2.32	1.72	1.94	1.72	2.37	2.24	3.45	3.02	APHA 23rd Ed., 2017,4500 NO3-B
9.	Nitrite as NO_2	µmol/L	0.235	0.17	0.259	0.215	0.379	0.312	0.344	0.293	0.328	0.293	0.302	0.276	APHA 23rd Ed.,2017,4500NO_2B
10.	Ammonical Nitrogen as NH_3	µmol/L	2.37	2.28	2.28	2.16	2.59	2.16	2.37	2.32	2.5	2.37	3.19	2.84	APHA 23rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO_4	µmol/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	APHA 23rd Ed.,2017,4500-P, D
12.	Total Nitrogen	µmol/L	5.52	5.47	5.029	4.695	5.289	4.19	4.654	4.333	5.198	4.903	6.942	6.136	APHA 23rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
14.	Total Dissolved Solids	mg/L	36428	36962	36128	36788	35922	36464	35864	36124	35810	35984	35846	36012	APHA 23rd Ed.,2017, 2540- C
15.	COD	mg/L	12.02	8.02	15.9	11.9	15.8	11.8	24.05	16.03	11.99	7.99	16.1	12.07	APHA 23rd Ed.,2017, 5220-B

Continue...

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

SR. NO.	TEST PARAMETERS	UNIT	Apr-22		May-22		Jun-22		Jul-22		Aug-22		Sep-22		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
A	Phytoplankton														
1.	Chlorophyll	mg/m³	2.4	3.25	2.98	2.88	2.88	3.21	3.21	3.15	2.36	3.25	1.98	3.25	APHA (23rd Ed. 2017)10200 H
2.	Phaeophytin	mg/m³	0.47	0.74	0.84	0.67	0.9	0.87	0.89	0.97	1.23	0.84	0.58	0.84	APHA (23rd Ed. 2017)10200 H
3.	Cell Count	No. x 10^3/L	123	75	105	89	96	98	106	58	98	69	71	69	APHA (23rd Ed. 2017)10200 F
4	Name of Group Number and name of group species of each group	--	*Navicula*	*Pinnularia*	*Navicula*	*Pinnularia*	*Biddulphia*	*Coscinodiscus*	*Pinnularia*	*Navicula*	*Pinnularia*	*Odontella*	*Ceratium*	*Nitzschia*	APHA (23rd Ed. 2017)10200 F
			Fragillaria	*Navicula*	*Fragillaria*	*Surirella*	*Fragillaria*	*Thalassionema*	*Surirella*	*Fragillaria*	*Surirella*	*Rhizosolenia*	*Diploneis*	*Pinnularia*	
			Thalassiothrix	*Odontella*	*Skeletonema*	*Odontella*	*Odontella*	*Rhizosolenia*	*Odontella*	*Thalassiothrix*	*Odontella*	*Coscinodiscus*	*Odontella*	*Odontella*	
			Grammatophora	*Grammatophora*	*Grammatophora*	*Grammatophora*	*Grammatophora*	*Dinophysis*	*Grammatophora*	*Grammatophora*	*Grammatophora*	*Grammatophora*	*Grammatophora*	*Dinophysis*	
			Surirella	*Melosira*	*Odontella*	*Melosira*	*Melosira*	*Skeletonema*	*Melosira*	*Surirella*	*Melosira*	*Thallassiosira*	*Melosira*	*Surirella*	

B	Zooplankton								
1	Abudance(Population)	noX103/ 100 m3	25	32	30	42	35	40	APHA (23rd Ed. 2017)10200 G
2	Name of Group Number and name of group species of each group		*Copepods*	*Copepods*	*Crustacean Larvae*	*Egg(Fish and Shrimps)*	*Egg(Fish and Shrimps)*	*Egg(Fish and Shrimps)*	
			Oikoplura	***Egg(Fish and Shrimps)***	***Decapoda***	***Oikoplura***	***Oikoplura***	***Oikoplura***	
			Crustacean Larvae	***Crustacean Larvae***	***Copepods***	***Copepods nauplii***	***Copepods nauplii***	***Copepods nauplii***	
			Crustacean	***Crustacean***	***Crustacean***	***Crustacean***	***Crustacean***	***Crustacean***	
			Bivalve Larvae	***Bivalve Larvae***	***Bivalve Larvae***	***Bivalve Larvae***	***Bivalve Larvae***	***Bivalve Larvae***	
3	Total Biomass	ml/100 m³	14.69	15.3	18.4	17.41	15.63	14.32	

Continue…

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

SR. NO.	TEST PARAMETERS	UNIT	Apr-22		May-22		Jun-22		Jul-22		Aug-22		Sep-22		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
C	Microbiological														
1	Total Bacterial Count	CFU/ml	201		142		214		128		100		234		APHA 23rd Ed.2017,9215-C
2	Total Coliform	/100ml	35		30		28		40		27		44		APHA 23rd Ed.2017,9222-B
3	Ecoli	/100ml	12		24		18		20		14		20		IS :15185:2016
4	Enterococcus	/100ml	8		12		6		14		8		14		IS:15186:2002
5	Salmonella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA 23rd Ed.2017,9260-E
7	Vibrio	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS: 5887 (Part V):1976

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Technical Manager

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

SR. NO.	TEST PARAMETERS	UNIT	APRIL-2022	MAY-2022	JUNE-2022	JULY-2022	AUGUST-2022	SEPTEMBER-2022	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT		
1.	Organic Matter	%	0.76	0.62	0.68	0.56	0.48	0.52	IS: 2720 (Part 22):1972 RA.2015, Amds.1
2.	Phosphorus as P	µg/g	512.6	546.2	536.2	546.2	502.4	518.1	IS: 10158 :1982, RA.2009 Method B
3.	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Lab SOP No. UERL/CHM/LTM/108
4.	Petroleum Hydrocarbon	µg/g	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
5.0	Heavy Metals								
5.1	Aluminum as Al	%	2.86	3.02	3.18	3.32	3.38	3.44	IS3025(Part 55)2003
5.2	Total Chromium as Cr+3	µg/g	88.2	102.1	111.4	118.1	125.4	120.2	EPA 3050B/7190 (Extraction &Analytical Method): 1986
5.3	Manganese as Mn	µg/g	539.8	556.3	542.6	586.3	602.5	614.5	EPA 3050B/7460 (Extraction &Analytical Method): 1986
5.4	Iron as Fe	%	3.21	3.28	3.49	4.06	4.12	4.18	EPA 3050B/7380 (Extraction &Analytical Method): 1986
5.5	Nickel as Ni	µg/g	33.16	36.24	35.68	36.12	33.24	40.36	EPA 3050B/7520 (Extraction &Analytical Method): 1986
5.6	Copper as Cu	µg/g	30.25	32.45	32.58	34.12	32.46	36.25	EPA 3050B /7210 (Extraction &Analytical Method):1986
5.7	Zinc as Zn	µg/g	78.64	82.14	84.86	92.46	96.54	104.2	EPA 3050B/7950 (Extraction &Analytical Method): 1986
5.8	Lead as Pb	µg/g	4.18	3.94	3.85	3.42	3.21	3.12	EPA 3050B /7420 (Extraction &Analytical Method):1986
5.9	Mercury as Hg	µg/g	BDL	BDL	BDL	BDL	BDL	BDL	EPA 7471B (Extraction &Analytical Method) :2007

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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	APRIL-2022 SEDIMENT	MAY-2022 SEDIMENT	JUNE-2022 SEDIMENT	JULY-2022 SEDIMENT	AUGUST-2022 SEDIMENT	SEPTEMBER-2022 SEDIMENT	TEST METHOD
D	Benthic Organisms								
1	Macrobenthos	--	*Gastropods*	*Decapods Larvae*	*Gastropods*	*Turbellarians*	*Amphipods*	*Amphipods*	APHA (23rd Ed. 2017)10500 C
			Isopods	*Isopods*	*Isopods*	*Isopods*	*Decapod Larvae*	*Decapod Larvae*	
			Amphipods	*Amphipods*	*Amphipods*	*Gastropods*	*Isopods*	*Isopods*	
			Sipunculids	*Sipunculids*	*Sipunculids*	*Sipunculids*	*Gastropods*	*Gastropods*	
2	MeioBenthos	--	*Polychates*	*Foraminiferan*	*Polychates*	*Polychates*	*Turbellarians*	*Turbellarians*	
			Herpectacoids	*Herpectacoids*	*Herpectacoids*	*Herpectacoids*	*Herpectacoids*	*Herpectacoids*	
3	Population	no/m²	*308*	300	280	268	302	*356*	

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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	APRIL-2022		MAY-2022		JUNE-2022		JULY-2022		AUGUST-2022		SEPTEMBER-2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1.	pH	--	8.14	8.05	8.25	8.11	8.19	8.05	8.21	8.12	8.19	8.05	8.21	8.09	IS 3025 (Part11)1983
2.	Temperature	°C	30.2	30.1	30.3	30.1	30.2	30	30.2	30.1	30.1	30	30.2	30.1	IS 3025 (Part 9)1984
3.	Total Suspended Solids	mg/L	126	112	132	106	132	106	124	98	136	106	144	112	APHA 23rd Ed.,2017,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	2.8	BDL	2.7	BDL	2.8	BDL	3	BDL	2.9	BDL	2.8	BDL	IS 3025(Part 44)1993Amd.01
5.	Dissolved Oxygen	mg/L	6.17	5.97	6.22	5.92	6.12	5.92	6.06	5.86	6.06	5.86	5.95	5.75	APHA 23rd Ed.,2017,4500-O, B
6.	Salinity	ppt	35.22	35.86	35.41	35.91	35.55	36.05	3542	36.11	35.36	36.05	35.42	36.11	By Calculation
7.	Oil & Grease	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	IS 3025(Part39) 1991, Amd. 2
8.	Nitrate as NO_3	µmol/L	2.67	2.41	2.84	2.59	3.45	2.59	3.23	2.59	2.8	2.59	3.02	2.37	APHA 23rd Ed., 2017,4500 NO3-B
9.	Nitrite as NO_2	µmol/L	0.54	0.475	0.56	0.517	0.431	0.328	0.413	0.379	0.362	0.345	0.345	0.302	APHA 23rd Ed.,2017,4500NO_2 B
10.	Ammonical Nitrogen as NH_3	µmol/L	2.67	2.54	2.32	2.28	2.84	2.62	3.66	2.93	2.8	2.5	3.79	3.36	APHA 23rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO_4	µmol/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	APHA 23rd Ed.,2017,4500-P, D
12.	Total Nitrogen	µmol/L	5.38	5.34	5.72	5.387	6.721	5.538	7.303	5.899	5.962	5.435	7.155	6.032	APHA 23rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
14.	Total Dissolved Solids	mg/L	36426	36832	36342	36744	36124	36580	36210	36742	36150	36544	36110	36540	APHA 23rd Ed.,2017, 2540- C
15.	COD	mg/L	20.04	12.02	23.9	15.9	19.7	11.8	16.03	12.02	15.98	11.99	24.14	16.1	APHA 23rd Ed.,2017, 5220-B

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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	Apr-22		May-22		Jun-22		Jul-22		Aug-22		Sep-22		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
A	Phytoplankton														
1.	Chlorophyll	mg/m³	3.14	2.97	2.87	3.21	2.74	2.98	2.85	2.78	2.78	2.05	3	2.05	APHA (23rd Ed. 2017)10200 H
2.	Phaeophytin	mg/m³	0.59	0.36	0.75	2.96	0.63	1.87	0.95	0.56	1	0.48	1.85	0.58	APHA (23rd Ed. 2017)10200 H
3.	Cell Count	No. x 10³/L	99	63	101	70	100	110	96	102	100	100	109	100	APHA (23rd Ed. 2017)10200 F
4	Name of Group Number and name of group species of each group	--	*Ceratium*	*Coscinodiscus*	*Pinnularia*	*Nitzschia*	*Cyclotella*	*Pleurosigma*	*Nitzschia*	*Ceratium*	*Melosira*	*Grammatophora*	*Thalassiothrix*	*Odontella*	APHA (23rd Ed. 2017)10200 F
			Diploneis	*Diplotella*	*Pleurosigma*	*Pinnularia*	*Pinnularia*	*Cyclotella*	*Pinnularia*	*Diploneis*	*Pinnularia*	*Rhizosolenia*	*Surirella*	*Rhizosolenia*	
			Odontella	*Odontella*	*Odontella*	*Odontella*	*Skeletonema*	*Biddulphia*	*Odontella*	*Odontella*	*Skeletonema*	*Nitzschia*	*Navicula*	*Coscinodiscus*	
			Grammatophora	*Dinophysis*	*Grammatophora*	*Dinophysis*	*Thallassiosira*	*Skeletonema*	*Dinophysis*	*Grammatophora*	*Rhizosolenia*	*Thallassiosira*	*Thallassiosira*	*Grammatophora*	
			Melosira	*Surirella*	*Melosira*	*Surirella*	*Thalassionema*	*Thallassiosira*	*Surirella*	*Melosira*	*Pleurosigma*	*Pleurosigma*	*Skeletonema*	*Thallassiosira*	

B	Zooplankton								
1	Abudance(Population)	noX103 / 100 m3	50	41	38	40	42	36	APHA (23rd Ed. 2017)10200 G
2	Name of Group Number and name of group species of each group		*Copepods nauplii*	*Copepods nauplii*	*Crustacean*	*Crustacean Larvae*	*Copepods nauplii*	*Crustacean Larvae*	
			Crustacean Larvae	*Crustacean Larvae*	*Oikoplura*	*Egg(Fish and Shrimps)*	*Oikoplura*	*Egg(Fish and Shrimps)*	
			Oikoplura	*Oikoplura*	*Crustacean Larvae*	*Copepods*	*Crustacean Larvae*	*Copepods*	
			Bivalve Larvae	*Bivalve Larvae*	*Oikoplura*	*Crustacean*	*Oikoplura*	*Crustacean*	
			Oikoplura	*Oikoplura*	*Bivalve Larvae*	*Bivalve Larvae*	*Bivalve Larvae*	*Bivalve Larvae*	
3	Total Biomass	ml/100 m³	15.89	14.36	15.89	16.95	16.23	15.46	

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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	APRIL-2022		MAY-2022		JUNE-2022		JULY-2022		AUGUST-2022		SEPTEMBER-2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
C	Microbiological														
1	Total Bacterial Count	CFU/ml	152		168		150		136		184		184		APHA 23rd Ed.2017,9215-C
2	Total Coliform	/100ml	41		36		47		52		40		40		APHA 23rd Ed.2017,9222-B
3	E.coli	/100ml	20		29		12		27		20		20		IS :15185:2016
4	Enterococcus	/100ml	12		15		9		13		12		12		IS:15186:2002
5	Salmonella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA 23rd Ed.2017,9260-E
7	Vibrio	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS: 5887 (Part V):1976

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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	APRIL-2022	MAY-2022	JUNE-2022	JULY-2022	AUGUST-2022	SEPTEMBER-2022	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT		
1.	Organic Matter	%	0.52	0.46	0.52	0.42	0.39	0.42	IS: 2720 (Part 22):1972 RA.2015, Amds.1
2.	Phosphorus as P	µg/g	602.4	586.1	544.6	534.6	558.5	564.2	IS: 10158 :1982, RA.2009 Method B
3.	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Lab SOP No. UERL/CHM/LTM/108
4.	Petroleum Hydrocarbon	µg/g	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
5.0	Heavy Metals								
5.1	Aluminum as Al	%	2.52	2.84	3.01	3.25	3.43	3.52	IS3025(Part 55)2003
5.2	Total Chromium as Cr+3	µg/g	68.2	79.2	80.4	94.8	104.5	111.5	EPA 3050B/7190 (Extraction &Analytical Method): 1986
5.3	Manganese as Mn	µg/g	492.1	512.4	528.5	567.9	588.4	602.8	EPA 3050B/7460 (Extraction &Analytical Method): 1986
5.4	Iron as Fe	%	2.86	2.96	3.24	3.52	3.59	3.68	EPA 3050B/7380 (Extraction &Analytical Method): 1986
5.5	Nickel as Ni	µg/g	36.89	42.12	44.19	41.4	38.9	42.5	EPA 3050B/7520 (Extraction &Analytical Method): 1986
5.6	Copper as Cu	µg/g	36.82	42.84	41.28	39.86	39.58	40.12	EPA 3050B /7210 (Extraction &Analytical Method):1986
5.7	Zinc as Zn	µg/g	56.85	60.12	55.64	64.23	70.45	78.94	EPA 3050B/7950 (Extraction &Analytical Method): 1986
5.8	Lead as Pb	µg/g	2.94	2.83	2.88	2.65	2.58	2.46	EPA 3050B /7420 (Extraction &Analytical Method):1986
5.9	Mercury as Hg	µg/g	BDL	BDL	BDL	BDL	BDL	BDL	EPA 7471B (Extraction &Analytical Method) :2007

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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	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
D			Benthic Organisms						
1	Macrobenthos	--	*Sipunculids*	*Sipunculids*	Sipunculids	*Foraminiferan*	*Amphipods*	*Gastropods*	APHA (23rd Ed. 2017)10500 C
			Decapods Larvae	*Decapods Larvae*	Decapods Larvae	Decapods Larvae	Isopods	Isopods	
			Amphipods	*Polychates*	Amphipods	*Amphipods*	*Sipunculids*	*Amphipods*	
			Isopods	*Isopods*	Isopods	*Polychates*	*Decapod Larvae*	*Sipunculids*	
2	MeioBenthos	--	*Turbellarians*	*Turbellarians*	Turbellarians	*Turbellarians*	*Herpectacoids*	*Polychates*	
			Herpectacoids	*Herpectacoids*	Herpectacoids	*Foraminiferan*	*Polychates*	*Herpectacoids*	
3	Population	no/m²	356	298	302	200	249	301	

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

SR. NO.	TEST PARAMETERS	UNIT	APRIL-2022		MAY-2022		JUNE-2022		JULY-2022		AUGUST-2022		SEPTEMBER-2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1.	pH	--	8.17	8.04	8.26	8.09	8.23	8.14	8.25	8.16	8.24	8.14	8.14	7.98	IS 3025 (Part11)1983
2.	Temperature	°C	30.1	30	30.2	30.1	30.3	30.2	30.1	30	30.2	30.1	30.1	30	IS 3025 (Part 9)1984
3.	Total Suspended Solids	mg/L	134	114	112	98	112	98	118	94	116	94	118	102	APHA 23rd Ed.,2017,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	2.6	BDL	2.9	BDL	3.1	BDL	2.9	BDL	2.8	BDL	2.7	BDL	IS 3025(Part 44)1993Amd.01
5.	Dissolved Oxygen	mg/L	6.07	5.97	6.02	5.92	6.02	5.8	6.17	6.1	6.17	6.1	5.85	5.7	APHA 23rd Ed.,2017,4500-O, B
6.	Salinity	ppt	35.28	35.88	35.52	36.12	35.44	35.94	35.26	35.86	35.22	35.89	35.28	35.94	By Calculation
7.	Oil & Grease	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	IS 3025(Part39) 1991, Amd. 2
8.	Nitrate as NO_3	µmol/L	2.93	2.76	2.84	2.67	2.49	2.15	3.23	3.02	3.02	2.8	3.23	2.8	APHA 23rd Ed., 2017,4500 NO3-B
9.	Nitrite as NO_2	µmol/L	0.3	0.235	0.345	0.284	0.259	0.13	0.344	0.259	0.362	0.293	0.328	0.276	APHA 23rd Ed.,2017,4500NO_2B
10.	Ammonical Nitrogen as NH_3	µmol/L	2.54	2.45	2.49	2.28	2.28	1.81	3.62	2.84	3.32	3.1	3.53	2.97	APHA 23rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO_4	µmol/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	APHA 23rd Ed.,2017,4500-P, D
12.	Total Nitrogen	µmol/L	5.55	5.47	5.675	5.234	5.029	2.461	7.194	6.119	6.702	6.193	7.088	6.046	APHA 23rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
14.	Total Dissolved Solids	mg/L	36344	36854	35984	36768	36002	36648	36118	36748	35986	36422	36080	36640	APHA 23rd Ed.,2017, 2540- C
15.	COD	mg/L	24.05	16.03	19.9	11.9	23.7	15.8	20.04	16.03	19.98	15.98	20.12	12.07	APHA 23rd Ed.,2017, 5220-B

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

SR. NO.	TEST PARAMETERS	UNIT	Apr-22		May-22		Jun-22		Jul-22		Aug-22		Sep-22		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
A			Phytoplankton												
1.	Chlorophyll	mg/m³	3	2.56	3.1	2.79	3.1	2.87	3.1	3.14	3.25	3.06	2.36	2.89	APHA (23rd Ed. 2017)10200 H
2.	Phaeophytin	mg/m³	1.2	0.97	0.93	1.23	85	0.99	78	1.03	1.42	1.45	0.96	1.25	APHA (23rd Ed. 2017)10200 H
3.	Cell Count	No. x 10³/L	84	102	98	120	100	130	95	124	105	109	102	118	APHA (23rd Ed. 2017)10200 F
4	Name of Group Number and name of group species of each group	--	*Pinnularia*	*Fragillaria*	*Fragillaria*	*Odentella*	*Odentella*	*Skeletonema*	*Odentella*	*Pinnularia*	*Cyclotella*	*Coscinodiscus*	*Cyclotella*	*Dinophysis*	APHA (23rd Ed. 2017)10200 F
			Thalassionema	*Rhizosolenia*	*Thalassionema*	*Rhizosolenia*	*Cyclotella*	*Diplotella*	*Rhizosolenia*	*Thalassionema*	*Pinnularia*	*Diploneis*	*Pinnularia*	*Pinnularia*	
			Navicula	*Pinnularia*	*Navicula*	*Coscinodiscus*	*Pinnularia*	*Odontella*	*Coscinodiscus*	*Navicula*	*Skeletonema*	*Rhizosolenia*	*Skeletonema*	*Thalassiothrix*	
			Thallassiosira	*Grammatophora*	*Thallassiosira*	*Grammatophora*	*Biddulphia*	*Dinophysis*	*Grammatophora*	*Thallassiosira*	*Thallassiosira*	*Dinophysis*	*Thallassiosira*	*Grammatophora*	
			Skeletonema	*Thallassiosira*	*Skeletonema*	*Thallassiosira*	*Thallassiosira*	*Surirella*	*Thallassiosira*	*Skeletonema*	*Thalassionema*	*Thalassionema*	*Thalassionema*	*Ceratium*	

B			Zooplankton												
1	Abudance(Population)	noX103 / 100 m3	32		45		51		39		28		37		APHA (23rd Ed. 2017)10200 G
2	Name of Group Number and name of group species of each group		*Copepods nauplii*		*Copepods nauplii*		*Copepods nauplii*		*Crustacean*		*Egg(Fish and Shrimps)*		*Copepods nauplii*		
			Oikoplura		*Copepods*		*Copepods*		*Copepods nauplii*		*Copepods*		*Crustacean Larvae*		
			Crustacean Larvae		*Crustacean Larvae*		*Crustacean Larvae*		*Crustacean Larvae*		*Crustacean Larvae*		*Oikoplura*		
			Crustacean		*Bivalve Larvae*		*Bivalve Larvae*		*Crustacean*		*Oikoplura*		*Bivalve Larvae*		
			Bivalve Larvae		*Crustacean*		*Crustacean*		*Bivalve Larvae*		*Crustacean*		*Oikoplura*		
3	Total Biomass	ml/100 m³	13.25		15.68		15.74		17.45		15.42		16.32		

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

SR. NO.	TEST PARAMETERS	UNIT	Apr-22		May-22		Jun-22		Jul-22		Aug-22		Sep-22		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM			
C			Microbiological												
1	Total Bacterial Count	CFU/ml	198		200		190		200		245		245		APHA 23rd Ed.2017,9215-C
2	Total Coliform	/100ml	39		28		40		36		42		42		APHA 23rd Ed.2017,9222-B
3	E.coli	/100ml	22		11		27		21		20		20		IS :15185:2016
4	Enterococcus	/100ml	15		18		15		20		14		14		IS:15186:2002
5	Salmonella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA 23rd Ed.2017,9260-E
7	Vibrio	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS: 5887 (Part V):1976

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RESULTS OF SEDIMENT ANALYSIS [M3 EAST OF BOCHAISLANOT DETECTED - N 22°46'530" E 069°41'690"]

SR. NO.	TEST PARAMETERS	UNIT	APRIL-2022	MAY-2022	JUNE-2022	JULY-2022	AUGUST-2022	SEPTEMBER-2022	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1.	Organic Matter	%	0.66	0.59	0.62	0.59	0.56	0.52	IS: 2720 (Part 22):1972 RA.2015, Amds.1
2.	Phosphorus as P	µg/g	574.4	588.2	594.6	574.2	562.4	542.2	IS: 10158 :1982, RA.2009 Method B
3.	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Lab SOP No. UERL/CHM/LTM/108
4.	Petroleum Hydrocarbon	µg/g	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
5.0	Heavy Metals								
5.1	Aluminum as Al	%	2.83	2.98	3.32	3.49	3.52	3.64	IS3025(Part 55)2003
5.2	Total Chromium as Cr+3	µg/g	82.4	94.2	92.2	104.2	110.5	118.4	EPA 3050B/7190 (Extraction &Analytical Method): 1986
5.3	Manganese as Mn	µg/g	402.1	424.6	462.4	489.6	510.5	522.4	EPA 3050B/7460 (Extraction &Analytical Method): 1986
5.4	Iron as Fe	%	2.89	3.05	3.15	3.35	3.42	3.58	EPA 3050B/7380 (Extraction &Analytical Method): 1986
5.5	Nickel as Ni	µg/g	38.94	40.1	42.5	46.32	44.26	52.24	EPA 3050B/7520 (Extraction &Analytical Method): 1986
5.6	Copper as Cu	µg/g	34.29	41.36	44.4	40.25	38.56	42.85	EPA 3050B /7210 (Extraction &Analytical Method):1986
5.7	Zinc as Zn	µg/g	64.97	70.19	65.2	75.94	78.24	82.85	EPA 3050B/7950 (Extraction &Analytical Method): 1986
5.8	Lead as Pb	µg/g	4.43	4.05	3.86	3.52	3.45	3.28	EPA 3050B /7420 (Extraction &Analytical Method):1986
5.9	Mercury as Hg	µg/g	BDL	BDL	BDL	BDL	BDL	BDL	EPA 7471B (Extraction &Analytical Method) :2007

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RESULTS OF SEDIMENT ANALYSIS [M3 EAST OF BOCHAISLANOT DETECTED - N 22°46'530" E 069°41'690"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
D	Benthic Organisms								
1	Macrobenthos	--	*Isopods*	*Gastropods*	*Isopods*	*Sipunculids*	*Polychates*	*Sipunculids*	APHA (23rd Ed. 2017)10500 C
			Polychates	*Polychates*	*Polychates*	*Polychates*	*Gastropods*	*Decapods Larvae*	
			Sipunculids	*Sipunculids*	*Sipunculids*	*Gastropods*	*Isopods*	*Amphipods*	
			Amphipods	*Amphipods*	*Amphipods*	*Isopods*	*Sipunculids*	*Isopods*	
2	MeioBenthos	--	*Polychates*	*Herpectacoids*	*Polychates*	*Herpectacoids*	*Herpectacoids*	*Turbellarians*	
			Foraminiferan	*Foraminiferan*	*Foraminiferan*	*Foraminiferan*	*Polychates*	*Herpectacoids*	
3	Population	no/m²	*300*	320	380	352	360	*355*	

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RESULTS OF MARINE WATER [M4 JUNA BANOT DETECTEDAR N 22°47'577" E 069°43'620"]

SR. NO.	TEST PARAMETERS	UNIT	APRIL-2022		MAY-2022		JUNE-2022		JULY-2022		AUGUST-2022		SEPTEMBER-2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1.	pH	--	8.04	7.92	8.18	8.01	8.24	8.08	8.19	8.04	8.21	8.08	8.24	8.12	IS 3025 (Part11)1983
2.	Temperature	°C	30.1	30	30.3	30.2	30.4	30.2	30.2	30.1	30.2	30.1	30.2	30.1	IS 3025 (Part 9)1984
3.	Total Suspended Solids	mg/L	128	102	124	108	124	108	126	88	130	112	124	106	APHA 23rd Ed.,2017,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	3.1	BDL	2.8	BDL	2.9	BDL	2.8	BDL	3.1	BDL	2.9	BDL	IS 3025(Part 4)1993Amd.01
5.	Dissolved Oxygen	mg/L	6.07	5.86	5.92	5.71	6.02	5.82	6.06	5.86	6.17	5.96	6.15	6.05	APHA 23rd Ed.,2017,4500-O, B
6.	Salinity	ppt	35.29	35.94	35.36	35.82	35.74	36.24	35.62	35.98	35.45	36.02	35.43	35.94	By Calculation
7.	Oil & Grease	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	IS 3025(Part39) 1991,Amd.2
8.	Nitrate as NO_3	µmol/L	2.84	2.5	2.32	2.93	2.84	2.59	2.37	2.16	2.59	2.24	3.66	3.23	APHA 23rd Ed., 2017,4500 NO3-B
9.	Nitrite as NO_2	µmol/L	0.365	0.325	0.379	0.31	0.345	0.3	0.207	0.189	0.241	0.198	0.276	0.259	APHA 23rd Ed.,2017,4500NO_2B
10.	Ammonical Nitrogen as NH_3	µmol/L	2.62	2.49	2.59	2.32	2.49	2.06	2.75	2.62	3.84	3.32	3.62	3.28	APHA 23rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO_4	µmol/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	APHA 23rd Ed.,2017,4500-P, D
12.	Total Nitrogen	µmol/L	5.68	5.55	5.289	5.56	5.675	4.95	5.327	4.969	6.671	5.758	7.556	6.769	APHA 23rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
14.	Total Dissolved Solids	mg/L	36524	37042	36204	36944	36312	36864	36422	36894	36128	36750	35988	36520	APHA 23rd Ed.,2017, 2540- C
15.	COD	mg/L	20.04	16.03	23.9	19.9	19.7	11.8	24.05	12.02	23.98	15.98	20.12	16.1	APHA 23rd Ed.,2017, 5220-B

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RESULTS OF MARINE WATER [M4 JUNA BANOT DETECTEDAR N 22°47'577" E 069°43'620"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-22		May-22		Jun-22		Jul-22		Aug-22		Sep-22		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
A	Phytoplankton														
1.	Chlorophyll	mg/m³	2.24	3.06	2.68	3.06	2.44	2.8	2.44	2.74	2.36	2.78	2.69	3.21	APHA (23rd Ed. 2017)10200 H
2.	Phaeophytin	mg/m³	0.48	0.48	0.8	0.48	0.79	0.65	0.87	0.68	0.84	0.62	1.32	0.52	APHA (23rd Ed. 2017)10200 H
3.	Cell Count	No. x 10³/L	129	86	109	86	114	70	98	100	101	120	95	123	APHA (23rd Ed. 2017)10200 F
4	Name of Group Number and name of group species of each group	--	*Melosira*	*Diploneis*	*Melosira*	*Gramma tophora*	*Diploneis*	*Cyclotella*	*Gramma tophora*	*Melosira*	*Gramma tophora*	*Rhizosolenia*	*Coscinodiscus*	*Ceratium*	APHA (23rd Ed. 2017)10200 F
			Pinnularia	*Rhizosolenia*	*Pinnularia*	*Rhizosolenia*	*Rhizosolenia*	*Fragillaria*	*Rhizosolenia*	*Pinnularia*	*Rhizosolenia*	*Pinnularia*	*Diploneis*	*Pinnularia*	
			Skeletonema	*Nitzschia*	*Skeletonema*	*Nitzschia*	*Nitzschia*	*Diniphysis*	*Nitzschia*	*Skeletonema*	*Nitzschia*	*Thalassiothrix*	*Rhizosolenia*	*Odontella*	
			Rhizosolenia	*Thalassiothrix*	*Nitzschia*	*Thallassiosira*	*Cyclotella*	*Thallassiosira*	*Thallassiosira*	*Rhizosolenia*	*Thallassiosira*	*Gramma tophora*	*Dinophysis*	*Thalassiothrix*	
			Pleurosigma	*Pleurosigma*	*Pleurosigma*	*Pleurosigma*	*Pleurosigma*	*Skeletonema*	*Pleurosigma*	*Pleurosigma*	*Pleurosigma*	*Ceratium*	*Thalassionema*	*Thallassiosira*	
B	Zooplankton														
1	Abudance(Population)	noX103 / 100 m3	45		38		41		40		31		40		APHA (23rd Ed. 2017)10200 G
2	Name of Group Number and name of group species of each group		*Egg(Fish and Shrimps)*		*Egg(Fish and Shrimps)*		*Egg(Fish and Shrimps)*		*Copepods nauplii*		*Copepods nauplii*		*Pinnularia*		
			Oikoplura		*Oikoplura*		*Oikoplura*		*Crustacean Larvae*		*Crustacean Larvae*		*Surirella*		
			Copepods nauplii		*Copepods nauplii*		*Copepods nauplii*		*Oikoplura*		*Oikoplura*		*Odentella*		
			Crustacean		*Crustacean*		*Crustacean*		*Bivalve Larvae*		*Bivalve Larvae*		*Grammatophora*		
			Bivalve Larvae		*Bivalve Larvae*		*Bivalve Larvae*		*Oikoplura*		*Oikoplura*		*Melosira*		
3	Total Biomass	ml/100 m³	17.24		16.35		13.98		14.74		16.48		16.54		

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RESULTS OF MARINE WATER [M4 JUNA BANOT DETECTEDAR N 22°47'577" E 069°43'620"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-22		May-22		Jun-22		Jul-22		Aug-22		Sep-22		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM			
C			Microbiological												
1	Total Bacterial Count	CFU/ml	150		188		128		148		200		204		APHA 23rd Ed.2017,9215-C
2	Total Coliform	/100ml	30		42		24		28		41		35		APHA 23rd Ed.2017,9222-B
3	E.coli	/100ml	28		30		12		10		23		22		IS :15185:2016
4	Enterococcus	/100ml	10		21		8		6		17		21		IS:15186:2002
5	Salmonella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA 23rd Ed.2017,9260-E
7	Vibrio	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS: 5887 (Part V):1976

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RESULTS OF SEDIMENT ANALYSIS [M4 JUNA BANOT DETECTEDAR N 22°47'577" E 069°43'620"]

SR. NO.	TEST PARAMETERS	UNIT	APRIL-2022	MAY-2022	JUNE-2022	JULY-2022	AUGUST-2022	SEPTEMBER-2022	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1.	Organic Matter	%	0.52	0.49	0.56	2.46	1.84	1.51	IS: 2720 (Part 22):1972 RA.2015, Amds.1
2.	Phosphorus as P	µg/g	622.1	638.2	612.4	586.4	582.5	544.1	IS: 10158 :1982, RA.2009 Method B
3.	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Lab SOP No. UERL/CHM/LTM/108
4.	Petroleum Hydrocarbon	µg/g	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
5.0	Heavy Metals								
5.1	Aluminum as Al	%	3.12	3.31	3.16	3.39	3.44	3.48	IS3025(Part 55)2003
5.2	Total Chromium as Cr+3	µg/g	58.64	71.2	68.6	76.9	80.4	91.2	EPA 3050B/7190 (Extraction &Analytical Method): 1986
5.3	Manganese as Mn	µg/g	404.1	419.8	435.6	486.2	502.2	513.4	EPA 3050B/7460 (Extraction &Analytical Method): 1986
5.4	Iron as Fe	%	3.12	3.26	3.52	3.75	3.84	4.02	EPA 3050B/7380 (Extraction &Analytical Method): 1986
5.5	Nickel as Ni	µg/g	42.16	44.39	44.82	42.62	40.26	44.36	EPA 3050B/7520 (Extraction &Analytical Method): 1986
5.6	Copper as Cu	µg/g	28.94	36.84	38.24	39.84	36.58	35.26	EPA 3050B /7210 (Extraction &Analytical Method):1986
5.7	Zinc as Zn	µg/g	52.12	58.57	55.64	64.85	68.52	76.94	EPA 3050B/7950 (Extraction &Analytical Method): 1986
5.8	Lead as Pb	µg/g	4.16	3.94	3.85	3.42	3.25	2.89	EPA 3050B /7420 (Extraction &Analytical Method):1986
5.9	Mercury as Hg	µg/g	BDL	BDL	BDL	BDL	BDL	BDL	EPA 7471B (Extraction &Analytical Method) :2007

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RESULTS OF SEDIMENT ANALYSIS [M4 JUNA BANOT DETECTEDAR N 22°47'577" E 069°43'620"]

SR. NO.	TEST PARAMETERS	UNIT	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
D	Benthic Organisms								
1	Macrobenthos	--	*Amphipods*	*Amphipods*	*Amphipods*	*Amphipods*	*Amphipods*	*Isopods*	APHA (23rd Ed. 2017)10500 C
			Decapod Larvae	*Decapod Larvae*	Sipunculids	Sipunculids	Sipunculids	Polychates	
			Isopods	*Isopods*	*Isopods*	*Isopods*	*Isopods*	*Sipunculids*	
			Gastropods	*Gastropods*	*Gastropods*	*Gastropods*	*Gastropods*	*Amphipods*	
2	MeioBenthos	--	*Foraminiferan*	*Turbellarians*	*Decapods Larvae*	*Decapods Larvae*	*Decapods Larvae*	*Polychates*	
			Herpectacoids	*Herpectacoids*	*Herpectacoids*	*Herpectacoids*	*Herpectacoids*	*Foraminiferan*	
3	Population	no/m²	278	265	290	321	342	289	

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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	APRIL-2022		MAY-2022		JUNE-2022		JULY-2022		AUGUST-2022		SEPTEMBER-2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1.	pH	--	8.12	8.02	8.31	8.12	8.24	8.11	8.21	8.04	8.25	8.09	8.22	8.12	IS 3025 (Part11)1983
2.	Temperature	°C	30.2	30.1	30.2	30.1	30.3	30.1	30.2	30.1	30.1	30	30.2	30.1	IS 3025 (Part 9)1984
3.	Total Suspended Solids	mg/L	94	88	106	96	106	96	102	90	142	114	138	110	APHA 23rd Ed.,2017,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	2.9	BDL	3	BDL	3.2	BDL	3.2	BDL	3	BDL	3.1	BDL	IS 3025(Part 44)1993Amd.01
5.	Dissolved Oxygen	mg/L	5.97	5.87	6.02	5.81	6.12	5.92	5.96	5.85	6.07	5.86	6.15	5.85	APHA 23rd Ed.,2017,4500-O, B
6.	Salinity	ppt	35.18	35.68	35.29	35.89	35.36	36.92	35.28	36.12	35.22	35.98	35.34	36.05	By Calculation
7.	Oil & Grease	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	IS 3025(Part39)1991, Amd.2
8.	Nitrate as NO_3	µmol/L	2.76	2.67	3.45	2.76	2.32	1.72	3.23	2.8	3.36	3.02	3.88	3.45	APHA 23rd Ed., 2017,4500 NO3-B
9.	Nitrite as NO_2	µmol/L	0.39	0.365	0.431	0.345	0.379	0.276	0.379	0.344	0.632	0.31	0.302	0.224	APHA 23rd Ed.,2017,4500NO_2B
10.	Ammonical Nitrogen as NH_3	µmol/L	2.37	2.24	2.84	2.49	2.59	2.24	3.96	2.93	3.84	3.62	3.19	2.84	APHA 23rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO_4	µmol/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	APHA 23rd Ed.,2017,4500-P, D
12.	Total Nitrogen	µmol/L	5.77	5.6	6.721	5.595	5.289	4.24	7.569	6.074	7.832	6.95	7.372	6.514	APHA 23rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
14.	Total Dissolved Solids	mg/L	36710	36944	36528	37002	36244	36948	36008	36644	35866	36542	35920	36610	APHA 23rd Ed.,2017, 2540- C
15.	COD	mg/L	16.03	8.02	15.9	11.9	15.8	7.9	20.04	16.03	7.99	4	24.14	12.07	APHA 23rd Ed.,2017, 5220-B

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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	Apr-22		May-22		Jun-22		Jul-22		Aug-22		Sep-22		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
A			Phytoplankton												
1.	Chlorophyll	mg/m³	3.16	2.36	2.9	3.1	3.12	2.94	2.68	3.41	2.47	2.98	2.47	2.87	APHA (23rd Ed. 2017)10200 H
2.	Phaeophytin	mg/m³	0.93	1.25	0.88	1.25	0.85	1.3	0.97	2.14	1.23	0.98	0.97	0.85	APHA (23rd Ed. 2017)10200 H
3.	Cell Count	No. x 10³/L	107	135	89	96	69	90	79	87	59	104	74	96	APHA (23rd Ed. 2017)10200 F
4	Name of Group Number and name of group species of each group	--	*Cyclotella*	*Pinnularia*	*Rhizosolenia*	*Thalassiothrix*	*Pinnularia*	*Ceratium*	*Thalassiothrix*	*Cyclotella*	*Rhizosolenia*	*Diploneis*	*Fragillaria*	*Surirella*	APHA (23rd Ed. 2017)10200 F
			Pinnularia	*Surirella*	*Biddulphia*	*Surirella*	*Biddulphia*	*Melosira*	*Surirella*	*Pinnularia*	*Biddulphia*	*Rhizosolenia*	*Thalassionema*	*Thalassiothrix*	
			Skeletonema	*Navicula*	*Skeletonema*	*Navicula*	*Navicula*	*Nitzschia*	*Navicula*	*Skeletonema*	*Skeletonema*	*Nitzschia*	*Navicula*	*Navicula*	
			Thallassiosira	*Thallassiosira*	*Thallassiosira*	*Thallassiosira*	*Thallassiosira*	*Dinophysis*	*Thallassiosira*	*Thallassiosira*	*Thallassiosira*	*Thalassiothrix*	*Thallassiosira*	*Skeletonema*	
			Thalassionema	*Skeletonema*	*Thalassionema*	*Skeletonema*	*Skeletonema*	*Pleurosigma*	*Skeletonema*	*Thalassionema*	*Thalassionema*	*Pleurosigma*	*Skeletonema*	*Thallassiosira*	
B			Zooplankton												
1	Abudance(Population)	noX103 / 100 m3	29		32		32		51		47		51		APHA (23rd Ed. 2017)10200 G
2	Name of Group Number and name of group species of each group		*Crustacean Larvae*		*Crustacean Larvae*		*Egg(Fish and Shrimps)*		*Egg(Fish and Shrimps)*		*Copepods*		*Nitzschia*		
			Decapoda		*Egg(Fish and Shrimps)*		*Copepods*		*Copepods*		*Oikoplura*		*Pinnularia*		
			Copepods		*Copepods*		*Crustacean Larvae*		*Crustacean Larvae*		*Crustacean Larvae*		*Odontella*		
			Crustacean		*Crustacean*		*Oikoplura*		*Oikoplura*		*Crustacean*		*Dinophysis*		
			Bivalve Larvae		*Bivalve Larvae*		*Bivalve Larvae*		*Bivalve Larvae*		*Bivalve Larvae*		*Surirella*		
3	Total Biomass	ml/100 m³	15.74		14.78		16.78		15.48		17.86		18.23		

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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	Apr-22		May-22		Jun-22		Jul-22		Aug-22		Sep-22		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM			
C			Microbiological												
1	Total Bacterial Count	CFU/ml	142		170		200		209		176		158		APHA 23rd Ed.2017,9215-C
2	Total Coliform	/100ml	50		44		39		42		39		23		APHA 23rd Ed.2017,9222-B
3	E.coli	/100ml	29		31		29		30		25		20		IS :15185:2016
4	Enterococcus	/100ml	18		20		22		20		16		10		IS:15186:2002
5	Salmonella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA 23rd Ed.2017,9260-E
7	Vibrio	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS: 5887 (Part V):1976

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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	APRIL-2022	MAY-2022	JUNE-2022	JULY-2022	AUGUST-2022	SEPTEMBER-2022	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1.	Organic Matter	%	0.49	0.52	0.56	0.49	0.45	0.44	IS: 2720 (Part 22):1972 RA.2015, Amds.1
2.	Phosphorus as P	µg/g	588.2	574.2	564.8	542.5	535.2	554.1	IS: 10158 :1982, RA.2009 Method B
3.	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Lab SOP No. UERL/CHM/LTM/108
4.	Petroleum Hydrocarbon	µg/g	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
5.0	Heavy Metals								
5.1	Aluminum as Al	%	2.61	2.86	3.16	3.39	3.46	3.51	IS3025(Part 55)2003
5.2	Total Chromium as Cr+3	µg/g	38.94	44.23	42.64	46.25	48.9	56.4	EPA 3050B/7190 (Extraction &Analytical Method): 1986
5.3	Manganese as Mn	µg/g	388.5	402.2	388.6	402.4	410.8	424.1	EPA 3050B/7460 (Extraction &Analytical Method): 1986
5.4	Iron as Fe	%	2.69	2.75	2.84	3.12	3.28	3.35	EPA 3050B/7380 (Extraction &Analytical Method): 1986
5.5	Nickel as Ni	µg/g	33.28	36.85	36.88	38.62	36.24	41.25	EPA 3050B/7520 (Extraction &Analytical Method): 1986
5.6	Copper as Cu	µg/g	18.96	24.21	24.82	26.89	28.64	33.28	EPA 3050B /7210 (Extraction &Analytical Method):1986
5.7	Zinc as Zn	µg/g	35.24	40.28	41.28	49.84	52.4	64.82	EPA 3050B/7950 (Extraction &Analytical Method): 1986
5.8	Lead as Pb	µg/g	3.56	3.24	3.64	3.38	3.12	2.82	EPA 3050B /7420 (Extraction &Analytical Method):1986
5.9	Mercury as Hg	µg/g	BDL	BDL	BDL	BDL	BDL	BDL	EPA 7471B (Extraction &Analytical Method) :2007

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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	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
D			Benthic Organisms						
1	Macrobenthos	--	Decapod Larvae	*Decapod Larvae*	*Polychates*	*Polychates*	*Polychates*	Amphipods	APHA (23rd Ed. 2017)10500 C
			Gastropods	*Gastropods*	*Gastropods*	*Gastropods*	*Gastropods*	*Decapod Larvae*	
			Isopods	*Isopods*	*Isopods*	*Isopods*	*Isopods*	*Isopods*	
			Amphipods	*Sipunculids*	*Sipunculids*	*Sipunculids*	*Sipunculids*	*Gastropods*	
2	MeioBenthos	--	*Herpectacoids*	*Herpectacoids*	*Herpectacoids*	*Herpectacoids*	*Herpectacoids*	*Foraminiferan*	
			Polychates	*Polychates*	*Polychates*	*Polychates*	*Polychates*	*Herpectacoids*	
3	Population	no/m²	250	278	284	384	325	306	

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

SR. NO.	TEST PARAMETERS	UNIT	APRIL-2022		MAY-2022		JUNE-2022		JULY-2022		AUGUST-2022		SEPTEMBER-2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1.	pH	--	8.21	8.08	8.26	8.11	8.26	8.02	8.24	8.11	8.15	8.02	8.16	7.97	IS 3025 (Part11)1983
2.	Temperature	°C	30.2	30.1	30.3	30.2	30.2	30.1	30.1	30	30.2	30.1	30.3	30.2	IS 3025 (Part 9)1984
3.	Total Suspended Solids	mg/L	122	114	132	112	132	112	122	108	128	114	136	112	APHA 23rd Ed.,2017,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	2.7	BDL	3.1	BDL	2.8	BDL	2.6	BDL	2.8	BDL	3	BDL	IS 3025(Part 44)1993Amd.01
5.	Dissolved Oxygen	mg/L	5.97	5.77	5.92	5.81	5.92	5.8	6.06	6	6.17	5.96	6.05	5.95	APHA 23rd Ed.,2017,4500-O, B
6.	Salinity	ppt	35.26	35.86	35.44	36.02	35.26	35.86	35.44	35.94	35.38	35.92	35.42	36.12	By Calculation
7.	Oil & Grease	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	IS 3025(Part39)1991, Amd. 2
8.	Nitrate as NO_3	µmol/L	2.84	2.67	2.93	2.67	2.76	2.59	2.8	2.37	3.23	2.59	3.66	3.02	APHA 23rd Ed., 2017,4500 NO3-B
9.	Nitrite as NO_2	µmol/L	0.235	0.17	0.241	0.198	0.379	0.276	0.259	0.189	0.293	0.259	0.328	0.259	APHA 23rd Ed.,2017,4500NO_2B
10.	Ammonical Nitrogen as NH_3	µmol/L	2.58	2.54	2.41	2.24	2.32	1.56	4.05	3.83	3.97	3.84	3.79	3.36	APHA 23rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO_4	µmol/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	APHA 23rd Ed.,2017,4500-P, D
12.	Total Nitrogen	µmol/L	5.81	5.64	5.581	5.108	5.459	4.426	7.109	6.389	7.493	6.689	7.778	6.639	APHA 23rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
14.	Total Dissolved Solids	mg/L	36128	36620	36442	36714	36244	36824	36102	36558	35956	36444	36020	36580	APHA 23rd Ed.,2017, 2540- C
15.	COD	mg/L	16.03	8.02	19.9	11.9	15.8	11.8	20.04	12.02	15.98	7.99	20.12	16.1	APHA 23rd Ed.,2017, 5220-B

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

SR. NO.	TEST PARAMETERS	UNIT	Apr-22		May-22		Jun-22		Jul-22		Aug-22		Sep-22		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
A			Phytoplankton												
1.	Chlorophyll	mg/m³	2.14	2.48	2.14	2.65	2.59	2.65	3.25	2.87	3	3.14	3	3	APHA (23rd Ed. 2017)10200 H
2.	Phaeophytin	mg/m³	0.74	0.96	0.74	1.1	0.78	1.85	0.96	2	0.78	2.03	0.9	1.75	APHA (23rd Ed. 2017)10200 H
3.	Cell Count	No. x 10³/L	110	140	110	128	83	115	90	109	98	114	108	106	APHA (23rd Ed. 2017)10200 F
4	Name of Group Number and name of group species of each group	--	*Gramma tophora*	*Coscinodiscus*	*Thallassiosira*	*Navicula*	*Coscinodiscus*	*Navicula*	*Navicula*	*Gramma tophora*	*Thallassiosira*	*Gramma tophora*	*Thallassiosira*	*Gramma tophora*	APHA (23rd Ed. 2017)10200 F
			Rhizosolenia	*Diploneis*	*Melosira*	*Skeletonema*	*Diploneis*	*Cyclotella*	*Skeletonema*	*Rhizosolenia*	*Melosira*	*Rhizosolenia*	*Melosira*	*Rhizosolenia*	
			Nitzschia	*Rhizosolenia*	*Nitzschia*	*Rhizosolenia*	*Rhizosolenia*	*Pinnularia*	*Rhizosolenia*	*Nitzschia*	*Nitzschia*	*Nitzschia*	*Nitzschia*	*Nitzschia*	
			Thalassionema	*Dinophysis*	*Rhizosolenia*	*Dinophysis*	*Dinophysis*	*Skeletonema*	*Dinophysis*	*Thalassionema*	*Rhizosolenia*	*Thalassionema*	*Rhizosolenia*	*Thallassiosira*	
			Pleurosigma	*Thalassionema*	*Pleurosigma*	*Thalassionema*	*Thalassionema*	*Thallassiosira*	*Thalassionema*	*Pleurosigma*	*Pleurosigma*	*Pleurosigma*	*Pleurosigma*	*Pleurosigma*	

B			Zooplankton												
1	Abudance(Population)	noX103 / 100 m3	30		27		36		47		41		48		APHA (23rd Ed. 2017)10200 G
2	Name of Group Number and name of group species of each group		*Crustacean*		*Copepods nauplii*		*Oikoplura*		*Oikoplura*		*Copepods nauplii*		*Copepods nauplii*		
			Oikoplura		*Oikoplura*		*Copepods nauplii*		*Copepods nauplii*		*Crustacean Larvae*		*Crustacean Larvae*		
			Crustacean Larvae		*Crustacean Larvae*		*Crustacean Larvae*		*Crustacean Larvae*		*Oikoplura*		*Oikoplura*		
			Oikoplura		*Oikoplura*		*Crustacean*		*Crustacean*		*Bivalve Larvae*		*Bivalve Larvae*		
			Bivalve Larvae		*Bivalve Larvae*		*Bivalve Larvae*		*Bivalve Larvae*		*Oikoplura*		*Oikoplura*		
3	Total Biomass	ml/100 m³	16.54		15.38		14.98		16.98		16.32		15.36		

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

SR. NO.	TEST PARAMETERS	UNIT	Apr-22		May-22		Jun-22		Jul-22		Aug-22		Sep-22		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
C			Microbiological												
1	Total Bacterial Count	CFU/ml	178		198		196		180		202		200		APHA 23rd Ed.2017,9215-C
2	Total Coliform	/100ml	39		32		47		36		32		30		APHA 23rd Ed.2017,9222-B
3	E.coli	/100ml	20		21		25		21		24		21		IS :15185:2016
4	Enterococcus	/100ml	17		14		20		14		15		17		IS:15186:2002
5	Salmonella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA 23rd Ed.2017,9260-E
7	Vibrio	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS: 5887 (Part V):1976

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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	APRIL-2022		MAY-2022		JUNE-2022		JULY-2022		AUGUST-2022		SEPTEMBER-2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1.	pH	--	8.22	8.09	8.19	8.12	8.24	8.16	8.18	8.06	8.22	8.02	8.05	7.92	IS 3025 (Part11)1983
2.	Temperature	°C	30.3	30.2	30.2	30.1	30.3	30.1	30.2	30.1	30.2	30.1	30.3	30.2	IS 3025 (Part 9)1984
3.	Total Suspended Solids	mg/L	118	104	134	106	134	106	144	126	156	130	134	112	APHA 23rd Ed.,2017,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	2.9	BDL	2.8	BDL	2.9	BDL	2.5	BDL	2.6	BDL	2.8	BDL	IS 3025(Part 44)1993Amd.01
5.	Dissolved Oxygen	mg/L	5.97	5.87	6.12	5.92	6.02	5.92	6.06	5.96	6.07	5.96	5.95	5.75	APHA 23rd Ed.,2017,4500-O, B
6.	Salinity	ppt	35.31	35.82	35.46	35.94	35.28	35.88	35.14	35.72	35.18	35.74	35.28	35.94	By Calculation
7.	Oil & Grease	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	IS 3025(Part39) 1991, Amd. 2
8.	Nitrate as NO_3	µmol/L	2.67	2.41	2.59	2.32	2.84	2.59	3.66	3.44	3.45	3.02	3.45	2.8	APHA 23rd Ed., 2017,4500 NO3-B
9.	Nitrite as NO_2	µmol/L	0.475	0.365	0.56	0.431	0.474	0.31	0.413	0.379	0.379	0.328	0.345	0.276	APHA 23rd Ed.,2017,4500NO_2B
10.	Ammonical Nitrogen as NH_3	µmol/L	2.62	2.58	2.49	2.24	2.41	1.89	3.96	3.62	3.84	3.62	3.28	3.1	APHA 23rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO_4	µmol/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	APHA 23rd Ed.,2017,4500-P, D
12.	Total Nitrogen	µmol/L	5.68	5.52	5.64	4.991	5.724	4.79	8.033	7.439	7.669	6.968	7.075	6.176	APHA 23rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
14.	Total Dissolved Solids	mg/L	36284	36622	36846	37124	36564	37056	36124	36786	36020	36594	36110	36630	APHA 23rd Ed.,2017, 2540- C
15.	COD	mg/L	16.03	12.02	15.9	11.9	19.7	11.8	24.05	16.03	11.99	7.99	16.1	12.07	APHA 23rd Ed.,2017, 5220-B

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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	Apr-22		May-22		Jun-22		Jul-22		Aug-22		Sep-22		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
A			Phytoplankton												
1.	Chlorophyll	mg/m³	2.09	3.21	3.14	3	3.14	2.69	2.98	2.47	3.01	2.85	3.01	2.85	APHA (23rd Ed. 2017)10200 H
2.	Phaeophytin	mg/m³	1.32	1.41	1.3	1.12	1.3	0.86	1.97	0.96	2.38	0.86	2.38	0.86	APHA (23rd Ed. 2017)10200 H
3.	Cell Count	No. x 10³/L	131	100	125	103	125	100	120	67	115	96	113	102	APHA (23rd Ed. 2017)10200 F
4	Name of Group Number and name of group species of each group	--	*Skeletonema*	*Rhizosolenia*	*Odontella*	*Dinophysis*	*Rhizosolenia*	*Surirella*	*Dinophysis*	*Skeletonema*	*Dinophysis*	*Skeletonema*	*Gramma tophora*	*Pinnularia*	APHA (23rd Ed. 2017)10200 F
			Gramma tophora	*Pinnularia*	*Gramma tophora*	*Pinnularia*	*Fragillaria*	*Rhizosolenia*	*Pinnularia*	*Gramma tophora*	*Pinnularia*	*Gramma tophora*	*Rhizosolenia*	*Thalassionema*	
			Nitzschia	*Thalassiothrix*	*Nitzschia*	*Thalassiothrix*	*Thalassiothrix*	*Nitzschia*	*Thalassiothrix*	*Nitzschia*	*Thalassiothrix*	*Nitzschia*	*Nitzschia*	*Navicula*	
			Thalassiothrix	*Gramma tophora*	*Thalassiothrix*	*Gramma tophora*	*Gramma tophora*	*Thalassionema*	*Gramma tophora*	*Thalassiothrix*	*Gramma tophora*	*Thalassiothrix*	*Thalassionema*	*Thallassiosira*	
			Pleurosigma	*Ceratium*	*Pleurosigma*	*Ceratium*	*Ceratium*	*Pleurosigma*	*Ceratium*	*Pleurosigma*	*Ceratium*	*Pleurosigma*	*Pleurosigma*	*Skeletonema*	

B			Zooplankton						
1	Abudance(Population)	noX103 / 100 m3	41	39	47	58	60	54	APHA (23rd Ed. 2017)10200 G
2	Name of Group Number and name of group species of each group		*Egg(Fish and Shrimps)*	*Egg(Fish and Shrimps)*	*Decapoda*	*Crustacean Larvae*	*Egg(Fish and Shrimps)*	*Egg(Fish and Shrimps)*	
			Copepods	*Copepods*	*Copepods*	*Decapoda*	*Oikoplura*	*Oikoplura*	
			Crustacean Larvae	*Crustacean Larvae*	*Crustacean Larvae*	*Copepods*	*Copepods nauplii*	*Copepods nauplii*	
			Oikoplura	*Oikoplura*	*Crustacean*	*Crustacean*	*Crustacean*	*Crustacean*	
			Bivalve Larvae	*Crustacean*	*Oikoplura*	*Bivalve Larvae*	*Bivalve Larvae*	*Bivalve Larvae*	
3	Total Biomass	ml/100 m³	17.21	16.21	15.36	14.52	15.23	14.68	

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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	Apr-22		May-22		Jun-22		Jul-22		Aug-22		Sep-22		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM			
C			Microbiological												
1	Total Bacterial Count	CFU/ml	200		202		214		208		216		264		APHA 23rd Ed.2017,9215-C
2	Total Coliform	/100ml	32		37		29		28		30		47		APHA 23rd Ed.2017,9222-B
3	E.coli	/100ml	19		22		20		20		17		31		IS :15185:2016
4	Enterococcus	/100ml	11		10		12		12		10		24		IS:15186:2002
5	Salmonella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA 23rd Ed.2017,9260-E
7	Vibrio	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS: 5887 (Part V):1976

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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	APRIL-2022	MAY-2022	JUNE-2022	JULY-2022	AUGUST-2022	SEPTEMBER-2022	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1.	Organic Matter	%	0.42	0.48	0.52	0.49	0.52	0.54	IS: 2720 (Part 22):1972 RA.2015, Amds.1
2.	Phosphorus as P	µg/g	594.2	601.2	609.8	611.2	594.5	560.5	IS: 10158 :1982, RA.2009 Method B
3.	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Lab SOP No. UERL/CHM/LTM/108
4.	Petroleum Hydrocarbon	µg/g	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
5.0	Heavy Metals								
5.1	Aluminum as Al	%	2.58	2.74	2.88	3.16	3.24	3.38	IS3025(Part 55)2003
5.2	Total Chromium as Cr+3	µg/g	42.41	48.9	44.6	56.58	59.54	66.8	EPA 3050B/7190 (Extraction &Analytical Method): 1986
5.3	Manganese as Mn	µg/g	431.2	444.1	452	487	497	510	EPA 3050B/7460 (Extraction &Analytical Method): 1986
5.4	Iron as Fe	%	2.61	2.73	2.84	3.25	3.35	3.42	EPA 3050B/7380 (Extraction &Analytical Method): 1986
5.5	Nickel as Ni	µg/g	32.62	36.94	34.85	36.92	35.24	37.16	EPA 3050B/7520 (Extraction &Analytical Method): 1986
5.6	Copper as Cu	µg/g	22.21	26.24	26.38	29.85	30.25	32.19	EPA 3050B /7210 (Extraction &Analytical Method):1986
5.7	Zinc as Zn	µg/g	46.82	52.22	55	65	70	78	EPA 3050B/7950 (Extraction &Analytical Method): 1986
5.8	Lead as Pb	µg/g	4.74	4.29	4.11	3.86	3.42	3.25	EPA 3050B /7420 (Extraction &Analytical Method):1986
5.9	Mercury as Hg	µg/g	BDL	BDL	BDL	BDL	BDL	BDL	EPA 7471B (Extraction &Analytical Method) :2007

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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	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
D			Benthic Organisms						
1	Macrobenthos	--	*Amphipods*	*Gastropods*	*Gastropods*	*Sipunculids*	*Sipunculids*	*Sipunculids*	APHA (23rd Ed. 2017)10500 C
			Sipunculids	*Isopods*	*Isopods*	*Isopods*	*Isopods*	*Decapods Larvae*	
			Isopods	*Amphipods*	*Amphipods*	*Foraminiferan*	*Foraminiferan*	*Polychates*	
			Decapod Larvae	*Decapod Larvae*	*Decapod Larvae*	*Decapod Larvae*	*Decapod Larvae*	*Isopods*	
2	MeioBenthos	--	*Herpectacoids*	*Polychates*	*Polychates*	*Herpectacoids*	*Herpectacoids*	*Turbellarians*	
			Polychates	*Turbellarians*	*Turbellarians*	*Turbellarians*	*Turbellarians*	*Herpectacoids*	
3	Population	no/m²	326	330	330	385	340	325	

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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	APRIL-2022		MAY-2022		JUNE-2022		JULY-2022		AUGUST-2022		SEPTEMBER-2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1.	pH	--	8.16	7.94	8.22	7.99	8.3	8.13	8.28	8.14	8.24	8.09	8.18	8.05	IS 3025 (Part11)1983
2.	Temperature	°C	30.3	30.2	30.4	30.3	30.3	30.2	30.1	30	30.1	30	30.2	30.1	IS 3025 (Part 9)1984
3.	Total Suspended Solids	mg/L	119	111	122	114	122	114	134	118	144	124	122	104	APHA 23rd Ed.,2017,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	2.8	BDL	2.8	BDL	2.9	BDL	2.7	BDL	2.5	BDL	2.6	BDL	IS 3025(Part 44)1993Amd.01
5.	Dissolved Oxygen	mg/L	6.07	5.87	6.22	6.02	6.12	6	6.17	6.1	6.17	5.96	6.15	5.95	APHA 23rd Ed.,2017,4500-O, B
6.	Salinity	ppt	35.22	35.74	35.28	35.82	35.42	35.94	35.19	35.82	35.24	35.78	35.22	35.95	By Calculation
7.	Oil & Grease	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	IS 3025(Part39) 1991, Amd. 2
8.	Nitrate as NO_3	µmol/L	2.67	2.33	2.76	2.59	2.93	2.67	3.23	3.02	2.93	2.37	3.02	2.59	APHA 23rd Ed., 2017,4500 NO3-B
9.	Nitrite as NO_2	µmol/L	0.325	0.235	0.379	0.31	0.241	0.22	0.293	0.259	0.241	0.198	0.276	0.215	APHA 23rd Ed.,2017,4500NO_2B
10.	Ammonical Nitrogen as NH_3	µmol/L	2.67	2.58	2.32	2.16	2.41	1.94	3.66	3.18	3.32	3.1	3.79	3.36	APHA 23rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO_4	µmol/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	APHA 23rd Ed.,2017,4500-P, D
12.	Total Nitrogen	µmol/L	5.55	5.47	5.459	5.06	5.581	4.83	7.183	6.459	6.491	5.668	7.086	6.165	APHA 23rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
14.	Total Dissolved Solids	mg/L	36112	36624	36628	37250	36524	37146	36262	36860	36124	36762	36140	36640	APHA 23rd Ed.,2017, 2540- C
15.	COD	mg/L	24.05	20.04	27.9	19.9	23.7	15.8	20.04	12.02	19.98	11.99	12.07	8.05	APHA 23rd Ed.,2017, 5220-B

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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	Apr-22		May-22		Jun-22		Jul-22		Aug-22		Sep-22		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
A			Phytoplankton												
1.	Chlorophyll	mg/m³	2.78	2.85	2.78	2.79	2.78	2.74	2.48	2.41	2.69	2.41	2.69	2.58	APHA (23rd Ed. 2017)10200 H
2.	Phaeophytin	mg/m³	1.1	1.32	0.97	1.2	0.97	1.32	0.91	2.14	1.02	1.65	1.02	1.78	APHA (23rd Ed. 2017)10200 H
3.	Cell Count	No. x 10³/L	90	98	98	101	98	98	90	108	86	106	97	114	APHA (23rd Ed. 2017)10200 F
4	Name of Group Number and name of group species of each group	--	*Ceratium*	*Melosira*	*Thalassiothrix*	*Ceratium*	*Melosira*	*Cyclotella*	*Ceratium*	*Ceratium*	*Diploneis*	*Ceratium*	*Diploneis*	*Pinnularia*	APHA (23rd Ed. 2017)10200 F
			Melosira	*Cyclotella*	*Melosira*	*Pinnularia*	*Pinnularia*	*Fragillaria*	*Pinnularia*	*Melosira*	*Rhizosolenia*	*Pinnularia*	*Rhizosolenia*	*Surirella*	
			Odentella	*Odontella*	*Odentella*	*Odontella*	*Skeletonema*	*Navicula*	*Odontella*	*Odentella*	*Nitzschia*	*Odontella*	*Nitzschia*	*Odentella*	
			Dinophysis	*Skeletonema*	*Dinophysis*	*Thalassiothrix*	*Thallassiosira*	*Thallassiosira*	*Thalassiothrix*	*Dinophysis*	*Cyclotella*	*Thalassiothrix*	*Cyclotella*	*Grammatophora*	
			Pleurosigma	*Thallassiosira*	*Pleurosigma*	*Thallassiosira*	*Thalassionema*	*Skeletonema*	*Thallassiosira*	*Pleurosigma*	*Pleurosigma*	*Thallassiosira*	*Pleurosigma*	*Melosira*	
B			Zooplankton												
1	Abudance(Population)	noX103 / 100 m3	32		44		50		43		36		44		APHA (23rd Ed. 2017)10200 G
2	Name of Group Number and name of group species of each group		*Oikoplura*		*Oikoplura*		*Egg(Fish and Shrimps)*		*Decapoda*		*Crustacean Larvae*		*Grammatophora*		
			Copepods nauplii		*Copepods nauplii*		*Oikoplura*		*Copepods*		*Decapoda*		*Rhizosolenia*		
			Crustacean Larvae		*Crustacean Larvae*		*Copepods nauplii*		*Crustacean Larvae*		*Copepods*		*Nitzschia*		
			Crustacean		*Crustacean*		*Crustacean*		*Crustacean*		*Crustacean*		*Thalassionema*		
			Bivalve Larvae		*Bivalve Larvae*		*Bivalve Larvae*		*Oikoplura*		*Bivalve Larvae*		*Pleurosigma*		
3	Total Biomass	ml/100 m³	15.36		14.96		17.58		16.85		17.86		15.26		

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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	Apr-22		May-22		Jun-22		Jul-22		Aug-22		Sep-22		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM			
C			Microbiological												
1	Total Bacterial Count	CFU/ml	214		200		190		190		184		202		APHA 23rd Ed.2017,9215-C
2	Total Coliform	/100ml	40		30		35		35		33		36		APHA 23rd Ed.2017,9222-B
3	E.coli	/100ml	25		20		20		26		29		30		IS :15185:2016
4	Enterococcus	/100ml	16		9		18		21		19		24		IS:15186:2002
5	Salmonella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA 23rd Ed.2017,9260-E
7	Vibrio	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS: 5887 (Part V):1976

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

SR. NO.	TEST PARAMETERS	UNIT	APRIL-2022		MAY-2022		JUNE-2022		JULY-2022		AUGUST-2022		SEPTEMBER-2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1.	pH	--	8.19	8.06	8.28	8.11	8.26	8.09	8.25	8.12	8.23	8.05	8.24	8.08	IS 3025 (Part11)1983
2.	Temperature	°C	30.3	30.2	30.3	30.1	30.2	30.1	30.1	30	30.2	30.1	30.1	30	IS 3025 (Part 9)1984
3.	Total Suspended Solids	mg/L	118	112	126	108	126	108	106	78	120	104	114	98	APHA 23rd Ed.,2017,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	3.2	BDL	2.9	BDL	3.1	BDL	2.9	BDL	2.8	BDL)	2.7	BDL	IS 3025(Part 44)1993Amd.01
5.	Dissolved Oxygen	mg/L	5.97	5.77	6.12	6.02	6.12	5.92	6.27	6.17	6.17	6.07	6.15	6.05	APHA 23rd Ed.,2017,4500-O, B
6.	Salinity	ppt	35.27	35.86	35.33	35.74	35.28	35.83	35.21	35.78	35.19	35.68	35.06	35.76	By Calculation
7.	Oil & Grease	mg/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	IS 3025(Part39) 1991, Amd. 2
8.	Nitrate as NO_3	µmol/L	2.5	2.24	2.84	2.76	2.59	2.15	3.44	2.59	3.36	2.8	3.23	2.37	APHA 23rd Ed., 2017,4500 NO3-B
9.	Nitrite as NO_2	µmol/L	0.3	0.17	0.474	0.431	0.56	0.379	0.344	0.293	0.328	0.276	0.345	0.302	APHA 23rd Ed.,2017,4500NO_2B
10.	Ammonical Nitrogen as NH_3	µmol/L	2.54	2.49	2.41	2.28	2.49	2.24	3.83	2.75	3.62	3.32	3.62	3.28	APHA 23rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO_4	µmol/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	APHA 23rd Ed.,2017,4500-P, D
12.	Total Nitrogen	µmol/L	5.68	5.55	5.724	5.471	5.64	4.77	7.614	5.633	7.308	6.396	7.195	5.952	APHA 23rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
14.	Total Dissolved Solids	mg/L	36638	36912	36942	37624	36842	37122	36520	37160	36442	36988	36520	36840	APHA 23rd Ed.,2017, 2540- C
15.	COD	mg/L	16.03	12.02	23.9	15.9	23.7	19.7	16.03	8.01	15.98	11.99	20.12	12.07	APHA 23rd Ed.,2017, 5220-B

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

SR. NO.	TEST PARAMETERS	UNIT	Apr-22		May-22		Jun-22		Jul-22		Aug-22		Sep-22		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
A			Phytoplankton												
1.	Chlorophyll	mg/m³	2.69	2.41	2.78	2.97	2.78	2.56	2.78	3.1	2.78	2.7	2.89	2.45	APHA (23rd Ed. 2017)10200 H
2.	Phaeophytin	mg/m³	0.82	0.85	0.95	1.11	0.95	0.88	1.25	0.85	0.78	0.78	1.25	0.87	APHA (23rd Ed. 2017)10200 H
3.	Cell Count	No. x 10³/L	105	126	100	113	100	90	96	86	87	91	90	108	APHA (23rd Ed. 2017)10200 F
4	Name of Group Number and name of group species of each group	--	*Biddulphia*	*Grammatophora*	*Pleurosigma*	*Surirella*	*Grammatophora*	*Coscinodiscus*	*Surirella*	*Biddulphia*	*Pinnularia*	*Surirella*	*Thallassiosira*	*Nitzschia*	APHA (23rd Ed. 2017)10200 F
			Fragillaria	*Dinophysis*	*Dinophysis*	*Thalassiothrix*	*Dinophysis*	*Diploneis*	*Thalassiothrix*	*Fragillaria*	*Biddulphia*	*Thalassiothrix*	*Melosira*	*Pinnularia*	
			Odentella	*Navicula*	*Odentella*	*Navicula*	*Navicula*	*Nitzschia*	*Navicula*	*Odentella*	*Navicula*	*Navicula*	*Nitzschia*	*Odontella*	
			Grammatophora	*Fragillaria*	*Grammatophora*	*Skeletonema*	*Fragillaria*	*Dinophysis*	*Skeletonema*	*Grammatophora*	*Thallassiosira*	*Skeletonema*	*Rhizosolenia*	*Dinophysis*	
			Melosira	*Thallassiosira*	*Melosira*	*Thallassiosira*	*Biddulphia*	*Thalassionema*	*Thallassiosira*	*Melosira*	*Skeletonema*	*Thallassiosira*	*Pleurosigma*	*Surirella*	

B			Zooplankton												
1	Abudance(Population)	noX103 / 100 m3	35		51		48		50		45		50		APHA (23rd Ed. 2017)10200 G
2	Name of Group Number and name of group species of each group		*Decapoda*		*Decapoda*		*Decapoda*		*Decapoda*		*Crustacean*		*Coscinodiscus*		
			Copepods		*Copepods*		*Oikoplura*		*Oikoplura*		*Oikoplura*		*Diploneis*		
			Crustacean Larvae		*Crustacean Larvae*		*Crustacean Larvae*		*Crustacean Larvae*		*Crustacean Larvae*		*Rhizosolenia*		
			Crustacean		*Crustacean*		*Bivalve Larvae*		*Bivalve Larvae*		*Oikoplura*		*Dinophysis*		
			Oikoplura	*Oikoplura*	*Oikoplura*	*Oikoplura*	*Oikoplura*	*Oikoplura*	*Bivalve Larvae*	*Thalassionema*					
3	Total Biomass	ml/100 m³	13.45		15.78		16.34		17.36		16.9		17.1		

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

SR. NO.	TEST PARAMETERS	UNIT	Apr-22		May-22		Jun-22		Jul-22		Aug-22		Sep-22		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM			
C			Microbiological												
1	Total Bacterial Count	CFU/ml	110		142		230		222		212		196		APHA 23rd Ed.2017,9215-C
2	Total Coliform	/100ml	24		31		40		41		46		52		APHA 23rd Ed.2017,9222-B
3	E.coli	/100ml	16		23		28		31		26		32		IS :15185:2016
4	Enterococcus	/100ml	8		10		18		12		18		22		IS:15186:2002
5	Salmonella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA 23rd Ed.2017,9260-E
7	Vibrio	/100ml	110		142		230		222		212		196		IS: 5887 (Part V):1976

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Mr. Nilesh Patel
Sr. Chemist

Mr. Nitin Tandel
Technical Manager

RESULTS OF ETP OUTLET WATER

SR.NO.	TEST PARAMETERS	UNIT	LIQUID TERMINAL						GPCB Limit	TEST METHOD
			APRIL-2022	MAY-2022	JUNE-2022	JULY-2022	AUGUST-2022	SEPTEMBER-2022		
			25-04-2022	30-05-2022	28-06-2022	21-07-2022	26-08-2022	27-09-2022		
1.	Colour	Pt. Co. Scale	20	25	30	20	25	30	100	IS 3025(Part 4)
2.	pH @ 27 ° C	--	7.14	7.34	7.46	7.14	7.38	7.44	6.5 to 8.5	APHA 23rd Ed.,2017,4500-H+B
3.	Temperature	^{0}C	30.5	31	31	30	30	30.5	40	IS 3025(Part 9)1984
4.	Total Suspended Solid	mg/L	46	38	44	36	42	44	100	APHA 23rd Ed.,2017,2540 –D
5.	Total Dissolved Solids	mg/L	1462	1486	1494	1502	1510	1524	2100	APHA 23rd Ed.,2017,2540- C
6.	COD	mg/L	72.6	88.4	89.1	76.4	80.8	88.5	100	IS 3025(Part 58)2006
7.	BOD (3 days at 27 ^{0}C)	mg/L	20	24	24	21	23	25	30	IS 3025(Part 44)1993Amd.01
8.	Chloride (as Cl) $^-$	mg/L	480.9	502.2	516.9	520.6	510.6	524.2	600	IS 3025(PART 32) 1988
9.	Oil & Grease	mg/L	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	10	IS 3025(Part39)1991, Amd. 2
10.	Sulphate (as SO_4)	mg/L	150.4	124.2	110.6	108	112	122	1000	IS 3025(Part 24)1986
11.	Ammonical Nitrogen	mg/L	22.2	26.8	24.8	28.6	26.5	22.5	50	IS 3025(Part 34)1988,
12.	Phenolic Compound	mg/L	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	1	IS 3025(Part 43)1992, Amd.2
13.	Copper as Cu	mg/L	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	3	IS 3025(Part 42)1992amd.01,
14.	Lead as Pb	mg/L	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	0.1	APHA 23rd Ed.,2017,3111-B

Continue…

SR.NO.	TEST PARAMETERS	UNIT	LIQUID TERMINAL						GPCB Limit	TEST METHOD
			APRIL-2022	MAY-2022	JUNE-2022	JULY-2022	AUGUST-2022	SEPTEMBER-2022		
			25-04-2022	30-05-2022	28-06-2022	21-07-2022	26-08-2022	27-09-2022		
15.	Sulphide as S	mg/L	0.54	0.86	0.54	1.12	1.19	1.24	2	APHA 23rd Ed.,2017,4500 S^{-2} F
16.	Cadmium as Cd	mg/L	BDL(MDL:0.003)	BDL(MDL:0.003)	BDL(MDL:0.003)	BDL(MDL:0.003)	BDL(MDL:0.003)	BDL(MDL:0.003)	2	APHA 23rd Ed.,2017,3111-B
17.	Fluoride as F	mg/L	1.03	0.84	0.86	1.03	0.94	0.82	2	APHA 23rd Ed.,2017,4500 F, D
18.	Residual Chlorine	mg/L	0.74	0.77	0.69	0.65	0.68	0.74	0.5 Min.	APHA 23rd Ed.,2017,4500-Cl-B
19.	Percent Sodium	%	45.59	46.92	47.84	46.57	46.52	45.46	60	By Calculation
20.	Sodium Absorption ratio	--	6.87	6.52	6.45	6.25	6.29	6.29	26	By Calculation

Mr. Nilesh Patel
Sr. Chemist

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Mr. Nitin Tandel
Technical Manager

Results of Ambient Air Quality Monitoring

Name of Location		CT3 RMU-2						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
1.	07-04-2022	87.56	35.43	35.43	41.25	1.2	5.12	NOT DETECTED
2.	08-04-2022	84.53	30.21	31.48	38.95	0.78	4.76	NOT DETECTED
3.	11-04-2022	88.43	43.25	37.25	44.56	1.25	3.54	NOT DETECTED
4.	12-04-2022	78.97	37.65	38.25	42.35	1.00	5.12	NOT DETECTED
5.	18-04-2022	88.24	41.25	35.67	40.17	0.98	4.43	NOT DETECTED
6.	21-04-2022	81.46	44.2	40.13	42.68	1.23	3.10	NOT DETECTED
7.	25-04-2022	85.52	45.21	36.54	41.45	1.00	5.00	NOT DETECTED
8.	28-04-2022	87.32	39.34	38.23	40.87	1.43	4.85	NOT DETECTED
9.	02-05-2022	78.34	40.25	36.73	43.56	1.00	4.12	NOT DETECTED
10.	05-05-2022	82.34	37.65	34.15	39.25	1.35	6.75	NOT DETECTED
11.	09-05-2022	88.76	34.56	35.25	41.78	1.16	4.25	NOT DETECTED
12.	12-05-2022	80.23	37.85	32.34	37.51	1.20	3.1	NOT DETECTED
13.	16-05-2022	75.67	36.12	31.56	37.25	1.15	5.25	NOT DETECTED
14.	18-05-2022	84.32	29.45	36.72	42.39	1.00	4.1	NOT DETECTED
15.	23-05-2022	79.54	35.21	34.84	40.44	1.26	3.9	NOT DETECTED

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Name of Location		CT3 RMU-2						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
16.	26-05-2022	85.21	30.25	36.17	43.52	1.40	5.45	NOT DETECTED
17.	30-05-2022	72.34	34.21	35.38	41.15	1.30	6.1	NOT DETECTED
18.	02-06-2022	84.51	34.56	31.23	38.23	1.24	5.37	NOT DETECTED
19.	06-06-2022	80.12	37.68	35.43	40.44	1.00	5.1	NOT DETECTED
20.	09-06-2022	76.55	31.25	30.25	36.78	1.4	6.25	NOT DETECTED
21.	13-06-2022	71.95	32.56	33.28	39.15	1.7	6.45	NOT DETECTED
22.	15-06-2022	69.45	30.18	29.47	34.55	1.34	5.12	NOT DETECTED
23.	20-06-2022	76.84	31.68	34.68	40.12	1.55	4.17	NOT DETECTED
24.	23-06-2022	85.43	33.21	31.94	38.45	1.2	6.15	NOT DETECTED
25.	27-06-2022	72.34	37.89	35.7	40.17	1.56	4.25	NOT DETECTED
26.	29-06-2022	88.75	34.52	32.17	37.95	1.23	5.12	NOT DETECTED
27.	04-07-2022	68.95	20.15	14.56	17.89	0.02	2.5	NOT DETECTED
28.	07-07-2022	37.67	12.56	7.68	11.25	NOT DETECTED	NOT DETECTED	NOT DETECTED
29.	11-07-2022	32.34	10.25	9.12	12.46	NOT DETECTED	NOT DETECTED	NOT DETECTED
30.	14-07-2022	31.23	9.23	8.12	11.21	NOT DETECTED	NOT DETECTED	NOT DETECTED
31.	18-07-2022	37.89	12.45	6.15	8.79	NOT DETECTED	NOT DETECTED	NOT DETECTED

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Name of Location		CT3 RMU-2						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
32.	21-07-2022	35.32	11.1	8.23	11.32	NOT DETECTED	NOT DETECTED	NOT DETECTED
33.	25-07-2022	40.15	14.28	7.15	9.33	NOT DETECTED	NOT DETECTED	NOT DETECTED
34.	28-07-2022	31.45	10.15	6.93	8.25	NOT DETECTED	NOT DETECTED	NOT DETECTED
35.	01-08-2022	75.47	46.26	29.47	36.55	1.13	3.79	NOT DETECTED
36.	04-08-2022	69.74	37.63	36.31	43.54	1.25	7.27	NOT DETECTED
37.	08-08-2022	86.69	41.22	34.65	38.79	1.05	5.83	NOT DETECTED
38.	11-08-2022	89.46	34.74	36.19	41.68	1.32	4.76	NOT DETECTED
39.	15-08-2022	72.18	39.12	37.64	43.84	1.21	4.39	NOT DETECTED
40.	18-08-2022	84.26	32.48	31.38	38.28	0.96	6.1	NOT DETECTED
41.	22-08-2022	81.94	37.93	32.89	42.37	1.2	3.96	NOT DETECTED
42.	25-08-2022	79.57	31.26	38.57	46.32	1.32	7.62	NOT DETECTED
43.	29-08-2022	64.34	37.63	34.75	40.14	1.28	4.26	NOT DETECTED
44.	01-09-2022	66.37	36.73	23.68	28.34	1.15	3.16	NOT DETECTED
45.	05-09-2022	86.37	28.69	26.41	32.29	1.00	6.38	NOT DETECTED
46.	08-09-2022	83.16	37.26	29.74	36.18	0.93	4.38	NOT DETECTED
47.	12-09-2022	81.84	26.93	32.94	38.63	1.24	3.95	NOT DETECTED

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Name of Location		CT3 RMU-2						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
48.	15-09-2022	87.52	41.69	34.84	39.59	1.18	4.83	NOT DETECTED
49.	19-09-2022	89.73	27.81	26.48	32.74	1.00	5.38	NOT DETECTED
50.	22-09-2022	75.05	34.72	28.15	34.38	1.15	4.37	NOT DETECTED
51.	26-09-2022	86.19	28.47	31.92	36.52	1.08	6.03	NOT DETECTED
52.	29-09-2022	84.39	31.29	27.3	34.49	1.16	5.71	NOT DETECTED
Permissible Value as per NAAQMS		**100.0**	**60.0**	**80.0**	**80.0**	**2.0**	**---**	**5.0**
Test Method		**IS - 5182, Part-23**	**UERL/AIR/SOP/11**	**IS - 5182, Part - 2**	**IS - 5182, Part - 6**	**IS - 5182, Part - 10**	**Gas analyzer**	**IS – 5182, Part – 11**

Nikunj D. Patel
(Chemist)

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Jaivik S. Tandel
(Manager - Operations)

Results of Ambient Air Quality Monitoring

Name of Location		Near Fire Station						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
1.	07-04-2022	87.25	35.67	34.67	41.23	1.25	3.45	NOT DETECTED
2.	08-04-2022	81.23	32.19	30.14	37.65	1.00	1.78	NOT DETECTED
3.	11-04-2022	76.45	39.76	36.15	40.25	0.45	4.56	NOT DETECTED
4.	12-04-2022	82.34	35.45	29.17	34.58	0.73	6.12	NOT DETECTED
5.	18-04-2022	77.35	28.23	35.31	42.45	1.00	4.35	NOT DETECTED
6.	21-04-2022	89.34	42.1	38.67	44.12	1.15	5.5	NOT DETECTED
7.	25-04-2022	82.57	30.14	34.56	40.25	0.85	3.12	NOT DETECTED
8.	28-04-2022	87.34	36.74	28.78	36.75	1.00	4.17	NOT DETECTED
9.	02-05-2022	73.22	40.25	36.12	42.35	1.15	2.45	NOT DETECTED
10.	05-05-2022	84.53	37.15	33.21	38.23	1.3	2.35	NOT DETECTED
11.	09-05-2022	87.65	34.12	37.34	43.18	1.00	3.1	NOT DETECTED
12.	12-05-2022	85.43	32.15	30.14	36.25	1.15	4.13	NOT DETECTED
13.	16-05-2022	72.17	39.25	27.25	33.45	1.25	2.25	NOT DETECTED
14.	18-05-2022	75.86	45.12	34.56	40.25	1.00	3.17	NOT DETECTED
15.	23-05-2022	81.34	36.15	37.12	42.15	0.94	4.00	NOT DETECTED

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Name of Location		Near Fire Station						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
16.	26-05-2022	85.23	32.45	33.15	38.26	1.15	5.15	NOT DETECTED
17.	30-05-2022	75.89	35.15	37.23	41.25	1.00	3.25	NOT DETECTED
18.	02-06-2022	78.95	35.17	32.15	38.16	1.2	4.1	NOT DETECTED
19.	06-06-2022	81.18	38.25	31.26	37.12	1.25	3.76	NOT DETECTED
20.	09-06-2022	84.56	33.45	35.45	40.19	1.00	2.55	NOT DETECTED
21.	13-06-2022	88.56	34.57	34.56	40.12	1.2	5.0	NOT DETECTED
22.	15-06-2022	80.24	41.28	30.18	36.78	1.15	4.2	NOT DETECTED
23.	20-06-2022	85.19	40.25	35.18	41.19	1.00	2.8	NOT DETECTED
24.	23-06-2022	77.87	32.88	36.12	42.35	1.00	4.15	NOT DETECTED
25.	27-06-2022	89.24	38.11	33.19	38.93	1.25	3.78	NOT DETECTED
26.	29-06-2022	81.23	32.45	34.55	40.15	1	2.75	NOT DETECTED
27.	04-07-2022	61.23	18.44	12.34	14.56	0.05	2.15	NOT DETECTED
28.	07-07-2022	30.17	12.34	8.12	10.23	NOT DETECTED	NOT DETECTED	NOT DETECTED
29.	11-07-2022	27.67	10.45	8.45	11.35	NOT DETECTED	NOT DETECTED	NOT DETECTED
30.	14-07-2022	25.67	8.65	7.68	9.45	NOT DETECTED	NOT DETECTED	NOT DETECTED
31.	18-07-2022	30.16	9.45	7.12	11.24	NOT DETECTED	NOT DETECTED	NOT DETECTED

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Name of Location		Near Fire Station						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
32.	21-07-2022	32.45	10.25	7.45	10.12	NOT DETECTED	NOT DETECTED	NOT DETECTED
33.	25-07-2022	36.78	12.26	6.15	8.78	NOT DETECTED	NOT DETECTED	NOT DETECTED
34.	28-07-2022	29.76	10.43	5.89	9.15	NOT DETECTED	NOT DETECTED	NOT DETECTED
35.	01-08-2022	85.78	36.78	32.79	41.67	1.2	3.72	NOT DETECTED
36.	04-08-2022	70.08	34.64	37.27	43.6	1.05	4.29	NOT DETECTED
37.	08-08-2022	81.49	32.16	34.11	38.24	1.25	4.7	NOT DETECTED
38.	11-08-2022	87.91	36.28	28.74	34.49	1.00	6.72	NOT DETECTED
39.	15-08-2022	83.91	41.39	34.7	40.82	1.12	3.74	NOT DETECTED
40.	18-08-2022	70.58	39.65	29.04	32.46	1.24	4.69	NOT DETECTED
41.	22-08-2022	84.19	31.36	39.16	46.89	1.15	3.27	NOT DETECTED
42.	25-08-2022	89.48	42.63	35.94	41.39	1.32	7.52	NOT DETECTED
43.	29-08-2022	74.33	37.47	41.48	47.24	0.91	5.21	NOT DETECTED
44.	01-09-2022	67.84	32.48	27.36	34.76	1.00	4.27	NOT DETECTED
45.	05-09-2022	83.86	28.36	32.58	36.87	0.9	5.83	NOT DETECTED
46.	08-09-2022	86.25	26.58	28.47	33.13	1.05	6.83	NOT DETECTED
47.	12-09-2022	72.73	33.49	24.83	27.37	1.15	7.18	NOT DETECTED

Continue…

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Name of Location		Near Fire Station						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
48.	15-09-2022	76.28	38.72	29.71	35.63	1.17	2.95	NOT DETECTED
49.	19-09-2022	81.27	33.62	32.47	38.31	1.1	6.73	NOT DETECTED
50.	22-09-2022	75.88	27.91	34.83	40.27	1.00	4.36	NOT DETECTED
51.	26-09-2022	78.94	34.39	31.18	37.49	1.25	5.98	NOT DETECTED
52.	29-09-2022	84.94	35.74	36.49	43.65	1.15	4.19	NOT DETECTED
Permissible Value as per NAAQMS		**100.0**	**60.0**	**80.0**	**80.0**	**2.0**	**---**	**5.0**
Test Method		**IS - 5182, Part-23**	**UERL/AIR/SOP/11**	**IS - 5182, Part - 2**	**IS - 5182, Part - 6**	**IS - 5182, Part - 10**	**Gas analyzer**	**IS – 5182, Part – 11**

Nikunj D. Patel
(Chemist)

UNISTAR ENVIRONMENT & RESEARCH LABS PVT. LTD. GUJARAT VAPI.

Jaivik S. Tandel
(Manager - Operations)

Results of Ambient Air Quality Monitoring

Name of Location		ADANI PORT – TUG Berth 600 KL Pupm House						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
1.	07-04-2022	84.35	31.46	32.45	39.23	1.00	3.12	NOT DETECTED
2.	08-04-2022	80.54	37.68	37.65	44.56	1.00	2.15	NOT DETECTED
3.	11-04-2022	78.45	29.21	33.45	40.21	0.75	2.67	NOT DETECTED
4.	12-04-2022	88.56	36.78	38.12	45.2	0.98	4.1	NOT DETECTED
5.	18-04-2022	83.45	42.57	37.34	43.67	1.15	1.34	NOT DETECTED
6.	21-04-2022	79.54	43.12	36.11	40.34	0.86	2.5	NOT DETECTED
7.	25-04-2022	84.56	37.97	34.5	38.21	0.9	3.12	NOT DETECTED
8.	28-04-2022	87.12	42.45	39.12	43.45	1.00	6.7	NOT DETECTED
9.	02-05-2022	78.77	35.67	35.13	41.35	1.25	4.58	NOT DETECTED
10.	05-05-2022	82.34	43.56	34.21	40.25	1.15	3.12	NOT DETECTED
11.	09-05-2022	85.67	37.89	36.85	42.67	1.8	5.16	NOT DETECTED
12.	12-05-2022	75.54	41.56	35.12	40.15	1.00	3.15	NOT DETECTED
13.	16-05-2022	70.12	42.56	35.45	38.85	1.35	1.5	NOT DETECTED
14.	18-05-2022	84.56	37.12	38.13	44.25	1.25	1.00	NOT DETECTED
15.	23-05-2022	88.34	45.92	34.00	40.15	1.14	1.25	NOT DETECTED

Continue…

Name of Location		ADANI PORT – TUG Berth 600 KL Pupm House						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
16.	26-05-2022	74.23	37.84	38.13	44.52	1.00	1.4	NOT DETECTED
17.	30-05-2022	87.25	35.91	34.87	40.85	1.25	1.15	NOT DETECTED
18.	02-06-2022	80.34	42.35	33.75	39.12	1.1	4.5	NOT DETECTED
19.	06-06-2022	82.36	37.25	36.72	42.19	1.34	3.15	NOT DETECTED
20.	09-06-2022	78.23	40.15	35.12	41.25	1.25	4.27	NOT DETECTED
21.	13-06-2022	75.43	44.58	36.71	42.78	1.24	3.15	NOT DETECTED
22.	15-06-2022	83.21	40.15	34.89	40.25	1.4	2.65	NOT DETECTED
23.	20-06-2022	89.17	36.25	32.15	36.75	1.25	4.15	NOT DETECTED
24.	23-06-2022	82.95	38.15	37.2	43.45	1.00	3.84	NOT DETECTED
25.	27-06-2022	74.2	42.55	32.38	38.44	1.32	2.25	NOT DETECTED
26.	29-06-2022	82.18	37.45	34.21	40.15	1.25	3.15	NOT DETECTED
27.	04-07-2022	68.78	19.89	14.56	16.23	0.05	2.15	NOT DETECTED
28.	07-07-2022	34.56	14.23	11.23	13.25	NOT DETECTED	NOT DETECTED	NOT DETECTED
29.	11-07-2022	30.12	11.21	10.45	12.36	NOT DETECTED	NOT DETECTED	NOT DETECTED
30.	14-07-2022	34.56	9.34	10.21	12.68	NOT DETECTED	NOT DETECTED	NOT DETECTED
31.	18-07-2022	37.89	10.23	9.12	11.21	NOT DETECTED	NOT DETECTED	NOT DETECTED

Continue…

Name of Location		ADANI PORT – TUG Berth 600 KL Pupm House						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
32.	21-07-2022	30.12	11.23	8.15	11.23	NOT DETECTED	NOT DETECTED	NOT DETECTED
33.	25-07-2022	41.25	13.45	8.45	9.15	NOT DETECTED	NOT DETECTED	NOT DETECTED
34.	28-07-2022	33.24	11.25	7.25	10.25	NOT DETECTED	NOT DETECTED	NOT DETECTED
35.	01-08-2022	86.84	32.87	31.26	43.74	1.25	6.12	NOT DETECTED
36.	04-08-2022	81.21	38.32	36.1	42.54	1.13	2.6	NOT DETECTED
37.	08-08-2022	72.86	42.86	29.97	36.38	1.28	4.82	NOT DETECTED
38.	11-08-2022	78.25	43.67	34.27	41.53	1.05	6.64	NOT DETECTED
39.	15-08-2022	69.52	46.21	38.54	46.38	1.3	3.23	NOT DETECTED
40.	18-08-2022	85.87	39.58	33.82	37.89	1.18	2.69	NOT DETECTED
41.	22-08-2022	89.57	41.37	36.49	43.61	1.15	1.00	NOT DETECTED
42.	25-08-2022	73.66	38.94	35.31	38.25	1.00	1.94	NOT DETECTED
43.	29-08-2022	84.49	43.73	37.69	44.84	1.34	4.74	NOT DETECTED
44.	01-09-2022	81.69	29.37	24.85	31.91	1.06	5.27	NOT DETECTED
45.	05-09-2022	74.61	33.46	28.18	36.48	1.00	3.85	NOT DETECTED
46.	08-09-2022	86.47	37.59	25.9	32.86	0.93	3.48	NOT DETECTED
47.	12-09-2022	72.84	36.92	31.24	38.71	1.18	5.93	NOT DETECTED

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Name of Location		ADANI PORT – TUG Berth 600 KL Pupm House						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
48.	15-09-2022	70.97	32.46	28.74	35.79	1.15	4.19	NOT DETECTED
49.	19-09-2022	76.48	38.28	21.93	28.31	1.07	3.75	NOT DETECTED
50.	22-09-2022	81.48	42.36	32.68	37.42	1.05	2.79	NOT DETECTED
51.	26-09-2022	73.63	28.72	24.38	28.63	1.00	3.82	NOT DETECTED
52.	29-09-2022	86.38	36.04	29.16	36.2	1.15	5.15	NOT DETECTED
Permissible Value as per NAAQMS		**100.0**	**60.0**	**80.0**	**80.0**	**2.0**	**---**	**5.0**
Test Method		**IS - 5182, Part-23**	**UERL/AIR/ SOP/11**	**IS - 5182, Part - 2**	**IS - 5182, Part - 6**	**IS - 5182, Part - 10**	**Gas analyzer**	**IS – 5182, Part – 11**

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Results of Ambient Air Quality Monitoring

Name of Location		PUB / Adani House						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
1.	07-04-2022	75.67	28.94	10.26	16.75	NOT DETECTED	2.12	NOT DETECTED
2.	08-04-2022	84.56	31.45	14.56	21.35	0.05	NOT DETECTED	NOT DETECTED
3.	11-04-2022	81.23	29.56	12.34	18.25	0.43	1.54	NOT DETECTED
4.	12-04-2022	79.23	34.55	17.20	23.45	0.20	1.00	NOT DETECTED
5.	18-04-2022	86.12	30.90	15.45	20.17	1.00	2.45	NOT DETECTED
6.	21-04-2022	81.45	28.75	13.45	21.23	0.25	NOT DETECTED	NOT DETECTED
7.	25-04-2022	88.34	34.62	16.21	25.67	0.04	1.67	NOT DETECTED
8.	28-04-2022	80.26	31.25	18.34	23.85	0.75	2.10	NOT DETECTED
9.	02-05-2022	84.24	30.25	14.56	21.34	1.00	3.15	NOT DETECTED
10.	05-05-2022	74.88	37.12	12.35	18.75	1.04	1.56	NOT DETECTED
11.	09-05-2022	80.12	32.45	17.34	23.92	1.00	2.85	NOT DETECTED
12.	12-05-2022	83.45	29.15	21.34	26.15	0.50	4.10	NOT DETECTED
13.	16-05-2022	78.15	27.94	18.45	24.55	0.80	3.35	NOT DETECTED
14.	18-05-2022	81.54	32.45	24.32	30.12	1.00	2.15	NOT DETECTED
15.	23-05-2022	86.54	29.15	20.17	27.13	1.10	4.15	NOT DETECTED

Continue…

Name of Location		PUB / Adani House						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
16.	26-05-2022	88.73	31.24	23.45	28.21	1.00	2.45	NOT DETECTED
17.	30-05-2022	80.56	34.27	21.15	27.12	1.25	3.25	NOT DETECTED
18.	02-06-2022	76.85	34.56	18.76	25.44	1.00	2.15	NOT DETECTED
19.	06-06-2022	88.95	35.67	23.18	28.74	1.00	1.00	NOT DETECTED
20.	09-06-2022	70.23	24.56	11.24	18.95	1.20	3.12	NOT DETECTED
21.	13-06-2022	85.34	36.76	19.23	26.73	0.50	2.50	NOT DETECTED
22.	15-06-2022	89.12	33.56	21.23	27.45	1.00	3.41	NOT DETECTED
23.	20-06-2022	81.90	36.75	25.21	30.21	0.50	3.75	NOT DETECTED
24.	23-06-2022	76.85	28.75	22.44	28.75	1.00	4.00	NOT DETECTED
25.	27-06-2022	84.10	30.15	17.85	23.45	0.70	2.76	NOT DETECTED
26.	29-06-2022	88.23	34.21	20.24	26.19	0.50	2.00	NOT DETECTED
27.	04-07-2022	56.78	17.89	12.14	15.45	0.05	NOT DETECTED	NOT DETECTED
28.	07-07-2022	30.12	9.23	8.67	11.23	NOT DETECTED	NOT DETECTED	NOT DETECTED
29.	11-07-2022	37.68	12.45	7.23	8.24	NOT DETECTED	NOT DETECTED	NOT DETECTED
30.	14-07-2022	32.14	10.15	9.34	10.26	NOT DETECTED	NOT DETECTED	NOT DETECTED
31.	18-07-2022	35.67	11.23	6.78	8.35	NOT DETECTED	NOT DETECTED	NOT DETECTED

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Name of Location		PUB / Adani House						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
32.	21-07-2022	32.45	9.85	8.24	10.21	NOT DETECTED	NOT DETECTED	NOT DETECTED
33.	25-07-2022	42.14	12.45	7.21	9.45	NOT DETECTED	NOT DETECTED	NOT DETECTED
34.	28-07-2022	34.56	11.29	6.34	8.33	NOT DETECTED	NOT DETECTED	NOT DETECTED
35.	01-08-2022	68.99	28.59	11.28	24.28	1.18	4.39	NOT DETECTED
36.	04-08-2022	87.93	34.35	14.07	20.93	1.15	2.86	NOT DETECTED
37.	08-08-2022	76.37	36.30	21.69	27.64	1.25	3.82	NOT DETECTED
38.	11-08-2022	89.47	27.84	26.46	32.18	1.00	6.2	NOT DETECTED
39.	15-08-2022	84.17	29.49	16.30	22.32	0.94	4.85	NOT DETECTED
40.	18-08-2022	68.23	38.31	19.98	28.58	1.21	1.79	NOT DETECTED
41.	22-08-2022	72.17	26.40	27.38	36.73	1.09	5.83	NOT DETECTED
42.	25-08-2022	80.74	36.47	21.71	27.47	1.15	4.2	NOT DETECTED
43.	29-08-2022	84.19	39.74	23.31	31.38	1.00	2.05	NOT DETECTED
44.	01-09-2022	72.47	25.73	14.28	18.29	1.05	3.84	NOT DETECTED
45.	05-09-2022	85.39	31.37	16.72	24.47	1.00	3.17	NOT DETECTED
46.	08-09-2022	79.18	33.78	19.34	26.82	1.13	4.82	NOT DETECTED
47.	12-09-2022	69.68	26.39	24.73	28.02	1.16	5.38	NOT DETECTED

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Name of Location		PUB / Adani House						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
48.	15-09-2022	74.18	25.47	22.86	28.63	1.06	5.93	NOT DETECTED
49.	19-09-2022	83.69	34.83	21.28	32.19	1.20	3.1	NOT DETECTED
50.	22-09-2022	81.32	24.49	24.75	30.92	1.00	3.69	NOT DETECTED
51.	26-09-2022	78.61	29.35	18.63	24.31	0.95	5.25	NOT DETECTED
52.	29-09-2022	80.74	36.50	27.62	36.58	1.15	3.93	NOT DETECTED
Permissible Value as per NAAQMS		**100.0**	**60.0**	**80.0**	**80.0**	**2.0**	**---**	**5.0**
Test Method		**IS - 5182, Part-23**	**UERL/AIR/SOP/11**	**IS - 5182, Part - 2**	**IS - 5182, Part - 6**	**IS - 5182, Part - 10**	**Gas analyzer**	**IS – 5182, Part – 11**

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Results of Noise Level Monitoring

Location Name		CT3 RMU-2					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Day Time					
		01-04-2022	06-05-2022	10-06-2022	10-07-2022	10-08-2022	12-09-2022
1	06:00 to 07:00	63.4	62.8	64.2	64.5	64.1	63.9
2	07:00 to 08:00	66.9	63.5	67.8	69.2	64.9	67.8
3	08:00 to 09:00	65.5	64.5	68.9	67.8	66.7	68.9
4	09:00 to 10:00	69.6	66.9	67.3	69.5	62.1	67.1
5	10:00 to 11:00	65.2	66.5	68.5	65.3	63.8	68.5
6	11:00 to 12:00	66.5	66.7	69.1	60.6	67.9	69.1
7	12:00 to 13:00	69.5	68.5	67.5	65.5	65.4	67.5
8	13:00 to 14:00	67.5	65.5	66.9	67.2	66.2	66.9
9	14:00 to 15:00	68.2	62.6	67.2	68.5	64	67.2
10	15:00 to 16:00	69.5	63.5	65.5	66.5	60.9	65.5
11	16:00 to 17:00	68.5	66.7	68.2	65.5	64.6	68.2
12	17:00 to 18:00	68.2	62.4	64.7	68.9	65.4	64.7
13	18:00 to 19:00	69.5	61.5	63.2	67.2	63.2	63.2
14	19:00 to 20:00	65.5	60.5	62.6	66.7	64.6	63.6
15	20:00 to 21:00	61.5	60.3	65.4	65.4	60.4	65.4
16	21:00 to 22:00	64.5	60.1	64.2	63.9	64.6	63.7
Day Time		<75 dB (A)					

Continue...

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Extended Work Office : G.I.D.C., Dahej-II, Bharuch, Gujarat.
CIN:U73100GJ2007PTC051463

Location Name		CT3 RMU-2					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) – Night Time					
		01-04-2022	06-05-2022	10-06-2022	10-07-2022	10-08-2022	12-09-2022
1	22:00 to 23:00	64.6	60.3	63.1	62.5	60.9	59.3
2	23:00 to 24:00	64.1	60.2	62.5	61.7	61.5	62.7
3	24:00 to 01:00	63.8	62.5	62.5	64.5	62.5	63.9
4	01:00 to 02:00	63.4	60.4	62.8	60.5	60.4	61.9
5	02:00 to 03:00	62.7	60.4	61.7	63.2	62.4	59.6
6	03:00 to 04:00	60.16	60.2	61.0	61.8	60.2	62.4
7	04:00 to 05:00	58.4	62.3	62.4	64.5	63.3	64.7
8	05:00 to 06:00	59.9	62.3	64.5	63.6	60.4	62.4
Night Time		<70 dB (A)					

Test Method	IS: 9989 : 1981

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Results of Noise Level Monitoring

Location Name		Near Fire Station					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Day Time					
		12-04-2022	03-05-2022	03-06-2022	07-07-2022	05-08-2022	05-09-2022
1	06:00 to 07:00	62.8	62.5	64.3	65.8	64.7	63.9
2	07:00 to 08:00	63.5	68.5	66.7	67.9	66.2	65.8
3	08:00 to 09:00	64.5	65.5	68.9	69.3	61.3	68.9
4	09:00 to 10:00	66.9	64.2	65.5	68.6	63.8	63.8
5	10:00 to 11:00	66.5	66.8	67.2	68.3	68.5	67.2
6	11:00 to 12:00	66.7	62.8	65.5	67.3	63.2	64.2
7	12:00 to 13:00	68.5	66.9	68.9	66.2	61.6	68.9
8	13:00 to 14:00	65.5	65.6	66.7	68.2	67.2	68.3
9	14:00 to 15:00	62.6	65.2	69.4	67.5	66.1	69.4
10	15:00 to 16:00	63.5	68.2	67.5	62.9	65.8	66.2
11	16:00 to 17:00	66.7	64.2	66.2	66.4	63.6	66.2
12	17:00 to 18:00	62.4	67.2	67.2	62.6	66.4	61.3
13	18:00 to 19:00	61.5	66.5	65.2	65.5	64.1	65.2
14	19:00 to 20:00	60.5	68.5	64.2	68.5	66.9	63
15	20:00 to 21:00	60.3	63.2	62.1	66.7	65.6	62.1
16	21:00 to 22:00	60.1	59.7	60.5	62.8	62.2	61.2
Day Time		<75 dB (A)					

Continue…

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CIN:U73100GJ2007PTC051463

Location Name		Near Fire Station					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Night Time					
		12-04-2022	03-05-2022	03-06-2022	07-07-2022	05-08-2022	05-09-2022
1	22:00 to 23:00	60.3	60.5	61.3	63.5	61.1	57.3
2	23:00 to 24:00	61.3	62.8	60.5	62.5	62.9	63.2
3	24:00 to 01:00	62.3	63.6	60.2	61.9	63.6	64.3
4	01:00 to 02:00	55.2	60.1	61.3	62.8	60.1	61.6
5	02:00 to 03:00	62.9	57.5	60.4	60.5	58.4	59.4
6	03:00 to 04:00	60.7	58.2	59.4	59.6	58.2	60.2
7	04:00 to 05:00	60.4	59.5	60.4	58.5	59.5	58.4
8	05:00 to 06:00	60.5	60.6	61.6	59.7	61.8	62.7
Night Time		<70 dB (A)					

Test Method	IS: 9989 : 1981

Nikunj D. Patel
(Chemist)

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Results of Noise Level Monitoring							
Location Name		ADANI PORT – TUG Berth 600 KL Pump House					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Day Time					
		04-04-2022	05-05-2022	07-06-2022	08-07-2022	08-08-2022	08-09-2022
1	06:00 to 07:00	62.6	61.3	62.5	63.4	64.3	62.1
2	07:00 to 08:00	68.3	63.5	66.7	66.9	65.1	66.7
3	08:00 to 09:00	64.2	66.7	68.5	65.5	67.4	67.3
4	09:00 to 10:00	69.8	65.5	66.2	69.6	66	66.2
5	10:00 to 11:00	62.2	68.2	69.5	65.2	63.8	69.5
6	11:00 to 12:00	68.8	64.5	66.7	66.5	60.1	62.8
7	12:00 to 13:00	67.2	63.9	65.4	69.5	62.3	65.4
8	13:00 to 14:00	62.5	66.7	68.2	67.5	65.7	69.3
9	14:00 to 15:00	67.1	62.6	65.1	68.2	63.3	65.1
10	15:00 to 16:00	61.5	65.5	68.3	69.5	64.8	69.1
11	16:00 to 17:00	66.8	69.1	67.5	68.5	66.9	68.9
12	17:00 to 18:00	69.2	69.2	68.6	68.2	68.5	68.6
13	18:00 to 19:00	68.1	64.5	65.5	69.5	62.4	63.4
14	19:00 to 20:00	65.2	62.3	66.2	65.5	63.6	66.2
15	20:00 to 21:00	64.1	60.6	63.2	61.5	61.9	63.7
16	21:00 to 22:00	61.2	60.5	62.8	64.5	63.2	61.9
Day Time		<75 dB (A)					

Continue…

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Location Name		ADANI PORT – TUG Berth 600 KL Pump House					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Night Time					
		04-04-2022	05-05-2022	07-06-2022	08-07-2022	08-08-2022	08-09-2022
1	22:00 to 23:00	61.9	60.5	62.5	61.5	59.3	58.8
2	23:00 to 24:00	62.8	58.6	60.5	62.5	58.6	58.6
3	24:00 to 01:00	63.8	57.5	61.2	62.3	57.5	57.0
4	01:00 to 02:00	60.1	58.2	59.5	62.3	59.0	61.1
5	02:00 to 03:00	61.9	56.9	60.2	61.6	56.9	57.4
6	03:00 to 04:00	63.7	58.5	60.5	60.3	58.5	59.5
7	04:00 to 05:00	63.5	57.5	61.5	64.4	60.6	62.8
8	05:00 to 06:00	57.9	60.5	62.3	61.8	58.5	59.4
Day Time		<70 dB (A)					

Test Method	IS: 9989 : 1981

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Results of Noise Level Monitoring

Location Name		PUB/Adani House					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Day Time					
		13-04-2022	02-05-2022	02-06-2022	05-07-2022	02-08-2022	01-09-2022
1	06:00 to 07:00	65.8	61.5	60.2	62.6	63.8	61.8
2	07:00 to 08:00	67.9	66.7	64.5	65.6	64.7	64.5
3	08:00 to 09:00	69.3	60.5	62.7	68.6	63.5	63.7
4	09:00 to 10:00	68.6	63.9	61.9	65.5	66.2	61.9
5	10:00 to 11:00	68.3	64.5	63.5	68.3	61.1	63.0
6	11:00 to 12:00	67.3	65.2	66.1	68.9	63.3	65.2
7	12:00 to 13:00	66.2	66.1	67.8	65.4	63.9	65.3
8	13:00 to 14:00	68.2	60.6	62.4	66.3	65.6	62.4
9	14:00 to 15:00	67.5	61.8	65.4	68.5	60.8	63.1
10	15:00 to 16:00	62.9	62.5	63.9	64.5	66.5	62.9
11	16:00 to 17:00	66.4	63.2	64.5	68.3	64.2	63.6
12	17:00 to 18:00	62.6	65.4	64.3	65.6	63.7	63.8
13	18:00 to 19:00	65.5	62.1	60.7	67.2	60.1	60.7
14	19:00 to 20:00	68.5	60.2	61.3	63.5	64.0	62.1
15	20:00 to 21:00	66.7	58.9	59.4	60.5	62.4	62.8
16	21:00 to 22:00	62.8	59.2	58.5	62.8	59.2	60.2
Day Time		<75 dB (A)					

Continue…

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Location Name		PUB/Adani House					
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Night Time					
		13-04-2022	02-05-2022	02-06-2022	05-07-2022	02-08-2022	01-09-2022
1	22:00 to 23:00	62.1	58.5	59.2	61.6	59.3	57.3
2	23:00 to 24:00	64.2	56.5	55.4	60.5	56.5	54.7
3	24:00 to 01:00	64.5	57.2	59.8	59.5	58.2	58.9
4	01:00 to 02:00	64.1	55.5	56.7	60.5	63.9	62.4
5	02:00 to 03:00	55.4	55.2	57.2	58.1	55.2	56.4
6	03:00 to 04:00	59.3	54.1	55.5	60.5	54.1	53.7
7	04:00 to 05:00	64.2	59.5	58.4	62.3	58.3	59.2
8	05:00 to 06:00	63.2	60.2	59.8	61.5	59.1	60.4
Day Time		<70 dB (A)					

Test Method	IS: 9989 : 1981

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UNISTAR ENVIRONMENT & RESEARCH LABS PVT. LTD. GUJARAT VAPI.

Jaivik S. Tandel
(Manager - Operations)

Results of Stack Monitoring

Sr. No.	Parameter	Unit	Hot Water System-1 (Liquid Terminal)	Hot Water System-2 (Liquid Terminal)	Thermic Fluid Heater (Bitumin-1)	Thermic Fluid Heater (Bitumin-2)	GPCB LIMIT	Method of Test
Apr-22								
1	Particulate Matter	mg/Nm^3	24.56	22.35	20.14	18.15	150	IS 11255 (Part - 1)
2	Sulphur Dioxide as SO_2	ppm	6.42	7.18	7.15	6.15	100	IS 11255 (Part - 2)
3	Oxides of Nitrogen as NO_X	ppm	19.45	23.78	21.18	20.64	50	IS 11255 (Part - 7)
May-22								
1	Particulate Matter	mg/Nm^3	20.17	21.34	22.34	20.14	150	IS 11255 (Part - 1)
2	Sulphur Dioxide as SO2	ppm	6.10	7.45	8.15	7.23	100	IS 11255 (Part - 2)
3	Oxides of Nitrogen as NOX	ppm	20.15	22.90	23.16	22.15	50	IS 11255 (Part - 7)
Jun-22								
1	Particulate Matter	mg/Nm^3	24.52	17.65	20.14	21.67	150	IS 11255 (Part - 1)
2	Sulphur Dioxide as SO_2	ppm	7.23	6.15	7.86	8.12	100	IS 11255 (Part - 2)
3	Oxides of Nitrogen as NO_X	ppm	21.50	18.54	19.23	21.62	50	IS 11255 (Part - 7)
Jul-22								
1	Particulate Matter	mg/Nm^3	20.15	20.45	18.76	22.40	150	IS 11255 (Part - 1)
2	Sulphur Dioxide as SO_2	ppm	6.15	7.12	6.45	7.89	100	IS 11255 (Part - 2)
3	Oxides of Nitrogen as NO_X	ppm	17.89	19.87	17.89	19.76	50	IS 11255 (Part - 7)

Continue…

Sr. No.	Parameter	Unit	Hot Water System-1 (Liquid Terminal)	Hot Water System-2 (Liquid Terminal)	Thermic Fluid Heater (Bitumin-1)	Thermic Fluid Heater (Bitumin-2)	GPCB LIMIT	Method of Test
Aug-22								
1	Particulate Matter	mg/Nm^3	22.27	22.74	24.28	19.82	150	IS 11255 (Part - 1)
2	Sulphur Dioxide as SO_2	ppm	8.12	6.74	9.72	9.02	100	IS 11255 (Part - 2)
3	Oxides of Nitrogen as NO_X	ppm	21.96	21.39	21.51	21.30	50	IS 11255 (Part - 7)
Sep-22								
1	Particulate Matter	mg/Nm^3	23.62	19.27	21.46	20.35	150	IS 11255 (Part - 1)
2	Sulphur Dioxide as SO_2	ppm	7.53	7.48	8.24	8.79	100	IS 11255 (Part - 2)
3	Oxides of Nitrogen as NO_X	ppm	19.23	22.27	20.63	20.13	50	IS 11255 (Part - 7)

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Results of Stack Monitoring

Sr. No.	Parameter	Unit	D.G. Set-6, 7 & 8 (1250 KVA - CT2) Common Stack	D.G. Set-9 (1500 KVA - CT3)	D.G. Set-10 (1500 KVA - CT3)	D.G. Set-11 (1500 KVA - CT3)	GPCB LIMIT	Method of Test
			Jul-22					
			19-09-2022	16-07-2022	16-07-2022	16-07-2022		
1	Particulate Matter	mg/Nm^3	24.8	18.64	18.35	20.4	150	IS 11255 (Part - 1)
2	Sulphur Dioxide as SO_2	ppm	7.13	9.3	6.8	7.5	100	IS 11255 (Part - 2)
3	Oxides of Nitrogen as NO_X	ppm	38.25	34.5	29.5	33.1	50	IS 11255 (Part - 7)
4	Carbon Monoxide	mg/Nm3	3.86	3.8	3.5	3.3	--	UERL/AIR/SOP/18
5	Non Methyl Hydro Carbon	ppm	Not Detected	Not Detected	Not Detected	Not Detected	--	UERL/AIR/SOP/27
Sr. No.	Parameter	Unit	D.G. Set-12 (1500 KVA) - CT4	D.G. Set-13 (1500 KVA) - CT4	D.G. Set-14 (1500 KVA) - CT4	D.G. Set-1 (500 KVA) - DG House - MPT	GPCB LIMIT	Method of Test
			Sep-22					
			30-09-2022	30-09-2022	30-09-2022	30-09-2022		
1	Particulate Matter	mg/Nm^3	21.45	24.56	20.14	16.24	150	IS 11255 (Part - 1)
2	Sulphur Dioxide as SO_2	ppm	8.7	9.13	8.2	6.48	100	IS 11255 (Part - 2)
3	Oxides of Nitrogen as NO_X	ppm	18.5	21.45	17.85	21.36	50	IS 11255 (Part - 7)
4	Carbon Monoxide	mg/Nm3	3.4	4.1	3.5	3.74	--	UERL/AIR/SOP/18
5	Non Methyl Hydro Carbon	ppm	Not Detected	Not Detected	Not Detected	Not Detected	--	UERL/AIR/SOP/27

Continue…

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Sr. No.	Parameter	Unit	D.G. Set-2 (500 KVA) - DG House - MPT	D.G. Set-3 (500 KVA) - DG House - MPT	D.G. Set-4 (500 KVA) - DG House - MPT	D.G. Set-5 (500 KVA) - DG House - MPT	GPCB LIMIT	Method of Test
			Sep-22					
			11-09-2022	11-09-2022	11-09-2022	11-09-2022		
1	Particulate Matter	mg/Nm^3	22.16	18.58	22.73	20.58	150	IS 11255 (Part - 1)
2	Sulphur Dioxide as SO_2	ppm	7.83	7.16	7.26	8.37	100	IS 11255 (Part - 2)
3	Oxides of Nitrogen as NO_X	ppm	29.67	24.27	28.83	26.13	50	IS 11255 (Part - 7)
4	Carbon Monoxide	mg/Nm3	4.79	4.26	5.27	4.82	--	UERL/AIR/SOP/18
5	Non Methyl Hydro Carbon	ppm	Not Detected	Not Detected	Not Detected	Not Detected	--	UERL/AIR/SOP/27

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RESULTS OF BORE HOLE WATER

SR.NO.	TEST PARAMETERS	UNIT	Pump House-1	Pump House-2	Pump House-3	TEST METHOD
			16-05-2022	16-05-2022	16-05-2022	
1.	pH @ 25 ° C	--	8.48	8.12	8.16	IS 3025(Part 11)1983
2.	Salinity	ppt	4.94	5.08	5.16	APHA 23rd Ed.,2017,2520 B
3.	Oil & Grease	mg/L	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	IS 3025(Part39)1991, Amd. 2
4.	Hydrocarbon	mg/L	Not Detected	Not Detected	Not Detected	GC/GCMS
5.	Lead as Pb	mg/L	0.072	0.084	0.064	IS 3025 (PART 47) 1994
6.	Arsenic as As	mg/L	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	APHA 23rd Ed.,2017,3114-C
7.	Nickel as Ni	mg/L	0.012	0.012	0.098	IS 3025 (PART 54) 2003
8.	Total Chromium as Cr	mg/L	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	IS 3025 (PART 52) 2003
9.	Cadmium as Cd	mg/L	BDL(MDL:0.003)	BDL(MDL:0.003)	BDL(MDL:0.003)	IS 3025(PART 41) 1992
10.	Mercury as Hg	mg/L	BDL(MDL:0.001)	BDL(MDL:0.001)	BDL(MDL:0.001)	APHA 23rd Ed.,2017, 3112-B
11.	Zinc as Zn	mg/L	0.152	0.289	0.155	IS 3025(PART 49) 1994
12.	Copper as Cu	mg/L	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	IS 3025 (PART 42) 1992
13.	Iron as Fe	mg/L	0.18	0.98	0.88	IS 3025(PART 53) 2003
14.	Insecticides/Pesticides	µg/L	Absent	Absent	Absent	USEPA 8081 B
15.	Depth of Water Level from Ground Level	meter	1.9	2.1	1.95	--

ENVIRONMENT & RESEARCH LABS PVT. LTD. * UNISTAR GUJARAT VAPI.

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RESULTS OF BORE HOLE WATER

SR.NO.	TEST PARAMETERS	UNIT	Pump House-1	Pump House-2	Pump House-3	Near Unloading bays	Near ETP	TEST METHOD
			04-08-2022	04-08-2022	04-08-2022	04-08-2022	04-08-2022	
1.	pH @ 25 ° C	--	8.44	8.02	8.06	7.79	7.6	IS 3025(Part 11)1983
2.	Salinity	ppt	3.4	0.79	0.81	1.12	11.64	APHA 23rd Ed.,2017,2520 B
3.	Oil & Grease	mg/L	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	IS 3025(Part39)1991, Amd. 2
4.	Hydrocarbon	mg/L	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	GC/GCMS
5.	Lead as Pb	mg/L	0.064	0.072	0.044	0.034	0.042	IS 3025 (PART 47) 1994
6.	Arsenic as As	mg/L	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	APHA 23rd Ed.,2017,3114-C
7.	Nickel as Ni	mg/L	0.114	0.101	0.09	0.069	0.105	IS 3025 (PART 54) 2003
8.	Total Chromium as Cr	mg/L	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	IS 3025 (PART 52) 2003
9.	Cadmium as Cd	mg/L	BDL(MDL:0.003)	BDL(MDL:0.003)	BDL(MDL:0.003)	BDL(MDL:0.003)	BDL(MDL:0.003)	IS 3025(PART 41) 1992
10.	Mercury as Hg	mg/L	BDL(MDL:0.001)	BDL(MDL:0.001)	BDL(MDL:0.001)	BDL(MDL:0.001)	BDL(MDL:0.001)	APHA 23rd Ed.,2017, 3112-B
11.	Zinc as Zn	mg/L	0.132	0.246	0.129	0.122	0.197	IS 3025(PART 49) 1994
12.	Copper as Cu	mg/L	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	IS 3025 (PART 42) 1992
13.	Iron as Fe	mg/L	0.12	0.85	0.79	1.12	0.94	IS 3025(PART 53) 2003
14.	Insecticides/Pesticides	µg/L	Absent	Absent	Absent	Absent	Absent	USEPA 8081 B
15.	Depth of Water Level from Ground Level	meter	1.9	2.1	1.95	2.15	2	--

GUJARAT VAPI. ENVIRONMENT & RESEARCH LABS PVT. LTD. UNISTAR

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Sr. Chemist

Mr. Nitin Tandel
Technical Manager

Minimum Detection Limit			
Ambient Air Quality Monitoring			
Sr. No.	**Test Parameter**	**Unit**	**MDL**
1	Particulate Matter (PM10)	µg/m3	5 µg/m3
2	Particulate Matter (PM2.5)	µg/m3	5 µg/m3
3	Sulphur Dioxide (SO2)	µg/m3	4 µg/m3
4	Nitrogen Dioxide (NO2)	µg/m3	5 µg/m3
5	Carbon Monoxide (CO)	mg/m3	0.01 mg/m3
6	Ammonia (NH3)	µg/m3	5 µg/m3
7	Ozone (O3)	µg/m3	5 µg/m3
8	Lead (Pb)	µg/m3	0.5 µg/m3
9	Nickle (Ni)	ng/m3	1 ng/m3
10	Arsenic (As)	ng/m3	1 ng/m3
11	Benzene	µg/m3	1µg/m3
12	Benzo(o)Pyrene	ng/m3	0.1 ng/m3
14	Hydro Carbon	µg/m3	1 µg/m3
Stack Emission Monitoring			
Sr. No.	**Test Parameter**	**Unit**	**MDL**
1	Suspended particulate matter	mg/Nm3	2 mg/Nm3
2	Sulphur Dioxide SOX	mg/Nm3	4 mg/Nm3
3	Oxides of Nitrogen NOX	mg/Nm3	5 mg/Nm3

ETP Water			
Sr. No.	**Test Parameter**	**Unit**	**MDL**
1	Colour	Pt. Co. Scale	5
2	pH @ 27 ° C	--	2
3	Temperature	0C	5
4	Total Suspended Solids	mg/L	4
5	Total Dissolved Solids	mg/L	4
6	COD	mg/L	2
7	BOD (3 days at 27 0C)	mg/L	1
8	Chloride (as Cl) -	mg/L	1
9	Oil & Grease	mg/L	2
10	Sulphate (as SO4)	mg/L	1
11	Ammonical Nitrogen	mg/L	2
12	Phenolic Compound	mg/L	0.1
13	Copper as Cu	mg/L	0.05
14	Lead as Pb	mg/L	0.01
15	Sulphide as S	mg/L	0.05
16	Cadmium as Cd	mg/L	0.003
17	Fluoride as F	mg/L	0.2
18	Residual Chlorine	mg/L	0.1
19	Percent Sodium	%	--
20	Sodium Absorption ratio	--	--

MARINE WATER			
Sr. No.	**Test Parameter**	**Unit**	**MDL**
1	pH	--	5
2	Temperature	oC	5
3	Total Suspended Solids	mg/L	4
4	BOD (3 Days @ 27oC)	mg/L	1
5	Dissolved Oxygen	mg/L	0.2
6	Salinity	ppt	0.01
7	Oil & Grease	mg/L	2
8	Nitrate as NO_3	µmol/L	0.4
9	Nitrite as NO_2	µmol/L	0.04
10	Ammonical Nitrogen as NH_3	µmol/L	0.8
11	Phosphates as PO_4	µmol/L	0.4
12	Total Nitrogen	µmol/L	2.2
13	Petroleum Hydrocarbon	µg/L	0.1
14	Total Dissolved Solids	mg/L	4
15	COD	mg/L	2

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Sea SEDIMENT			
Sr. No.	**Test Parameter**	**Unit**	**MDL**
1	Organic Matter	%	0.5
2	Phosphorus as P	µg/g	1
3	Texture	--	--
4	Petroleum Hydrocarbon	µg/g	0.1
5	Aluminum as Al	%	0.1
6	Total Chromium as Cr+3	µg/g	2
7	Manganese as Mn	µg/g	1
8	Iron as Fe	%	0.1
9	Nickel as Ni	µg/g	1
10	Copper as Cu	µg/g	1
11	Zinc as Zn	µg/g	1
12	Lead as Pb	µg/g	1
13	Mercury as Hg	µg/g	0.05

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BORE HOLE WATER			
Sr. No.	**Test Parameter**	**Unit**	**MDL**
1	pH @ 25 ° C	--	5
2	Salinity	ppt	--
3	Oil & Grease	mg/L	2
4	Hydrocarbon	mg/L	0.1
5	Lead as Pb	mg/L	0.01
6	Arsenic as As	mg/L	0.01
7	Nickel as Ni	mg/L	0.02
8	Total Chromium as Cr	mg/L	0.05
9	Cadmium as Cd	mg/L	0.003
10	Mercury as Hg	mg/L	0.001
11	Zinc as Zn	mg/L	0.05
12	Copper as Cu	mg/L	0.05
13	Iron as Fe	mg/L	0.1
14	Insecticides/Pesticides	µg/L	0.1
15	Depth of Water Level from Ground Level	meter	--

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Monthly Average Report
AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : April - 2022

Name of Location : Village - Siracha

ID No. : **URA/ID/A-22/04/001**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1.	01/04/2022	60.9	24.1	17.4	25.5		--
2.	05/04/2022	50.5	27.9	19.5	15.8		--
3.	08/04/2022	55.7	21.3	22.3	21.2		--
4.	12/04/2022	72.6	22.2	17.6	22.7		--
5.	15/04/2022	59.2	25.9	13.4	19.1		--
6.	19/04/2022	56.2	26.7	14.0	21.4	21.3	BDL
7.	22/04/2022	67.4	24.4	19.3	25.8		--
8.	26/04/2022	66.7	22.1	17.0	22.9		--
9.	29/04/2022	58.0	24.4	10.1	18.4		
Average		**60.8**	**24.3**	**16.7**	**21.4**		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, **PM_{10}** - IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** - IS: 5182 (Part 2), 2001, **NO_X** - IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb**O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Remarks:
Opinion & Interpretation (if required):

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : April - 2022

Name of Location : Village - Kandagara

ID No. : **URA/ID/A-22/04/002**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1.	01/04/2022	62.5	27.2	20.8	23.1		--
2.	05/04/2022	58.8	29.9	15.5	18.8		--
3.	08/04/2022	55.9	24.1	21.3	25.7		--
4.	12/04/2022	66.7	28.5	16.5	21.9		--
5.	15/04/2022	55.8	25.6	13.9	17.8		--
6.	19/04/2022	58.6	25.8	13.5	18.2	18.9	BDL
7.	22/04/2022	68.4	25.4	19.6	23.1		--
8.	26/04/2022	49.6	23.0	18.5	25.5		--
9.	29/04/2022	63.1	20.8	13.2	16.3		
Average		**59.9**	**25.6**	**17.0**	**21.2**		**--**

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM– IS: 5182 (Part 4), 1999, **PM_{10}**– IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2**– IS: 5182 (Part 2), 2001, **NO_x**– IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Remarks:
Opinion & Interpretation (if required):

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : April - 2022

Name of Location : Village - Wandh

ID No. : **URA/ID/A-22/04/003**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1.	01/04/2022	68.0	30.5	16.5	18.5		--
2.	05/04/2022	56.1	27.0	19.4	23.8		--
3.	08/04/2022	71.2	31.7	22.7	21.3		--
4.	12/04/2022	63.5	34.7	17.6	25.4		--
5.	15/04/2022	74.2	38.1	20.2	22.1		--
6.	19/04/2022	61.5	32.7	21.1	28.4	28.9	BDL
7.	22/04/2022	60.7	29.0	16.9	21.7		--
8.	26/04/2022	51.3	33.6	21.1	18.7		--
9.	29/04/2022	65.2	30.3	13.7	16.8		
Average		**63.5**	**32.0**	**18.8**	**21.9**		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, **PM_{10}** - IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** - IS: 5182 (Part 2), 2001, **NO_X** - IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Remarks:
Opinion & Interpretation (if required):

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : April - 2022

Name of Location : Nr.20 MLD Plant

ID No. : **URA/ID/A-22/04/004**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1	21/04/2022	64.2	30.8	15.1	24.3	15.8	BDL
Average		**64.2**	**30.8**	**15.1**	**24.3**	**15.8**	**BDL**

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, **PM_{10}** - IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** - IS: 5182 (Part 2), 2001, **NO_x** - IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Remarks:
Opinion & Interpretation (if required):

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : April - 2022

Name of Location : Nr. Shantiniketan - 1

ID No. : **URA/ID/A-22/04/005**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1	21/04/2022	58.6	25.4	12.9	16.5	14.8	BDL
Average		**58.6**	**25.4**	**12.9**	**16.5**	**14.8**	**BDL**

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, **PM_{10}** - IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** - IS: 5182 (Part 2), 2001, **NO_X** - IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Remarks:
Opinion & Interpretation (if required):

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : May - 2022

Name of Location : Village - Siracha

ID No. : **URA/ID/A-22/05/001**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1.	03/05/2022	60.7	23.9	15.8	21.3		--
2.	06/05/2022	64.9	25.8	21.6	28.2		--
3.	10/05/2022	55.7	22.5	18.3	23.1	22.4	BDL
4.	13/05/2022	58.8	26.8	12.7	16.7		--
5.	17/05/2022	52.8	23.3	20.3	27.5		--
6.	20/05/2022	63.6	24.3	22.6	24.1		--
7.	24/05/2022	65.8	26.2	16.3	19.4		--
8.	27/05/2022	70.4	26.4	17.2	20.8		--
9.	31/05/2022	64.2	24.0	13.8	17.6		
Average		**61.9**	**24.8**	**17.6**	**22.1**		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, **PM_{10}** - IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** - IS: 5182 (Part 2), 2001, **NO_X** - IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb**O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Remarks:
Opinion & Interpretation (if required):

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : May - 2022

Name of Location : Village - Kandagara

ID No. : **URA/ID/A-22/05/002**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1.	03/05/2022	59.6	27.6	18.9	25.1		--
2.	06/05/2022	56.7	26.0	23.6	28.6		--
3.	10/05/2022	67.4	26.9	17.9	20.4	17.9	BDL
4.	13/05/2022	62.2	27.4	19.5	23.6		--
5.	17/05/2022	70.5	25.0	22.1	27.3		--
6.	20/05/2022	51.9	26.5	18.1	22.3		--
7.	24/05/2022	64.9	27.9	16.2	19.7		--
8.	27/05/2022	57.0	28.8	12.5	15.3		--
9.	31/05/2022	68.7	29.3	15.2	18.7		
Average		**62.1**	**27.3**	**18.2**	**22.3**		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM– IS: 5182 (Part 4), 1999, **PM_{10}**– IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2**– IS: 5182 (Part 2), 2001, **NO_x**– IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Remarks:
Opinion & Interpretation (if required):

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : May - 2022

Name of Location : Village - Wandh

ID No. : **URA/ID/A-22/05/003**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1.	03/05/2022	68.7	33.8	19.3	25.3		--
2.	06/05/2022	71.3	35.2	17.2	22.9		--
3.	10/05/2022	65.9	31.8	24.5	29.8	26.5	BDL
4.	13/05/2022	72.6	35.8	15.9	19.7		--
5.	17/05/2022	67.1	33.2	20.6	23.3		--
6.	20/05/2022	53.3	32.9	16.1	18.2		--
7.	24/05/2022	64.4	33.0	19.6	23.7		--
8.	27/05/2022	55.0	31.9	16.6	19.5		--
9.	31/05/2022	58.7	31.5	17.6	20.2		
Average		**64.1**	**33.2**	**18.6**	**22.5**		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, **PM_{10}** - IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** - IS: 5182 (Part 2), 2001, **NO_x** - IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Remarks:
Opinion & Interpretation (if required):

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : May - 2022

Name of Location : Nr.20 MLD Plant

ID No. : **URA/ID/A-22/05/004**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1	25/05/2022	71.1	31.4	17.2	22.6	18.2	BDL
Average		**71.1**	**31.4**	**17.2**	**22.6**	**18.2**	**BDL**

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, **PM_{10}** - IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** - IS: 5182 (Part 2), 2001, **NO_X** - IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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(Authorized Signatory)

Remarks:
Opinion & Interpretation (if required):

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : May - 2022

Name of Location : Nr. Shantiniketan - 1

ID No. : **URA/ID/A-22/05/005**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1	25/05/2022	59.7	28.2	14.3	19.4	15.6	BDL
Average		**59.7**	**28.2**	**14.3**	**19.4**	**15.6**	**BDL**

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, **PM_{10}** - IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** - IS: 5182 (Part 2), 2001, **NO_x** - IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Remarks:
Opinion & Interpretation (if required):

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Monthly Average Report
AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : June - 2022

Name of Location : Village - Siracha

ID No. : **URA/ID/A-22/06/001**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1.	03/06/2022	60.8	29.8	18.3	23.7		--
2.	07/06/2022	71.2	32.1	13.0	17.1		--
3.	08/06/2022	50.8	22.6	20.5	26.3		--
4.	14/06/2022	62.4	30.2	15.2	20.7		--
5.	17/06/2022	64.2	31.1	13.7	18.4		--
6.	21/06/2022	53.6	29.1	16.5	22.4	25.2	BDL
7.	24/06/2022	68.6	32.7	14.7	19.5		--
8.	28/06/2022	62.3	30.2	17.2	20.8		--
Average		**61.7**	**29.7**	**16.1**	**21.1**		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, **PM_{10}** - IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** - IS: 5182 (Part 2), 2001, **NO_X** - IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb**O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : June - 2022

Name of Location : Village - Kandagara

ID No. : **URA/ID/A-22/06/002**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1.	03/06/2022	69.1	28.6	16.0	21.3		--
2.	07/06/2022	57.4	21.9	19.8	25.1		--
3.	08/06/2022	54.9	19.4	15.6	23.7		--
4.	14/06/2022	70.2	32.6	12.4	16.8		--
5.	17/06/2022	51.8	23.8	17.3	23.9		--
6.	21/06/2022	64.1	31.0	15.7	19.3	18.8	BDL
7.	24/06/2022	53.3	29.3	14.2	17.8		--
8.	28/06/2022	62.9	26.9	12.5	15.3		--
Average		**60.4**	**26.7**	**15.4**	**20.4**		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM– IS: 5182 (Part 4), 1999, **PM_{10}**– IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2**– IS: 5182 (Part 2), 2001, **NO_X**– IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : June - 2022

Name of Location : Village - Wandh

ID No. : **URA/ID/A-22/06/003**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1.	03/06/2022	56.3	26.6	14.5	19.3		--
2.	07/06/2022	68.7	31.3	16.7	22.5		--
3.	08/06/2022	66.5	32.4	20.3	26.7		--
4.	14/06/2022	72.4	39.8	18.1	24.7		--
5.	17/06/2022	63.0	33.6	13.9	18.2		--
6.	21/06/2022	68.9	35.3	16.1	21.7	29.4	BDL
7.	24/06/2022	59.8	28.0	15.9	19.4		--
8.	28/06/2022	67.2	34.1	16.5	22.4		--
Average		**65.4**	**32.6**	**16.5**	**21.9**		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, **PM_{10}** - IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** - IS: 5182 (Part 2), 2001, **NO_X** - IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Remarks:
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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : June - 2022

Name of Location : Nr.20 MLD Plant

ID No. : **URA/ID/A-22/06/004**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1	18/06/2022	68.2	29.2	18.9	24.2	20.4	BDL
Average		**68.2**	**29.2**	**18.9**	**24.2**	**20.4**	**BDL**

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, **PM_{10}** - IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** - IS: 5182 (Part 2), 2001, **NO_x** - IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Remarks:
Opinion & Interpretation (if required):

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : June - 2022

Name of Location : Nr. Shantiniketan - 1

ID No. : **URA/ID/A-22/06/005**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1	18/06/2022	63.4	26.5	15.8	21.3	17.8	BDL
Average		**63.4**	**26.5**	**15.8**	**21.3**	**17.8**	**BDL**

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, **PM_{10}** - IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** - IS: 5182 (Part 2), 2001, **NO_x** - IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Remarks:
Opinion & Interpretation (If required):

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : July - 2022

Name of Location : Village - Siracha

ID No. : **URA/ID/A-22/07/001**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1.	01/07/2022	Rain					
2.	05/07/2022						
3.	08/07/2022						
4.	12/07/2022						
5.	15/07/2022						
6.	19/07/2022	41.7	17.1	10.0	17.1		--
7.	22/07/2022	52.7	23.7	12.5	16.4	13.4	BDL
8.	26/07/2022	55.8	22.9	13.2	20.7		--
9.	29/07/2022	61.1	25.2	15.6	21.2		
Average		**52.8**	**22.2**	**12.8**	**18.9**		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM – IS: 5182 (Part 4), 1999, **PM_{10}** – IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** – IS: 5182 (Part 2), 2001, **NO_X** – IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb**O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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(Authorized Signatory)

Remarks:
Opinion & Interpretation (if required):

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : July – 2022

Name of Location : Village – Kandagara

ID No. : **URA/ID/A-22/07/002**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1.	01/07/2022	Rain					
2.	05/07/2022						
3.	08/07/2022						
4.	12/07/2022						
5.	15/07/2022						
6.	19/07/2022	52.3	20.4	12.4	16.8		--
7.	22/07/2022	46.0	17.6	10.3	16.9	14.2	BDL
8.	26/07/2022	60.2	28.5	15.7	19.3		--
9.	29/07/2022	45.7	16.4	13.2	17.3		
Average		**51.0**	**20.7**	**12.9**	**17.6**		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM– IS: 5182 (Part 4), 1999, **PM_{10}**– IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2**– IS: 5182 (Part 2), 2001, **NO_x**– IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : July - 2022

Name of Location : Village - Wandh

ID No. : **URA/ID/A-22/07/003**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1.	01/07/2022	Rain					
2.	05/07/2022						
3.	08/07/2022						
4.	12/07/2022						
5.	15/07/2022						
6.	19/07/2022	48.1	20.7	12.4	22.8		--
7.	22/07/2022	57.5	28.1	14.2	26.1	16.7	BDL
8.	26/07/2022	64.6	30.9	17.9	24.3		--
9.	29/07/2022	52.5	23.4	18.9	24.3		
Average		**55.7**	**25.8**	**15.9**	**24.4**		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, **PM_{10}** - IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** - IS: 5182 (Part 2), 2001, **NO_x** - IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Remarks:
Opinion & Interpretation (if required):

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : July - 2022

Name of Location : Nr.20 MLD Plant

ID No. : **URA/ID/A-22/07/004**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1	18/07/2022	60.3	25.1	14.8	21.3	17.3	BDL
Average		**60.3**	**25.1**	**14.8**	**21.3**	**17.3**	**BDL**

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, **PM_{10}** - IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** - IS: 5182 (Part 2), 2001, **NO_X** - IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Remarks:
Opinion & Interpretation (if required):

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : July - 2022

Name of Location : Nr. Shantiniketan - 1

ID No. : **URA/ID/A-22/07/005**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1	18/07/2022	56.4	22.3	12.3	18.9	14.2	BDL
Average		**56.4**	**22.3**	**12.3**	**18.9**	**14.2**	**BDL**

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, **PM_{10}** - IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** - IS: 5182 (Part 2), 2001, **NO_X** - IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Remarks:
Opinion & Interpretation (if required):

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : August - 2022

Name of Location : Village - Siracha

ID No. : **URA/ID/A-22/08/001**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1.	02/08/2022	50.1	22.3	13.0	17.1		--
2.	05/08/2022	55.0	19.3	16.5	21.3		--
3.	09/08/2022	Rain					
4.	12/08/2022						
5.	16/08/2022	57.3	22.3	12.4	17.5	14.7	BDL
6.	19/08/2022	Rain					
7.	23/08/2022						
8.	26/08/2022	63.0	19.6	13.2	18.6		--
9.	30/08/2022	Rain					
Average		**56.4**	**20.9**	**13.8**	**18.6**		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM – IS: 5182 (Part 4), 1999, **PM_{10}** – IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** – IS: 5182 (Part 2), 2001, **NO_x** – IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb**O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : August – 2022

Name of Location : Village – Kandagara

ID No. : **URA/ID/A-22/08/002**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1.	02/08/2022	48.6	18.2	11.2	18.4		--
2.	05/08/2022	54.8	24.0	14.8	21.2		--
3.	09/08/2022	Rain					
4.	12/08/2022						
5.	16/08/2022	52.3	20.8	12.8	15.7	16.2	BDL
6.	19/08/2022	Rain					
7.	23/08/2022						
8.	26/08/2022	60.8	21.6	13.7	20.1		--
9.	30/08/2022	Rain					
Average		**54.1**	**21.2**	**13.1**	**18.9**		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM– IS: 5182 (Part 4), 1999, **PM_{10}**– IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2**– IS: 5182 (Part 2), 2001, **NO_x**– IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : August - 2022

Name of Location : Village - Wandh

ID No. : **URA/ID/A-22/08/003**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1.	02/08/2022	56.0	20.3	15.2	21.3		--
2.	05/08/2022	60.2	27.3	14.1	18.9		--
3.	09/08/2022	Rain					
4.	12/08/2022						
5.	16/08/2022	54.2	26.5	17.2	22.3	18.9	BDL
6.	19/08/2022	Rain					
7.	23/08/2022						
8.	26/08/2022	68.6	29.6	12.6	17.4		--
9.	30/08/2022	Rain					
Average		**59.8**	**25.9**	**14.8**	**20.0**		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, **PM_{10}** - IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** - IS: 5182 (Part 2), 2001, **NO_X** - IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Remarks:
Opinion & Interpretation (if required):

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : August - 2022

Name of Location : Nr.20 MLD Plant

ID No. : **URA/ID/A-22/08/004**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1	09/08/2022	62.4	29.7	14.7	20.6	19.4	BDL
Average		**62.4**	**29.7**	**14.7**	**20.6**	**19.4**	**BDL**

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, **PM_{10}** - IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** - IS: 5182 (Part 2), 2001, **NO_X** - IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Remarks:
Opinion & Interpretation (if required):

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : August - 2022

Name of Location : Nr. Shantiniketan - 1

ID No. : **URA/ID/A-22/08/005**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1	09/08/2022	54.7	23.8	13.6	17.5	18.1	BDL
Average		**54.7**	**23.8**	**13.6**	**17.5**	**18.1**	**BDL**

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, **PM_{10}** - IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** - IS: 5182 (Part 2), 2001, **NO_X** - IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Remarks:
Opinion & Interpretation (if required):

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : September - 2022

Name of Location : Village - Siracha

ID No. : **URA/ID/A-22/09/001**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1.	02/09/2022	70.1	32.0	14.2	16.7		--
2.	06/09/2022	61.7	29.0	12.0	15.2		--
3.	09/09/2022	47.2	27.1	17.2	21.5		--
4.	13/09/2022	Rainfall					
5.	16/09/2022						
6.	20/09/2022	55.6	26.2	10.5	13.9	15.9	BDL
7.	23/09/2022	64.8	27.5	15.7	17.2		--
8.	27/09/2022	60.6	28.4	13.8	19.4		--
9.	30/09/2022	57.8	30.2	18.6	20.8		--
Average		**59.7**	**28.6**	**14.6**	**17.8**		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM – IS: 5182 (Part 4), 1999, **PM_{10}** – IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** – IS: 5182 (Part 2), 2001, **NO_x** –IS: 5182 (Part 6), 2006, **Hg:** AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb**O3**: IS – 5182 (Part 9) 2009**O**zone BDL limit: 5 µg/m3

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Remarks:
Opinion & Interpretation (if required):

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : September - 2022

Name of Location : Village – Kandagara

ID No. : **URA/ID/A-22/09/002**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1.	02/09/2022	51.5	29.0	16.5	20.2		--
2.	06/09/2022	73.4	31.6	11.2	14.6		--
3.	09/09/2022	52.3	24.8	14.8	18.5		--
4.	13/09/2022	Rainfall					
5.	16/09/2022						
6.	20/09/2022	57.2	27.7	13.5	16.9	14.6	BDL
7.	23/09/2022	60.1	29.4	10.2	13.5		--
8.	27/09/2022	58.8	26.7	12.7	20.3		--
9.	30/09/2022	54.1	27.5	15.8	22.6		--
Average		**58.2**	**28.1**	**13.5**	**18.1**		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM– IS: 5182 (Part 4), 1999, **PM_{10}**– IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2**– IS: 5182 (Part 2), 2001, **NO_x**–IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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Remarks:
Opinion & Interpretation (if required):

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : September - 2022

Name of Location : Village - Wandh

ID No. : **URA/ID/A-22/09/003**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1.	02/09/2022	55.1	27.5	14.6	20.2		--
2.	06/09/2022	66.4	26.4	16.6	22.3		--
3.	09/09/2022	52.8	25.9	15.4	23.7		--
4.	13/09/2022	Rainfall					
5.	16/09/2022						
6.	20/09/2022	60.4	32.1	13.1	17.5	19.4	BDL
7.	23/09/2022	67.0	28.5	16.1	28.3		--
8.	27/09/2022	73.2	31.5	20.6	25.2		--
9.	30/09/2022	61.8	29.4	18.4	23.6		--
Average		**62.4**	**28.8**	**16.4**	**23.0**		--

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, **PM_{10}** - IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** - IS: 5182 (Part 2), 2001, **NO_x** - IS: 5182 (Part 6), 2006, **Hg:** AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

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(Authorized Signatory)

Remarks:
Opinion & Interpretation (if required):

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Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : September - 2022

Name of Location : Nr.20 MLD Plant

ID No. : **URA/ID/A-22/09/004**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		**100**	**60**	**80**	**80**	**100**	**N.A.**
1	21/09/2022	67.8	32.1	15.8	21.7	20.7	BDL
Average		**67.8**	**32.1**	**15.8**	**21.7**	**20.7**	**BDL**

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, **PM_{10}** - IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** - IS: 5182 (Part 2), 2001, **NO_x** - IS: 5182 (Part 6), 2006, **Hg:** AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

UniStar Environment & Research Labs Pvt. Ltd.

(Authorized Signatory)

Remarks:
Opinion & Interpretation (if required):

***** End of Report ******

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MoEF&CC (GOI) Recognized Environmental Laboratory under the EPA-1986 (12.01.2020 to17.03.2023) | QCI-NABET Accredited EIA Consultant Organization | GPCB Recognized Environmental Auditor (Schedule-II) | ISO 9001:2015 Certified Company | ISO 45001:2018 Certified Company

Monthly Average Report

AMBIENT AIR MONITORING

Name and Address of Client : **M/s. Adani Power (Mundra) Ltd.**
Village: Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
GUJARAT – 370 435.

Month of Monitoring : September - 2022

Name of Location : Nr. Shantiniketan - 1

ID No. : **URA/ID/A-22/09/005**

Sr. No.	Sampling Date	Concentration in Ambient Air (µg /m³)					
		PM_{10} µg/M³	$PM_{2.5}$ µg/M³	Sulphur Dioxide (SO_2) µg/M³	Nitrogen Dioxide (NO_2) µg/M³	Ozone (O_3) µg/M³	Mercury (Hg) µg/M³
GPCB Permissible Limit (TWA for 24 hrs.)		100	60	80	80	100	N.A.
1	21/09/2022	58.7	27.8	14.1	19.6	19.2	BDL
Average		**58.7**	**27.8**	**14.1**	**19.6**	**19.2**	**BDL**

Remark: Calibrated equipment & instruments were used during monitoring & analysis of above identified sample.

Analysis Method Reference: SPM - IS: 5182 (Part 4), 1999, **PM_{10}** - IS: 5182 (Part 23), 2006, **$PM_{2.5}$**- Guidelines by CPCB (Vol-1), **SO_2** - IS: 5182 (Part 2), 2001, **NO_X** - IS: 5182 (Part 6), 2006, **Hg**: AAS by VGA Method -3112 B APHA 22 Edison & **Hg:** 2 ppb **O3**: IS – 5182 (Part 9) 2009Ozone BDL limit: 5 µg/m3

UniStar Environment &
Research Labs Pvt. Ltd.

(Authorized Signatory)

Remarks:
Opinion & Interpretation (if required):

******** End of Report ********

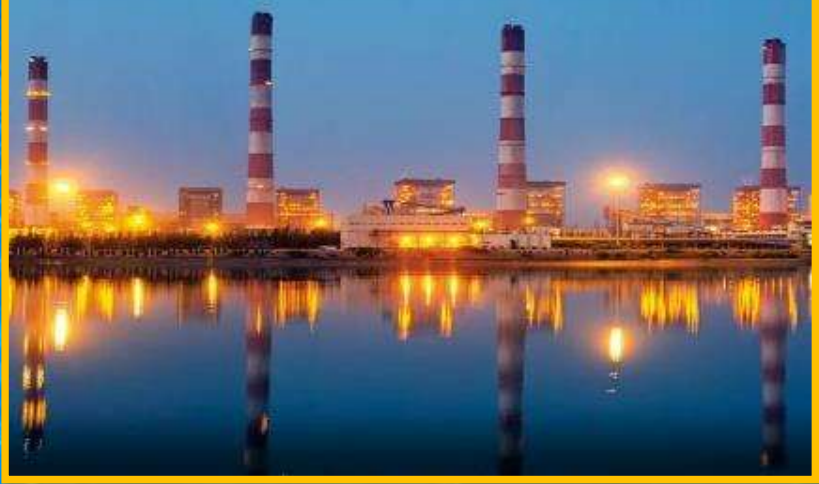
adani

MARINE MONITORING REPORT

June 2022

FOR

M/s. ADANI POWER (MUNDRA) LIMITED



At

Tunda & Siracha,
Tal. Mundra, Dist.: Kutch.
KUTCH, GUJARAT – 370 435

Prepared by

UniStar
Environment & Research Labs Pvt. Ltd.

PREFACE

M/s. Adani Power (Mundra) Limited (APMuL) is a subsidiary company of Adani Group engaged in imported coal-based thermal power generation located near village Tunda and Siracha, Taluka Mundra District Kutch, Gujarat. APMuL has commissioned the first supercritical 660 MW unit in the country. This is also the World's First supercritical technology project to have received the 'Clean Development Mechanism (CDM) Project' certification from United Nations Framework Convention on Climate Change (UNFCCC). Currently, the total power production capacity of the APMuL has increased to 4620 MW.

APMuL has engaged **M/s. UniStar Environment and Research Labs Pvt. Ltd., Vapi** to **carry out the** seasonal Marine Monitoring Study along with the seawater intake and outfall (discharge) channels of Mundra power plant. This marine monitoring study involved the assessment of Physio-chemical parameters at the earlier prescribed locations. The distribution and diversity of marine flora and fauna were assessed through water sampling from sub-tidal regions. Furthermore, the distribution of the benthic community was evaluated from the sediment samples collected along the sub-tidal and inter-tidal regions. The overall objective of this study is to monitor the status of prevailing ecology along the intake and discharge (outfall) channels, in terms of water and sediment quality through assessment of physico-chemical parameters and marine biota. This marine monitoring report provides a comprehensive analysis of the Data obtained through a monitoring study undertaken during June 2022.

Date: 08/06/2022

M/S.UniStar Environment and Research Labs Pvt. Ltd.

White House, Char Rasta,

Vapi-396 191

Sampling by	Report Prepared By	Approved by
		
(Bhavin Patel)	**(Shweta Rana)**	**(Jaivik Tandel)**

adani

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1. INTRODUCTION

1.1 OVERVIEW

Adani Power (Mundra) Limited (APMuL) is an imported coal-based thermal power plant located near village Tunda and Siracha, Taluka Mundra, District Kutch, Gujarat, India. APMuL is the largest single location private coal-based power plant in the world. Mundra plant capacity is 4620 MW, comprising of 9 units with 4 units of 330 MW (Phase I and II) and 5 units of 660MW (Phase III and IV). The 330 MW units are based on subcritical technology and the 660 MW units are based on supercritical technology. APMuL has created history by synchronizing the first super-critical technology based 660MW generating unit. This is not only the first super-critical generating unit in the country but also the fastest project implementation ever by any power developer in the country. The Phase III of the Mundra project, which is based on supercritical technology, has received the 'Clean Development Mechanism (CDM) Project' certification from United Nations Framework Convention on Climate Change (UNFCCC).

M/S. UniStar Environment and Research Labs Pvt. Ltd., Vapi, India have carried out the routine Marine Monitoring Study in the vicinity of the APMuL Mundra plant. The sampling was carried out along the sea intake channel (2 stations) and discharge/outfall water mixing (3 stations) region. This assessment involves the collection of physico-chemical parameters from 5 subtidal locations (Table 1). The distribution and diversity of marine microflora (phytoplankton and pigments) and fauna (zooplankton) were assessed from water samples collected from 5 subtidal stations (Table 1). The assemblage of the microbenthic community was studied from 5 sub-tidal and 3 inter-tidal stations. The Outfall Channel of the APMuL was closed due to maintenance work since September 2021 and just started in June 2022. Thus, this report presents the detailed account of the results observed during the Marine Monitoring Study at the vicinity of the APMuL.

1.2 OBJECTIVES

a) To analyses the physico-chemical seawater parameter for understanding the water quality in the study area.

b) Evaluation of the prevailing status of marine biota through the quantitative and qualitative analysis of marine flora (phytoplankton and pigments) and fauna (zooplankton and macrobenthos).

c) To recommend adequate marine environmental management measures.

2. STUDY PROGRAM

2.1 STUDY PERIOD

The field investigation was carried out on 08 and 09 June 2022. The sampling strategy was planned in such a manner as to get a detailed characteristic of the marine environment of the study area. Sampling and analysis for the marine environment have been carried out by **M/S. UniStar Environment and Research Labs Pvt. Ltd, Vapi, India**.

2.2 SAMPLING LOCATIONS

Sampling was carried out at 5 subtidal stations and 3 intertidal transects along with the sea intake and outfall channels. Out of 5 subtidal stations, 2 were in the sea intake channel and 3 along the discharge mixing (outfall channel) region. One intertidal station was located along the sea intake channel and 2 were along the discharge region. The detailed geographic coordinates of sampling stations are given in Table 1 and Figure 1.1.

Table 1: Geographic coordinates, water, and sediment parameters at the subtidal sampling stations, APMuL during June 2022.

Subtidal station							
Station	**Station code**	**Locations**	**Coordinates**		**Water depth**	**Tide**	**Sediment texture**
1	St-1	Intake point	22°48’ 30.’50”N	69°32’57.84”E	5 m	Flood	Silty-sand
2	St-2	Mouth of intake point	22°47’07.20 ”N	69°32’06.50”E	5.6 m	Flood	Silty-sand
3	St-3	West port area	22°45’27.70 ”N	69°34’50.63”E	5.1 m	Ebb	Silty-sand
4	St-4	Outfall area	22°44’ 40.56”N	69°36’26.61”E	4.0 m	Ebb	Silty clay
5	St-5	Outfall area	22°45’12.60 ”N	69°36’44.54”E	4.2 m	Ebb	Silty clay

Table 2: Geographic coordinates, water, and sediment parameters at the inertial sampling stations, APMuL during June 2022.

Intertidal transect						
Station	**Station code**	**Tide Level**	**Coordinates**	**Water depth**	**Intertidal exposed area**	**Sediment texture**
I	IT-1 (HW)	High Tidewater level	22°47'07.55" N	69°32'16.91" E	9 m	Silty-sand
	IT-1 (LW)	Low Tide water level	22°47'06.38"N	69°32'11.62"E		Silty-sand
II	IT-2 (HW)	High Tide water level	22°45'58.72" N	69°34'35.41" E	8 m	Silty-Sandy
	IT-2 (LW)	Low Tidewater level	22°45'57.74" N	69°34'35.05" E		Silty-sand
III	IT-3 (HW)	High Tidewater level	22°44' 52.21" N	69°36'41.64"E	9.2 m	Sandy
	IT-3 (LW)	Low Tidewater level	22°44' 51.23" N	69°36'39.28" E		Sandy

Figure 1: Map of the study area illustrating the subtidal and intertidal sampling stations.

2.3 SAMPLING STRATEGY

2.3.1 Sampling frequency

A sampling at the subtidal stations was carried out during the flood to ebb tides. Surface and bottom water samples were collected in duplicate for assessing water quality and marine biota. Intertidal samples were collected in duplicate during low tide at each transect.

2.3.2 Sampling methodology

For estimation of physico-chemical parameters and marine flora (phytoplankton and pigments), subsurface samples were collected using the Niskin water sampler (5-litre capacity) with a mechanism for closing at the desired depth. Surface water samples were collected using a clean polyethylene bucket. Phytoplankton samples were collected in clean polyethylene bottles (1 L) fitted with inert cap liners and preserved with 4% Lugol's iodine solution. For pigment analysis, water samples were stored in the clean, dark polyethylene cans (5 L). Chemical parameters samples were collected in polyethylene or glass bottles. Samples for phenol were collected in polyethylene or glass bottles and PHs collected in glass bottles. Dissolve oxygen (DO) and Biological Oxygen Demand (BOD) samples were collected in glass BOD bottles. The temperature was measured on the field with a calibrated thermometer. Analysis of other parameters was carried out in the laboratory.

For zooplankton oblique hauls were made using Heron Tranter net attached with calibrated flow meter. Samples were stored in clean polyethylene bottles (0.5 L) and fixed with 5% formaldehyde.

For the analysis of macrobenthos, subtidal sediment samples were collected using a Van Veen grab covering an area of 0.04 m^2. Intertidal samples were collected using a metal quadrant. Samples were sieved with a 500 µ metal sieve and preserved with Rose Bengal-formalin solution and stored in plastic zip-lock bags.

2.4 SAMPLE ANALYSIS METHODS

2.4.1 Physico-chemical parameter:

Samples were analysed by using different analytical methods for estimations of Temperature, Turbidity, PH, Suspended Solid (SS), Salinity, DO, BOD, COD, Phosphate, Total nitrogen, Nitrite, Nitrate, Phenols and PHc. The standard methods used for the analysis of each parameter are given in Table 3.

2.4.2 Sediment Quality parameters:

Sediment texture, Petroleum Hydrocarbon (PHc), Phosphorus, Organic Carbon, Aluminium, Iron, Chromium, Nickel, Zinc, Lead, Copper, Cobalt, Cadmium, Mercury, Arsenic. The standard methods used for the analysis of each parameter.

2.4.3 Biological parameters:

2.4.3a Phytoplankton:

The Lugol's preserved samples were allowed to settle for 48-72 hrs. The identification and enumeration of phytoplankton cells were carried out under a compound microscope using the Sedgwick Rafter slide. Species were identified to the genus level.

2.4.3b Phytoplankton pigments:

For the estimation of Chlorophyll *a* (Chl*a*) and Pheophytin, a known volume of field-collected water samples were filtered through Whatman glass microfiber filters (GF/F). Then filter paper was macerated in 90% acetone and stored overnight in the dark at 4°C. For estimation of Chl*a* fluorescence of extract was measured using Turner Fluorometer. For phaeophytin fluorescence was measured after acidification with 0.1 N HCl.

2.4.3c Zooplankton:

Formalin preserved sample was divided into 4 equal portions using the Folsom Plankton Splitter. One portion of samples was used to determine biomass using the volume displacement method. Another portion was used for enumeration and identification of (25-50%) faunal composition.

For quantification of zooplankton, 4-5 ml of the sample was taken in a zooplankton counting chamber. The identification was carried out under Stereomicroscope. The zooplanktons were identified at the group level.

2.4.3d Benthos:

For enumeration and identification of the macrobenthos, the organisms were handpicked using forceps and a paintbrush. After sorting, organisms were preserved in 10% formalin. Identification of the organisms was done to the group level under a stereomicroscope.

3 WATER QUALITY MONITORING

3.1 RESULT OF PHYSICO-CHEMICAL WATER PARAMETER ANALYSIS

The samples collected during the field visit were brought to the laboratory for further analysis of physico-chemical parameters. The standard methods used for the analysis of water quality parameters are given in Table 3

Table 3: Water quality parameters and their test methods.

Sr. No.	Parameters	Station 1		Station 2		Test Method Permissible
		Surface	Bottom	Surface	Bottom	
PHYSICAL QUALITY						
1.	pH @ 25°C	8.1	8.1	8.1	8.1	IS 3025(Part 11)1983
2.	Temperature (^{0}C)	32.5	31.2	32.6	31.5	IS 3025(Part 9)1984
3.	Turbidity (NTU)	1	1	1	1	IS 3025(Part 10)1984
CHEMICAL QUALITY						
1.	Total Suspended Solids (mg/l)	164	175	160	166	APHA 23rd Ed.,2017,2540- D
2.	Salinity	35.2	36.0	35.0	35.9	By Calculation
3.	Dissolved Oxygen (mg/l)	5.7	5.2	5.9	5.1	APHA 23rd Ed.,2017,4500-O, B
4.	Biochemical Oxygen Demand (BOD) (mg/l)	4.1	3.7	4.0	3.9	IS 3025(Part 44)1993Amd.01
5.	Sulphate as SO_4 (mg/l)	2230	2320	2386	2456	APHA 23rd Ed.,2017,4500- SO_4 E
6.	Ammonical Nitrogen (µmol/l)	BDL(MDL :2.0)	BDL(MDL:2.0)	BDL(MDL :2.0)	BDL(MDL:2.0)	APHA 23rd Ed.,2017,4500- NH_3 B
7.	Total Nitrogen (µmol/l)	3.8	3.9	3.7	5.1	By Calculation
8.	PO_4^{3-}-P (µmol/l)	0.6	1.1	0.7	1.5	APHA 23rd Ed.,2017,4500 NH_3 - B
9.	(NO_3^--N) (µmol/l)	4.8	5.1	3.2	4.1	APHA 23rd Ed.,2017,4500 NO_3-B
10.	(NO_2^--N) Nitrite (µmol/l)	0.3	0.3	0.3	0.4	APHA 23rd Ed.,2017,4500NO_2B
11.	Phenol (mg/l)	BDL(MDL :0.01)	BDL(MDL:0.01)	BDL(MDL :0.01)	BDL(MDL:0.01)	IS 3025(Part 43)1992 Amd.02
12.	PHc (ppb)	N.D.	N.D.	N.D.	N.D.	GC Method

Note: MDL = Minimum Detection Limit (MDL: 0.01) and N.D. = Not detectable
Turbidity= 0.1=1 to 10 NTU; 1=10 to 40 NTU; 5=40-100 NTU

Table 3 (Continued 2)

Sr. No	Parameters	Station 3		Station 4		Test Method Permissible
		Surface	Bottom	Surface	Bottom	
PHYSICAL QUALITY						
1.	pH @ 25°C	8.1	8.2	8.2	8.2	IS 3025(Part 11)1983
2.	Temperature ^{0}C	33	32.5	32.2	31.5	IS 3025(Part 9)1984
3.	Turbidity (NTU)	1	1	5	5	IS 3025(Part 10)1984
CHEMICAL QUALITY						
1.	Total Suspended Solids (mg/l)	181	198	160	166	APHA 23rd Ed.,2017,2540-D
2.	Salinity	35.2	36.3	36.4	37.1	By Calculation
3.	Dissolved Oxygen (mg/l)	6.1	5.3	5.5	5.1	APHA 23rd Ed.,2017,4500-O, B
4.	Biochemical Oxygen Demand (BOD) (mg/l)	3.9	3.5	4.3	3.9	IS 3025(Part 44)1993Amd.01
5.	Sulphate as SO_4 (mg/l)	2280	2610	2482	2610	APHA 23rd Ed.,2017,4500-SO_4 E
6.	Ammonical Nitrogen (µmol/l)	BDL(MDL: 2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	APHA 23rd Ed.,2017,4500-NH_3 B
7.	Total Nitrogen (µmol/l)	3.9	4.6	3.1	2.9	By Calculation
8.	PO_4^{3-}-P (µmol/l)	0.6	1.0	0.6	0.9	APHA 23rd Ed.,2017,4500 NH_3 - B
9.	(NO_3^--N) (µmol/l)	3.2	3.9	4.2	4.6	APHA 23rd Ed.,2017,4500 NO_3-B
10.	(NO_2^--N) Nitrite (µmol/l)	0.4	0.3	0.3	0.5	APHA 23rd Ed.,2017,4500NO_2B
11.	Phenol (mg/l)	BDL(MDL: 0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	IS 3025(Part 43)1992 Amd.02
12.	PHc (ppb)	N.D.	N.D.	N.D.	N.D.	GC Method

Note: MDL = Minimum Detection Limit (MDL: 0.01) and N.D. = Not detectable
Turbidity= 0.1=1 to 10 NTU; 1=10 to 40 NTU; 5=40-100 NTU

Table 3 (Continued 3)

Sr. No.	Parameters	Station 5		Test Method Permissible
		Surface	Bottom	
PHYSICAL QUALITY				
1.	pH @ 25°C	8.2	8.2	IS 3025(Part 11)1983
2.	Temperature (^{0}C)	32.1	31.6	IS 3025(Part 9)1984
3.	Turbidity (NTU)	1	1	IS 3025(Part 10)1984
CHEMICAL QUALITY				
1.	Total Suspended Solids	171	178	APHA 23rd Ed.,2017,2540- D
2.	Salinity	36.8	37.3	By Calculation
3.	Dissolved Oxygen (mg/l)	5.9	5.4	APHA 23rd Ed.,2017,4500-O, B
4.	Biochemical Oxygen Demand (BOD) (mg/l)	4.0	5.1	IS 3025(Part 44)1993Amd.01
5.	Sulphate as SO_4 (mg/l)	2524	2460	APHA 23rd Ed.,2017,4500-SO_4 E
6.	Ammonical Nitrogen(µmol/l)	BDL(MDL:2.0)	BDL(MDL:2.0)	APHA 23rd Ed.,2017,4500-NH_3 B
7.	Total Nitrogen (µmol/l)	3.8	3.1	By Calculation
8.	PO_4^{3-}-P (µmol/l)	0.8	1.2	APHA 23rd Ed.,2017,4500 NH_3 - B
9.	(NO_3^--N) (µmol/l)	4.2	4.8	APHA 23rd Ed.,2017,4500 NO_3-B
10.	(NO_2^--N) Nitrite (µmol/l)	0.3	0.4	APHA 23rd Ed.,2017,4500NO_2B
11.	Phenol (mg/l)	BDL (MDL:0.01)	BDL(MDL:0.01)	IS 3025(Part 43)1992 Amd.02
12.	PHc (ppb)	N.D.	N.D.	GC Method

Note: MDL = Minimum Detection Limit and N.D. = Not detectable
Turbidity= 0.1=1 to 10 NTU; 1=10 to 40 NTU; 5=40-100 NTU

3.1.1 Temperature: Marine water temperature was checked on site during the sampling. Surface and bottom water temperatures observed in the study area was in a range between 31.2^{0}C to 33^{0}C. The water temperature generally varied in accordance with the prevailing air temperature, tidal activity, and seasonality.

3.1.2 pH: The pH of the water is generally buffering effect, influenced by the freshwater and anthropogenic discharge from land. The observed pH in the study area was in the range of 8.1 to 8.2 at the surface and bottom water.

3.1.3 Turbidity: Seawater turbidity is the cloudiness caused by large numbers of individual particles such as very fine clay and minute marine organisms. This also varies seasonally due to intrusion of land runoff and/or sediment resuspension. Surface and bottom water turbidity observed in the study area was in a range between 1 (10.3-19.7 NTU) to 5 (41.5-46.2) NTU.

3.1.4 Total suspended solids (TSS): The suspended solids generally constitute silt and clay eroded from the land or shore erosions and suspension of the benthic layers from the seabed. Anthropogenic discharges also contribute to suspended solids in the form of contaminants such as oil and solid waste in a polluted area. On a seasonal basis, high TSS in seawater could be observed during the active monsoon season. Suspended solid concentration in the study area was a little variable. In surface water, TSS was 160 to 181 mg/l and in the bottom water, it was range from 166 to 198 mg/l.

3.1.5 Salinity: Salinity is an indicator of (saline or freshwater) water masses intrusion within the region. The standard average salinity of seawater is 35, which may vary with the riverine or inland influx, rains, or evaporation in the region. The salinity variation during the present sampling was 35 to 36.8 at surface and 35.9 to 37.3 at bottom water.

3.1.6 DO and BOD: High DO level is an indication of good oxidizing conditions in an aquatic environment. In unpolluted waters equilibrium is maintained through oxygen production during photosynthesis, dissolution from the atmosphere consumption by the respiration and decay of organic matter in a manner that DO levels are close to or above saturation value.

The DO level of the study area was varied from 5.4 to 6.1 mg/l at the water surface and 5.1 to 5.4 mg/l at bottom water. The average DO value was 5.6 mg/l, which indicates the oxygenated conditions in the study region.

BOD is generally indicating effective consumption of oxidizable matter in that water body. The industrial effluents contain high BOD levels. Thus, high BOD is also an indication of the intrusion of industrial polluted effluent into natural waters. BOD levels in the study area were varied from 3.9 to 4.3 mg/l at surface and 3.5 to 5.1 mg/l at bottom water.

3.1.7 Nutrients: Dissolved phosphorus and nitrogen compounds serve as the nutrients for phytoplankton growth. The high nutrient concentrations in the seawater generally could be attributed to anthropogenic and industrial influx. This could lead to further eutrophication and further deterioration of the pristine ecosystem. Phosphorous compounds are present predominantly as reactive phosphate while combined nitrogen is present as nitrate, nitrite, and ammonium species. In the present study, Phosphate concentration was range from 0.6

to 0.8 µmol/l on the surface and 0.9 to 1.5 µmol/l bottom water. Nitrate concentrations were not detected on the surface and bottom water. Nitrite concentration was range from 3.2 to 4.8 µmol/l on the surface and 3.9 to 5.1 µmol/l bottom water.

3.1.8 PHc and phenol: The Phenol compounds and PHc were not detected in the present investigation.

4 BIOLOGICAL PARAMETERS (BIODIVERSITY STUDY)

Marine ecosystems are subject to a multitude of direct human pressures, such as overexploitation, eutrophication, pollution, and species introductions. These stressors can have synergistic effects on marine ecosystems, altering its functioning. Anthropogenic involvements constantly compromise the health of the marine ecosystem by disturbing the ecological balance. Hence the assessment of the biotic components along with abiotic factors is an integral part of environmental assessment and monitoring study. During present investigation at APMuL, the abundance and distribution of marine organism (Plankton and benthos) were studied as part of routine environmental monitoring.

4.1 PLANKTONIC FORMS

The name plankton is derived from the Greek word “planktons”, meaning “wanderer” or “drifter”. While some forms of plankton are capable of independent movement and can swim up to several hundred meters in a single day, their position is primarily determined by currents in the body of water they inhabit. As per definition, organisms classified as "plankton" are unable to resist ocean currents. Plankton is primarily divided into two broad functional groups i.e., Phytoplankton and Zooplankton.

4.1.1 Phytoplankton

Phytoplankton are microscopic, single-celled photosynthetic organisms that live suspended in all water niches, including oceans, freshwater and marine niche. Like the terrestrial ecosystem where plants are integral part of the ecosystem, phytoplankton play key role in biogeochemistry of the oceans. As they are dependent on sunlight for the energy, they mostly inhabit euphotic zone. Therefore, they are responsible for production of half of the atmosphere’s oxygen and more than half of the primary production in the oceans. There are many species of phytoplankton, each of which has a characteristic shape, size, and function. Marine species of phytoplankton grow abundantly in oceans around the world and are the foundation of the marine food chain. Marine phytoplankton are the producing (autotrophic)

component in the ocean. There are fourteen classes of phytoplankton. Each class of phytoplankton contains unique attributes in size, cell structure, nutrients, and function.

4.1.2 Zooplankton:

Zooplankton occupy second position in the food web of marine niche. They are the primary consumers organisms and generally feed on phytoplankton or small, microscopic group of organisms for they are nutritional needs. They are incapable of making their own food from sun-light or inorganic compounds, and feed on organisms or the remains of other organisms to get the energy necessary for survival.

4.2 SIGNIFICANCE OF PHYTO- AND ZOOPLANKTONS

Phytoplankton are vital to marine ecosystems. They are producers, or autotrophs, that form the foundation of most marine food webs. As photosynthetic organisms, they can convert solar energy into chemical energy and store it in form of sugars. They are responsible for half of the photosynthetic activity on the planet. The significance of zooplanktons is found in their role of transferring biological production from phytoplankton to large organisms in the marine food web and the seafloor. The microscopic protozoan, tunicates, copepods, and other crustaceans graze upon many phytoplankton species. These in turn become food for other animals further linking the food web. Therefore, variability in reproduction of copepods would affect the survival of young fish that feeds on them.

Table 4: Test methods for phytoplankton and zooplankton analysis

Sr. no.	Test performed	Method
1	Phytoplankton	APHA, Edition 23, Part 10000, 10200 F
2	Chlorophyll *a* and Pheophytin	APHA, Edition 23, Part 10000, 10200 H (with some modification)
3	Zooplankton	APHA, Edition 23, Part 10000, 10200 G
4	Macro benthos	APHA, Edition 23, Part 10000,10500 A-10500 D

4.3 PHYTOPLANKTON DIVERSITY:

Phytoplankton sampling was carried out at 5 stations. At each station, water samples were collected from surface and bottom waters. During the sampling period (June 2022) the

phytoplankton population in the coastal waters of APMuL, Mundra was diverse and represented with a total of 41 phytoplankton genera (Table 5) belonging to diatoms (34 genera) and dinoflagellates (7 genera). Diatoms Species belonged to *Bellerochea* sp. *Chaetoceros* sp. *Corethron* sp., *Coscinodiscus* sp., *Cyclotella* sp., *Cymbella* sp., *Ditylum* spp., *Guinardia* sp., *Melosira* sp., *Odontella* spp., *Paralia sulcate*, *Rhizosolenia* spp., *Thalassiosira* sp., *Amphora* sp., *Amphorprora* sp., *Asterionella* sp., *Bacillaria* sp., *Bellerochea* sp., *Cylindrotheca* sp., *Diploneis* sp., *Gyrosigma* sp., *Lauderia* sp., *Leptocylindrus* sp., *Licmophora* sp., *Lithodesmium* sp., *Meunieri* sp., *Navicula* spp., *Nitzschia* spp., *Pinnularia* sp., *Pleurosigma* spp., *Pseudo-nitzschia* spp., *Surirella* sp., *Synedra* sp. and *Thalassionema* sp. (Table 5). Among them, *Asterionella* sp. (16%), *Coscinodiscus* sp. (12%) and *Nitzschia* spp. (9%) were predominant. The predominance of *Asterionella* sp. (72 cells×10^2/L) was observed at surface of station 2. Similarly, *Coscinodiscus* sp. (38 cells×10^2/L) and *Nitzschia* sp. (36 cells×10^2/L) were also dominant at surface depth of Station 2. Among dinoflagellates, *Scrippsiella* sp. (5.34%). and *Gymnodinium* spp. (1.5%) were predominant. *Scrippsiella* sp. was predominant (16 cells×10^2/L) at Station 3 and 4 bottom waters.

The phytoplankton abundance in the study region was ranged from 114 to 228 cells×10^2/L (Figure 2; Table 5). The highest phytoplankton abundance was observed at Station 2 in surface (228 cells×10^2/L) and then at Station 5 in surface water (189 cells×10^2/L). The lowest phytoplankton abundance (114 cells×10^2/L) was observed at Station 3 in bottom water. The study shows that the marine water around was enriched with the diverse phytoplankton population

Table 5: Phytoplankton abundance (cells×10^{-2}/L) at different sampling stations in the coastal waters of APMuL, Mundra during June 2022.

Note: S=surface; B=bottom; St=station

Phytoplankton Genera	Sampling Stations									
	St-1	St-1	St-2	St-2	St-3	St-3	St-4	St-4	St-5	St-5
	S	B	S	B	S	B	S	B	S	B
Diatoms										
Bellerochea sp.	0	0	0	0	0	0	0	2	0	0
Chaetoceros sp.	0	4	0	2	0	0	0	0	2	2
Corethron sp.	0	0	0	0	0	0	2	0	0	0
Coscinodiscus sp.	26	34	38	26	14	10	18	14	2	6
Cyclotella sp.	0	2	2	0	6	0	0	0	2	2
Cymbella sp.	2	0	0	0	0	0	0	0	0	0

Ditylum spp.	4	8	4	2	0	2	12	6	2	2
Guinardia sp.	18	2	4	30	0	6	2	10	18	0
Melosira sp.	8	0	0	6	0	0	0	0	0	0
Odontella spp.	14	10	2	2	8	2	16	2	20	22
Paralia sp.	8	0	2	2	26	26	10	6	2	0
Rhizosolenia spp.	2	2	18	12	4	4	0	10	4	2
Thalassiosira sp.	0	0	18	12	0	0	0	2	0	0
Amphora sp.	0	0	0	2	8	2	0	0	8	4
Amphorprora sp.	0	0	0	0	0	2	20	2	0	0
Asterionella sp.	22	36	72	22	18	4	16	4	46	36
Bacillaria sp.	4	0	0	0	8	2	0	0	6	0
Bellerochea sp.	2	0	0	2	0	2	6	0	2	0
Cylindrotheca sp.	0	0	0	0	2	0	0	2	0	0
Diploneis sp.	0	0	0	0	2	0	0	0	0	0
Gyrosigma sp.	2	2	0	0	2	0	0	0	0	0
Lauderia sp.	0	2	0	0	0	0	0	0	0	0
Leptocylindrus sp.	0	0	18	4	0	2	0	0	0	0
Licmophora sp.	0	0	2	0	0	0	0	2	2	0
Lithodesmium sp.	8	0	0	0	2	0	2	8	0	0
Meunieri sp.	2	4	0	2	2	2	0	0	0	0
Navicula spp.	12	2	2	2	6	4	6	14	10	6
Nitzschia spp.	2	20	36	16	2	0	8	12	20	32
Pinnularia sp.	8	0	0	2	0	0	10	0	2	2
Pleurosigma spp	2	10	0	2	8	2	14	12	12	2
Pseudo-nitzschia spp.	0	0	2	0	0	2	4	4	2	0
Surirella sp.	0	0	0	0	0	2	0	2	0	0
Synedra sp.	0	0	0	0	0	0	2	0	2	0
Thalassionema sp.	14	22	0	2	16	16	8	18	10	18
Dinoflagellates										
Alexandrium sp.	0	0	0	0	0	0	0	0	0	2
Chattonella sp.	0	0	0	2	0	0	0	0	0	0
Gymnodinium sp.	0	2	0	0	10	4	0	4	4	2
Gyrodinium spp.	0	0	2	0	0	0	0	0	0	0
Protoperidinium spp.	4	2	0	0	2	0	0	0	0	0
Prorocentrum sp.	0	0	0	0	2	2	0	0	0	0
Scrippsiella spp.	8	4	6	6	10	16	8	16	10	4
Total Phytoplankton (Cells x 10^2/L)	**172**	**168**	**228**	**158**	**158**	**114**	**164**	**152**	**188**	**144**

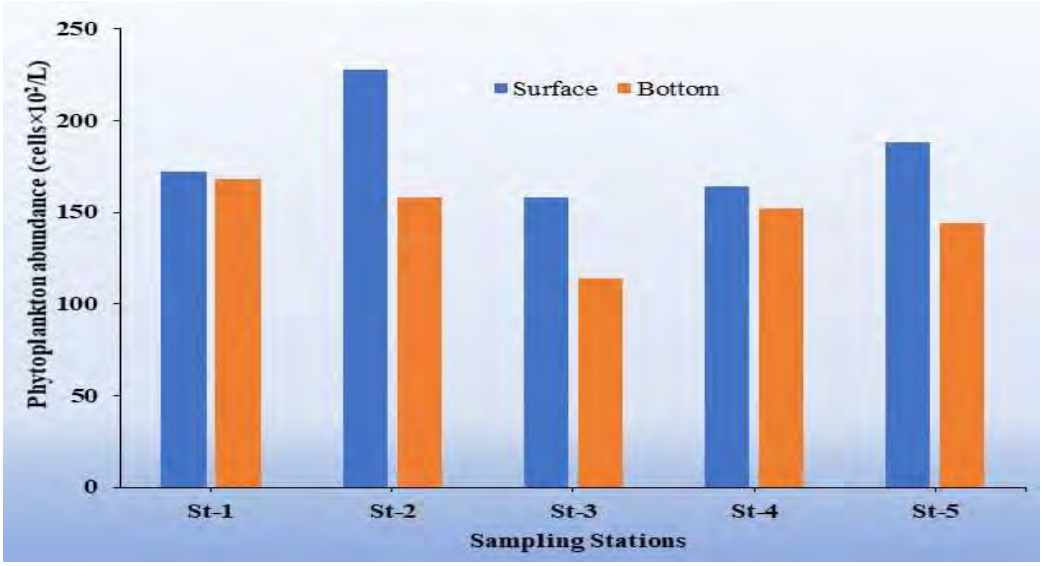
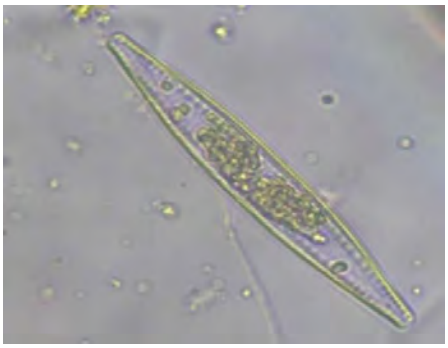
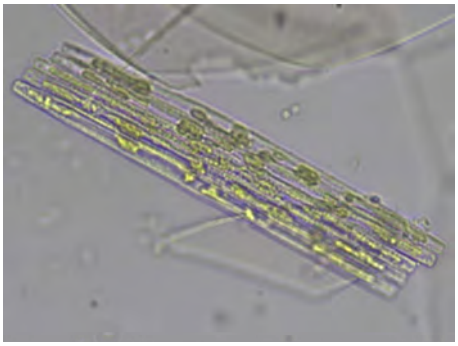


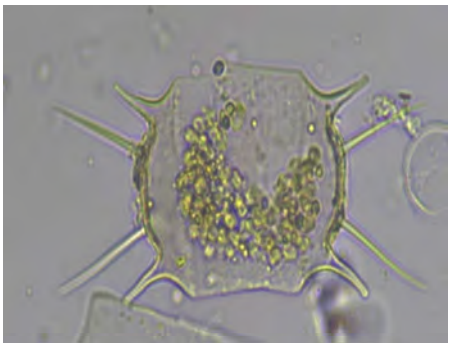
Figure 2: Phytoplankton abundance (cells×10^2/L) reported in the surface and bottom waters along the APMuL coast, Mundra during June 2022. Note: St=Station



***Pseudo-Nitzschia* sp.**



***Bacillaria* sp.**



***Odontella* sp.**

***Cosinodiscus* sp.**

Figure 3: Microphotographs of phytoplankton reported in the coastal waters of APMuL, Mundra during June 2022.

4.4 PHYTOPLANKTON PIGMENTS (CHLOROPHYLL *a* AND PHEOPHYTIN):

Marine phytoplankton contains the essential as well as accessory pigment like that of terrestrial plants. Phytoplankton pigments capture sunlight. The resulting photosynthesis and its products, especially the oxygen and organic compounds, all rely on the light energy captured by the different phytoplankton pigments. Chlorophyll *a* is the major pigment for light harvesting, and play a significant role in photosynthesis and photoprotection, by extending the light collection window and protecting the cell from damage of high irradiance levels or high ultraviolet light exposure.

Algal chlorophyll forms a series of degradation products upon degradation. In addition to Chlorophyll the naturally occurring pigments in algal cells. The nature of these degradation products depends on which part of the chlorophyll molecule is affected. As chlorophyll degrades, the initial step is either the loss of the magnesium from the center of the molecule or the loss of the phytol tail. This results in the formation of the molecule, phaeophytin. Depending on the parent molecule several distinct molecules like phaeophytins, chlorophyllides, and pheophorbides can be produced. Thus, in addition to Chlorophyll a filtered seawater contains color degradation products of phytoplankton pigments.

4.4a CHLOROPHYLL *a* AND PHAEOPHYTIN CONCENTRATIONS

The phytoplankton biomass distribution expressed in terms of Chlorophyll a (Chl-*a*) and Pheophytin at selected stations in the coastal region of APMuL, Mundra is presented in Table 6. The Chl-*a* concentrations in the study region were ranged from 1.5 µg/L to 2.0 µg/L. The Pheophytin content was ranged from 0.6 µg/L to 1.0 µg/L. The Chl-*a* and Pheophytin concentrations were more in the surface water as compared to the bottom water. The variations observed between the surface and bottom waters could be due to several natural biological variability. The highest Chl-*a* and Pheophytin concentrations were observed at Station 2 surface water (Table 6).

Table 6: Chlorophyll *a*, Pheophytin concentrations along with their ratios (Chl*a*: Pheophytin) in the marine waters of APMuL, Mundra during June 2022.

Note: ST= Station

Sampling stations		Chlorophyll a (µg/L)	Phaeophtin (µg/L)	Chl*a*:Phaeophtin ratio
St-1	**Surface**	1.9	1.0	1.9
St-1	**Bottom**	1.6	1.0	1.7

St-2	**Surface**	2.0	1.0	2.0
St-2	**Bottom**	1.8	0.9	2.0
St-3	**Surface**	1.7	0.8	2.1
St-3	**Bottom**	1.6	0.6	2.7
St-4	**Surface**	1.9	1.0	1.9
St-4	**Bottom**	1.5	0.8	1.9
St-5	**Surface**	1.9	0.9	2.1
St-5	**Bottom**	1.7	0.8	2.1

The concentration of Pheophytin is a measure of the dead cells and is an indirect indicator of biotic and abiotic stress conditions of the algae leading to a deterioration of Chl-*a*. The ratio from concentrations of Chl-*a* and Pheophytin in an aquatic ecosystem suggests a balance between the growth and mortality of phytoplankton life. In healthy environments, ratios of Chl-*a* to Pheophytin generally exceed 1.1. In the present study, this ratio was ranged from 1.7 to 2.7 (Table 6). The Chl-*a* and Pheophytin ratio showed marginally elevated levels in the surface waters as compared to the bottom waters. Overall, the ratios of Chl-*a* and Pheophytin concentration in the study region were generally high (>1), indicating that the appropriate conditions prevailed for the phytoplankton growth.

4.5 ZOOPLANKTON DIVERSITY:

Zooplankton standing stock in terms of population and biomass revealed substantial spatial variation within all 5 stations (Table 7; Figure 4). The maximum zooplankton population (17.6 no×10^3/100 m^3) and biomass (1.9 ml/ 100 m^3) were recorded at Station 4. The lowest zooplankton population (10.7 no×10^3/100 m^3) and biomass (1.01 ml/100 m^3) observed at Station 3 and Station 1, respectively (Table 7). A total of 8 groups of zooplankton including Copepods, Cyclopoids, Harpacticoids, Copepod nauplii, Barnacle nauplius, Gastropda, Chaetognath and Polychaete were identified during this study (Table 7). Among these groups Copepod nauplii (31%) and Copepods (30%) were most dominant (Figure 5). Harpacticoids were also dominant group (21%) in zooplankton population (Figure 5). Gastropod, polychaete larvae as well as fish eggs also were another observed as minor group the present study. The occurrence of copepods and their nauplii together with decapods and fish larvae/eggs in zooplankton samples highlights the fair production potential of live food resources (organisms) to support the fish and crustacean population in the study region

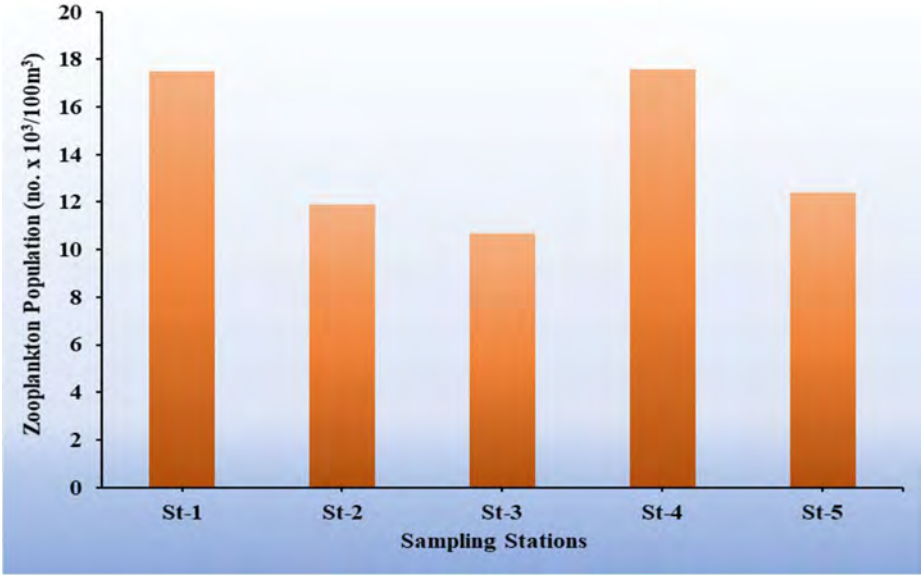


Figure 4: Zooplankton density (nos. /100 m^3) reported in the subtidal waters (Station 1 to 5) along the APMuL coast, Mundra during June 2022.

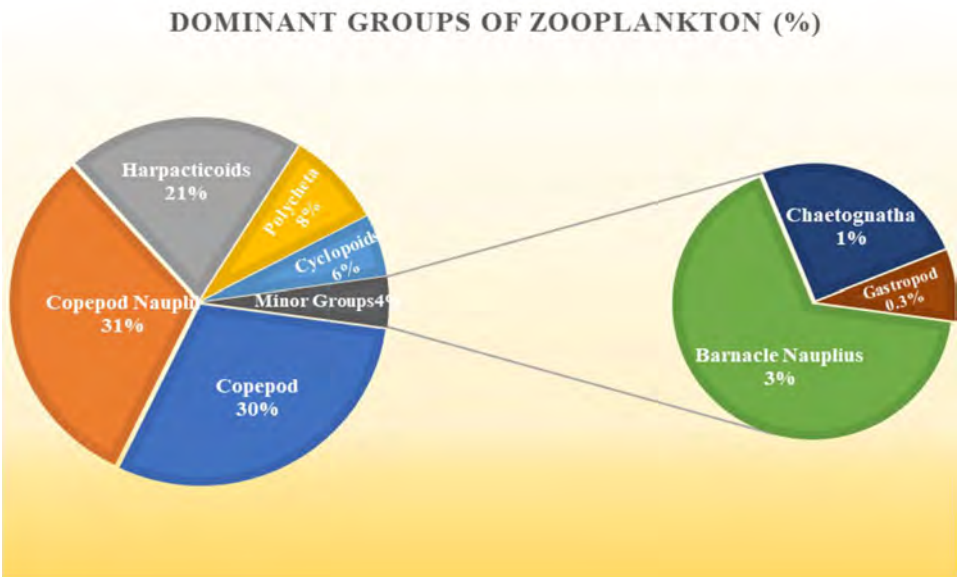


Figure 5: Dominant groups of Zooplankton reported from APMuL coast, Mundra during June 2022.

Table 7: Density (no/100m^3), percentage contribution (%) and biomass (ml/100m^3) of various zooplankton groups in the coastal waters at the APMuL, Mundra during June 2022.

Zooplankton Groups	St-1	St-2	St-3	St-4	St-5
Copepods					
Acartia sp.	4	2	4	0	4
Subeucalanus sp.	10	0	2	2	4
Labidocera sp.	1	1	2	0	0
Centropages sp.	0	0	0	2	0
Tortanus sp.	0	1	0	0	1
Other calanoids	30	10	9	60	45
Cyclopoids					
Oithona sp.	1	6	5	11	6
Corycaeus sp.	0	0	1	0	0
Harpacticoids					
Euterpina acutifrons	10	7	11	8	4
Microsetella sp.	2	7	6	0	0
Other harpacticoids	4	23	8	20	10
Copepod nauplii	66	48	39	9	39
Non-Copepods					
Barnacle nauplius	2	6	3	4	1
Gastropoda	1	0	1	0	0
Chaetognatha	2	0	3	0	1
Polychaeta	20	0	4	38	2
Decapod larva	18	8	1	13	1
Oekopleura	0	0	5	0	8
Bryozoan larva	3	0	2	3	1
Fish egg	1	0	0	0	0
Bivalve	0	0	1	6	0
Fish larva	0	0	0	0	1
Population (no. x 10^3/100m^3)	**17.5**	**11.9**	**10.7**	**17.6**	**12.4**
Biomass (ml./100 m^3)	**1.01**	**1.5**	**1.3**	**1.9**	**1.5**

Polychaete Larva

Copepod Nauplius

Fish Larva

Cyclopoid Copepod

Figure 6: Microphotographs of zooplanktons reported in the coastal waters of APMuL, Mundra during June 2022.

4.6 Microbenthic fauna

The benthic zone is the lowest ecological zone of a water body which usually involves the sediments at the seafloor. The benthic environment is divided into distinctive ecological zones based on depth, seafloor topography, and vertical gradients of physical parameters. These are the supralittoral, littoral, sublittoral, bathyal, abyssal, and hadal zones. The number of phyla and species of benthic animals exceeds those of pelagic species, at least partly because of the greater physical variety of benthic habitats. Benthic animals are separated into infaunal and epifaunal species, depending upon whether they live within sediments or on the surface of the seafloor, respectively. Size categories of the zoobenthos consist of the larger macrofauna (>1.0 mm), the small meiofauna which is characteristically found in sand and mud, and the microfauna which is made up mostly of protozoans.

Benthic organisms are morphologically different from those planktonic organisms. Many are adapted to live on the substrate (bottom). In benthic habitats, they can be considered dominant creatures. These organisms adapted to deep-water pressure so cannot survive in the upper parts of the water column. Since light does not penetrate very deep ocean water, the benthic organisms often depend on the organic matter falling from the upper water column as their main energy source. This dead and decaying matter sustains the benthic food chain. The most benthic organisms are scavengers or detritivores. These organisms under being relatively stationary, are constantly exposed to changes undergoing in overlying water, and hence, respond very well to aquatic pollution. The macro benthos population is very sensitive to environmental perturbation and is highly influenced by the physicochemical

characteristics of water, the nature of the substratum, food, predation, and other factors. The density of benthic invertebrates also fluctuates widely with the changes in the season.

4.6.1 Significance of macrobenthic organisms

The biomass of microbenthic organisms in estuaries and coastal embayment is often high. It declines if communities affected by prolonged periods of poor water quality especially when anoxia and hypoxia are common. Burrowing and tube-building by deposit-feeding benthic organisms (bioturbations) help to mix the sediment and enhance the decomposition of organic matter. Nitrification and denitrification are also enhanced because a range of oxygenated and anoxic micro-habitats are created. For example, the area of oxic-anoxic boundaries and the surface area available for diffusive exchange are increased by tube-building macrobenthos. The loss of benthic suspension-feeders can further enhance turbidity levels because these organisms filter suspended particles including planktonic algae, and they enhance sedimentation rates through bio deposition (i.e., voiding of their wastes and unwanted food). Changes in the macro fauna (and flora) cause changes in nutrient storage pools. Macro fauna is also important constituents of fish diets and thus are an important link for transferring energy and nutrients between trophic levels, also driving pelagic fish and crustacean production. For these reasons, the benthic organisms are extremely important indicators of environmental change.

4.6.2 Benthic Diversity

4.6.2a Subtidal region:

During the present study, more macrobenthos abundance and biomass was reported at subtidal stations than intertidal stations at APMuL, Mundra (Table 8). The macrobenthos density was ranged from 225 no/m^2 to 500 no/m^2 at sampling stations (Table 8; Figure 7). The biomass of the macrobenthic community in the study region was ranged from 0.84 g/m^2 to 1.54 g/m^2 in the study region. The maximum abundance of benthic microorganisms was reported at Station 3 (500 no/ m^2) and mainly contributed by dominance of amphipods (24%). The highest biomass of macrobenthic species was observed at Station 5 (1.54 g/ m^2) with dominance of Polychaetas (84%). The least density (225 no/ m^2) and biomass (0.76 g/ m^2) was observed at Station 1 (Table 8; Figure 8). In species composition, Polychaete species (Phylum Annelida) belonging to the family Paraonidae, Pilargidae, Capitillidae, Cossuridae, *Sternaspis* sp, Ciratullidae, *Nephthys* sp, Heterospionidae, Lumbriconereis, Spionidae were abundant contributing ~79% to macrobenthic population (Figure 8). Overall, the presence of

Polychaete, Sipuncula worms and amphipods suggest the availability of food organisms for benthic predators in the area.

Table 8: Faunal composition, density (no/m^2) and biomass (g/m^2) of the macrobenthos community in the subtidal region at APMuL, Mundra during June 2022.

Note: ST=Station

Taxa	Stations				
	St-1	St-2	St-3	St-4	St-5
Phylum Polychaeta					
Paraonidae	50	125	25	0	25
Pilargidae	50	0	0	0	0
Capitillidae	50	100	75	75	0
Cossuridae	0	25	50	0	0
Sternaspis sp.	0	0	75	0	0
Ciratullidae	0	0	50	25	0
Nephthys sp.	0	0	0	100	150
Heterospionidae	0	0	75	0	0
Lumbriconereis	0	0	0	150	150
Spionidae	25	25	0	0	25
Phylum Mollusca					
Bivalvia	25	50	0	0	0
Gastropoda	25	0	50	0	0
Phylum Arthopoda					
Cumaceans	0	0	0	0	0
Amphipoda	0	50	100	50	75
Total abundance (no/m^2)	**225**	**375**	**500**	**400**	**425**
Biomass (g/m^2)	**0.76**	**0.84**	**1.12**	**1.01**	**1.54**

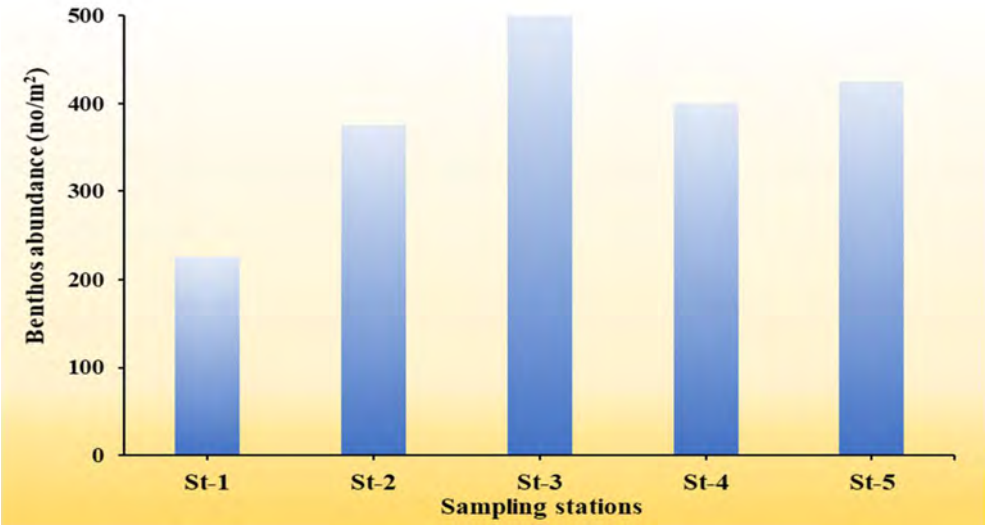


Figure 7: Subtidal macro benthos abundance (no/m^2) at different sampling stations at APMuL, Mundra during June 2022

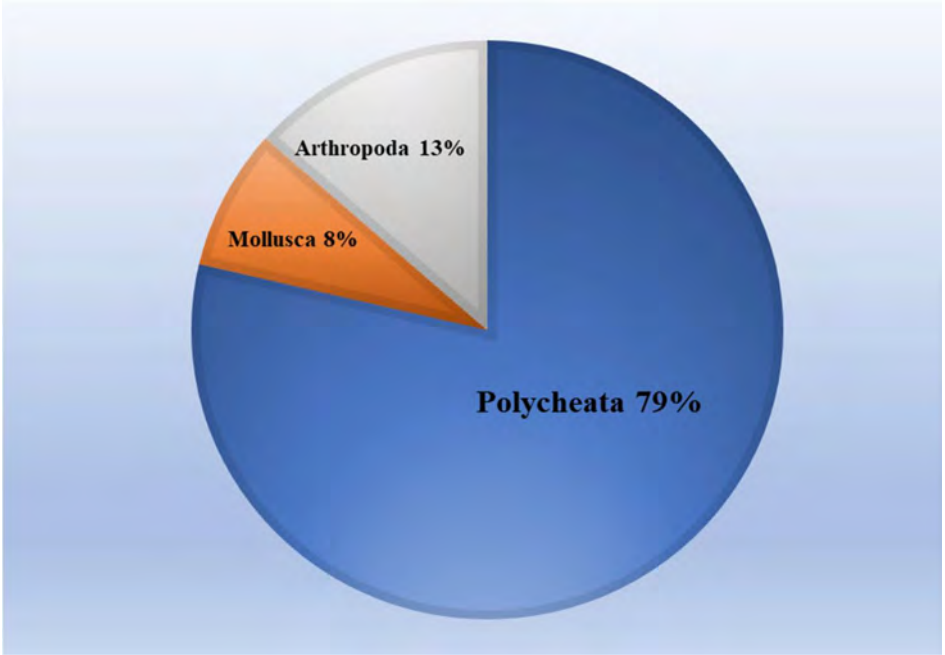


Figure 8: Percent composition of Subtidal benthic taxa from the marine waters of APMuL, Mundra during June 2022

4.6.2b Intertidal region

The sandy substratum with low organic matter affects the occurrence of the microbenthic community in the intertidal region. Low macrobenthos biomass was measured (0.10 g/m^2 to 0.14 g/m^2) in the intertidal region at the APMuL (Table 9). The lowest density of macrobenthic organisms was reported at station IT-3 (LW) (75 no/m^2), whereas the highest density was reported at Station IT-2 (HW) (125 no/m^2). Polychaete species contributed (48%) to the total macrobenthic abundance at these stations followed by Amphipoda (30%) (Table 9). No macrobenthic community was observed at station 3 (HW and LW) may be due to sandy sediment.

Table 9: Faunal composition, density (no/m^2) of macrobenthos from the sediments collected at High tide water level (HW) and Low tide water level (LW) in the inter-tidal region at APMuL, Mundra during June 2022.

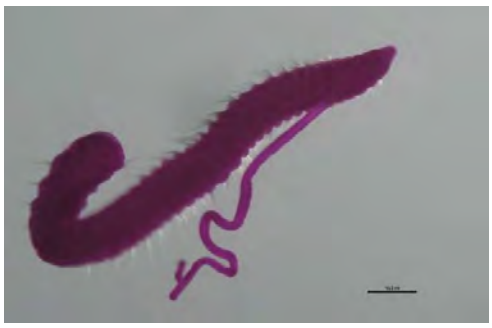
(Note: LW=low water during low tide; HW=high water during high tide; St=Station)

Faunal groups	Intertidal stations					
	IT-1 (HW)	IT-1 (LW)	IT-2 (HW)	IT-2 (LW)	IT-3 (HW)	IT-3 (LW)
Phylum Annelida						
Polychaetes	50	50	75	25		
Phylum Mollusca						
Bivalve	0	25	0	0		
Phylum Arthropoda						
Amphipoda	25	50	25	25		
Isopoda	25	0	25	0		
Phylum Sipuncula						
Sipunculids	0	0	0	25		
Total density (no/m^2)	**75**	**125**	**125**	**75**	-	-
Biomass (g/m^2)	**0.11**	**0.12**	**0.14**	**0.10**	-	-

Capitallidae

Spoinidae

Pilargidae



Cossuridae

Figure 9: Microphotographs of microbenthic organisms observed in the sediment samples collected in the vicinity of APMuL, Mundra during June 2022.

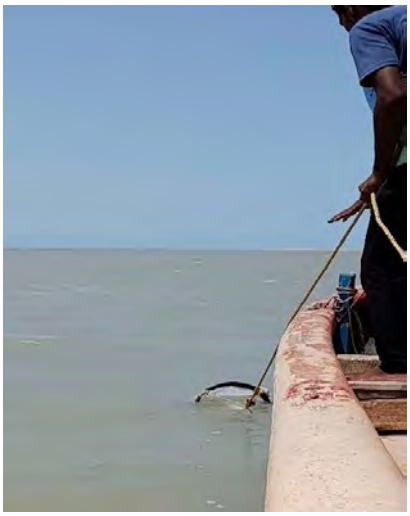
5 CONCLUSIONS

- The phytoplankton abundance in the study region ranged from 114 to 228 cells×10^2/ L. Highest phytoplankton abundance was observed at the Station 2 surface water. A maximum 41 phytoplankton genera were identified from water samples collected in this region. The diverse phytoplankton population supported by the environmental cues emphasizes healthy ecosystem.
- In general, the Chl*a* concentrations in the study region were ranged from 1.5 µg/L to 2.0 µg/L. The highest Chl*a* (2.0 µg/L) and pheophytin (1.0 µg/L) content was recorded at Station 2.
- Zooplankton abundance was ranged in between 10.7 to 17.6 no x10^3/100 m^3. The highest zooplankton abundance (17.6 no x10^3/100 m^3) and biomass (1.9 ml/100 m^3) was reported at Station 4.
- In the sub-tidal region, the high macro benthos abundance and biomass were reported at station 3 (500 no/m^2) and Station 5 (1.54 g/m^2) respectively. The lowest abundance (225 no/m^2) and biomass (0.76 g/m^2) was recorded at station 1. The more abundance of macrobenthic community suggests the stable and enriched substratum supports their growth. In turn benthic macrofauna could support the benthic feeder fish population in this region.

The present assessment reveals the influence of the environmental cues on the physicochemical and biological parameters along the study region. The diverse phytoplankton and zooplankton population indicates favourable water condition for their survival and growth along the region. This diverse planktonic flora together with enriched subtidal benthic fauna along the outfall channel region could substantially support the fishery population in the region. These observations are in line with our present bioassay study where 90% survival of fish Mugil cephalus recorded in absolute outfall water as per compliance. For bioassay study, these fishes were collected from the Kotadi Creek. 90% survival of fish population in bioassay study together with the diverse biota at outfall channel from the present study emphasizes that the abiotic characteristics does not have adverse biological impact of discharge water.

Table 10: Names of the Marine Monitoring Team Members

Sr. No.	Name of Person
1.	Mr. Vijay Thanki (Env. Chemist)
2.	Mr. Pravin Singh (Env. Chemist)
3.	Ms. Shweta A. Rana (Env. Microbiologist)
4.	Mr. Bhavin Patel (Env. Engineer)



PHOTOGRAPHS OF DIFFERENT TYPES OF SAMPLING

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Annexure – 5

Cost of Environmental Protection Measures

Sr. No.	Activity	Cost incurred (INR in Lacs)			Budgeted Cost (INR in Lacs)
		2020 – 21	2021 – 22	2022 – 23 (till Sep'22)	2022 – 23
1.	Environmental Study / Audit and Consultancy	6.2	6.82	7.32	11.05
2.	Legal & Statutory Expenses	10.58	10.52	9.70	12
3.	Environmental Monitoring Services	19.17	14.31	6.37	33
4.	Hazardous / Non-Hazardous Waste Management & Disposal	83.55	107.09	72.35	127.72
5.	Environment Days Celebration and Advertisement / Business development	5.3	4.04	2.05	8.00
6.	Treatment and Disposal of Bio-Medical Waste	2.09	2.14	0.68	2.04
7.	Mangrove Plantation, Monitoring & Conservation	32.59	53.6	24.0	35.0
8.	Other Horticulture Expenses	689	921	490	913
9.	O&M of Sewage Treatment Plant and Effluent Treatment Plant (including STP, ETP of Port & SEZ & Common Effluent Treatment Plant)	148.49	252.27	77.36	196.63
10.	Expenditure of Environment Dept. (Apart from above head)	89.11	149.8	68.02	75.79
	Total	**1086.08**	**1371.79**	**757.85**	**1414.23**

Annexure – 6

PCB ID: 17739

APSEZL/EnvCell/2022-23/001 Date: 05/04/2022

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

Sub : Submission of compliance to observation/suggestion/instruction made by GPCB officials during inspection.

Reference : GPCB Inspection letter dated 23.03.2022, PCB ID: 17739

Respected Sir,

With reference to the above-mentioned subject, M/s. Adani Ports and Special Economic Zone Limited (APSEZL) hereby submitting the compliance details w.r.t. your observations as below:

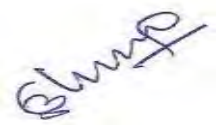
Compliance against your Observation / Remarks:

- The current dredging activity is part of maintenance dredging, and it is required to dredge the area in navigation channel, turning circle as well as basin area at requisite depths on regular basis to maintain flawless ship traffic to and fro the ports and smooth functioning of port operation. It is also required to dredge sea water intake channel on regular basis for ensuring the supply of requisite water requirement to both the thermal power plants as well as APSEZ.
- Maintenance dredging is being carried out within the approved quantity of 6.5 Million m^3/Year in line with permissions granted by regulatory authorities.

Kindly consider our compliance against the given written instructions and acknowledge the same.

Thank you
Yours Faithfully,

For, Adani Ports and Special Economic Zone Limited



Bhagwat Swaroop Sharma
Head – Environment

Copy to:
The Unit Head, GPCB - Head Office,
Paryavaran Bhavan Sector 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 51110
info@adani.com
www.adani.com

Annexure – 7

April 21, 2022

Mundra Lpg Terminal Private Limited

Adani Corporate House, Shantigram Nr. Vaishno Devi Circle, S
G Highway, Ahmedabad,Gujarat, Gandhi Nagar,
Gujarat-382421

Dear Customer,

Sub: Business Public Liability Insurance (Under PLI Act 1991) Policy No: 3133204621956600000

We thank you for having preferred us for your *Insurance* requirements. We at HDFC ERGO General Insurance believe ***"Insurance"*** as not only to be an assurance to indemnify in the event of unfortunate circumstances, but one that signifies protection and support, which you can count on when you need it most.

The Insurance Policy enclosed herewith is a written agreement providing confirmation of our responsibility towards you that puts insurance coverage into effect against stipulated perils.

Please note that the policy has been issued based on the information contained in the proposal form and / or documents received from you or your representative / broker.

Name of the Intermediary: Ace Insurance Brokers Pvt Ltd
Intermediary Code: 21037952

Where the proposal form is not received, information obtained from you or your representative /broker, whether orally or otherwise, is captured in the policy document.

If you wish to contact us in reference to your existing policy and /or other general insurance solutions offered by us, you may write to our correspondence address as mentioned below. Alternatively, you may visit our website www.hdfcergo.com. To enable us to serve you better, you are requested to quote your Policy Number in all correspondences.

Thanking you once again for choosing HDFC ERGO General Insurance Company Limited and looking forward to many more years of association.

Yours sincerely,

Rasgotra

Authorised Signatory

Public Liability Insurance (Under PLI Act 1991)

SCHEDULE

Policy No: 3133204621956600000

Item 1.	**Insured**	:	Mundra Lpg Terminal Private Limited
Item 2.	**Producer**	:	Ace Insurance Brokers Pvt Ltd
Item 3.	**Financial Interest**	:	Not Applicable
Item 4.	**Mailing address of the Insured**	:	Adani Corporate House, Shantigram Nr. Vaishno Devi Circle, S G Highway, Ahmedabad,Gujarat, Gandhi Nagar, Gujarat, 382421.
Item 5.	**Pan Card Number**	:	AANCA7329N
Item 6.	**Business**	:	LPG Terminalling Services
Item 7.	**Policy Period**	:	From 00:01 hours : 01 April 2022 To (Midnight) : 31 March 2023
Item 8.	**Premium**	:	Rs. 8,947.00
Item 9.	**Premium & Coverage Statement** 9.1 Premium Computation 9.2 Insurance Limits & Excess	:	Refer to Page 2

Item 10. Clauses, Conditions & Warranties :

Form Number	Form Name	Effective Date	Date Issued
PL-02-0032	Policy Schedule	1 April 2022	21 April 2022
PL-02-0031	Insurance Contract	1 April 2022	21 April 2022

Subject otherwise to terms and conditions of Public Liability Insurance Policy.

Signed for and on behalf of HDFC ERGO General Insurance Company Limited, on 21 April 2022

Authorised Signatory

GST Registration No: 24AABCL5045N1ZE. The contract will be cancelled ab intio in case; the consideration under the policy is not realized.

" The stamp duty of ₹ 0.50 paid by Demand Draft, vide Receipt/Challan no. LOA/CSD/303/2022/1381 dated 28/03/2022 as prescribed in Government of Maharashtra Order No. Mudrank-2017/CR.97/M-1, dated the 09th January 2018".

Note: Where the proposal form is not received, information obtained from insured, whether orally or otherwise, is captured in the policy document. Discrepancies, if any, in the information contained in the policy document may be pointed out by an insured within 15 days from the policy issue date after which information contained in the policy document shall be deemed to have been accepted as correct.

Branch	206, Sec Fl. Shopper Plaza Iv,Opp. Bsnl Tel Exch Rd, Navarangpura Ahmedabad, 380006. Tel.: +91-79-39883600

Warranties :

"Warranted that there are no known losses and /or circumstances that may lead to losses or claims under this policy (except the claims and / or circumstances already reported to HDFC ERGO General Insurance Co. Ltd.).

This policy is issued basis the information and representations provided by or on behalf of the insured (whether by way of a proposal form or otherwise), and it is thus warranted that such information/representations are true, accurate, and complete, and that no other material information has been withheld.

If the policy document, schedule or endorsement contains any inadvertent error or omission in regards the information provided to us, you are requested to inform us within 15 days of receipt of the policy document so that we can correct any such error or omission."

Broker Name : Ace Insurance Brokers Pvt Ltd
Broker Code : 21037952

Premium & Coverage Statement

(Item. 9 of Schedule, Attached to and forming part of Policy No: **3133204621956600000)**

9.1 Premium Computation

Premium Details	Amount (Rs.)
Net Premium	4,104.00
GST 18% : Central Tax 9% (Rs. 369.36) + State Tax 9% (Rs. 369.64)	739.00
Add: Contribution to Environment Relief Fund	4,104.00
Total Premium	8,947.00
Invoice Number :	2042100983941
GSTN :	24AANCA7329N1Z6
Place of Supply	**Gujarat**
SAC Code	**997139**

9.2 Insurance Limits & Excess

Insurance Limits

Details	Amount (Rs.)
Each Accident Insurance Limit	50,000,000.00
Aggregate Insurance Limit	150,000,000.00

Excess

Compulsory Excess	Not Applicable
Voluntary Excess	Not Applicable

Public Liability Insurance (Under PLI Act 1991)

1. OPERATIVE CLAUSE

WHEREAS the Insured named in the Schedule hereto and carrying on the business described in the said schedule has applied to HDFC ERGO GENERAL INSURANCE COMPANY LIMITED (hereinafter called `the Company') for the indemnity hereinafter contained and has made a written proposal and declaration which shall be the basis of this contract and is deemed to be incorporated herein and has paid the premium and statutory contribution towards the Environment Relief Fund as consideration for or on account of such indemnity in accordance with the manner prescribed under Section 64VB of the Insurance Act, 1938 and as per the provisions of the Public Liability Insurance Act and the rules framed there under.

NOW THIS POLICY WITNESSETH that subject to the terms, conditions and exclusions herein contained or endorsed or otherwise expressed herein, to indemnify the Insured or Owner against the statutory liability arising out of accidents occurring during the currency of the policy due to handling of hazardous substances as provided for in the said Act and the Rules framed thereunder.

2. DEFINITIONS

For the purpose of this policy, the following terms shall have the meaning as set forth hereunder:

(i) "Act" unless otherwise specifically mentioned shall mean the Public Liability Insurance Act 1991 as amended from time to time;

(ii) "Accident" means an accident involving a fortuitous, sudden or unintentional occurrence while handling any hazardous substance resulting in continuous, intermittent or repeated exposure to death of, or injury to any person or damage to any property but does not include an accident by reason only of war or radioactivity;

(iii) "Handling" in relation to any hazardous substance means the manufacture, processing, treatment, package, storage, transportation by vehicle, use, collection, destruction, conversion, offering for sale, transfer or the like of such hazardous substance;

(iv) "Hazardous Substance" and group means any substance or preparation which is defined as hazardous substance under the Public Liability Insurance Act, 1991 and the Rules framed thereunder;

(v) "Owner" or "Insured" means a person who owns, or has control over handling of any hazardous substance at the time of accident and includes:

(a) in the case of a firm, any of its partners
(b) in the case of an association, any of its members, and
(c) in the case of a company, any of its directors, managers, secretaries or other officers who is/are directly in charge of, and is/are responsible to the company for the conduct of the business of the company;

(vi) "Turnover" shall mean

(a) In case of Manufacturing Units - Entire annual gross sales turnover including all levies and taxes of manufacturing units handling hazardous substance as defined in the Public Liability Insurance Act, 1991. For the purpose of this insurance, the term "Units" shall mean all operations being carried out in the manufacturing complex in one location.

(b) In case of Godowns/ Warehouse Owners – Total annual rental receipts of premises handling hazardous substance as defined in the Public Liability Insurance Act, 1991.

(c) In case of Transport Operators – Total annual freight receipts

(d) In all other cases – Total annual gross receipts

3. EXCLUSIONS

The Company shall not be liable:

(i) for any wilful or intentional non-compliance of any statutory requirements;

(ii) in respect of fines, penalties, punitive and /or exemplary damages;

(iii) under any law or legislation except in so far as provided for in Section 8 (1) & 8 (2) of the Act;

(iv) in respect of damage to property owned, leased or hired or under hire purchase or on loan to the Insured or otherwise in the Insured or Owner's control, care or custody;

(v) for any liability directly or indirectly occasioned by, happening through or in consequence of war, invasion, act of foreign enemy, hostilities (whether war be declared or not) civil war, rebellion, revolution, insurrection or military or usurped power;

(vi) for any liability directly or indirectly caused by or contributed to by:

(a) Ionising radiation or contamination by radioactivity from any nuclear fuel or from any nuclear waste from the combustion of nuclear fuel

(b) the radioactive, toxic, explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof;

(vii) for matter outside the scope of Public Liability Insurance Act, 1991.

(viii) in respect of losses/liability arising outside India.

4. CONDITIONS

1) The Insured Owner shall give written notice to the Company as soon as reasonable practicable of any claim made against the Insured Owner or of any specific event or circumstance that may give rise to a claim. The Insured Owner shall immediately give to the Company copies of notice of application forwarded by the Collector and all such additional information and/or assistance that the company may require.

2) No admission, offer, promise or payment shall be made or given by or on behalf of the Insured owner under this policy without the written consent of the Company.

3) The Company shall not be liable for any claim for relief made after five years from the date of occurrence of the accident.

4) The Insured Owner shall keep record of annual turnover, and at the time of renewal of insurance declare such turnover and all other details as may be required by the Company. The Company shall at all reasonable times have full rights to call for and examine such records.

5) If at the time of happening of any accident resulting in a claim under the policy there be any other insurance covering the same liability,

then the Company shall not be liable to pay or contribute more than its rateable proportion of such liability.

6) The Company may cancel this policy by giving seven days' notice in writing of such cancellation to the Insured's last known address and in such an event the Company will return a pro-rata portion of the premium (subject to a minimum retention of 25 per cent of the annual premium) for the unexpired part of the insurance.

The policy may also be cancelled by the Insured by giving thirty days' notice in writing to the Company, in which event the Company will retain premium at short period scale as set forth in the table below, provided there is no claim under the policy during the Policy Period.

In case of any claim under the policy no refund of premium shall be allowed.

The Company shall have no obligation to give notice that the policy is due for renewal or renew this policy upon expiration or termination.

Table of Short Period Scales

Period of Risk(Not exceeding)	Premium to be retained by the Company (% of the Annual Rate).
1 week	10%
1 month	25%
2 months	35%
3 months	50%
4 months	60%
6 months	75%
8 months	85%
Exceeding 8 months	Total Annual Premium

7) If the Company shall disclaim by the Insured Owner for any claim hereunder and such claim shall not within 12 calendar months from the date of such disclaimer have been made the subject matter of a suit in a component Court of Law. Then the claim for all practical purpose shall be deemed to have been abandoned and shall not thereafter be recoverable hereunder or be mad the subject matter of any suit.

8) The Company shall not be liable to make any payment in respect of any claim if such be in any manner fraudulent or support by any person on behalf of the insured Owner and/or if the insurance has been continued in consequence of any material misstatement or non-disclosure of any material information by or on behalf of the Insured Owner. In such a case if the Company pays any amount to the claimant due to any statutory provision such amount shall be recoverable from the Insured Owner.

9) The policy and the Schedule shall be read together as one contract and any word or expression to which a specific meaning has been assigned in the Act and the Rules framed there under or this policy shall bear such as specific meaning.

10) Any dispute regarding interpretation of the terms, conditions and exceptions of the Policy shall be determined in accordance with the law and practice of a court of competent jurisdiction within India.

11) Any person who has a grievance against the Company, may himself or through his legal heirs make a complaint in writing to the Insurance Ombudsman in accordance with the procedure contained in The Redressal of Public Grievance Rules, 1998 (Ombudsman Rules). Proviso to Rule 16(2) of the Ombudsman Rules however, limits compensation that may be awarded by the Ombudsman, to the lower of compensation necessary to cover the loss suffered by the insured as a direct consequence of the insured peril or Rs. 20 lakhs Rupees Twenty Lakhs Only) inclusive of ex-gratia and other expenses. A copy of the said Rules shall be made available by the Company upon prior written request by the Insured.

HDFC ERGO General Insurance Company Limited. IRDAI Reg No.146 CIN : U66030MH2007PLC177117. Registered & Corporate Office: 1st Floor, HDFC House, 165/166 Backbay Reclamation, H.T.Parekh Marg, Churchgate, Mumbai - 400 020. UIN: IRDAN125P0002V01200809 Customer Service Address: D 301, 3rd Floor, Eastern Business District (Magnet Mall), LBS Marg, Bhandup (West), Mumbai - 400078. Customer Service No : +91 22-62346234 /+91-120 6234 6234 www.hdfcergo.com

GRIEVANCE REDRESSAL PROCEDURE

If you have a grievance that you wish us to redress, you may contact us with the details of your grievance through:

- Call Centre : 022-62346234/ 0120-62346234
- Emails - care@hdfcergo.com
- Designated Grievance Officer in each branch.
- Company Website - www.hdfcergo.com
- Courier : Any of our Branch office or corporate office

You may also approach the Complaint & Grievance (C&G) Cell at any of our branches with the details of your grievance during our working hours from Monday to Friday.

If you are not satisfied with our redressal of your grievance through one of the above methods, you may contact our Head of Customer Service at

The Complaint & Grievance Cell ,
HDFC ERGO General Insurance Company Ltd.
Customer Happiness Center,
D-301, 3rd Floor, Eastern Business District (Magnet Mall),
LBS Marg, Bhandup (West),MUMBAI - 400078.
State : Maharashtra, City : Mumbai
Pincode : 400078
Email: grievance@hdfcergo.com

In case you are not satisfied with the response / resolution given / offered by the C&G cell, then you can write to the Principal Grievance Officer of the Company at the following address

The Chief Grievance Officer
HDFC ERGO General Insurance Company Limited
Customer Happiness Center,
D-301, 3rd Floor, Eastern Business District (Magnet Mall),
LBS Marg, Bhandup (West),Mumbai - 400078.
State : Maharashtra, City : Mumbai
Pincode : 400078
E Mail: cgo@hdfcergo.com

You may also approach the nearest Insurance Ombudsman for resolution of your grievance. The contact details of Ombudsman offices are mentioned below if your grievance pertains to:

- Insurance claim that has been rejected or dispute of a claim on legal construction of the policy
- Delay in settlement of claim
- Dispute with regard to premium
- Non-receipt of your insurance document

Names of Ombudsman and Addresses of Ombudsmen Centers	
Jurisdiction	**Office Address**
Gujarat, Dadra & Nagar Haveli, Daman and Diu	AHMEDABAD - Shri Kuldip Singh Office of the Insurance Ombudsman,Jeevan Prakash Building, 6th floor,Tilak Marg, Relief Road,Ahmedabad - 380 001. Tel.: 079 - 25501201/02/05/06 Email: bimalokpal.ahmedabad@ecoi.co.in (mailto:bimalokpal.ahmedabad@ecoi.co.in)
Karnataka	BENGALURU - Smt. Neerja Shah Office of the Insurance Ombudsman, Jeevan Soudha Building,PID No. 57-27-N-19 Ground Floor, 19/19, 24th Main Road,JP Nagar, Ist Phase,Bengaluru - 560 078. Tel.: 080 - 26652048 / 26652049 Email: bimalokpal.bengaluru@gbic.co.in (mailto:bimalokpal.bengaluru@ecoi.co.in)
Madhya Pradesh, Chattisgarh	BHOPAL - Shri Guru Saran Shrivastava Office of the Insurance Ombudsman,Janak Vihar Complex, 2nd Floor,6, Malviya Nagar, Opp. Airtel Office,Near New Market,Bhopal - 462 003. Tel.: 0755 - 2769201 / 2769202 Fax: 0755 - 2769203 Email: bimalokpal.bhopal@ecoi.co.in (mailto:bimalokpal.bhopal@ecoi.co.in)
Orissa.	BHUBANESHWAR - Shri Suresh Chandra Panda Office of the Insurance Ombudsman,62, Forest park,Bhubneshwar - 751 009. Tel.: 0674 - 2596461 /2596455 Fax: 0674 - 2596429 Email: bimalokpal.bhubaneswar@ecoi.co.in (mailto:bimalokpal.bhubaneswar@ecoi.co.in)
Punjab, Haryana, Himachal Pradesh, Jammu & Kashmir, Chandigarh	CHANDIGARH - Dr. Dinesh Kumar Verma Office of the Insurance Ombudsman,S.C.O. No. 101, 102 & 103, 2nd Floor,Batra Building, Sector 17 - D,Chandigarh - 160 017. Tel.: 0172 - 2706196 / 2706468 Fax: 0172 - 2708274 Email: bimalokpal.chandigarh@ecoi.co.in (mailto:bimalokpal.chandigarh@ecoi.co.in)
Tamil Nadu, Pondicherry Town and Karaikal (which are part of Pondicherry).	CHENNAI - Shri M. Vasantha Krishna Office of the Insurance Ombudsman,Fatima Akhtar Court, 4th Floor, 453,Anna Salai, Teynampet,CHENNAI - 600 018. Tel.: 044 - 24333668 / 24335284 Fax: 044 - 24333664 Email: bimalokpal.chennai@ecoi.co.in (mailto:bimalokpal.chennai@ecoi.co.in)
Delhi	DELHI - Shri Sudhir Krishna Office of the Insurance Ombudsman,2/2 A, Universal Insurance Building,Asaf Ali Road,New Delhi - 110 002. Tel.: 011 - 23232481/23213504 Email: bimalokpal.delhi@ecoi.co.in (mailto:bimalokpal.delhi@ecoi.co.in)
Assam, Meghalaya, Manipur, Mizoram, Arunachal Pradesh, Nagaland and Tripura.	GUWAHATI - Shri Kiriti .B. Saha Office of the Insurance Ombudsman,Jeevan Nivesh, 5th Floor,Nr. Panbazar over bridge, S.S. Road,Guwahati - 781001(ASSAM). Tel.: 0361 - 2632204 / 2602205 Email: bimalokpal.guwahati@ecoi.co.in (mailto:bimalokpal.guwahati@ecoi.co.in)

Andhra Pradesh, Telangana, Yanam and part of Territory of Pondicherry.	HYDERABAD - Shri I. Suresh Babu Office of the Insurance Ombudsman,6-2-46, 1st floor, "Moin Court",Lane Opp. Saleem Function Palace,A. C. Guards, Lakdi-Ka-Pool,Hyderabad - 500 004. Tel.: 040 - 67504123 / 23312122 Fax: 040 - 23376599 Email: bimalokpal.hyderabad@ecoi.co.in (mailto:bimalokpal.hyderabad@ecoi.co.in)
Rajasthan	JAIPUR - Smt. Sandhya Baliga Office of the Insurance Ombudsman,Jeevan Nidhi - II Bldg., Gr. Floor,Bhawani Singh Marg,Jaipur - 302 005. Tel.: 0141 - 2740363 Email: Bimalokpal.jaipur@ecoi.co.in (mailto:bimalokpal.jaipur@ecoi.co.in)
Kerala, Lakshadweep, Mahe-a part of Pondicherry.	ERNAKULAM - Ms. Poonam Bodra Office of the Insurance Ombudsman,2nd Floor, Pulinat Bldg.,Opp. Cochin Shipyard, M. G. Road,Ernakulam - 682 015. Tel.: 0484 - 2358759 / 2359338 Fax: 0484 - 2359336 Email: bimalokpal.ernakulam@ecoi.co.in (mailto:bimalokpal.ernakulam@ecoi.co.in)
West Bengal, Sikkim, Andaman & Nicobar Islands.	KOLKATA - Shri P. K. Rath Office of the Insurance Ombudsman,Hindustan Bldg. Annexe, 4th Floor,4, C.R. Avenue, KOLKATA - 700 072. Tel.: 033 - 22124339 / 22124340 Fax : 033 - 22124341 Email: bimalokpal.kolkata@ecoi.co.in (mailto:bimalokpal.kolkata@ecoi.co.in)
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adani
Ports and Logistics

Compliance Report of EMP & Mitigation Measures

Sr. No.	Suggested Measures	Compliance Status
Construction Phase:		
1	Proper care is warranted while dredging which should be in a controlled manner. It should also be insured that reclamation, dredging, widening and slop stabilization measures do not significantly alter the stabilized erosional-accretional regime and prevailing rate of exchange of water between the outer area of the intricate creek system as well as the free flow of tidal water, to protect the mangroves.	All construction and operation activities as well as dredging and reclamation activities are being carried out as per the approvals. Please refer condition no. 8 & 9 of the CRZ recommendation compliance report for further details.
2	Good sanitation, water and fuel should be made available to the work force. Labour colonies should be set-up landward of the HTL and away from mangrove.	Most of the construction labours resides 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. are provided by APSEZ. Details were submitted as a part of compliance report submission for the period Apr'17 to Sep'17. Please refer general condition no. ii of the EC & CRZ clearance for further details.
Operation Phase:		
1	Wastewater such as generated during cleaning of jetties, floor washing, domestic use etc. should be collected in a settling pond and released to marine environment only after ascertaining that it is free from oil and SS. The toilets on the jetties must have compact sewage treatment facilities.	Entire quantity of sewage generated from APSEZ premises is being treated in designated ETP / STP and treated sewage is used for Horticulture purposes. Please refer specific condition no. xii of the EC & CRZ clearance or further details.
2	Dust should be routinely monitored at the vantage points and corrective measures such as water sprinkling should be practiced if it increases beyond permissible limits.	Ambient Air Quality (twice in a week) monitoring is being carried out by NABL and MoEF&CC accredited agency namely M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi. Adequate safeguard measures are being taken for abatement of dust emissions.

Sr. No.	Suggested Measures	Compliance Status
		Please refer specific condition no. xi of the EC & CRZ clearance or further details.
3	It should be ensured that the effluent released into the Gulf meets the prescribed GPCB criteria at all times.	Entire quantity of effluent / sewage generated from APSEZ premises is being treated in designated ETP / STP and treated water is being utilized on land for Horticulture purposes after compliance with GPCB standards. Please refer specific condition no. xii of the EC & CRZ clearance or further details.
4	Appropriate spill response scheme (Tier-1 to Tier-3) should be in place to minimize impacts on marine environment, should a spill occur.	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 updated on 31.07.2022 is in place and implemented. Updated Oil spill contingency response plan is attached as **Annexure-8**
5	MPSEZL should commit mangrove restoration programme through afforestation in a defined time frame over larger and promising areas and should monitored periodically and protect from anthropogenic pressures.	APSEZ has carried out mangrove afforestation in 3140 ha. area across the coast of Gujarat. Please refer specific condition no. i & vii of the EC & CRZ clearance or further details.
6	A comprehensive marine quality monitoring programme with periodic investigations at predetermined locations should be undertaken by a specialized agency.	Marine monitoring is being carried out once in a month by NABL and MoEF&CC accredited agency namely M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi. Please refer specific condition no. ix of the EC & CRZ clearance or further details.
7	The dust and noise levels at pre-decided locations including the jetty sites should be periodically monitored and remedial action taken if the levels exceed the prescribed norms.	Ambient Air Quality (twice in a week) and Noise (once in a month) monitoring are being carried out by NABL and MoEF&CC accredited agency namely M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi. Please refer specific condition no. xi of the EC & CRZ clearance or further details.
8	MPSEZL should establish an Environment Management Cell (EMC) directly under the control of	M/s APSEZL has a well-structured Environment Management Cell, staffed with qualified manpower for

Sr. No.	Suggested Measures	Compliance Status
	the Chief Executive.	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 were submitted as part of compliance report submission for the duration of Apr'21 to Sep'21. And there is no further change.

Annexure – 8

RISK ASSESSMENT STUDY AND PREPARATION OF CONTINGENCY PLAN FOR MARINE OIL SPILLS AT ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD., MUNDRA

Final Report

JULY 2022

Client

ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD
Mundra

Environ Software Pvt. Ltd.

#60/4, Environ Towers,4th Floor, Hosur Main Road, Electronic City, Bangalore - 560 100

Certificate of Endorsement

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 protections 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, when 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 are fully explained as well as arrangement for continual review of the progress and effectiveness of the clean-up operation.

9. The arrangement 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 submissions of a fresh certificate of endorsement.

Seal

Signature :
Name
Designation : Dy. Conservator
Organization: Adani Ports and SEZ Limited, Mundra

Date:
Place:

CONTINGENCY PLANNING COMPLIANCE CHECKLIST

Port Authority: Adani Ports & SEZL

	Description	Complied Yes/ No	Remarks
RISK ASSESSMENT			
1	Whether the facility produces/ handles/ uses/ imports/ stores any type of petroleum product	Yes	Petroleum products are directly transferred from vessels through pipelines
2	Whether risk assessment is done	Yes	Chapter-2 Page No. 17 & Chapter-4 Part-B report
3	Who did the risk assessment		Environ Software Pvt Ltd
4	Whether maximum volume of oil spill that can occur in the worst-case scenario is considered	Yes	25000 T Chap2, refer Para 2.5.3-page No: 21 & Chapter-4 Part-B report
5	Whether relative measure of the probability and consequences of various oil spills including worst case scenario are taken into account	Yes	Chapter2 refer para 2.5.3 Page No. 23 & Chapter-4 Part-B report
6	Whether all types of spills possible in the facility are considered including Grounding, Collision, Fire, Explosion, Rupture of hoses	Yes	Chapter2 refer para 2.1.1 Page No. 17 & Chapter-4 Part-B report
7	Please specify the list of oils considered for risk assessment	Crude, HSD & Fuel Oil	Chapter2 refer para 2.8 Page No. 24 & Chapter-4 Part-B report
8	Whether the vulnerable areas are estimated by considering maximum loss scenario and weather condition	Yes	Chapter2 refer para 2.12 Page No. 31
9	Whether impacts on the vulnerable areas are made after considering the Marine protected areas, population, fishermen, saltpans, mangroves, corals and other resources within that area	Yes	Chapter2 refer para 2.12- & 2.13-Page No. 31,32 & Chapter-3 Part-C report
10	Whether measures for reduction of identified high risks are included by reducing the consequences through spill mitigation measures	Yes	Chapter7 refer fig.7.1 Page No. 66
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	Yes	Chapter 7 refer fig 7.1 Page No. 66
12	Whether risk levels are established for each month after considering the probability with tide and current and consequences of each such spill	NA	
13	Whether prevention and mitigation measures are included in the plan	Yes	Chapter8 refer para 8.1 Page No 84
14	Whether the spill may affect the shoreline. (length of the shoreline with coordinates)	Yes	Part-B report, chapter 5-OS modelling tables (Jan, July, Oct) page nos. 58-66
15	Whether time taken the oil spill to reach ashore	Yes	Part-B report, chapter 5-OS

	in each quantity of spill in various months are mentioned in the plan		modelling tables (Jan, July, Oct) page nos. 58-66
16	Whether sensitivity mapping has been carried out	Yes	Part-C report, chapter 3, refer para 3.1-page no. 5
17	Does the sensitivity mapping clearly identify the vulnerable areas along with MPAs, corals, fishermen community, saltpans, mangroves and other socio- economic elements in the area	Yes	Part-C report chapter 3, refer para 3.1-page no. 5
18	Do the sensitivity maps indicate area to be protected on priority	Yes	Part-C report Annexure-1 refer fig A.1.8-page no. 37
19	Does the map indicate boom deployment locations	Yes	Part-C report Annexure-1 refer fig A.1.1(a), (b)-page no. 35
20	Whether any Marine. Protected Area will be affected	Yes	Part-C report chapter 3, refer para 3.15-page no. 17
21	Whether total number of fishermen likely to be affected is mentioned in the plan	No	
22	Whether any saltpan in the area is going to be affected	No	
23	Whether any mangroves in the area will be affected by a spill	No	
Preparedness			
24	Whether any containment equipment is available	Yes	Chapter4, refer para 4.2 Page No. 43
25	Whether any recovery equipment is available	Yes	Chapter4 refer para 4.2 Page No. 43
26	Whether the facility is having any temporary storage capacity	Yes	Chapter4 refer para 4.1 Page No. 43
27	Whether location of the oil spill response equipment is mentioned in the plan	Yes	Chapter4 refer para 4.1 Page No. 43
28	Whether suitable vessels available for deploying the boom, skimmer etc	Yes	Chapter4 refer para 4.4 Page No. 44
29	Whether OSD held with facility	Yes	5000 Ltrs – Page No: 50
30	Whether the OSD held with the facility is approved for use in Indian waters	Yes	
31	Whether the facility has MoU with other operators for tier-1 preparedness	Yes	Oil companies, HMEL Operators
32	Whether the list of oil spill response equipment available with each agency in MoU is deliberated	Yes	Chapter 9 refer para 9.1 page no. 89
33	Whether the facility has any MoU with private OSRO	Yes	Chapter 9 refer para 9.4 page no. 91
34	Whether the procedure for evoking the mutual aid is clearly described in the plan	Yes	
35	Whether additional manpower is available	Yes	Chapter 10 refer para 10.2.3 page no. 106
36	Whether list of approved recyclers is mentioned in the plan	Yes	Chapter 10 refer para 10.2.1 Page No 105
37	Whether NEBA (Net Environmental Benefit	Yes	Part-D report, chapter 1,

	Analysis) has been undertaken		refer 1.2-page no. 2
38	Whether the areas from priority protection have identified in the plan	Yes	Part-D report, chapter 2, refer para 2.2-page no. 13
39	Whether relevant authorities and stakeholders were consulted for NEBA and during the areas for priority protection	Yes	Part-D report chapter 3
40	Whether District administration has been appraised of the risk impact of oil spills?	Yes	Part-D report
Action Plan			
41	Whether the plan outlines procedure for reporting of oil spills to Coast Guard	Yes	Chapter 2, refer para 2.6-page no. 22
42	Whether the oil spill response action is clearly mentioned	Yes	Chapter 3, refer para 3.1-page no. 36
43	Whether the action plan includes all duties to be attended in connection with an oil spill	Yes	Chapter 3, refer para 3.1 page no. 36
44	Whether the action plan includes key personnel by their names and designation viz. COO, ICO	Yes	Chapter 5-page no. 54
45	Whether alternate coverage is planned to take care of the absence of a particular person [in cases where action plan is developed basis names]	Yes	
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	Chapter 10 page no. 93
47	Whether contact directory containing numbers of key response and management personnel is intimated in the plan	Yes	Chapter10 Page No. 93
48	Whether approved recyclers are identified for processing recovered oil and oily debris	Yes	Chapter10 Page No. 104
49	Whether the shoreline likely to be affected is identified	Yes	
50	Whether final report on the incident is submitted to CGHQ as per NOS-DCP 2015	NA	
51	Whether the spill incident and its consequences are informed to fishermen and other NGOs for environment protection through media	NO	
Training and Exercises			
52	Whether mock fire I emergency response drills are specified in the plan	Yes	Chapter 5 refer para 5.2, page no. 54
53	Whether the mock drills cover all types of probable oil spills	Yes	Chapter 5 refer para 5.2, page no. 54
54	Whether the plan mentions list of trained manpower	Yes	Chapter 5 refer para 5.3, page no. 55
55	Whether records for periodic mock drills are maintained in a well defined format	Yes	Quaterly
56	Whether the plan to updated according to the findings in mock-drills and exercises	Yes	

57	What is the frequency of updatron / review of contingency plan?	Yes	As an when required
58	Periodicity of joint exercise with mutual aid partners	Yes	
59	Frequency of mock-drills for practice	Yes	Twice in a year Chapter 12 Page no.131
60	Whether the records for periodic mock drills are maintained in a well defined format	Yes	Chapter 5
61	Frequency of updation / review of contingency plan	Yes	As an when required

We, hereby, declare that the all information appended above and true and correct to my knowledge or belief

Date Chief Conservator / Installation Manager

VERIFIED

Date (District Commander ICG) or his representative

Date Regional Commander ICG)or his representative

This is to state that at the request of Adani Ports & SEZL (AP &SEZL), the undersigned persons have prepared the Oil Spill Contingency Plan (OSCP). This OSCP has been prepared for oil spillage assessed based on the Risk Assessment carried out for various Port activities including loading / unloading operations of Crude / HSD / FO at berths, SPM, subsea pipeline leakage and Vessel collision / Grounding.

CONFIDENTIALITY CLAUSE

The report has been prepared based on studies 1. Hydrodynamic, 2. Oil Spill fate and weathering characteristics 3. Environmetal Senstivity Mapping and 4. NEBA carried out for preparation of OSCP for Adani Ports & SEZL as per the work order dated 19th February, 2022 and is considered confidential. No part of this report may be release to any outside organization unless explicity advisied by the owners in writing.

Issued By:
Environ Software Pvt Ltd

Prepared by

Dr N M Anand Dr G S Reddy Dr. Rashmi

Reviewed by
Ms. Smitha, Environmental Engineer

Report Revision Record

Document No.		**ENVR 2022-003-R1**			**Page:**	

Introduction of

ABOUT ENVIRON

Environ Software Pvt. Ltd.

Environ Software (P) Ltd was incorporated in October 1998 and is located at Bangalore- the Silicon Valley of INDIA. It has a team of highly skilled and dedicated staff, specializing in Coastal Engineering, Hydraulics, Mechanical Engineering and Computer Science & Engineering. Environ is a multi-disciplinary software development and consulting firm focusing primarily on solutions to problems involving Air, Water and Soil pollution through the in-house, state-of-the-art computational tools. It is capable of solving a wide variety of coastal and marine pollution related problems that include prediction of currents and tides, flood forecasting, morphological changes of estuarine bed and effects on marine population due to discharge of various industrial pollutants and construction of marine structures.

The company is also capable of predicting the spread of various pollutants in air media, emitted from the industries and vehicles. Environ also provides numerical solution to the problems related to sub-surface flows and transport of pollutants. The company also provides full service on field monitoring studies to measure and asses conditions in oceans, coastal areas, lakes, rivers and in air pollution monitoring.

Apart from dealing with complex environmental issues the company is developing a sophisticated Computational Fluid Dynamics (CFD) software, with appropriately chosen numerical methods and physical models for solving Fluid flow, Heat Transfer and Radiation problems. It is capable of solving incompressible, compressible, and two phase

Hydrodyn™

flows etc, with different integrated solvers. The company is also concentrating on the development of dedicated software for a specific application because the user is more oriented in many other things than looking for new developments in numerical methods.

Environ products are absolutely user friendly which requires minimal training. The highlights of the products of Environ are interactive, high quality Pre- and Post-Processor utilities which promises enhanced performance.

Environ was developed softwares for Library Automation, Institutional Management and Company Automation etc. based on client/Server, Internet/ e-Business and Wireless Application tools.

STRATEGIC AREAS

Scientific Simulation Software

Scientific simulation software products are self-contained, absolutely user friendly and integrated with pre- and post processor utilities.

- Air Pollution Simulation Models (APSM)
- Surface Water Pollution Simulation Models (SWPSM)
- Ground Water Pollution Simulation Models (GWPSM)
- Noise Pollution Simulation Models (NPSM)
- Fluid Dynamics Simulation Models (FDSM)

Consultancy Services offered

Internet and e-Business Development

- Complete e-business solution
- Business to Customer and Business to Business Solutions
- Web Design and Consultancy
- Support & Maintenance of launched web sites
- Wireless Applications

Client/Server Applications

- Modelling of Air, Water, Ground Water Pollution & Fluid Dynamic and Heat Transfer Applications
- Environmental Modelling & Impact Assessment
- Risk Assessment/Analysis
- Hazardous Waste water Management
- Library Management System for complete library automation
- Customized Application Development viz. Inventory control, Accounts etc.
- Medical Transcription Monitoring System

1. *Development of Scientific Simulation Software for*
   - Air Pollution, Surface Water pollution and Ground Water Pollution and Noise pollution problems
2. *Consultancy Services offered for*
   - Modelling of Air, Water, Ground Water Pollution & Fluid Dynamic and Heat Transfer Applications
   - Environmental Modelling & Impact Assessment
   - Risk Assessment/Analysis, Hazardous Waste water Management
3. *Internet and e-Business Developmentr*
   - Complete e-business solution
   - Business to Customer and Business to Business Solutions
   - Web Design and Consultancy
   - Support & Maintenance of launched web sites
   - Wireless Applications
4. *Client/Server Applications*
   - Library Management System for complete library automation
   - Customized Application Development viz. Inventory control, Accounts etc.
   - Medical Transcription Monitoring System.

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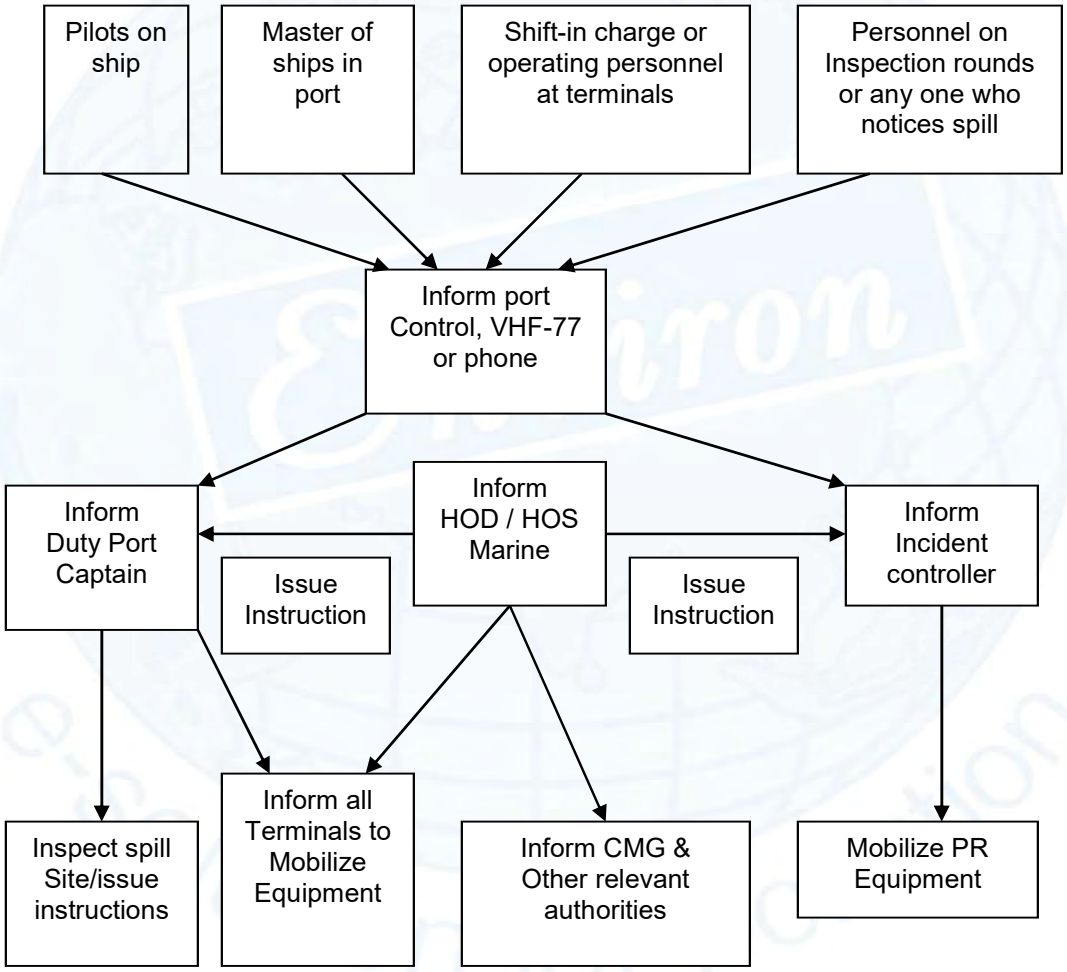
ABBREVIATIONS

ADIOS	Automated Data Inquiry for Oil Spills
CC	Communications Coordinator
CCA	Central Coordinating Authority
CGHQ	Coast Guard Head Quarters
CIC	Chief Incident Controller
CISF	Central Industry Security Force
CMG	Crisis Management Group
CMT	Crisis Management Team
COC	Communication and Operations Center
CTTL	Chemical Terminal Trombay Ltd.
DCA	District Coordinating Authority
DCC	District Contingency Committee
DHQ	Coast Guard District Head Quarters
DNV	Det Norske Veritas
ECC	Emergency Control Center
EG	Environment Group
ESI	Environmental Sensitivity Index
HFO	Heavy Fuel Oil
HM	Harbour Master
IAP	Incident Action Plan
IC	Incident Controller
IDRN	Indian Disaster Resource Network
IM	Incident Manager
IMD	India Meteorological Department
IMO	International Maritime Organization
IMT	Incident Management Team
IOCL	Indian Oil Corporation Ltd.
IPIECA	International Petroleum Industry Environmental Conservation Association
JD	Jawahar Dweep
LAG	Local Action Group
LCA	Local Combat Agency
LO	Logistics Officer
LST	Local Action Group Support Team
MARPOL 73/78	International Convention for the Prevention of Pollution from ships 1973 as modified by the protocol of 1978
MMd	Mercantile Marine Department
MoU	Memorandum of Undertaking
MPC	Marine Pollution Coordinator
MRU	Marine Response Unit
NEBA	Net Environmental Benefit Analysis
NFPA	National Fire Protection Association
NOS-DCP	National Oil Spill Disaster Contingency Plan
NRT	National Response Team
OPRC Convention	International Convention on Oil Pollution Preparedness, Response and Co-operation 1990
OSC	On screen Coordinator

OSD	Oil Spill Dispersant
OSR	Oil Spill Response
OSRO	Oil Spill Response Organization
OSRO-M	Oil Spill Response Organization-Manager
OSRO-S	Oil Spill Response Organization-Specialist
PC	Port Control
POC	Participating Oil Company
POL	Petroleum, Oil and Lubricants
SA	Statutory Agency
SC	Shoreline Coordinator
SCBA	Self-Contained Breathing Apparatus
SRV	Spill Response Vessel
UNCLOS	United Nations Convention on Laws of the Sea
VHF	Very High Frequency

OILSPILL CONTINGENCY PLAN

Contingency Chart to deal with Oil Spill



FINAL MEASURES

- Coordinate at District, State, National level including MOST if crisis level 2 or 3
- Informs Coast Guard-clean up contractors
- Restore berth operational
- Question witnesses
- Complete maritime accident report
- Give press reports
- Survey and cost damage to port installation
- Hold meeting of all concerned parties
- Seek compensation
- Distribute final report to concerned authorities.

PREFACE

Adani Ports and SEZ Limited, Mundra has been awarded the project to M/s Environ Software Pvt Ltd to carry out the Risk Assessment Study, Sensitivity area mapping and preparation of Oil Spill Contingency Plan for Tier-1 Oil Spill Response (OSR) facility for Adani Mundra Ports & SEZL. This report contains the Strategy Plan& operation plan which describes the scope of the plan including geographical coverage, oil spill modeling studies, perceived risks, spill response and clean-up strategy, equipment, storage facilities, responsibilities and action plans, communication, etc.

The report also presents the characteristics and weathering processes of oil, the impact of oil spills on the marine environment and agencies to be informed in case of emergency. The report elaborates on the strategy plan for the oil spill as per IMO guidelines as well as the responsibilities of regional and national oil spill combating agencies.

Marine stativity Atlas has been prepared for areas all along the coasts of Gulf of Kutch region. Environmental sensitivity mapping also done based on the available data of environmental, biological and industrial information.

The report also includes specific instructions for responders, once the spill occurs, response plan based on NEBA studies for combating operations for spilled oil. This is to ensure that emergency action by responders gets underway promptly and in an orderly manner. The statutory regulations, area operations, training and competence also included in the report.

We express our gratitude to Mr.Yogesh Nandaniya, Mr. Sudhakar Singh, Capt. Sachin Srivastava Head-Marine Services, Mr. Sanjay Kewalramani COO-TAHSL, Capt. Rajat Garg, Mr. Mangal Choudhary of Adani Ports & SEZ Ltd for their assistance and suggestions during the preparation and successful completion of this project. We are thankful to the above officers for providing information on oil spill contingency plan and acknowledge the valuable information provided by them.

Dr. G. S. Reddy
(Managing Director)

EXECUTIVE SUMMARY

Adani Port and SEZ Limited, Mundra handles the majority of its Cargo and Liquid products traffic through the South and West port terminals. There are several berths and Jetties at Mundra for berthing of cargos. Two subsea pipelines connect the onshore to the IOCL, HEML SPMs. There are 11 Container Berths, 16 Multi-purpose Berths, 1 LNG Jetty and two SPMs with back-up facilities at Mundra for berthing cargo vessels and oil tankers. Two subsea pipelines connect the SPMs (IOCL and HMEL) to onshore oil terminals at Mundra.

The location of Cargo Berths, SPMs and marine facilities are situated at AP &SEZL at approximately Easting (m) Easting (m) 572000 and Northing (m) 2515500. The berths are Located in the North bank of Gulf of Kutch at Mundra. The berths are operating for cargo operability and potential to meet the future trends. Sufficient clearance to the existing surroundings has been maintained, including a minimum encroachment into the greenbelt and adequate distance to populated areas. The layout of the complex allows space for future extension, without compromising desired safety separation distances within the complex or to adjacent port activities.

The main objective of the study to carryout risk analysis of oil spills for various activities of port operations and to the assess the impact of major accidental hazards from the facilities on the marine population and property within and outside the battery limit of the facilities and on coastal environment. Results of the study will be useful in preparation of response plan for containment of oil spills, in case of that may occur during loading / unloading operations / accidents. The results will also be useful in developing a meaningful emergency and response plan.

At present Adani Port and SEZ Limited, Mundra has responsibility to deal with Tier-1 oil spill within port limits. The Adani Port and SEZ Limited, Mundra has entered into MOU with neighboring ports and others to deal with Oil spills. The funding is by ports and others. The Consultant assessed the OSR Equipment available with the Port and agencies in the vicinity of Adani Port and SEZ Limited, Mundra. The existing mechanism to deal with Tier-1 oil spill response through a specialist agency (where there is no capital cost and manpower by the Adani Port and SEZ Limited, Mundra is appropriate in the present circumstances.

Based on Gap Analysis a new Equipment list is suggested which incorporates some of the recommendations of NOS DCP-2018 and a comparative chart provides justification for the variance from NOS DCP-2018.

The following studies were carried out as integral part of Oil Spill Contingency Plan

A. Quantitative Risk Assessment of oil spill for AP & SEZL

The oil spill risks at Adani Port and SEZ Limited, Mundra are evaluated consideration of probability of a spill occurring and the consequences. The risk assessment has been made considering many factors i.e. Frequency of vessel movement, Operation time of the port, Vessel condition, Performance of vessel crew, Traffic density, Weather conditions, Type of oils handling, relevant past data, identification of Hazard, Frequency, Consequence and risk estimation.

After carrying out the detailed study of offshore facilities which include the surface facilities viz., platforms, berths / Jetties, vessels and subsurface pipelines and all other associated infrastructure required for port operations of Adani Port and SEZ Limited, Mundra the following are the causes of spill scenarios are identified.

- Operations at Berth
- Spills due to Collision/Grounding in the Tanker route
- Bunker/ fuelling operations
- Ship distress / sinking
- Spill due to rupture in subsea pipeline corridor (size of crack-1")
- Rupture of export line due to movement and landing along the coast.
- Bunkering of HSD / Crude for vessels

Based on the above factors and failure frequency of port operation facilities, the following spill quantity are estimated.

- Spill due to Loading arm failure at Jetty: (167 m3, at pumping rate of 10000 m3/h crude oil for 1 min)
- Spill due to rupture of sub-sea crude oil pipeline from refinery to shore tanks: (2611 tons of crude for 36 hrs)
- Spill due to Tanker Collision at Jetty having capacity between 1,00,000-3,00,000 metric tons (25000 tons)
- Spill due to collision or grounding in the Tanker route (25000 tons)

The following spill locations were identified based on port operations.

- Crude oil spill of 700t at selected SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Fuel oil spill of 700t at selected West Port(S5), Vessel route(S7), LNG Jetty(S8), South basin (S9), Mundra Ports(S11), MICT/AMCT(S12)
- Crude oil spill of 10000t at SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Crude oil spill of 25000t at SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Fuel oil spill of 100t at selected West Port (S5, S6), LNG Jetty(S8), South basin (S9,

S10), Mundra Ports(S11), MICT/AMCT(S12), East Basin(S13), North Basin(S14)

- HSD oil spill of 50t at selected West Port(S5), LNG Jetty(S8), South basin (S9), Mundra Ports(S11)
- HSD oil spill of 20t at selected West Port(S6), South basin (S10)

Continuous Spills

- Crude oil spill of 10000 m3/hr for 1 min at selected SPM-HMEL(S1), SPM-IOCL(S2)
- Crude oil spill of 10000 m3/hr for 1 min at selected VLCC Jetty (S15)
- Crude oil spill of 10000 m3/hr for 1 min at sub-sea pipeline route (S3)

The details for estimating the quantitative risk assessment at spill locations are discussed in **PART-B-OILSPILL MODELING STUDIES** of the report.

B. Assess Oil Spill trajectory in the worst-case scenario in different weather and sea conditions;

The prediction of fate and transport of oil spill plays a major role in the analysis of risks due to oil spills. It is computed based on the surface water currents and wind speed

Modeling the hydrodynamic processes is an integral part of modeling of fate and transport of oil spills. The basic oil-spill model developed at Environ Software (P) Ltd was used in the present work to estimate risk assessment due to oil spills for various weathering and meteorological conditions.

Hydrodynamic modeling studies carried out using the Hydrodyn-FLOSOFT for predicting tidal levels and current for various seasons (Pre-monsoon (January), SW Monsoon (May) and Post Monsoon (October). For all possible port facilities, spring and neap tide conditions has been simulated. The details for Hydrodynamic modeling studies are discussed in **PART-A-HYDRODYNAMIC MODELING STUDIES** of the report.

Fifteen spill locations at and around Adani Port and SEZ Limited, Mundra regions and 33 oil spill scenarios are considered for oil spill simulations.

Details of Oil Spill Scenarios

Table. 4.4. Details of Oil Spill Scenarios

Comp. Runs	Spill Location	WD (m)	Spill Qty	Type of oil	Spill Location Co-ordinates
A	**SPMs**				
1	SPM-HMEL (S1)	29.50	700 tons	Crude	69° 37' 23.19" E, 22° 40' 59.06" N
2			10000 tons	Crude	
3			25000 tons	Crude	
4			10000 m^3/h for 1 min	Crude	
5	SPM-IOCL (S2)	28.45	700 tons	Crude	69° 39' 14.05" E, 22° 40' 47.21" N
6			10000 tons	Crude	
7			25000 tons	Crude	
8			10000 m^3/h for 1 min	Crude	
B	**VLCC Jetty**				
9	Spill Location (S15)	15.71	700 tons	Crude	69° 40.78' E, 22° 43.6' N
10			10000 tons	Crude	
11			25000 tons	Crude	
12			10000 m^3/h for 1 min	Crude	
C	**Pipeline**				
13	Crude oil spill of 2611 tons at the pumping rate of 12500 m^3/hr (2611 Tons of crude for 36 hrs) along the pipeline corridor at a select (midway) point of subsea pipeline in the pipeline routes. -- Spill point: (**S3)**	21.20	12500 m3/hr for 3hr	Crude	69° 39' 43.35" E, 22° 42' 36.39" N
D	**Tanker Route**				
14	Instantaneous crude oil spill of 25000t along the tanker route at select location. Spill point: S4	22.54	25000 tons	Crude	69°32'11.38'' E, 22°36'1.13" N
E	**West Basin (berths)**				
15	100 tons (due to Berthing incident/ collision) at the West Basin berths (FO) Spill point: **S5**	14.61	100 tons	FO	69°34'13.99'' E, 22°45'15.54" N
16	50 Tons (due to Berthing incident/ collision (diesel oil tanks) at the West Basin berths (HSD)		50 tons	HSD	69°34'13.99'' E, 22°45'15.54" N

	Spill point: **S5**				
17	700 Tons due to Hull Failure / Fire / Explosion (FO) at the berths -- Spill point: **S5**		700 tons	FO	69°34'13.99'' E, 22°45'15.54" N
18 & 19	In the maneuvering basin: ○ 20 Tons of HSD oil due to Tug Impact (HSD) ○ 100 Tons of FO due to Tug Impact Spill point: **S6**	14.48	20 Tons 100 Tons	HSD FO	69°34'22.75'' E, 22°45'5.33" N
20	Along the vessel route at one location: Instantaneous oil spill of 700t along the tanker route at a select location. (FO): Spill point: **S7**	17.08	700 tons	FO	69°33'40.66'' E, 22°43'36.31" N
F	**LNG berth**				
21	100 tons (due to Berthing incident/ collision) at the LNG berth (FO) -- Spill point: S8	13.76	100 tons	FO	69°33'40.66'' E, 22°43'36.31" N
22	50 Tons (due to Berthing incident/ collision (diesel oil tanks)) at the LNG berth (HSD) –Spill point: **S8**		50 tons	HSD	69°33'40.66'' E, 22°43'36.31" N
23	700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth-- Spill point: **S8**		700 Tons	FO	69°33'40.66'' E, 22°43'36.31" N
G	**South Basin (berths)**				
24	100 tons (due to Berthing incident/ collision) at the LNG berth (FO) -- Spill point: **S9**		100 Tons	FO	69°39'38.08'' E, 22°43'32.54" N
25	50 Tons (due to Berthing incident/ collision (diesel oil tanks) at the South Basin berths (HSD) – Spill point: S9	14	50 Tons	HSD	69°41'3.53'' E, 22°43'50.33" N
26	700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth -- Spill point: S9		700 Tons	FO	69°41'3.53'' E, 22°43'50.33" N
27 & 28	At the turning circle: ○ 20 Tons of HSD oil	17	20 Tons 100 Tons	HSD FO	69°41'33.62'' E, 22°44'6.49" N

	due to Tug Impact ○ 100 Tons of FO due to Tug Impact Spill point: S10				
H	**MMPT**				
	At the existing MPT1 berth: : Spill Point S11	20.80			69°42'20.45'' E, 22°43'32.17" N
29	100 tons (due to Berthing incident/ collision) at the berth(FO) -- Spill point: S11		100 Tons	FO	69°42'20.45'' E, 22°43'32.17" N
30	50 Tons (due to Berthing incident/ collision (diesel oil tanks)) at the berth (HSD) – Spill point: S11		50 Tons	HSD	69°42'20.45'' E, 22°43'32.17" N
31	700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth : Spill point S11		700 Tons	FO	69°42'20.45'' E, 22°43'32.17" N
I	**MICT / AMCT Berths:**				
	At the existing MICT / AMCT Berths: : Spill point S12	15.12			69°42'56.30'' E, 22°44'36.69" N
32	100 tons (due to Berthing incident/ collision) at the (FO) - Spill point S12		100 Tons	FO	69°42'56.30'' E, 22°44'36.69" N
33	700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth - Spill point S12		700 Tons	FO	69°42'56.30'' E, 22°44'36.69" N

Hydrodyn-OILSOFT, a dedicated software for oil spill trajectory modeling was used for prediction of oil spill scenarios at selected locations in and around Adani Ports & SEZL facilities for various meteorological and hydrological conditions considering the worst-case oil spill scenario of instantaneous / continuous. The output of the model shall indicate the amount of spill that can take place and time taken by the spill (Hourly/Day basis) to reach the shoreline or protected areas such as mangroves, environmentally sensitive receptors, eco-sensitive zones, etc.). From the oil spill modelling studies, the following conclusion could be drawn.

- The spill volume and time taken to reach the coast and losses during its movement have been calculated.

- The percentage of spill volume reaching the coast, extent of oiling on the coast in metres, likely vulnerable areas, spill analysis, have been calculated.
- Resources such as tidal flats, islands and coastal areas which are likely to be threatened from oil spills have been identified.
- It can be concluded that the spills would move towards Sikka coast, Kalubar Island, Mundra Port and Vadinar coastal Zones during early of January.
- During the early of July, spills would move towards towards Kandla, Adani Port boundaries within 2 hours from spill start. Some spill scenarios such as Tanker Entry shows the spill staying in open ocean for long period of time.
- It can be noticed that the spill oil would reach Sikka and Vadinar coast. Some spill scenarios such as Tanker Entry, shows the spill staying in open ocean for long period of time.

The details for Oil spill trajectory and weathering studies are discussed in **PART-B- OIL SPILL FATE AND TRAJECTORY MODELING STUDIES** of the report.

C Environmental Sensitivity mapping of the areas likely to be affected by the oil spill

The objective of the study is to produce a tool for oil spill responders by providing an overview of resources vulnerable to oil spills, i.e. natural resources (Mangroves, Mudflats, Reef flats, Sandy Area, Sea Birds/Birds Nesting Area, Marine Mammals (Dolphins, Dugongs, Whales), Turtle Nesting Areas, Marine National Park, Marine Sanctuary, Forest Area) and Human activities (Fishing zones, Industrial sea water Intakes, outfall, Ports, jetties etc.)

The Environmental Sensitivity Index has been prepared based on the latest satellite information as well as available secondary data information of Gulf of Kutch region. This study is made as a part of the preparations for Risk Analysis study of oil spills in the Mundra region, Gulf of Kutch. The study covers the region between latitude Lat 22° 44′ 18.89” N and longitude 69° 46’ 42.67” is in Mundra region. The entire area of Gulf of Kutch has been divided into 12 zones and collected all marine sensitive information and prepared the Environmental sensitivity Index Mapping and Atlas based on IMO guidelines for the Adani Port and SEZ Limited, Mundra area.

Identified the most sensitive site and resources potentially exposed to oil spills due to the handling of crude oil in the Adani Port and SEZ Limited, Mundra region. The coastal sensitive areas including biological, industrial and socio-economic resources are identified and prepared Environmental Sensitivity Index (ESI) mapping of the areas likely to be affected by the oil spill. The details of ESI are discussed **in PART-C: SENSITIVITY INDEX MAPPING** of the report

D. Oil Spill Response equipment and manpower to deal with the assessed quantity of the oil spill

Various response options (Mechanical equipment's, in-situ burning, dispersants and shoreline booming) have been discussed based on various spill scenarios of Adani Port and SEZ Limited, Mundra considering coastal marine sensitivity analysis of Gulf of Kutch region. The Net Environmental Benefit Analysis (NEBA) has been formulated considering all available response options for oil spills and selected the techniques that will provide the best opportunities to minimize consequences for the environment.

The study has been divided the potential relative Impact ranging from 1 (None) to 4(High). Likewise, the impact modification factor was also divided from 1 (None) to 4 (High) for four categories of response options (Mechanical equipment's, in-situ burning, dispersants and shore line booming). The intermediately ranges for both axes were then further divided to provide some more definition to the matrix. The risk ranking matrix for this NEBA was based on Environmental, Industrial and Biological sensitive areas risk assessment matrices generated.

Th NEBA process is to evaluate the consequences of Natural Attenuation, which serves as a baseline. All subsequent rankings are relative to the baseline, i.e., are conditions better or worse for each resource when using each individual response options. Using the risk ranking matrix requires estimating the proportion of the resource affected, and how long it will take the resource to recover. Based on the total impact mitigation score and ranking of High (4), Low (- 4) was assigned.

Based on the NEBA analysis selected best multiple response options are mechanical and dispersants among other response options available for APSEZL Mundra

NEBA studies has been carried out based on available response options to be prepared as a part of Oil Spill Contingency Plan for Adani Port and SEZ Limited, Mundra region. The details of NEBA studies are discussed **in PART-D: NET ENVIRONMENT BENEFIT ANALYSIS** of the report.

In accordance with the National Oil Spill Disaster Contingency Plan (NOSDCP) all the Ports are required to maintain Tier-I Oil Spill Response (OSR) facilities. Accordingly, Adani Port and SEZ Limited, Mundra has to set up and sustain Tier-I (up to maximum spill volume of 700 Tonnes) OSR facilities in Mundra in co-ordination with neighboring companies operating at these Ports. For this purpose, Adani Port and SEZ Limited, Mundra and other Participating Companies (HMEL) has executed a Memorandum of Understanding (MOU) for sustenance of Tier-1 OSR facilities for combating oil spills at and surrounding area within Mundra region. The following oil spill response facilities and required manpower are estimated based on risk assessment study

and oil weathering condition to deal with expected quantity of spill and should be placed in the vicinity of Adani Ports & SEZ Limited.

Sr. No.	ITEM	Minimum No. of operators/ workmen deployed on the equipment	Quantity / Unit
(1)	(2)	(3)	(4)
1	Operation and Management of OSR Centre at Adani Ports & SEZL as mentioned in column (3) including 2 VHF and 3 walkie talkie sets, computers & printers with furniture etc. and operating at 24 x 7 x 365 days	Operation Manager with Level 3 – 1 No. OSR I/c with Level 3 – 3 No. Shift I/c – 1 No. Radio Operator – 1 No. Responders – 10 Nos. Total Man power – 16 Nos.	1 3 1 1 10 Total: 16 Nos
2a	OSR Work Boat with crew as per column (3) as per detailed specifications		1
2b	Tugs		1
3a	inflatable boom with accessories (Material: Neoprene/ Neoprene Rubber/ Rubber) with freeboard of about 440mm, overall height 1200 mm and skirt of about 500 mm and length of 100/200 m in a bag/reel complete including 4 nos hydraulic air blowers etc complete as per Specifications.	NA	2000m
3b	Fence Boom (Material: Neoprene/ Neoprene Rubber/ Rubber) with freeboard of 450mm and over all height of 1200mm and length of 100m etc. complete as per specifications	NA	235m
4a	Weir type oil skimmer of 50 m^3/hr capacity oil recovery free floating skimmer along with suitable pump and hydraulic Power Pack complete with all accessories.	NA	2 Nos.
4b	Drum/ brush type oil skimmer 50 m^3/hr capacity oil recovery free floating skimmer, along with suitable pump and hydraulic Power Pack complete with all accessories etc. complete as per specifications.	NA	2 Nos.
4c	Vacuum type oil skimmer 30 m^3/hr capacity oil recovery pump coupled to a diesel engine complete with all accessories etc. complete as per specifications.	NA	2 Nos
5a	Bio Remediation (L)	NA	2000 L
5b	Oil Spill Dispersant, concentrate type-3 combined, approved by the	NA	3 KL

	Indian Coast Guard		
6	Flex Barge of about 10 KLtrs. along with its accessories.	NA	2 Nos
7a	Absorbent (oil only) 80 L Kit for quick oil spill response	NA	2 Nos
7b	Sorbent pads 20-inch x 20 inch (nos)	NA	2000 Nos
7c	Sorbent Boom size min 5inch dia, min length 5 feet	NA	500 Nos
8	Protective Equipment (PPE) kit for oil spill response.	NA	15 Nos
9	VOC Portable Monitor	NA	0

F. Adani Port – IMO level trained Responders

(IMO OPRC) Level - 3

Sr No.	Name	Course Institute	Issued on	Valid till
1	Capt. Sachin Srivastava (HOD-Marine Services, Adani Mundra Port).	OSCT India 01-04 Mar 2022		
2	Capt. Aditya Gaur (HOD- Marine Services Adani, Kattupalli Port)	OSCT India 01-04 Mar 2022		
3	Capt. Ajit Mahapatra (HOD- Marine services, Adani Dhamra Port)	OSCT India 01-04 Mar 2022		

(IMO OPRC) Level - 2

Sr No.	Name	Course Institute	Issued on	Vaild till
1	Sudhakar Singh	OSCT India 18 -22 April 2022	22-Apr-22	21-Jun-25
2				

(IMO OPRC) Level - 1

Sr No.	Name	Institute	Issued on	Vaild till
Marine Serivces				
1	Mr.Ramdas Pawale	ICG	10-Aug-18	9-Aug-23
2	Mr Leelu Singh	ICG	10-Aug-18	9-Aug-23
3	Mr Amod Pandey	ICG	10-Aug-18	9-Aug-23

4	Mr Santosh Rasam	ICG	10-Aug-18	9-Aug-23
5	Saket Kumar	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
6	Ashok Singh	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
7	Chandra Shekhar Kumar	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
8	Upinder Samkaria	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
9	Yugal Kishor Sharma	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
10	Arapn Chowdhury	ICG	Course 04-08 April 2022	7-Apr-27
11	Mehul Makwana	ICG	Course 04-08 April 2022	7-Apr-27

G. Other Departments

1	Mr Amrendra Tiwari, LQD	ICG	10-Aug-18	9-Aug-23
2	Haresh Patel, LT Ops	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
3	Sachin Patel, LT Ops	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
4	Ravindra Parikh, Lqd	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
5	Mr Nikul Kasta, CT4	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
6	Mr Ajay Kumar Bhatt CT4	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
7	Vimal Chhabhaiya CT-4	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
8	Mr. Kamlashankar Joshi CT Planner	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
9	Laxmikant Limbani, AICTPL ICD	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
10	Rajesh Makwana, AICTPL	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22

11	Farhan Khan, AICTPL	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
12	Mukesh Pushkarna, ES CT-3	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22
13	Vijay Chavda, HSE	Sea Care Marine Serives	Course 28th to 31st Aug 2019	27-Aug-22

First Aid Post

Post Number	Location
First Aid Post No:1 – with ambulance service	Occupational Health Centre, MMPT
First Aid Post No:2 – with ambulance service	Occupational Health Centre, WB
First Aid Post No: 3	Adani Hospital

H. Gap analysis between required and available resources and provide detailed specification of the required additional equipment/ facilities along with detailed justification for the recommended additional facilities.

Sr. No.	ITEM	As per NOS-DCP 2018	Available in the present
(1)	(2)	(3)	(4)
1	Operation and Management of OSR Centre at Adani Ports & SEZL as mentioned in column (3) including 2 VHF and 3 walkie talkie sets, computers & printers with furniture etc . and operating at 24 x 7 x 365 days	Operation Manager with Level 3 - No. OSR I/c with Level 3 - No. Shift I/c - No. Radio Operator - Nos. Responders - Nos. Total Man power – Nos	1 3 1 1 10 Total: 16 Nos
2a	OSR Work Boat with crew as per column (3) as per detailed specifications	4 Nos	4 Nos
2b	Tugs	4 Nos	4 Nos
3a	inflatable boom with accessories (Material: Neoprene/ Neoprene Rubber/ Rubber) with freeboard of about 440mm, overall height 1200 mm and skirt of about 500 mm and length of 100/200 m in a bag/reel complete including 4 nos hydraulic air blowers etc complete as per Specifications.	2000 m	2000m
3b	Fence Boom (Material: Neoprene/ Neoprene Rubber/ Rubber) with freeboard of 450mm and over all height of 1200mm and length of 100m etc. complete as per specifications	1000 m	235 m
3c	Current buster room -fasflo-75 (for response in fast		2 Nos

	current)		
4a	Weir type oil skimmer of 50 m³/hr capacity oil recovery free floating skimmer along with suitable pump and hydraulic Power Pack complete with all accessories.	3 Nos	2 Nos
4b	Drum/ brush type oil skimmer 50 m³/hr capacity oil recovery free floating skimmer, along with suitable pump and hydraulic Power Pack complete with all accessories etc. complete as per specifications.	3 Nos	2 Nos.
4c	Vacuum type oil skimmer 30 m³/hr capacity oil recovery pump coupled to a diesel engine complete with all accessories etc. complete as per specifications.	5 Nos	2 Nos.
5a	Bio Remediation (KL)	2 KL	2 KL
5b	Oil Spill Dispersant, concentrate type-3 combined, approved by the Indian Coast Guard	3 KL	5 KL
6	Flex Barge of about 10 KLtrs. along with its accessories.	4 Nos	2 Nos
7a	Absorbent (oil only) 80 L Kit for quick oil spill response	0	1 Nos
7b	Sorbent pads 20-inch x 20 inch (nos)	2000 Nos	2000 Nos
7c	Sorbent Boom size（12.5cm*4m)	500 Nos	500 Nos
8	Protective Equipment (PPE) kit for oil spill response.	Lev-A – 5 Nos Lev-B -10 Nos Lev-C -20 Nos Lev-D -30 Nos	15 Nos
9	VOC Portable Monitor	4 Nos	0

Additional equipment and location

LIST OF RESOURCES AVAILABLE-ADANI PORTS and SEZ LIMITED, MUNDRA						
Tugs Available for Oil Spill Containment						
Name of Tug	**Type**	**BHP**	**OSD**	**AFFF**	**Capacity (cum/Hr)**	**BP**
Dolphin No. 4	ASD	2200 X 2	3000 ltr	2000 ltr	1200	55
Dolphin No. 7	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
Bitarni	ASD	2000 x 2	3000 ltr	2000 ltr	1200	65
Khushboo	Fixed screw	401 X 2	-	-	-	10

Dolphin No. 4, 7, 11, 14, 15, 16, 17, 18, Brahmini and Bitarni 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.

All above ten Tugs have class notation as Harbour Tugs and are certified to work within the Harbour limits only.

2. Reception Facility: 12" pipe line, connected to a slop tank at chemical tank farm.

Dolphin 11 has firefighting system of 1200 m3/hr along with 20 ton lifting "A" frame and diving support facility.

Location of Oil Spill Equipment: The Oil Spill Equipment stored in SPM Store.

I. Comprehensive oil spill contingency plan (OSCP) for the Adani Ports and SEZ Limited, Mundra

The report consists of the following sections

Strategy section

This part consists of oil spill risk assessment, response objectives and strategies, organization and details of response equipment's. This section is designed to help responders understand in advance the expected oil spill scenarios, the ways and means to respond effectively and to minimize pollution of the environment. This part of the plan is from **Chapter 2** to **Chapter 6**.

Action and operation section

This section includes specific instructions for responders, once the spill occurs, on what to do and how to do, for each oil spill incident. This is to ensure that emergency action by responders gets

underway promptly and in an orderly manner. This part is from **Chapter 7** to **Chapter 10**.

Data directory

This part includes information on Coastal facilities, Access roads, Telephones, Hotels, shoreline resources available with various organizations, Sensitivity area Mapping, primary oil spill equipment available, communication facilities etc., statutory regulations, area of operation, training and competence, weathering data on Hydrodyn-OILSOFT, Mud flat shore cleanup techniques, OSD Specifications, Oil Spill Management plan of Adani Ports & SEZL, oil spill response decision tree, IMO Guidelines on OSR to areas full of. This part is Chapter 11.

PROJECT TEAM OF ENVIRON SOFTWARE (P) LTD

Name of the Person Involved	Project Designation	Role and Responsibility
Dr G S Reddy	Project Leader	Assessing the data required Managing the team and Supervision of data inputting the model Analyzing the output data Report preparation
Ms. Smitha Dr Rashmi	Team Members	Data interpretation & Simulation runs Prepare the tools for report preparation Preparing the input data for model Simulation runs Digitizing the satellite Maps Graphical outputs preparation Report preparation

1. INTRODUCTION

1.1 Contingency Plan:

Oil spill contingency planning is the process of developing a suitable spill response capability that is in compliance with the local regulatory framework and commensurate with the oil spill risks of an organization or facility. This document provides guidance on the contingency planning process for potential oil spills in or on water following an accidental release of oil to a marine or aquatic environment, whether that be during the handling, transport, production or storage of oil products.

The intensity of marine traffic has increased tremendously along the Indian coasts, especially increase of oil tankers for transporting the petroleum products. Hence, the risk for occurrence of oil spills increasing in vessel route, Berth/Ports during terminal operations. The spills also occurring from collision/grounding of vessels. The oil spills will lead to marine environmental pollution and damaging the ecosystem including marine infrastructure facilities of Ports and Harbors. Hence, oil industries and ports should create individual capabilities to handle the response activity in case of spills. The procedures prepared at various levels for handling the spills called Contingency Plan. The study area as shown in Fig 1.1 provides a location of Adani Ports and SEZ Limited in Mundra including cargo berths / Jetties and SPMs.

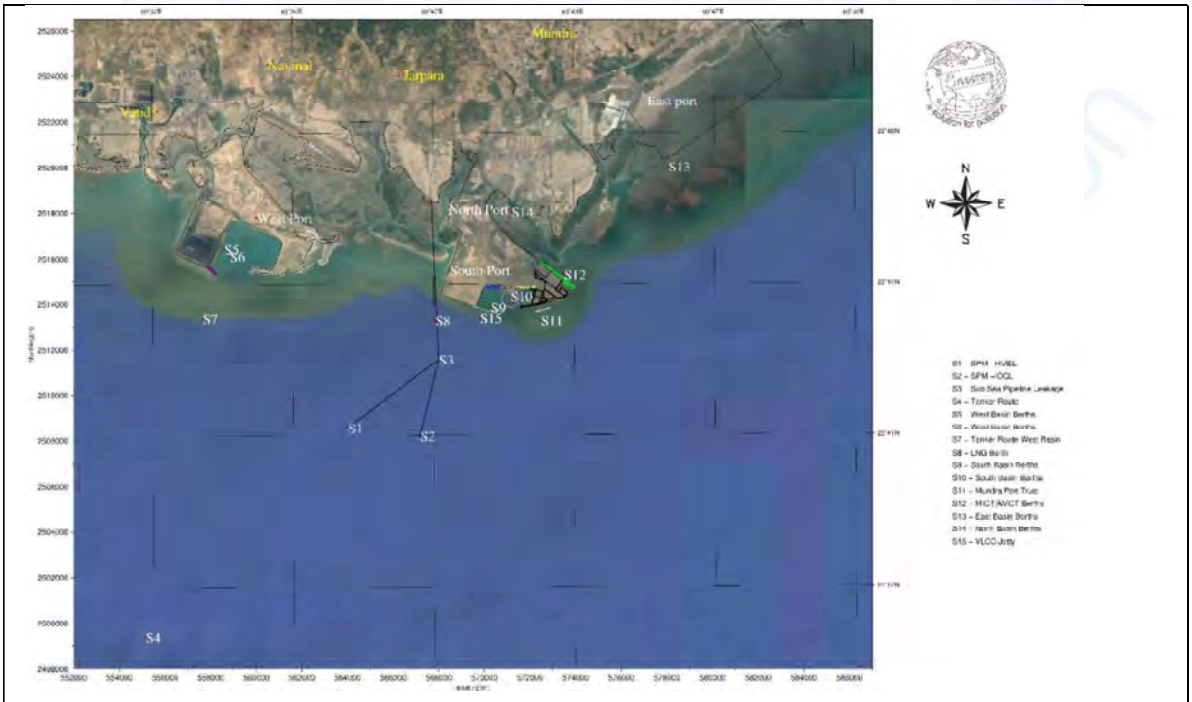


Fig.1.1 Cargo berths / Jetties of Adani Ports and SEZ Limited, in the Mundra region, Gulf of Kutch

1.2 Description of operations at Adani Ports and SEZ Limited, in Mundra

The Adani Ports and SEZ Limited, Mundra, is located (Lat 22° 44′ 18.89" N, long 69° 41′ 35.62" E) at Mundra in Gulf of Kutch, protected by the southern / northern coast of Gulf of Kutch. The deep waters in the Gulf provide ample shelter for shipping throughout the year. The entrance of the Ports which has approaches from the mouth of Gulf of Kutch at Okha, a distance of about 90 km from Mundra.

The approach channels to the APSEZL ports are deepened to meet the requirement of cargo vessels. With good lighting arrangements navigation is allowed at the port round the clock.

Adani Ports and SEZ Limited, Mundra has been operational since Oct 1998 when the construction of primary infrastructure and a multi-purpose terminal for Dry and Liquid Bulk cargo was completed. Presently Adani Ports and SEZ Limited, Mundra has 11 Container Berths, 16 Multi-purpose Berths, 1 - LNG, 1 - VLCC and 2 - SPMs with back-up facilities.

The location of the Berths is situated at Mundra at approximately (Lat 22° 44′ 18.89" N, Long 69° 41′ 35.62" E). The berths are Located in the north bank of Gulf of Kutch region. The berthing jetties are for operating vessel operability and potential to meet the future trends. APSEZL has developed Cargo berths, approaches and turning circles to handle vessels at the Berth.

Adani Ports and SEZ Limited, Mundra, currently owns and operates several marine facilities located at Mundra, Gulf of Kutch. The Mundra port facility is located on the West Coast of India in Gulf of Kutch about 50 Km west of Kandla in District Bhuj of Gujarat state.

The Adani Ports and SEZ Limited, Mundra handles the majority of its Dry and Liquid products traffic through the South, West terminals. There are several berths and Jetties at Mundra for berthing of cargos. Two subsea pipelines connect the onshore to the IOCL, HEML SPMs (Fig.1.1).

APSEZL, Mundra has developed various marine facilities which include four mega scale basins i.e. South Basin and West Basin at Mundra in last five years. Fig.1.2 gives the overall layout of the Mundra port facilities and, Fig.1.3, Fig.1.4 gives the zoomed-up portion of the port layout considered for this study.

Fig.1.2 Overall layout of the APSEZL, Mundra port facilities showing spill locations selected

Fig.1.3 Zoomed portion showing marine facilities of South Basin and spill locations selected

Fig.1.4 Zoomed portion showing marine facilities of West Basin and spill locations selected

Existing berths and Proposed Jetties

There are 16 existing berths at MMPT 1, MMPT 2, MMPT 3, MICT, AMCT catering to liquid, Container as well as General cargo. Adani Ports and SEZ Limited, Mundra is under progress for expanding the Terminal-2 and Terminal-3 for handling container and dry cargos.

West Basin

West Basin is about 10 Nautical miles west of the existing terminals of Mundra port. Four Berths are located at approx. 22° 45' 14.82" E and 69° 34' 6.23" N, off Tunda Wandh falling in Taluka Mundra. The basin is also planning to expand with 3 more additional berths for handling dry cargo. Two power plants are located North of these berths, in barren waste land. National Highway 8A extension passes through north side of the power plant sites at a distance of approximately 6 km.

South Basin

The south basin is in western side of the existing port on Navinal Island. Six berths are located at approx. Lat 22° 44′ 18.89" N, Long 69° 41′ 35.62" E. It has presently 6 operational berths. It has an enclosed turning basin and necessary back up area. The basin is also planning to expand with two container berths (CT-5) for handling Container cargo.

VLCC Jetty:

The development of jetty facilities is in progress for handling VLCC at Mundra for Crude oil operations.

The oil spill risk analysis studies is to be carried out for all these facilities within the Mundra port limit facilities which comprise of the SPMs, West basin, South basin, LNG Jetties, proposed VLCC jetty and existing berths as shown in Fig.1.1, Fig.1.2, Fig.1.3, Fig.1.4 and Fig.1.5. Hence, mathematical modeling studies for predicting the fate and oil spill trajectory due to spills if any at Port operations facilities for various seasons is mandatory for OSCP. Oil spill modeling to be carried out as a part of Oil Spill Contingency Plan to identify the suitable combating operations for controlling the spills.

1.3 Purpose of the Plan

Adani Ports and SEZ Limited, Mundra (APSEZL, Mundra) is committed to properly manage any oil spill incident that may arise during the course of the port operational activities in order to minimize the impact on personnel, environment, ecology, socio-economy, property, company's financial position and its reputation. As part of regulatory requirements, APSEZL, Mundra is mandated to establish an Oil Spill Contingency Plan (OSCP) for Tier-1 response capabilities and duly approved by the regulatory authorities, and which includes an effective response system with trained personnel and a pre-established organization structure as well as the capability to mobilize and respond to the spill incident in the least amount of time. The primary purpose of the plan is to facilitate the implementation of the necessary actions to stop or minimize the discharge of oil/ chemicals and to mitigate its effects using best response facilities and use of oil spill dispersants (OSD).

1.4 Objectives of the Plan

The objectives of the OSCP are:

- To establish a rapid and effective system for detection and reporting of spills, with adequate measures for preparedness for oil and chemical pollution;
- To facilitate rapid and effective response to spill events with adequate measures to protect the health and safety of personnel, community, socio economic resources and protection of the marine environment;
- To establish appropriate response techniques to prevent, control, and combat oil and chemical pollution during spills, and disposal of contained material in an environmentally sound manner;
- To establish the communication channels essential for the coordination of tasks needed to deal with a pollution incident, and

- To ensure that the plan provides an integrated response together with the National Oil Spill Disaster Contingency Plan (NOS-DCP 2015).

1.5 Applicability and Geographical Limits of the Plan

This OSCP provides the response procedures and arrangements available for oil spill incidents during the port operations in the APSEZL, Mundra limits. It assigns roles and responsibilities for different personnel during an emergency.

The plan covers all spill incidents that occur within the block area and are likely to affect the marine environment and coastline along the block area. It must be noted that this document is not restrictive in nature and is developed in order meet requirements specified under statutory requirements presented for handling oil spill emergencies. The level of response will be guided by the response strategies defined in this document and will be governed by the severity of the spill event, its effect on the health and safety of the employees and contractors, impacts on the environment and Port reputation.

The scope of this plan extends to the entire area and beyond depending upon the trajectory of the spill. The geographical coordinates of the spill locations in the Mundra region as shown in Figure.1.1. The locations within the limits of study domain are Ports, Port operational facilities at South / West / MPT port facilities etc. The sensitive areas including berths / jetties, Mangrove vegetation, biological resources are to be protected with better response plan adopting well-planned tactical response methods.

1.6 Authorities and Responsibilities

Prevention of accidental oil spillage is APSEZL, Mundra first priority. Port operating facilities will be designed, installed and operated in such a manner so as to minimize possibility of oil spills. Facilities, resources and support provided by third parties are also required to meet international pollution prevention design and operation standards.

The Oil Spill Contingency Plan (OSCP) has been prepared based on National Oil Spill – Disaster Contingency Plan (NOS-DCP) and the provision of Merchant Shipping Act, 1958 and Major Port Trusts Act, 1963.

Risks of oil spills associated with APSEZL, Mundra operations are and as such several measured for oil spill contingency planning were taken by port.

APSEZL, Mundra shall be responsible for any clean-up responses and all other incidental and consequential costs of whatsoever nature resulting from oil spills due to their activities/ operations. APSEZL, Mundra Man (Manager) is incident Response Coordinator. The Port is committed to integrate in its operations ways to identify oil spill risks, prevent oil spills, and to implement appropriate changes in its contingency plan for spill response and clean-up strategies.

To achieve this, APSEZL, Mundra policy will be to:

- Respond immediately to any oil spill incident with the objective of protecting Marine & Human life and to minimize environmental impacts;
- Work and consult with appropriate government bodies and the local community to address any issues relating to oil spills in a timely manner;
- Provide adequate training and information to enable employee and contractors to adopt environmentally responsible work practices and to be aware of their responsibilities in the prevention and clean-up of oil spill.
- Develop emergency plans and procedures so that incidents (accidental releases) can be responded to in a timely manner.
- Develop and maintain management system to identify, control and monitor risks and to comply with Statutory Regulations and Industry Guidelines.
- Assess the situation and take timely and appropriate action where third-party interests are involved, such as products or chartered vessels from nearby ports / agencies etc.
- Ascertain that each identified employee is responsible for the implementation of this policy in association with his specific duties. This includes contractors and employees.

1.7 Coordinating Committee

Crisis Management Group (CMG) will be the coordinating committee for oil spill response operations under Facility level oil spill contingency plan for APSEZL, Mundra. Oil spill response plan identifies the APSEZL, Mundra spill response organization, team responsibilities, communications and the procedures to respond all possible oil spill emergencies within the Port limits.

The assigned duties with respect to conduct of operation as mentioned here under will accordingly be required to be discharged by each On Scene Commander (OSC) (in the event of multiple ops). On Scene Coordinator (OSCo)/ Chief OSCo is responsible for undertaking all possible and feasible actions to respond to spill and direct the response team / teams at site. He is to decide the best response action required to be adopted as per situation and guide the response team/ teams accordingly.

The callout system for an oil spill incident is identical to any other emergency as contained in disaster management plan of APSEZL, Mundra. Emergency Control Team (ECT) will arrange mobilization of additional resources like Emergency Response Team (ERT) as when, required.

Emergency Control Team

The ECT will compromise the following members

- Chief Operating Officer APSEZL, Mundra

- Incident Control Officer (HOS – Marine / Duty Port Captain)
- Site Emergency Coordinator (Senior Pilot and Duty Radio Officer)
- Fire Coordinator (HOS – Fire / HOS -Safety)
- HOS – Security / Duty Security officer
- Medical Superintendent
- Marine Pollution Coordinator – Manager (Marine /Pollution Control)
- Traffic Coordinator - Duty Port Captain
- Communications Officer (Duty Port Captain / Marine Control in-Charge)
- Chief Emergency Controller (Head -HSE)
- Civil Coordinator (HOS – Environment Cell / HOS Estate)
- Marine Engineering Coordinator (HOS – SPM / Diving Team in-Charge)
- HOD – Corporate Affairs
- HOS-Legal & HOD Estate

1.7.1 Statutory Requirements

As a part of this Plan, the port, facility or the identified ECT (Emergency Control Team) is responsible to undertake spill mitigation operations apart from managing, acquiring and maintaining oil spill response equipment and resources appropriate for response as per the Risk Category-A (NOSDCP-2018). Equipment, resources and personnel will be stockpiled at one or more suitable location/s as necessary to meet response requirements within shortest period.

The ECT is responsible for executing all the response mechanisms and procedures identified by the Plan and maintain trained personnel to undertake the operations.

An oil spill contingency plan is based on the understanding of the regulatory framework in which the assets and operations are located and in which the planning and response actions will be carried out.

This section summarizes the relevant national and international legislations related to oil spill response.

1.7.2 Enforcement Agencies and Authorities

At national level, various regulations have been formulated to ensure that oil spills are adequately notified and handled with least impacts on the aquatic and terrestrial environment along with public health and safety.

- Merchant Shipping Act 1958 and Amendment in 2003: This Act requires oil companies to clean up any oil spill from offshore petroleum related activities whether at sea or ashore.
- Environment Protection Act 1986 and EIA Notification, 2006: The Ministry of Environment and Forests and Climate Change (MoEF&CC) while granting environmental clearance to oil and gas projects requires the company to establish oil spill control capabilities.
- Section 32 of the Water (Prevention and Control of Pollution) Act 1974: The Gujarat State Pollution Control Board (GPCB) holds the power to prevent discharge of hazardous and polluting materials into the sea or tidal waters.
- Coast Guard Act, 1978: The Act requires every owner, operator of a port facility, oil installation, and offshore installation to prepare and implement oil spill disaster contingency plan.
- Petroleum and Natural Gas (Safety in Offshore Operations) Rules, 2008 (PNGSOOR), G.S.R. 469(E): These Rules have been formulated through Sections 5, 6 and 7 of the Oilfields (Regulation and Development) Act, 1948 (53 of 1948). It requires operators to undertake risk assessment related to activities and prepare safety management systems and emergency response plans pursuant to the provisions of the Rules.

Indian Coast Guard

The Indian Coast Guard is the national coordinating authority for marine oil spills. Under the Coast Guard Act, 1978, the CG is responsible for control of pollution at sea and protection of marine environment. Indian Coast Guard has prepared and implemented a National Oil Spill Disaster Contingency Plan (NOS-DCP). As per the Act, all spills are required to be reported to the Coast Guard. In the event of a spill, the nearest Coast Guard station will be notified. When a spill is reported, the Coast Guard will monitor the movement of spill while Adani Ports and SEZ Limited, Mundra takes the response measures.

Oil Industry Safety Directorate (OISD)

Oil Industry Safety Directorate (OISD) is a technical directorate under the Ministry of Petroleum and Natural Gas that formulates and coordinates the implementation of a series of self-regulatory measures aimed at enhancing the safety in the oil and gas industry in India. OISD maintains a database of accidents taking place in the oil industry and also investigates the major incidents, therefore has to be notified of incidents in offshore installations.

1.7.3 Statutory Requirements

International Convention for the Prevention of Pollution from Ships (MARPOL 73/78)

MARPOL 73/78 is the International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978. The Protocol desires to achieve the complete elimination of intentional pollution of the marine environment by oil and other harmful substances and the minimization of accidental discharge of such substances. The Convention includes regulations aimed at preventing and minimizing pollution from ships - both accidental pollution and that from routine operations - and currently includes six technical Annexes.

- Annex I: Regulations for the Prevention of Pollution by Oil;
- Annex II: Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk;
- Annex III: Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form;
- Annex IV: Prevention of Pollution by Sewage from Ships;
- Annex V: Prevention of Pollution by Garbage from Ships; and
- Annex VI: Prevention of Air Pollution from Ships.

Regulation 37 of MARPOL Annex-I require that oil tankers of 150 gross tonnage and above and all ships of 400 gross tonnage and above carry an approved Shipboard Oil Pollution Emergency Plan (SOPEP). Regulation 17 of MARPOL Annex-II makes similar stipulations that all ships of 150 gross tonnage and above carrying noxious liquid substances in bulk carry an approved shipboard marine pollution emergency plan for noxious liquid substances. The latter may be combined with a SOPEP and should be referred to as a Shipboard Marine Pollution Emergency Plan (SMPEP).

The SOPEP/ SMPEP must include:

- Procedures for reporting oil pollution incidents.
- List of authorities and persons to be contacted in the event of an incident.
- Detailed description of immediate action to be taken to reduce or control discharge of oil following an incident.
- Procedures and point of contact for coordinating spill response actions with national and local authorities.

The International Maritime Organization (IMO) has produced the following guidelines to facilitate the preparation of such plans:

- Guidelines for the Development of Shipboard Marine Pollution Emergency Plans, 2010 Edition which includes Guidelines for the development of Shipboard Oil Pollution Emergency Plans (SOPEP) (resolution MEPC.54 (32), as amended by resolution MEPC.86(44)).
- Guidelines for the development of Shipboard Marine Pollution Emergency Plans of Oil and/or Noxious Liquid Substances (Resolution MEPC.85 (44), as amended by resolution MEPC.137 (53)).

MARPOL also gives guidelines for reporting pollution incidents to the authorities and outlines standard report formats.

International Convention on Oil Pollution Preparedness, Response and Cooperation, 1990

The IMO's Marine Environment Protection Committee developed this Convention to provide a framework for international cooperation for combating major oil pollution incidents. The Convention has the following key elements:

- precautionary and preventative measures are important in the avoidance of oil pollution in the first instance;
- prompt and effective action is essential to minimize possible damages in the event of pollution;
- contingency planning needs to be emphasized and the role of the oil and shipping industries should be included within these plans;
- the need for mutual assistance, international cooperation and information exchange (on response capabilities and reporting incidents);
- the 'polluter pays' principle; and
- the importance of related international instruments on liability and compensation, including the 1992 Civil Liability Convention (1992 CLC) and the 1992 Fund Convention.

Article-3 of the International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990, also requires operators of offshore units under the jurisdiction of Parties to have oil pollution emergency plans or similar arrangements which must be coordinated with national systems for responding promptly and effectively to oil pollution incidents.

1.8 Mutual aid Agreement

For the port activities suitable agency will be hired for supporting logistics for port operations. As a part of the service, necessary emergency services will also be sought from the port authority.

As per the National Oil Spill Disaster Contingency Plan (NOS-DCP), all Ports or facilities handling oil and oil products are required to maintain Tier-I Oil Spill Response (OSR) capabilities to undertake response activity within their area of operation.

Accordingly, the ports of Adani Ports and SEZ Limited, Mundra is required to set up and sustain Tier-I OSR facilities in Mundra region in co-ordination with HMEL operating at these Port. For this purpose, APSEZL, Mundra and other Participating viz. HMEL, Mundra have executed a Memorandum of Understanding (MOU) for sustenance of Tier-1 OSR facilities for combating oil spills at and in surrounding area within Adani Mundra / GOK.

Under the said MOU, it has been decided to put in place Tier-1 Oil Spill Response Services in Mundra Region for conduct of Oil Spill Operations and mitigation of Pollution within the identified area of operation.

1.9 Geographical Limits of the Plan:

The scope of this plan extends to following locations facilities stretched and facilities over a geographical area of more than 100 Sq Km with multiple operations going on same time.

Ports of Adani

Transshipment facilities at Adani Ports and SEZ Limited, Mundra

Adani West and South Ports

Kandla Port, Essar Port at Vadinar, Coast Guard Jetty

Intake and outfalls

1.10 Interface with ROSDCP and NOSDCP

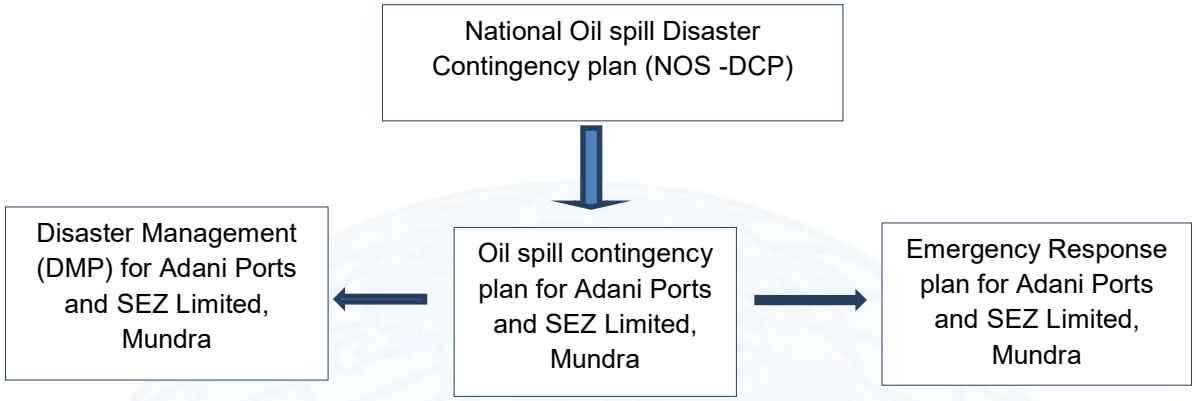
National Oil Spill Disaster Contingency Plan is aimed at coordination of resource agencies to combat an oil spill in Indian waters and also spells the actions required of oil handling facilities i.e. to prepare contingency plans for respective facilities and to develop Tier-I response capabilities and also to report oil spills.

Render resources for pollution response when called for, Report Oil Spills, prepare contingency plans for respective spill scenario, set up Tier I response facilities and Use of Oil Spill dispersants (OSD) in accordance with Plan.

Of the three tiers of response envisaged and planned to handle a spill situation in consonance with quantum of spill, Tier-1 is the primary and first step of responses, to be mounted by the facility where the spill takes place.

While, NOS-DCP outlines the response activities as per Tier system of addressable of spill, the facility plan is the instrument to address the spill scenario at local level. Tier-1 being the first and primary response level has to be executed and undertaken by the facility handling polluting cargo, for which purpose drafting of a CP is the primary requirement.

A spill situation could arise out of an incident or a number of incidents that could be either natural or man-made leading to emergencies. In the event of multiple emergencies, while the spill response will be undertaken as per this Plan, response to other emergencies will be as per Adani Ports and SEZ Limited, Mundra Emergency Response Plan. This plan interfaces with following documents as illustrated below:



This Oil Spill Contingency Plan has the direct interface with the following plans, manual, guideline and standards of APSEZL, Mundra and Port Operational program:

- APSEZL, Mundra – Disaster Management Plan
- Regional Oil Disaster Contingency Plan (ROSDCP)
- National Oil spill Disaster Contingency plan (NOS -DCP)

2. QUANTITATIVE RISK ASSESSMENT OF OIL SPILLS

The oil spill may occur generally during either from transportation or from offshore facilities which include the surface facilities viz., platforms, berths / Jetties, vessels and subsurface pipelines and all other associated infrastructure required for the transport / port operations. The spilled oil moves in the directions of resultant of wind and current and finally either stranded in the coast or in the sea. If spill reaches the coast, it will damage the coastal sensitive areas, which are to be protected with proper response equipment in a planned response manner.

The risk is to be assessed that are posed to sensitive areas in and around of Adani Ports and SEZ Limited, Mundra regions and then address those problems by identifying suitable response methods to prevent Biological / industrial / socio-economic sensitive areas from exposer to oil spill and how best to advise the local authority of the dangers that could be posed by the spill and how to address them and to repair the damage done by the spill.

2.1 Identification of Port Operational activities and Risks

APSEZL, Mundra currently owns and operates several marine facilities located at Mundra, Gulf of Kutch. The Mundra port facility is located on the West Coast of India in Gulf of Kutch about 50 Km west of Kandla in District Bhuj of Gujarat state.

The APSEZL, Mundra handles the majority of its Dry and Liquid products traffic through the South, West, terminals. There are several berths and Jetties at Mundra for berthing of cargos. Two subsea pipelines connect the onshore to the IOCL, HEML SPMs.

The location of the Adani Ports and SEZ Limited is situated at Mundra at approximately Lat 22˚ 44′ 18.89” N, long 69˚ 41′ 35.62” E. The berths are Located in the North bank of Mundra region. The berthing jetties are for operating vessel operability and potential to meet the future trends. APSEZL, Mundra has developed berths, approaches and turning circles to handle vessels at the Berth.

Existing berths and Jetties

There are 21 existing berths at MMPT 1, MMPT 2, MMPT 3, MICT, AMCT catering to liquid, Container as well as General cargo. M/s Adani also planning to expand MPT-T2 for handling dry cargos.

West Basin

West Basin is about 10 Nautical miles west of the existing terminals of Mundra port. Four Berths are located at approx. 22° 45' 14.82" E and 69° 34' 6.23" N, off Tunda Wandh falling in Taluka Mundra. The basin is also planning to expand with 3 more additional berths for handling dry cargo. Two power plants are located North of these berths, in barren waste land. National Highway 8A extension passes through north side of the power plant sites at a distance of approximately 6 km.

South Basin

The south basin is in western side of the existing port on Navinal Island. Six berths are located at approx. Lat 22° 44′ 18.89" N, Long 69° 41′ 35.62" E. It has presently 6 operational berths. It has an enclosed turning basin and necessary back up area. The basin is also planning to expand with two container berths for handling liquid cargo.

VLCC Jetty:

The development of jetty facilities is in progress for handling VLCC at Mundra for Crude oil operations.

Hence, mathematical modeling studies for predicting the fate and oil spill trajectory due to spills if any at Port operations facilities for various seasons is mandatory for OSCP. Oil spill modeling to be carried out as a part of Oil Spill Contingency Plan to identify the suitable combating operations for controlling the spills.

Oil Spill Scenarios Including Worst Case Discharge

Evaluating oil spill risks requires consideration of two factors, namely the probability of a spill occurring, and the consequences.

The potential oil spill scenarios from the APSEZL, Mundra marine facilities and associated activities are summarized in the next sections. In practice, due to preventive actions such as training, operating procedures and engineered solutions, potential spills are likely to be smaller. Larger oil spills being extremely unlikely.

The events and scenarios presented here are indicative only. Though accounting every eventuality is not practicable, however the above scenarios represent a broad cross section of

possible oil spill incidents. The credible release quantities given are only an indication and an actual oil spill may vary significantly.

Risk Assessment Methodology

Risk Assessment exercise is primarily for the concern of environmental pollution caused by accidental spillage of Oil at and around the APSEZL, Mundra Port facilities. The factors which may influence the risk will include the followings:

- Exposure time of the port due to transit of ship
- Performance of ship's crew, including pilot
- Hydrographic and meteorological conditions;

The present Risk Assessment exercise has been carried out in stages as follows:

- ✓ Gathering of relevant information and data;
- ✓ Hazard Identification;
- ✓ Frequency Estimation;
- ✓ Consequence Estimation;
- ✓ Risk Estimation.

The oil spill may occur generally during transportation of crude/Fuel oil from the offshore facilities which include the surface facilities viz., platforms, berths / Jetties, vessels and subsurface pipelines and all other associated infrastructure required for the transport operations. The causes of oil spill during operations of APSEZL in the Mundra region along the North Coast of Gulf of Kutch are broadly defined under the following sections.

2.1.1 Sources of oil spill:

At various port operational facilities that can lead to the oil spill are given below: Also, worst case scenario i.e. Worst case volume and likely volume can be mentioned.

- ➢ Operations at Jetty / berth - loading / unloading
- ➢ Spills due to Collision/Grounding in the Tanker route
- ➢ Bunker/ fuelling operations
- ➢ Ship distress / sinking
- ➢ Spill due to rupture in subsea pipeline corridor (size of crack-1")
- ➢ Rupture of export line due to movement and landing along the coast.

2.2 Failure frequency of pipeline, transfer and storage tank

The damage of pipelines is subjected number of factors such as corrosion, age of pipeline, life of pipeline and length. The reliability data of pipelines are presented here from the international database and hence these can be taken as indicative.

The probabilities of pipe ruptures are presented below:

d ≤ 50 mm	1 x 10^{-10}/m hr.
50 < d ≤ 150 mm	3 x 10^{-11}/m hr.
d > 150 mm or greater	1 x 10^{-11}/m hr.
Sub-Sea pipeline failure	6.1 x 10^{-12}/m hr.

where 'd' is the diameter of pipe

The probability of hose failures is presented below:

Loading arm failure	3 x 10^{-8}/hr.
Flexible hose pipe failure	4 x 10^{-5}/hr.
Atmospheric storage tank failure rate	3 x 10^{-4}/yr

Flow lines	Partial rapture	1.25 x 10-5 / year
Flow lines	Total rapture	1.25 x 10^{-5} / year
Block value		3-11" – 1.08 x 10^{-4}/year
Flange Joints		3-11" -- 5.56 x 10^{-5}/year

Based on the above failure frequency, it is apparent that the failure rate of the flexible hose pipe ranks higher. The failure rate of above ground pipeline depends on the pipe size and its length. As the pipe diameter increases, the failure rate decreases and as the length increases, the failure rate increases. The failure rate of underground pipeline is relatively much lesser compared to that of above ground pipeline. The underground pipelines are well designed to take care of corrosion etc.

Based on the past 10 years accidental data, it is observed that the frequency of oil spills is around 1.7 x 10^{-6} per cargo vessel transferred.

2.2.1 Quantity of oil leaked – pipelines

The quantity of oil spilled can be calculated based on size of the rupture and also for hole leaks taking account the diameter of hole and flow rate. The formula for total calculation is

Volume of spill = 2πrLv

r = radius of pipeline

L = length of pipeline

v = flow velocity

2.3 Sub-sea Pipeline Damage

There was pipeline leakage at Bombay high and observed the flow and pressures monitored continuously at platform and Uran terminal after the pumping has been stopped. Before stopping pumping, the leak rate is high due to higher pressure than hydrostatic pressure and leak rate would reduce gradually after stopping the pumping. The details of spill volumes are furnished in Table 2.1.

Table 2.1 Pipeline spill volume (m3)

Time in hours after rupture	Spill Size
1	1900
3	3400
6	5300
12	9000
24	13500
36	14100

In case of total rupture of the 48" pipeline running from SPM to onshore oil terminal, the pump will be shutdown automatically within few minutes and the volume of spill would be around 20 m3 only.

The failure rate of loading arm is extremely low because of the sophisticated safety systems incorporated in the design.

2.4 Cargo Operations or Transfer frequencies

Since 1974, International Tanker Owners Pollution Federation Limited (ITOPF), London has maintained a database of oil spills from tankers, combined carriers and barges. This covers all accidental spillages except those resulting from acts of war. The database (Table.2.6) contains information on both the spill itself (amount and type of oil spilt, cause and location) and the vessels involved. For historical reasons, spills are generally categorized by size (<7 tons, 7-700 tons and >700 tons) although the actual amount spilt is also recorded. Information based on nearly 10,000 incidents, found that the vast majority (85%) fall into the smallest category i.e. <7 tons. Information is gathered from both published sources, such as the shipping press and other specialist publications, and also from vessel owners and their insurers. Not surprisingly,

information from published sources generally relates to large spills, often resulting from collisions, groundings, structural damage, fires and explosions, whereas the majority of individual reports relate to small operational spillages. The details of the spills occurred based on the ITOPF data collected are presented in Table. 2.2

Table- 2.2: Number of oil spills occurred during 1974 to 2010 and their causes and the spill quantity

	<7 Tones	7-700 Tones	>700 Tones	TOTAL
OPERATIONS				
Loading/Discharging	3157	385	37	3579
Bunkering	562	33	1	596
Other Operations	1250	61	15	1326
ACCIDENTS				
Collisions	180	337	132	649
Groundings	237	269	160	666
Hull Failures	198	57	55	310
Equipment Failures	202	39	4	245
Fires & Explosions	84	33	34	151
Other/Unknown	1975	121	22	2118
TOTAL	7845	1335	460	9640

Table-2.2 gives the number of oil spills occurred along with quantity of oil spilled and the operations associated during 1974 to 2010 It is found that, most spills from tankers result from routine operations such as loading, discharging and bunkering which normally occur in ports or at oil terminals, the majority of these operational spills are small with some 81% involving quantities of less than 7 tons and accidents involving collisions and groundings generally give rise to much larger spills, with at least 4% involving quantities in excess of 700 tons.

The exact quantity of spill from each of the above incident is difficult to predict due to the variables of operating conditions and the length of risk exposure. Maximum risks associated with the events may be considered while devising the oil spill contingency plan. The spill scenarios 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. The software is intended to use for specific scenarios, through a few simulations are made in this report considering the worst-case scenarios.

The failure rate of loading arm is extremely low because of the sophisticated safety systems incorporated in the design. Accidental release of any chemical due to catastrophic rupture of tanks and ship collision are also relatively very low. The impact due to failure of storage tanks

and ship collisions on environment are very high because of the large quantity released when compared to the pipe failure.

For the purpose of simulation, the below given scenarios are taken into account considering the above spill risks.

2.5 Operational Leakage

2.5.1 Spill due to Loading arm failure at Jetty: (pumping rate of 10000 m3/hr crude oil for 1 min)

Crude pumping rate from the tanker will be around 6500 m3/hr to 10000 m3/hr. In the present study, maximum pumping rate of 10000 m3/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 few seconds in the event of hose rupture or failure. Again, for the sake of assessing higher risk, a response time of 1 min is considered to estimate the amount of oil that would spill at the Jetty. Thus, the quantity of crude oil spill has been estimated as 167 m3 in the event of loading arm failure.

2.5.2 Spill due to rupture of sub-sea crude oil pipeline from refinery to shore tanks: (2611 Tons of crude for 36 hrs)

Crude oil pumping rate from the tanker will be in the range of 12500m3/hr – 6500 m3/hr. In the present study, to assess the maximum risk the pumping rate of 12500 m3/hr has been considered to be on higher risk side. 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 is provided on the surface of the pipeline. Hence crude oil pipelines designed, constructed and laid as per the international norms are safe and leakages are extremely rare during its designed life. However, a rupture of size 1" has been assumed for assessing the quantum of oil spill through sub-sea pipeline.

Pump discharge pressure on-board will be 10 kg/cm2 at tanker manifold and crude oil thus will be pumped to the COT tanks without any boosting device in-between. As the level in the tanker depletes, discharge pressure would also be reduced. Moreover, with the 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, a pressure of 10 kg/cm2 and a water column height of 20 m have been considered.

In the present study, for the sake of assessing the amount oil spill in case of rupture the response has been considered as 36 hr for quantification of oil spill. Accordingly, the quantity of Crude oil spill has been estimated to be 2611 tons.

2.5.3 Spill due to Tanker Collision at Jetty having capacity between 1,00,000-3,00,000 metric tons

Crude Oil is received at Jetty by ocean tankers having capacity between 1,00,000 - 3,00,000 metric tons. Crude Oil is pumped to shore tanks by pipeline from the SPM. In the present scenario, collision of the vessel at the jetty or tanker route with another vessel enroute to other terminals can cause partial damage to the vessel's cargo tanks (not more than 3 Nos. Cargo tanks) leading to a maximum oil spill of about 700 tons to 25,000 tons of crude oil. Hence, in the present study the probable quantities of crude oil spills due collision at Jetty is considered as 700 tons, 10000 tons and 25,000 tons.

2.5.4 Spill due to collision or grounding in the Tanker route

Tankers are expected to call at the Jetty frequently to load these oil products. These tankers may meet accidents like collision with other vessels or grounding in the vicinity of the Jetty. In case of such accidents the spillage may vary depending on the size of the tanker, the extent of damage and number of cargo tanks ruptured. In the present study the probable quantity of spills in the tanker route considered for modelling is about 25000 tons.

As can be seen above the spill scenarios mentioned above 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 the magnitude of impact zone and the quantity involved in such impacts. The software is intended for use by the Client for specific scenarios, through a few hypothetical simulations are made in this report considering the worst-case scenarios.

The failure rate of loading arm is extremely low because of the sophisticated safety systems incorporated in the design. Accidental release of any chemical due to catastrophic rupture of tanks and ship collision are also relatively very low. The impact due to failure of storage tanks and ship collisions on environment are very high because of the large quantity released when compared to the pipe failure.

2.6 Risk assessment of oil spill in APSEZL, Mundra area

a) Oil spill risk analysis and modeling studies for Adani Ports and SEZ Limited at operating facilities in Mundra Region, Gulf of Kutch (**Part-A & B of the report**)

b) Mapping of Marine Sensitive areas in the Coastal areas of Gulf of Kutch region (**Part-C of the report**)

The two documents mentioned above deal extensively with oil spill risk analysis & trajectory and Mapping of marine sensitive areas based on the available data information. These two studies follow the structure of and are compliance with the "IPIECA-A guide to contingency planning for oil spills on water and are aligned with the Indian coast guard "National Oil Spill Disaster Contingency plan" These important documents provide all details of the local environment, risks of the oil spill Tier-I credible spill, fate of the spills, sensitivity mapping of the area and local, regional and country wide response capabilities.

These documents shall be used in the conjunction with the oil spill response plan.

2.7 Spill locations and scenarios

Based on above oil spill risk analysis the following 15 oil spill scenarios are considered for simulations as shown in Fig. 2.1.

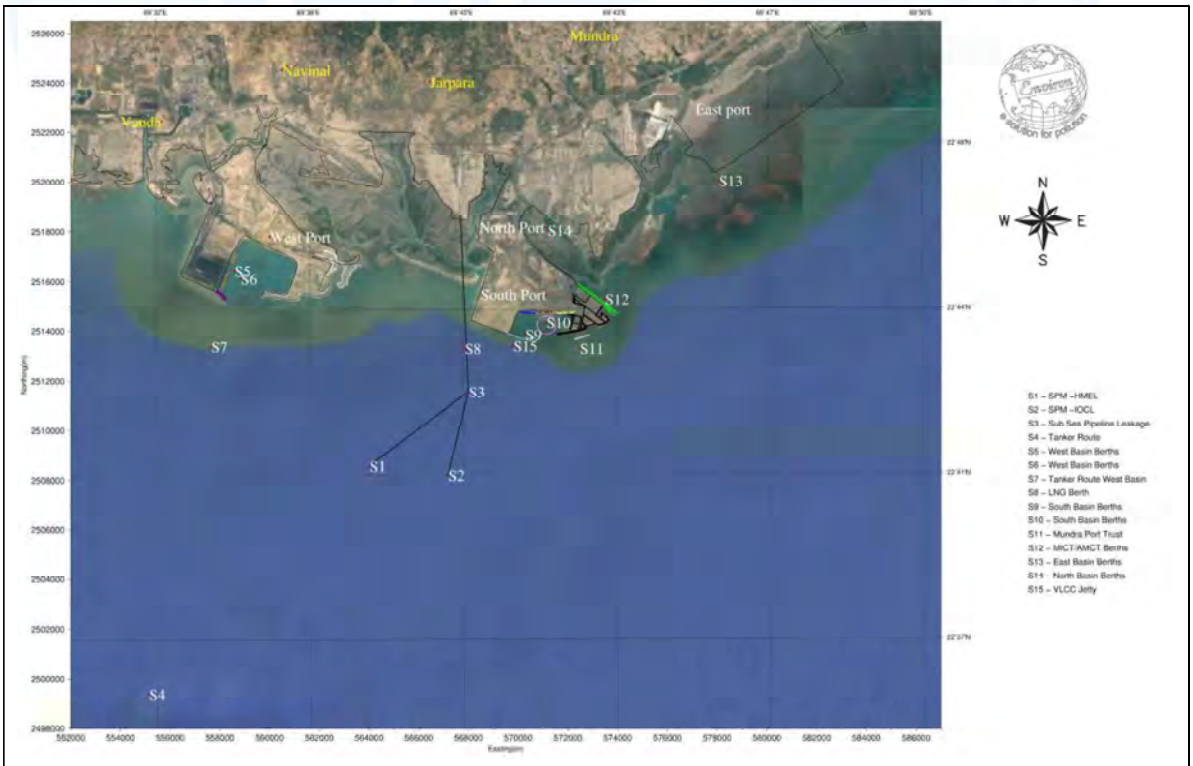


Fig.2.1 Spill Locations considered in Adani Ports and SEZ Limited at Mundra region

- SPMs(S1, S2)
- VLCC Jetty (S15)
- Sub-sea pipeline(S3)

- Tanker entry into the Ports (S4)
- Adani West Port berths (S5, S6, S7)
- LNG Berth (S8)
- Adani South Port berths (S9, S10)
- Mundra Port (S11)
- MICT / AMCT Berths (S12)

The following are oil spill risks identified in terms of quantities and spill types

- Crude oil spill of 700t at selected SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Fuel oil spill of 700t at selected West Port(S5), Vessel route(S7), LNG Jetty(S8), South basin (S9), Mundra Ports(S11), MICT/AMCT(S12)
- Crude oil spill of 10000t at SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Crude oil spill of 25000t at SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Fuel oil spill of 100t at selected West Port (S5, S6), LNG Jetty(S8), South basin (S9,S10), Mundra Ports(S11), MICT/AMCT(S12)
- HSD oil spill of 50t at selected West Port(S5), LNG Jetty(S8), South basin (S9), Mundra Ports(S11)
- HSD oil spill of 20t at selected West Port(S6), South basin (S10)

Continuous Spills

- Crude oil spill of 10000 m3/hr for 1 min at selected SPM-HMEL(S1), SPM-IOCL(S2)
- Crude oil spill of 10000 m3/hr for 1 min at selected VLCC Jetty (S15)
- Crude oil spill of 10000 m3/hr for 1 min at sub-sea pipeline route (S3)

2.8 Types of Oil Likely to Spilled

Oil Type

The oil handling at Port area majority will be crude oil. The International Tank Owners Pollution Federation (ITOPF) classifies oil into four (4) groups based on their specific gravity. Typically, crude oils will fall into Group 2 (with specific gravity 0.8 – 0.85, API 35 – 45) or Group 3 (with specific gravity 0.85 – 0.95, API 17.5 -35). The behaviour of a particular crude oil may differ from the general pattern depending on its properties and environmental conditions at the time of the spill.

The other oils that will be used for Cargo / tankers are fuel oils. The specific gravity of Fuel oil is typically in the range of 0.9-0.95 (API 25 – 35) and viscosity 6.5 cst / 50°C. Fuel oil will spread slowly on water and should evaporate less quantity within a few days upon release onto the sea

surface. Evaporation can be enhanced by higher wind speeds, warmer water and air temperatures. A small percentage may also dissolve.

The following characteristics of oils are used for modelling study

Table.2.3 Type of oils selected for oil spill modelling studies

Chemical and Physical Properties	Fuel Oil	Crude Oil	HSD
Sp. Gr	0.9	0.85	0.86
API	25.72	41.27	25.72
Surface Tension	0.0028Nm^{-1}	0.003Nm^{-1}	0.0028Nm-1
Viscosity of Oil	6.5X10^{-6} m^2/s	3.822X10^{-6} m^2/s	3.822X10-6 m2/s
Molar Volume	0.0002 m^3/mol	0.0002 m^3/mol	0.00023 m3/mol
Wax content (%)	912-19%	12-19%	03-44%
Pour point (˚C)	35 deg C	18 to 30 deg C	60 C - 180 C

2.9 Probable Fate of Spilled Oil

The physical and chemical characteristics of spilled oil change almost immediately when spilled in the marine environment due to evaporation, dispersion, emulsification, dissolution, oxidation, sedimentation and biodegradation. All of these processes that set in together are collectively referred to as oil weathering and decide the final fate of spilled oil and quantities that would need to be removed physically. If the oil is persistent and does not vaporizes immediately or disperses and comes ashore, then the costs in terms of clean up, damages and economic loses can be considerable. Some of the weathering processes that spilled oil goes through and the time duration of these processes which are important for emergency response and need to be taken into account by the responders, are provided in Table 2.8 below:

Table.2.4: Oil Weathering Processes

Process	Description	Importance	Time Frame
Evaporation	Conversion of liquid to gaseous state. Lighter factions are lost first.	Major process accounting for loss of oil. At 15°C gasoline will evaporate completely over a 2-day period, 80% of diesel fuel and 40% of light crude, 20% of heavy crude and about 5- 10% of Bunker C fuel.	< 5 days
Emulsification	Small water droplets get mixed into liquid oil. Water content will	Will increase the amount of pollutant to be recovered by a factor of 2 - 4.	Onset may be delayed but emulsification

Process	Description	Importance	Time Frame
	reach 50-80%.		process will start rapidly.
Natural Dispersion	Breakup of an oil slick into small droplets	Removes oil from water surface	< 5 days
Dissolution	Mixing of soluble oil components into water	Water soluble components are most toxic	< 5 days
Biodegradation	Breaking of oil by microbes into smaller compounds and finally to water and carbon dioxide	Rate depends on oil type, temperature, nutrients, oxygen and amount of oil	Weeks to months
Formation of tar balls	Breakup of heavy crudes and refined oils into small patches with long persistence	Hard to detect	Days to weeks

In this present study, the oil type considered is 'weathering' type which is typically used for all the oil spill trajectory prediction studies. Non weathering oil is an oil type that does not change chemically or physically over time in the marine environment. Weathering Processes like evaporation, emulsification etc., affect spills and no-weathering oils doesn't considered these processes hence the trajectory oil spill analysis for non-weathering type represents worst case scenario.

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.2.2 shows schematic diagram of weathering processes with time.

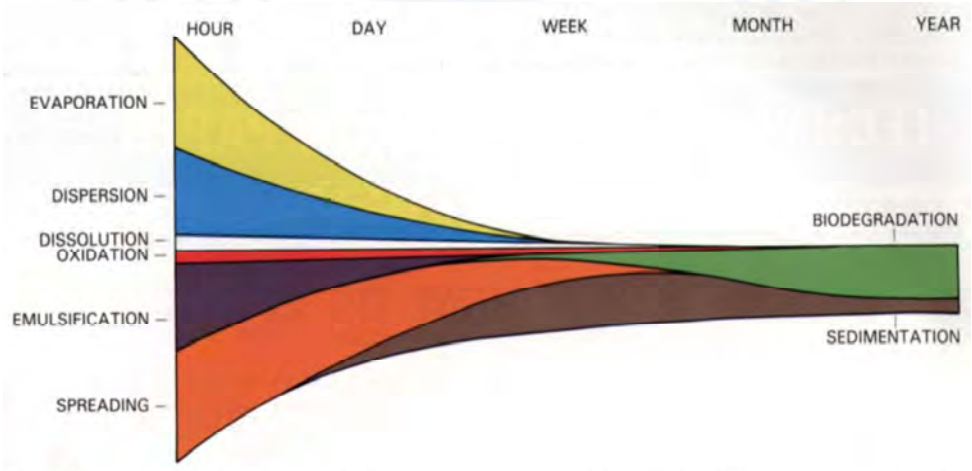


Fig.2.2 shows schematic diagram of weathering processes with time.

2.10 Appearance and Thickness of Oil Slick

Depending on the properties of the spilled oil, the thickness of oil slick can range from a tenth of a micron to hundreds of microns. The colour of oil film post spreading is a good measure of quantity of oil that may be contained within the slick.

- When direct light from the sun contacts a very thin oil film (<0.1 micron; µm), much of the light is reflected back to the observer as grey or silver sheen.
- If the film is thicker (perhaps 0.1 to 3 µm), the light passes through the film and is reflected off the oil-water interface and back to the viewer. The observer will then see a film that can range from rainbow to darker-colored sheens.
- For very thick films (> 3 µm), the light is absorbed and the slick appears dark coloured (i.e., black or brown) to the observer. However, the viewer can no longer determine film thickness based on colour. If the slick is dark-coloured, the observer cannot tell whether the film is 3 µm or 100 µm thick.

In order to quantify oil thickness, the following thumb rules are used:

Table.2.5: Appearance and Thickness of Slick

Appearance	Thickness
Silver Sheen	0.0001mm
Rainbow sheen	0.003 mm
Light brown/ Black slick	0.1 mm
Dark brown/ Black slick	> 1 mm

To determine an approximate quantity of spilled oil in the event of a spill, the following formula is used:

V = L x W x T /100

Where, L = Length of slick (in metres)

W = Width of slick (in metres)

T = Thickness of slick (in mm)

V = Volume of spilled oil (in cubic metres)

2.11 Development of oil spill scenarios including worst case spill

2.11.1 Spill Size

In the present study, series of scenarios considered based on operational activities, a worst-case scenario and logarithmic multiple to up to 25000 tons (instantaneous) and 550 m3 (continuous) has been considered for the model study.

Simulations were made for the following scenarios at Adani Mundra region:

Table.2.6 Details of Oil Spill Scenarios

Comp. Runs	Spill Location	WD (m)	Spill Qty	Type of oil	Spill Location Co-ordinates
A	**SPMs**				
1	SPM-HMEL (S1)	29.50	700 tons	Crude	69° 37' 23.19" E, 22° 40' 59.06" N
2			10000 tons	Crude	
3			25000 tons	Crude	
4			10000 m^3/h for 60 sec	Crude	
5	SPM-IOCL (S2)	28.45	700 tons	Crude	69° 39' 14.05" E, 22° 40' 47.21" N
6			10000 tons	Crude	
7			25000 tons	Crude	
8			10000 m^3/h for 1 min	Crude	
B	**VLCC Jetty**				
9	Spill Location (S15)	15.71	700 tons	Crude	69° 40.78' E, 22° 43.6' N
10			10000 tons	Crude	
11			25000 tons	Crude	
12			10000 m3/hr for 1 min	Crude	
C	**Pipeline**				
13	Crude oil spill of 2611 tons at the pumping rate of 12500 m3/hr for 60 sec (2611 Tons of crude for 36 hrs) along the pipeline corridor at a select (midway) point of subsea pipeline in the pipeline routes. -- Spill point: (**S3)**	21.20	12500 m3/hr for 3hr	Crude	69° 39' 43.35" E, 22° 42' 36.39" N
D	**Tanker Route**				
14	Instantaneous crude oil spill of 25000t along the tanker route at select location. Spill point: S4	22.54	25000 tons	Crude	69°32'11.38" E, 22°36'1.13" N
E	**West Basin (berths)**				

15	100 tons (due to Berthing incident/ collision) at the West Basin berths (FO) Spill point: **S5**	14.61	100 tons	FO	69°34'13.99'' E, 22°45'15.54" N
16	50 Tons (due to Berthing incident/ collision (diesel oil tanks) at the West Basin berths (HSD) Spill point: **S5**		50 tons	HSD	69°34'13.99'' E, 22°45'15.54" N
17	700 Tons due to Hull Failure / Fire / Explosion (FO) at the berths -- Spill point: **S5**		700 tons	FO	69°34'13.99'' E, 22°45'15.54" N
18 & 19	In the maneuvering basin: ○ 20 Tons of HSD oil due to Tug Impact (HSD) ○ 100 Tons of FO due to Tug Impact Spill point: **S6**	14.48	20 Tons 100 Tons	HSD FO	69°34'22.75'' E, 22°45'5.33" N
20	Along the vessel route at one location: Instantaneous oil spill of 700t along the tanker route at a select location. (FO): Spill point: **S7**	17.08	700 tons	FO	69°33'40.66'' E, 22°43'36.31" N
F	**LNG berth**				
21	100 tons (due to Berthing incident/ collision) at the LNG berth (FO) -- Spill point: S8	13.76	100 tons	FO	69°33'40.66'' E, 22°43'36.31" N
22	50 Tons (due to Berthing incident/ collision (diesel oil tanks)) at the LNG berth (HSD) –Spill point: **S8**		50 tons	HSD	69°33'40.66'' E, 22°43'36.31" N
23	700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth-- Spill point: **S8**		700 Tons	FO	69°33'40.66'' E, 22°43'36.31" N
G	**South Basin (berths)**				
24	100 tons (due to Berthing incident/ collision) at the LNG berth (FO) -- Spill point: **S9**		100 Tons	FO	69°39'38.08'' E, 22°43'32.54" N
25	50 Tons (due to Berthing	14	50 Tons	HSD	69°41'3.53'' E, 22°43'50.33" N

	incident/ collision (diesel oil tanks) at the South Basin berths (HSD) – Spill point: S9				
26	700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth -- Spill point: S9		700 Tons	FO	69°41'3.53" E, 22°43'50.33" N
27 & 28	At the turning circle: ○ 20 Tons of HSD oil due to Tug Impact ○ 100 Tons of FO due to Tug Impact Spill point: S10	17	20 Tons 100 Tons	HSD FO	69°41'33.62" E, 22°44'6.49" N
H	**Mundra Port**				
	At the existing MPT1 berth: : Spill Point S11	20.80			69°42'20.45" E, 22°43'32.17" N
29	100 tons (due to Berthing incident/ collision) at the berth (FO) -- Spill point: S11		100 Tons	FO	69°42'20.45" E, 22°43'32.17" N
30	50 Tons (due to Berthing incident/ collision (diesel oil tanks)) at the berth (HSD) – Spill point: S11		50 Tons	HSD	69°42'20.45" E, 22°43'32.17" N
31	700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth: Spill point S11		700 Tons	FO	69°42'20.45" E, 22°43'32.17" N
I	**MICT / AMCT Berths:**				
	At the existing MICT / AMCT Berths: : Spill point S12	15.12			69°42'56.30" E, 22°44'36.69" N
32	100 tons (due to Berthing incident/ collision) at the (FO) - Spill point S12		100 Tons	FO	69°42'56.30" E, 22°44'36.69" N
33	700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth - Spill point S12		700 Tons	FO	69°42'56.30" E, 22°44'36.69" N

Results of scenario:

Hydrodyn-OILSOFT is a dedicated software for oil spill trajectory modeling. This software is used for the prediction of oil spill scenarios in the Mundra region for various meteorological and hydrological conditions.

Knowledge of probable movement of an oil slick gives a distinct advantage while planning response strategies. Thus, for instance, no major clean-up operation is necessary if the modeling results indicate that the spilled oil would remain at sea thereby sparing the shore ecology. On the contrary, if modeling results are suggestive of shoreward drift and predict that particular ecologically sensitive or important areas would be hit, effective counter measures such as deployment of deflection booms, containment and recovery of oil etc. can be effectively taken.
The results of various numerical runs are discussed in the following sections. The detailed results of the simulations are available in the tabular form in the oil spill risk analysis (**PART-B of the OSCP**).

During the year representative spill locations in Adani Mundra would move towards coastal areas during all seasons depending on the spill residence time as delineated in **Part-B of the OSCP**.

The behavior of slick movement is more or less similar in various scenarios irrespective of quantities of oil spilled. The area of oil spread differs depending on the source quantities. The details of spill losses during its movement and time taken to reach the coast boundaries from all locations have been discussed in **Part-B of the OSCP**.

2.12 Environmental sensitivity index mapping

The mapping of the sensitivity of the environment to accidental oil pollution is an essential step in oil pollution preparedness, response and coordination efforts. 'Sensitivity' relates to the efforts of accidental marine pollution involving hydrocarbons. Sensitivity mapping has been prepared which provides a basis for the definition of priorities for protection and clean-up to the On-scene commander, on-site responders and information to plan the best suited response strategy to the decision makers. Sensitivity mapping has been used to support the development of the response strategy for oil spill contingency plan. Elements which have been considered sensitive to oil spill are: protected areas, important areas for biodiversity, sensitive ecosystems, critical habitats, endangered species, and key natural resources.

Sensitivity maps prepared has covered the areas of coast at risk of spillage originating from the facilities and provide information about the various types of environments that may be affected by a spill (sand beached, rocky coast, marshes, etc.) for which the clean-up equipment should be suited. Sensitivity maps prepared also included the mapping of coastal, sub-tidal habitats and information on the potential impact of dispersed oil in the water column so as to support the decision on the use of oil spill dispersant.

The shorelines are of the high priority areas for protection because they are difficult to clean once the spill washed to shore. According to the sensitivity and importance of the shoreline, the following order of priority is set in shoreline cleaning:

- Marshes and mangroves.
- Coral reef flats which are exposed at low tide.
- Raised fossil reefs with undercuts which allow the floating oil to penetrate boulder and Cobble beaches.
- Pebble and cobble beaches.
- Beaches of mixtures of sand, pebbles and cobbles.
- Exposed beach rock.
- Port harbour/Jetty/Berth

The details of the environmental sensitivity map including ecologically sensitive areas and economic resources for the APSEZL, Mundra have been provided as Part-C of the OSCP.

2.13 Environmental resources, priorities for protection

Amenity areas, economically important tourist and recreation facilities, bathing beaches, ecologically sensitive areas, industrial or drinking water intakes, fisheries, Marine culture, sea birds, marine mammals and other resources likely to be threatened shall be identified. In most of the oil spill incident, it may not be possible to prevent some oil coming ashore, and in some circumstances, it might be advantageous to deflect the oil to a another less important chosen place onshore. It is therefore necessary to decide in advance which areas are to be given priority for protection. Before making such decisions, a wide variety of interested parties should be consulted.

The environmental sensitivity with key ecologically sensitive areas and economic infrastructures Mundra surrounding areas are

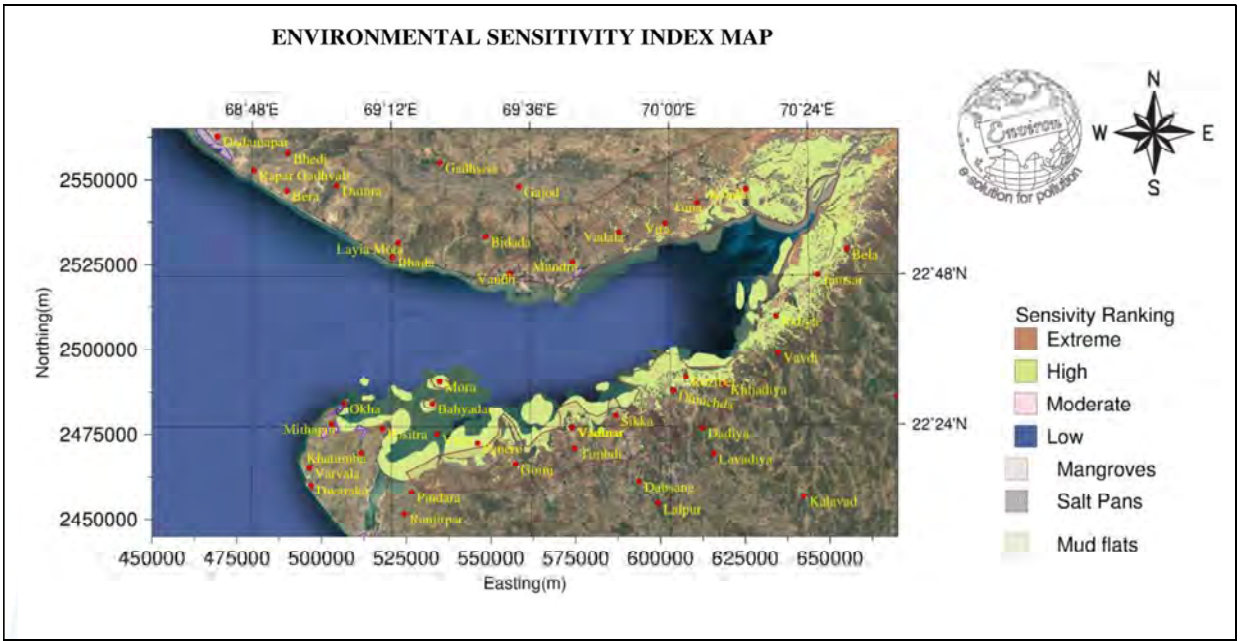


Fig 2.3: Sensitive areas along the block

It is endowed with a great diversity of natural ecosystems, of which the major systems are salt pans, intertidal zones, sand dunes, mangroves, creeks and Open Ocean. The biological sensitive resources are discussed in detail below.

Biological Resources

Various Biological resources are discussed in Part-C (Sensitivity Mapping Studies) of the report which are sensitive to oil spills. As per the IMO standards, each species indicated with symbol and color. Species that are especially vulnerable to the effects of oil spills are Bird, Fish, and Marine Mammal. The Biological resources, which are vulnerable to the effects of oil spills are categories are then further divided by grouping species together by similar taxonomy, morphology, life history, and/or sensitivity to spilled oil.

When a biological resource exists in a small area (such as a bird nesting site), it is indicated by a symbol. When a biological resource encompasses a larger area, it is represented by a polygon with a specific pattern and color.

The information of all categories of biological resources is displayed on shoreline sensitivity maps are placed at Annexure-2 of Part-C of the report.

Industrial Resources

Various industrial resources i.e. Intake, outfalls, Port /Jetty, salt pans that are vulnerable to oil spills is discussed in Part-C of the report and also shown in Annexure-2. They are indicated by a

symbol with specific pattern and color.

Human Use Resources

Human-use resources that may be either negatively impacted by an oil spills or used as access points for oil spill cleanup are typically marked with a symbol. Most human-use features (such as public beaches and aquaculture facilities) exist in a small area and are represented by human – use point symbols. Larger areas such as parks, preserves, protected areas, and wildlife refuges are shown as polygons.

The area from Okha to Kandla is marked by number of creeks, mangrove vegetation, Mudflats, salt pans, APSEZL installations and number of landing points etc. The coastline from Positra to Bedi stretching south into Gulf of Kutch is highly developed in terms of manmade structures and has large extends of mudflats with mangrove vegetation and marine sensitive areas. The further stretch up to Navalakki is the hub of commercial activity and includes Adani, Kandla Port Installations.

All categories of sensitive zones along the coastal areas of APSEZL region as well as creeks are displayed on ESI maps which are to be protected and placed at Annexure-2 of Part-C of the report.

2.14 NET ENVIRONMENTAL BENEFIT ANALYSIS (NEBA)

The objective of a NEBA is to consider all available response options for an oil spill and select those techniques that will provide the best opportunities to minimize consequences for the environment. This section of the report provides an overview of the approach used to prepare the NEBA in support of oil spill response planning for Adani Ports and SEZ Limited, Mundra. The analysis is largely based on information discussed in **Oil spill Modeling Studies (Part-B of the OSCP)** and **Marine Sensitivity Area Mapping** (**Part-C of OSCP**).

This qualitative, NEBA analysis was conducted for oil spill contingency planning purposes, and is dependent upon a variety of input sources. It is intended to address the overall risk for the oil spills. Because it is intended to be a broad analysis of a large-scale event, there is no specific season or trajectory analysis that will account for every possible spill scenario. However, it should represent likely exposure risks and levels of concern.

To conduct this study, the following important factors were considered and/or employed:

- The comprehensive trajectory modeling using state-of-the-art models and including oil spill scenario carried out (**PART-B** of the project report)

- Risk matrix which has been prepared based numerous other studies;
- Design of a scenario representing a high-volume discharge incident for this area; and
- Use of the above assumptions that were conservative and evaluated maximum extent of the impact.

Recommendations Concerning Response Options

All of the response options evaluated offer the potential for a net improvement over natural attenuation, and none have material adverse consequences. All of them should be discussed and considered when developing an oil spill response plan. It is always assumed that a combination of response techniques will be used, as appropriate, to minimize oil exposure to sensitive resources and to promote rapid recovery of the ecosystem as a whole. The OSRP provides information on the integration and activation of multiple response options for this Project Area.

However, the response options vary greatly in their potential effectiveness in association with a large-scale scenario, as summarized below (from least to most beneficial):

- **On-water In-situ Burning (ISB) –** This response option is severely restricted by seasonal day length, year-round weather conditions and strong tidal currents and large tidal ranges, most of spill trajectories reached the coast before proper weathering and logistical constraints. As a result, it is unlikely to offer substantial Net Environmental benefits.
- **On-water mechanical recovery –** On-water mechanical recovery resources are generally easier to obtain and deploy in larger numbers. The option is viable for open waters in the Mundra Port region. This option is effective for smaller, confined spills, the estimated oil recovery for large-volume scenarios is generally associated with low ecological benefit.
- **Shoreline protection and recovery –** As a result of the high probability of shoreline contact indicated in trajectory spill modeling studies (**PART-B**), this response option will have more overall effect, except in the cases where spills are moving away from the shore. The deployment of shore line protection and recovery gears are quite difficult due to the fact that the existence of very strong tidal currents as well as large tidal ranges and most of the coastal zonal areas the west coast are inaccessible by road. Due to the above reasons, this is not showing much Net benefit over Natural attenuation.
- **Dispersant application –** This response option was shown to be effective in substantially reducing surface oil in treated areas. While it can be very effective in treating fresh oil, surface oil reduction is predicted to be 40-60% in the first 4 days of the spill. Crude oil concentrations in the upper 10 to 20 m of the water column would increase in treated areas for a very short period, but would rapidly dilute and therefore not pose a

long-term risk to the ecosystem. Quick application of dispersants within an hour is highly recommended offering Net environmental Benefit to the Higher Deg

3. EQUIPMENT, SUPPLIES AND SERVICES

There are a number of techniques to remove the oil floating on the sea. The spill combating equipment's should be selected in relation to the assessment of the risk of spills and to the defense of agreed priorities for protection. The equipment must be chosen for the anticipated range of weather conditions and oil types. Various equipment's used are: use of booms, skimmers, absorbents, dispersants/bioremediates and burning. NEBA Studies has been carried out based on Adani Ports and SEZ Limited, Mundra facilities, coastal geo-information and port operational conditions. Recommended multiple response methods i.e Mechanical equipment or dispersants /bioremediates based on NEBA studies, put into use in case of oil spill.

3.1 Equipment and Supplies

The response equipment required for mounting an operation consists of equipment for offshore and shoreline operations and could include following spill equipment's

Offshore & shoreline Equipment's

- Booms, Skimmers, Absorbents, boats / tugs / response vessel
- Protective clothing for everybody (including boots and gloves), spare clothing.
- Cleaning material, rags, soap, detergents, 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.

Other special equipment which may be used are:

- Workboats
- Trucks / cars (four-wheel drive)
- Radio transmitter / receivers
- Workshop / repair facilities
- Bulldozers, mechanical scrapers and similar earthmoving
- Equipment

- Vacuum trucks
- Tank trailers
- Life vests
- Explosive meters

The response operations carried out for both offshore and onshore as discussed below.

3.2 Offshore Operations:

The minimum oil spill equipment required for response in terms of containment, recovery and disposal will be maintained at Adani Ports and SEZ Limited at Mundra and onboard the tugs fitted with fire contain remote controlled fire monitors. The equipment maintained at marine control room will be the first to be deployed for containment and would be augmented by movement of additional equipment as required by the situation. The details of total equipment required for response operations as follows.

Sr. No	ITEM	QTY	CAPACITY
1	Inflatable boom for Fast Response	2000 m	
2	Weir Type Skimmer	2	50m3/hr
3	Multi Skimmer	2	50 m3/hr
4	Vacuum Skimmer	2	30 m3/hr
5	Floating storage tank	2	10 m3
6	Oil spill Applicator with spray arms type with 2 nozzles	1	
7	Bio Remediation (lit)	2000L	
8	Dispersants-type-III	3000L	
9	Personnel Protective Kit	30	
10	Oil Absorbent Kit	2	

The list of equipment available with Adani Ports and SEZ Limited, Mundra is given in Data directory

3.3 Shoreline operations

Shoreline operations will be undertaken by local civil administrative as per their contingency Plan. Taking into account the spill movement and area sensitivity, the Equipment will be mobilized along with manpower to the site by the local administrative authority. The procedures laid down in Operations Manual will be available for reference to clean up teams along with expertise held with responders. The details of spill equipment for shore cleanup are as follows.

Sr. No	ITEM	QTY	CAPACITY
1	Shoreline Cleanup Equipment's Mini Vacuum pumps capacity (25 m3)	2	
2	Floating storage tank (10T)	2	
3	Absorbent (oil only) 80 L Kit for quick oil spill response	1	
4	Sorbent pads 20-inch x 20 inch (nos)	500	
5	Sorbent Boom size min 5inch dia, min length 5 feet	250	

Based on the oil spill modeling study, it has been observed that an oil spills at berth locations / SPM / tanker route will reach the coast within hours (Part-B: Report). Accordingly, the resources required for Tier-1 response plan are estimated as below:

3.4 Additional equipment and response

While, the equipment held with response team will be available for initial and first response, the additional requirements would be met from equipment held by participating companies being addressed by this Plan. As per the NOS-DCP18 (Appendix-17), the ports are under Category-A as per the risk Category, hence, additional equipment's are to be procured listed in Appendix-16 for compliance with NOSDCP.

In the event of a decision being taken by the team managing the spill, the equipment held with the participating units will be made available to response teams. The details of equipment held at different locations are placed as follows.

Additional equipment and location

LIST OF RESOURCES AVAILABLE-ADANI PORTS and SEZ LIMITED, MUNDRA						
Tugs Available for Oil Spill Containment						
Name of Tug	**Type**	**BHP**	**OSD**	**AFFF**	**Capacity (cum/Hr)**	**BP**
Dolphin No. 4	ASD	2200 X 2	3000 ltr	2000 ltr	1200	55
Dolphin No. 7	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
Bitarni	ASD	2000 x 2	3000 ltr	2000 ltr	1200	65
Khushboo	Fixed screw	401 X 2	-	-	-	10
Dolphin No. 4, 7, 11, 14, 15, 16, 17, 18, Brahmini and Bitarni 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. All above ten Tugs have class notation as Harbour Tugs and are certified to work within						

the Harbour limits only.

2. Reception Facility: 12" pipe line, connected to a slop tank at chemical tank farm.

Dolphin 11 has firefighting system of 1200 m3/hr along with 20 ton lifting "A" frame and diving support facility.

Location of Oil Spill Equipment: The Oil Spill Equipment stored in SPM Store.

RESOURCES/EQUIPMENTS WITH AVAILABLE APSEZL, MUNDRA

Item	quantity
Canadine fence boom (reel model 7296/8496 with power pack,towing bridles and tow lines-235 meter)	1 no
Power pack with boom reel with hydraulic hoses	2no
Power pack-20kv with boom reel with hydraulic hoses	2no
Lamor side collector system (recovery capacity 123 m^3 /hr (side collector LSC-3C/2300(01C02-P536). Oil transfer pump OT A 50 with oil transfer hose set	2no 2sets
Lamor minimax 12m3 skimmer	2sets
Power pack for skimmers with hydraulic hoses	4no
Power pack -20 KV for skimmers with hydraulic hoses	1no
Floating tank(25m3)	1no
Foot pumps for floating tank	6no
Oil spill dispersants	5000ltr
Portable dispersant storage tank: 1000 ltr capacity	1no
Portable pumps	2no
Two -way hydraulic maneuvering panel	2no
Oil containment boom -length 2000 meters, height-1500 mm, draft-900mm, free board-600mm	2000 mtr
Current buster room -fasflo-75 (for response in fast current)	2no
Skimmer -KOMARA 15 duplex skimmer system with floating IMP 6 PUMP	4no
12.5T flexible floating storage tank (PUA).	3no
Diesel driven transfer pump for flex barge	2no
Site hose kit for the transfer pump for flex barge	2no
3" and 2" hose adaptor for transfer pump and hose	2no
Shoreline cleanup equipment	
Mini vac system	5no
OSD applicator =oil dispersant spry unit (20 ltr) for use on beach and inter tidal zones	2no
Startank with capacity 1000 liter(10m3)	2no
Sorbent boom pack (12.5cm*4m)	500 mtr
Sorbent pad	2000 nos

Facilities in the marine control room

1. Tidal stream guage: this can accurately read the prevalent rate of flow and direction of current.
2. Tide guage: for accurately calculating the height of tide at any given time.
3. Wind guage: for direction and speed of wind
4. VHF sets (fixed and portable) with complete range of marine frequencies to be used for field operations.

In the event of an ongoing spill or a spill that requires declaring of Tier 2 or 3 responses, the additional equipment and manpower held with any other OSRO or facility will be sourced in an accelerating manner including resourcing from the National / international spill handling companies. Contact details of companies holding equipment in India and International OSROs are listed below.

LIST OF ADDITIONAL RESOURCES AND INTERNATIONAL OSROs

1. **Australian Marine Oil Spill Centre**
   PO Box 305
   Victoria 3214
   Australia
   Tel + 61 3 5272 1555 Fax + 61 3 5272 1839
   Mail: amose@amosc.com.au
   Web: http://www.aip.com.au

2. **Fast Oil Spill Team**
   C/o PIM 40 G 23 Tour Elf
   92078 Paris- La Defense Cedex France
   Tel: + 33 1 4744 5636 Fax : + 33 1 4744 2677
   Mail : giefost@club-internet.fr

3. **Oil Spill Response Ltd**
   Oil Spill Services Centre
   Lower William Street Northam
   Southampton SOI 1 QE, UK
   Tel: + 44 1703 331 551 Fax: + 44 1703 331 972
   Mail: osrl@osrl.co.uk
   Web: http://www.oilsillresponse.com

4. **Petroleum association of Japan**
   Oil Spill response Department
   Keidanren Building
   9-4, 1 – Chome, Ohtemachi
   Chiyoda- Ku,
   Tokyo 100, Japan
   Tel: + 81 3 3279 3819 Fax: + 81 3 3242 5688
   Mail: mail@pcs.gr.ip
   Web : http://www.pcs.gr.ip

3.5 Inspection, maintenances, and Testing

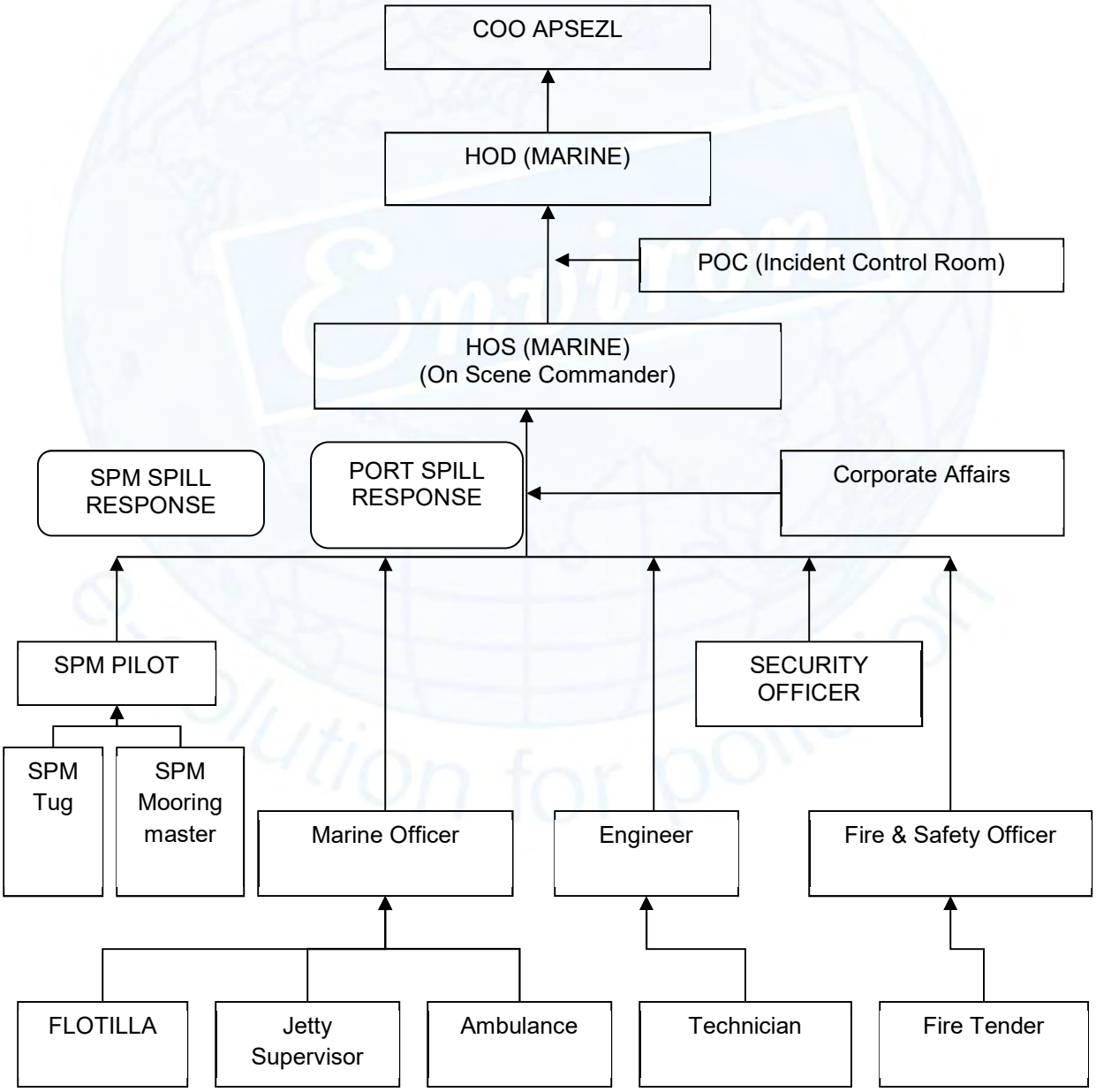
The oil spill response equipment will be maintained in highest state of operational readiness. This is achieved through a planned maintenance, inspection and testing program. A record of inspection, maintenance and test will be maintained.

The response team will be responsible for regular testing and mock drills. All personal assigned with the task of operation of this equipment are adequately trained and their level of competency will be maintained by conducting regular exercises.

Hands on training to personnel will be given by actually deploying the equipment and checking their effectiveness. Similarly, crew of support vessels will also be kept trained by regular, periodic training and exercises.

4. OIL SPILL MANAGEMENT

Management of the oil spill response operations will be undertaken by a Spill Management Team involving personnel and having various levels of responsibilities in their exiting operational areas. The Organization Chart for Oil Spill Response is giving below.



4.1 Crisis Management Team (CMT) / Chief Operating Officer (COO)

CMT is the primary unit for incident management and is composed of senior manager from various departments for providing advice and resources and take on the spot decision to meet any immediate requirements arising during the response operation.

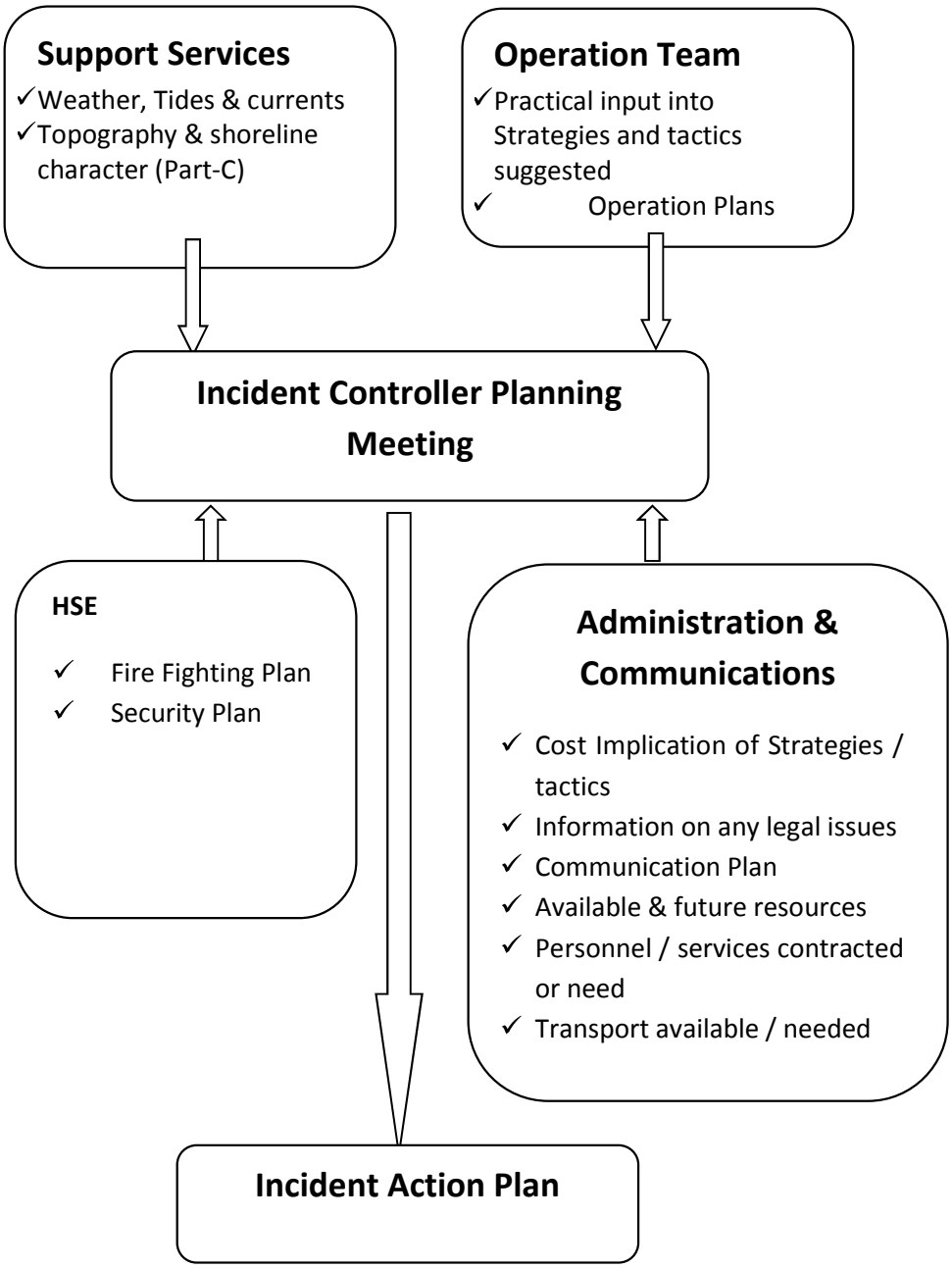
The major functions that would need to be carried out by CMT to discharge the Plan are as per table 4.1

Table.4.1: Major functions of Crises Management Team

Field operations	✓ Initiation, Control of Operations and response activity
	✓ Emergency Control room functions
	✓ Implementing tired response and disposal
	✓ Shoreline cleaning (when initiated through this CP)
	✓ Planning and strategy
Admin and logistics	✓ Victuals
	✓ Transport
	✓ Additional manpower and equipment
	✓ Security
Technical matters	✓ Cargo ops, availability of response items, repairs
Liaison	✓ Communication- operational and with other
	✓ Government / non govt. authorities, Media
Legal	✓ Documentation of damages, claims and
	✓ compensation, notifications
Health and safety	✓ Medical assistance

4.2 Incident Organization Chart

CMT is the primary unit for incident management and is composed of senior manager from various departments for providing advice and resources and take on the spot decision to meet any immediate requirements arising during the responses. Organizational chart as follows



4.3 Financial Authorities

The financial Authorities of APSEZL, Mundra is as per the existing organization structure. At the time of the crises, the need of the hour will be understood and requirements of OSC / ERT will be met at a faster rate than normal. Since all head of Department (HODs / HOS marine) would be available, immediate on the spot approval will be accorded.

4.4 Functional Designations

Following functional designations stand identified and notified through the Plan, to give effect to this Plan:

i. Chief Operating Officer APSEZL Mundra
ii. Incident Control Officer (HOS – Marine / Duty Port Captain)
iii. Site Emergency Coordinator (Senior Pilot and Radio Officer)
iv. Fire Coordinator (HOS – Fire / HOS -Safety)
v. HOS – Security / Duty Security officer
vi. Medical Superintendent
vii. Marine Pollution Coordinator – Manager (Marine /Pollution Control)
viii. Traffic Coordinator - Duty Port Captain
ix. Communications Officer (Duty Port Captain / Duty Radio Officer)
x. Chief Emergency Controller (Head -HSE)
xi. Civil Coordinator (HOS – Environment Cell / HOS Estate)
xii. Marine Engineering Coordinator (HOS – SPM / Diving Team in-Charge)
xiii. HOD – Corporate Affairs
xiv. HOS-Legal & HOD Estate

4.5 Manpower availability (on-site, on-call)

As per the policy of port, the marine department would be providing required man power for all the OSR activities. However, various departments providing assistance of water craft, vehicles, cranes etc. for movement of men and material: would provide necessary manpower and their departments, as required, so as to continue the OSR operations uninterrupted.

4.5.1 A float Operations and Response Team/ Teams

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, should be 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.

Roles & Responsibilities of key persons

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 Defense, 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/firefighting/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 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 onsite and off-site personal protection, safety and accountability
- Monitor that causalities 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

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 firefighting 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 center 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.
- 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 Radio 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)

- Organize the tugs for combating the pollution
- Start the rigging of pollution combating equipment on tugs/launches
- Hire additional crafts if required

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)

The functions of response team can be assigned to an identified and qualified OSRO also. In such an event of nomination, all functions with respect to response team and On Scene Co-coordinator will be carried out by the OSRO or OSRO representative, while, CMT and CIC will continue to function hitherto.

Response resources like equipment to be deployed having been identified in terms of quantity and location, additional resources like Spill Response Vessel (SRV) and work boat etc along with responders would be as per identification and notification by CMT leader. In the event of an OSRO being assigned the responsibility to provide resources, OSRO will have to mobilize the different units.

4.6 Availability of additional manpower

The response team is to comprise of a Manager, Specialists, responders, response workers apart from the crew of the vessel or work boat assigned to response duties. The team and additional resource composition are

(i) Incident Manager / OSRO Manager
(ii) OSC- Incident Controller/On Scene Coordinator
(iii) SR Vessel and Captain
(v) Responders
(v) Vessel crew
(vi) Work boat, master and crew

Additional responders or additional teams could be assembled during response ops as the requirement demands.

4.7 Advisors and experts – Spill Response, Wildlife, and Marine Environment:

Advices as felt necessary is to be sought from the commanding officer, ICG, Jamnagar, who look after such affairs related to oil spill response of Gujarat State Commander Coast Guard Region, Jamnagar may be approached in case, any need arises or as directed by CO, ICG

Advice on wild life and marine environment is provided Ministry Environment and Forest and Gujarat State Government Department

In Case, it is felt that private consultant / advisor opinion is required, Clean Sea Enterprise at Mumbai may be contacted in consultation with the component authority

4.8 Training / Safety schedules and drill / exercise programmed

4.8.1 Training:

Adani Ports and SEZ Limited, Mundra personnel, who have a role / responsibility for oil spill response and emergency management, shall undergo training appropriate to their role / responsibilities

Adani Ports and SEZ Limited, Mundra will ensure that their emergency response personnel, who are required to operate oil spill equipment, undergo training for effective deployment of equipment and devices.

Masters of Tugs and Adani Ports and SEZ Limited, Mundra Vessels are to ensure that their crews are fully trained in department of equipment and devices held on board.

4.8.2 Drill / exercise program

The purpose of exercises and drills is to test the knowledge of persons and members associated with response activity and maintain them in the highest state of readiness and professional competence. The exercises would aim to assess acquaintance of response teams with operation ability and initiation of Plan and also the knowledge of operational parameters.

For this purpose, it is required to conduct both in house training and evaluation exercises and also multi agency co-ordination exercises.

In addition to classroom training, the responders would need to go through regular internal and external exercises that would include deployment of equipment to demonstrate level of proficiency. With respect to management of operations in consonance with the plan, it is desirable to conduct real time CP exercises with all industrial stack holders involved. Such an exercise conducted at a large magnitude would need to incorporate the staff from Adani Ports and SEZ Limited, Mundra Participating Companies and the Indian Coast Guard and scheduled as mutually agreed.
The purpose of exercises and drills would be to check the following:

1. **Organizational and Planning**

   a. Knowledge of Contingency Plan and Procedures

   b. Personnel Notifications and Staff Mobilization

c. Ability to operate as per CP and Operations Manual

2. Operational Response

a. Oil spill assessment
b. Response equipment selection
c. Containment strategies
d. Spilled oil recovery techniques
e. Disposal of recovered oily water and contaminated material

3. Response Support

a. Communications
b. Logistics
c. Personnel support
d. Documentation

Types of exercise

Exercise requirement as per contract is to conduct internal and external exercise. In addition to classroom training exercise are include deployment of equipment to demonstrate satisfactory of proficiency. External exercises are to incorporate with the staff from Adani Ports and SEZ Limited, Mundra, participating companies and the Indian Coast Guard.

Type: A: Internal exercises lasting approx. one day for ensuring OSR readiness of all equipment, services and personnel.

Type B: Emergency response exercise (Tier-1) is to be conducted twice in a year

Type C: This exercise designed to test either specific scenarios or emergency plans includes external participation (i.e. mutual aid, govt. agencies)

5. COMMUNICATION AND CONTROL

5.1 Incident Control Room and Facilities

The core operational team discharging the functions of incident control, administration and management is designated as Crisis Management Team/s (CMT) operating from the identified persons unless the magnitude of operations dictates manning of any particular operation by one operator only. (As far as practicable, both functions should be located at same site.)

Any person who observes a spill or gets an information of a spill or observes a situation that could lead a potential spill, may pass the available information with maximum possible details to any one control centre located in the Port Administrative building.

In the event, the response activity is assigned by the Adani Ports and SEZ Limited to an OSRO, the OSRO will appoint a manager in addition to incident manager to undertake the responsibility of meeting the demands of response teams.

A permanent location is to be designated as Communication and Ops Centre (COC) by the authority responsible for execution of this plan. Both functions are to be manned by different of – port control, control and operations Room, Harbour master, by fastest means available (All incidents of soil whatever magnitude are to be reported to HM by Port Control Room or COC)

Contact Details

Port Control (MMPT Marine Control)	Landline- Adani Ports and SEZ Limited, Mundra	02838-255739
	VHF – Adani Ports and SEZ Limited, Mundra	VHF Channel -77 & 16
COC (MMPT Marine Control)	Landline No	02838-255739
	Mobile	98252 28673
	VHF	VHF Channel -77 & 16
Harbour Master / CIC	Landline – Adani Ports and SEZ Limited, Mundra	02838-277727
	Mobile	6359883102

5.2 Field Communication Equipment

An effective inter-facility communication system among various departments/ agencies will be maintained with Operators. Communication will be established during the port operation in Mumbai and with the Operators.

5.2.1 Equipment

The communication centre is to be provided the following equipment

- VHF - 3 Nos.
- Walkie talkies – as per the number of response teams and functional team leaders
- Telephone (Landline or wireless) – 2 Nos,
- Computer and printer with internet and projector facility

5.2.2 Publications

- Copy of CP and appendixes
- Details of CMT, OSRO organization and their contact details
- Charts of Mundra harbor, Tide Table
- Large scale charts showing layout of POL and cargo berths
- GA plan of a typical oil tanker
- Location map of jetties, berthing and landing facilities available in Mumbai estuary along with facilities available
- Telephone contact directory of all emergency aid and medical services, port offices and local administration authority
- OSRP of Adani Ports, SEZ Limited Mundra and HMEL

5.3 Reports, Manuals, Charts and Incident Logs

The log incident Report from (as per sample below) has been developed to ensure that the basic information required to formulate a response to an Oil Spill Emergency is obtained during the notification (if Required). Port Control / Harbour Master / Communication and Ops Centre will complete the form and dispatch to the concerned authorities by the fastest means. In all cases, the original status report forms will be handed over to ECT, who in turn would maintain the fastest means. In all cases, the original status report forms will be handed over to ECT, whom turns, would maintain record of all such documents.

The personal Log forms and the Continuation Sheets are to be used during the emergency response to record the contacts and actions carried out during the emergency. After "stand-down" the Personal Log Form and the Continuation Sheets, are numbered, signed and handed over to the Harbour Master. All incident logs and records will be maintained.

INCIDENT LOG

INCIDENENT INFORMATION

INCIDENT TITLE (Name of Vessel) ----------

Incident Number (Sq number/ dd /mm/ yyyy)----------

1.DETAILS

Time of recording …… (24 hr format) Date ……..

Day……

Person / Organization reporting incident

Name …….. Designation …….

Contact number ……

2. INCIDENT

Name of VESSEL …… Location ……..…….

Position (if not alongside) Latitude ……

Longitude ……..……

Sounding……..…….

Incident details

Time ……. (Of incident, 24 hrs format) Date ……..

Cause of spill

Type of oil

Estimated quantity of spill

Details of damage to vessel / installation

3. COMMENTS

1. Recorded by

Name ----------

Time ----------

Note: FOUR COPIES OF INFORMATION ARE TO BE RECORDED. RETAINING ONE FOR OFFICE RECORD, THREE COPIES ARE TO BE CIRCULATED ONE EACH TO CHIEF INCIDENT CONTROLER OSC / RESPONDER/ INCIDENT CONTROLER VESSEL MASTER

The personal log form (and continuation sheets) has been developed to allow all personnel involved on the emergency response to maintain a personal log of event. The personal log forms and the continuation sheets are to be used during the oil spill response to record the contacts and activities carried out during such emergency.

Incident Logs are must for logging of all the events taking place. This will help in preparation a comprehensive incident report on a day to day basis as well as on completion of operation.

After the repose work is over, the personnel log form (as per sample below) and the continuation sheet are to be numbered, signed and handed over to the Deputy Conservator.

PERSONAL LOG (ALL MEMBSERS OF SPILL RESPONSE ORGANISATION)

Incident Title ----------Number---------- ----(as per)

_____

Date ----------

Name ----------Designation (as per C P) ----------

Time of Rx / Forwarding Info Activity requested by/ demanded of other Member/s Observations on days operations

Note – Copy of Personal Log is to be handed over to COC daily or as earliest as possible on completion of a schedule

6. INITIAL PROCEDURES

Oil spill being one of the emergencies in the potential list of emergencies in the port operations, the initial activation of emergency plans commences from the site level irrespective of the magnitude of the event. Since not all the emergencies lead to oil spills, the activation of emergency response is oriented towards the required technical and operational mitigation. Adani Ports and SEZ Limited, Mundra Emergency Response Plans at the site, project and port level (Tier-1) takes precedence to the oil spill response plans in the initial events.

The initial actions that will be taken by Adani Ports and SEZ Limited, Mundra in the event of an oil spill will comprise of following procedures, as detailed subsequently:

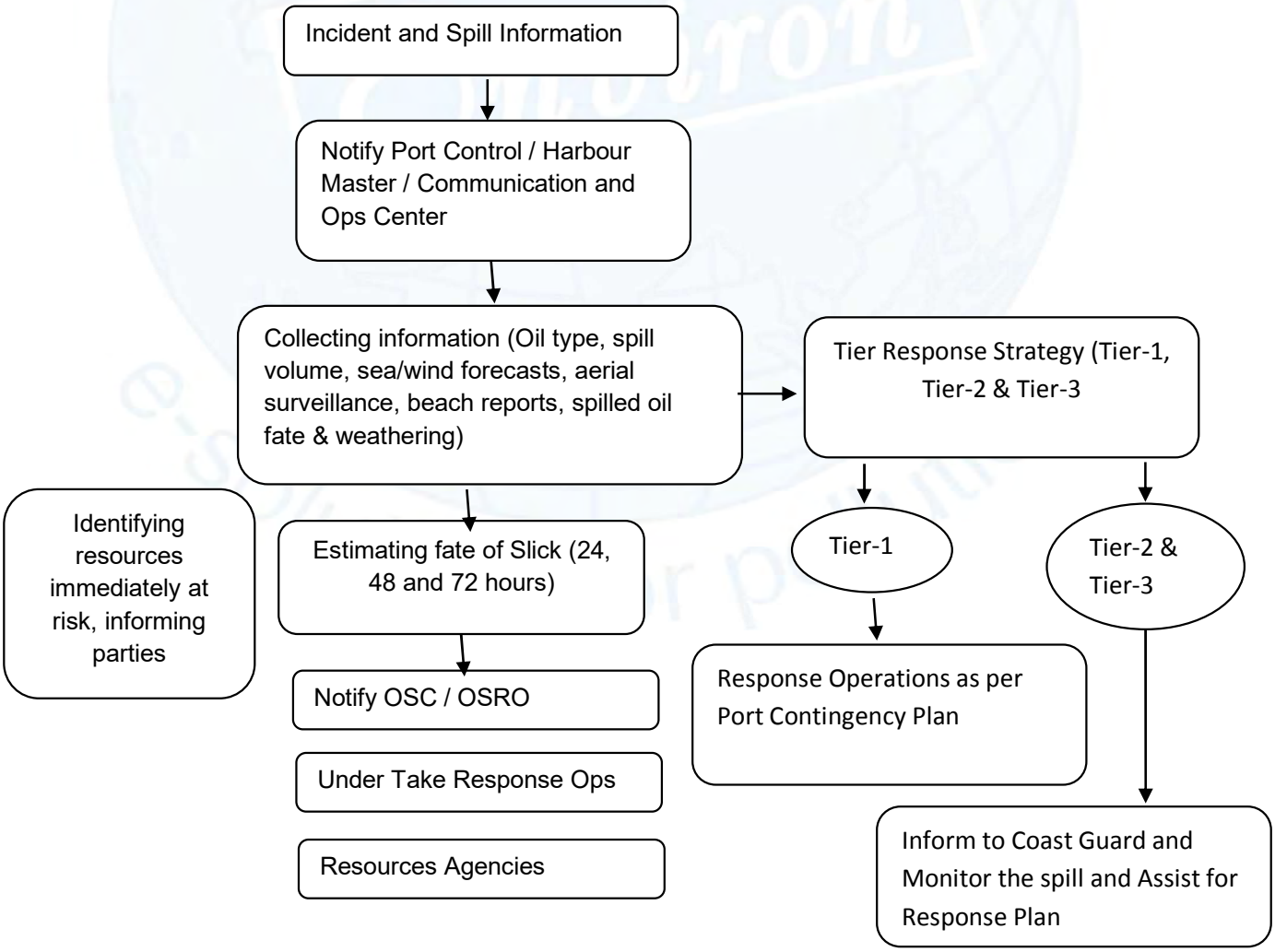


Fig.6.1 Flow chart for Incident and information

6.1 Notification of oil spill to Concerned Authorities

A trigger to activate emergency response can be done by any individual either working in Port Administrative roles or in contractual arrangements based on his initial observations or inferred potential threats in the process or hazards involved in operations. The escalation of emergency from the observer to the Port Control / Harbour master must be fast and unhindered. Following communication channels shall be used by the individuals at the work site to communicate emergency:

- **Shout about the event** – viz., leak, spill, fire, gas release, collapse, fall, etc. depending on the event so as to catch the attention of others in the vicinity.
- **Hand signals:** When there is no other means of communication, hand signals shall be used to convey the above events.
- **Walkie-talkies and other marine communications:** when the individuals have proper communication facilities viz. walkie talkie, VHF or mobile phones, the details of the incident shall be communicated to Port Control / Harbour master.

Once the nature, source & quantity of oil spill is assessed then the following procedure to be followed for notifying the oil spill

1) In the event of an oil spill, the spill observer will alert and notify the Port authorities of the spill. The spill will be reported to the Port Control / Harbour master. Preliminary information on the location of the spill, spill size, oil type, release rates and any injuries will be provided to the Port Control / Harbour master (**Appendix – 10 Prescribed Formats**). The Port Control / Harbour master will thereafter notify the Agent / response Agencies. In case the Port Control / Harbour master is activated, the Crisis Management Team Leader will be notified.
2) A preliminary estimate of the response Tier will be undertaken by the OSC. The OSC will allocate appropriate Tier level using guidelines given in earlier sections. *ECT* will be activated for Tier-1 spills while EMT will be activated for Tier 2/3 spills.
3) The spill event will also be reported to the Adani Ports and SEZ Limited, Mundra Authority, Indian Coast Guard and other relevant authorities by the CMT Leader, in the prescribed formats. The CMT Leader and OSC will also have the responsibility to manage and mobilize external resources. If required, the CMT Leader will liaise with ECT for information and support requests.
4) The OSC will also need to collect information on the oil type and sea/ wind forecasts of the region which will assist in handling the spill. Aerial surveillance will be initiated if required to assess the extent of the spill and record the size and location of the slick. The response team deployed onshore in case of spill reaches the shore will also be instrumental in generating reports

5) The fate and movement of the slick will be estimated as part of the initial response actions. Assessment of oil slick trajectory will be undertaken as per the following:
   a. Obtain information on tides, direction / speed of current and wind.
   b. Using the information on current and wind, predict the trajectory and speed of the spill movement.
   c. Draw the slick on a chart (map) with co-ordinates, showing position and predicted the movement of the oil
   d. Record observations on form provided in **Appendix - log Book Format**.
6) The colour of the oil on water will indicate its thickness. The volume of oil will be calculated based on the area and colour of oil visible from the aerial observation.
7) Once the size and movement of the spill are known, it is possible for the Incident Controller to assess the potential danger to people and nearby installations, and if necessary, to set safety exclusion zones. The predicted movement of the slick is also important for guiding responders to the right locations for clean-up. The Incident Controller must also gather additional key information about the incident from the On-Scene Commander.

6.1.1 Reporting of oil spill incident

In case of reporting of oil spill incidents, the following information is to be provided by the incident observer.

- Location of the spill
- Likely source of the spill
- Area impacted at the time of observation
- General observation of movement of slicks (based on winds and currents)

Upon receipt of such first information report, the same should be forwarded to the CMT leader through the fastest means of communication through the channels defined above. The person intimating about the incident (including near miss) shall not be made responsible for any actions relevant to spill response unless he is a member of the team relevant to the response. Prompt intimation of such incidents and near misses shall be encouraged by Mundra Port as a part of incident reporting and management system. Concerned authorities will be intimated according to the statutory requirements.

6.2 Preliminary Estimate of Response Tier

6.2.1 Preliminary Assessment of the Incident

The OSC along will make a preliminary assessment of the incident by contacting the person reporting the spill. If needed, the OSC may take assistance/ guidance from ICG Coordinator and other Government Agency. The following will be the broad objectives:

- Evaluating the magnitude and impact of the discharge or threat of discharge on the public health, welfare, and the environment
- Determining in which jurisdiction the incident occurred
- Determining or confirming the responsible party
- Determining or confirming the source of the spill
- Assessing the need for state assistance; and
- Assessing the feasibility of removal and determining the equipment needed to remove the oil.

6.2.2 Containment and Control

Clean-up actions must begin as soon as possible to minimize the effect on natural and other resources. These actions shall include locating the source of the discharge and preventing any further spillage, placement of containment boom to control the spread of oil and to protect sensitive areas, measuring and sampling, physical removal of the oil from water and land, the use of chemicals to herd or disperse the oil, and in-situ burning. The official coordinating response to the spill must address many questions, including:

- How large an area will the spill cover?
- How thick will the slick be?
- How fast and in what direction will the slick drift?
- When and where will the oil hit the shoreline?
- What will happen to the oil if it is not removed?
- What is the value and sensitivity of the resources at risk?
- The answers to these questions will determine what response actions are taken.

6.3 Notifying Key Team Members and Authorities

The port authorities such as, HOD-Marine, Fire Officer and other HODs will be informed over phone /Mobile phone, and same be also logged at ECR. Upon confirmation of the incident with Authority reporting spill, inform to CMG and initiate notifications to the CG for all larger spills of more than 700 tons and intimation to international experts for response reediness.

6.4 Manning Control Room – MMPT Marine Control

The Emergency Control Room (ECR) would function with the members of Emergency Control Team (ECT) and they will consist of following:

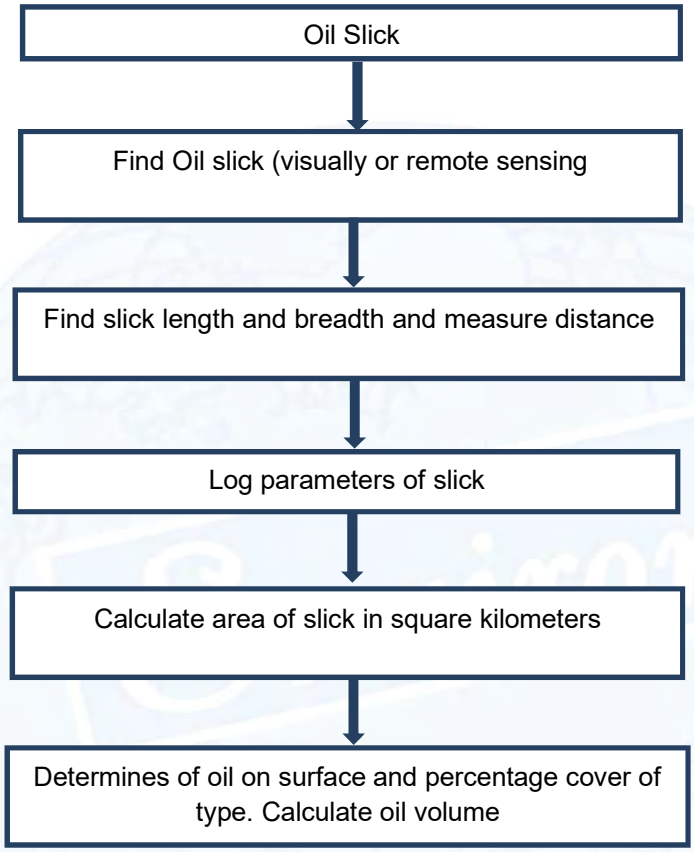
- HOD-Marine Services
- HOS-Marine Services
- SPM In-Charge
- Duty Port Captain
- Security In-charge
- Radio Officer

6.5 Collecting Information (oil type, sea/ wind forecasts, aerial surveillance, beach reports)

In case of oil spill reported, intimate to various department of Port Organization. The department will notify the following information to OSRO / Agencies

i. Marine department will provide all the relevant data i.e. Tide conditions at that time, Tide timings, Current, Wind direction / speed, Weather forecast for 3 days next to that day to ECR. The Vessel movements, Vessel position in harbour, Water crafts availability for pollution response activities. Relevant Navigation Charts and any other important data / information available may also be provided to ECR. Also, number of Security personnel available at that time will be made available.
ii. Security department to provide information regarding availability of type and number of vehicles available for transportation of men and equipment's. Also, number of Casual labors available at that time will be made available.
iii. Fire department to indicate readiness about FIRE CONTINGENCY including OILFIRE and also number of spare Life Jackets available.
iv. ECT is ensure that no individual working/supervising/observing OSR operations/Exercise without life jackets "ON"
v. OSC is to collect following information immediately in case of oil spill

Surveillance and tracking of oil at sea immediately after the spill, carry out the surveillance for assessing the quantity and of spilled oil:



The OSC is to collect the following information immediately in case of oil spill, with the help of Master of the vessel/aircraft.

- Time spill occurred
- Position in Latitude/ Longitude and also with reference to any prominent land mark
- Visual appearance, apparent thickness of oil and extent of area covered
- Percentage cover of various thickness of oil
- Existing weather condition and weather forecast
- Current, tide and wind conditions;
- Immediate availability of support vessels, equipment and man power specifying time factor as well
- Estimate oil spill trajectory and likely area and time of its landfall;
- Volume of each oil type.
- General comments on oil appearance (shape, direction of movement).
- General comments on weather.
- Appearance of oil at sea.

Code	Colour	Oil Type	Thickness	Volume/km^2
1	Silvery	Sheen	0.0001mm	0.1m^3
2	Iridescent	Sheen	0.0003mm	0.3m^3
3	Black/dark brown	Crude/Fuel Oil	0.1mm	100m^3
4	Brown/Orange	Emulsion	1mm	1000m^3

Movement of oil on the sea surface: Oil will move at 100% of the current speed and approximately 3% of the wind speed.

6.6 Estimating fate of Oil Slick(24,48and72hours)

While predicting the movement of the oil spill, state of tide and currents along with prevailing wind must be taken in to account. Schematic diagram of weathering process with time and typical fraction of Crude Oil is shown the following figure.

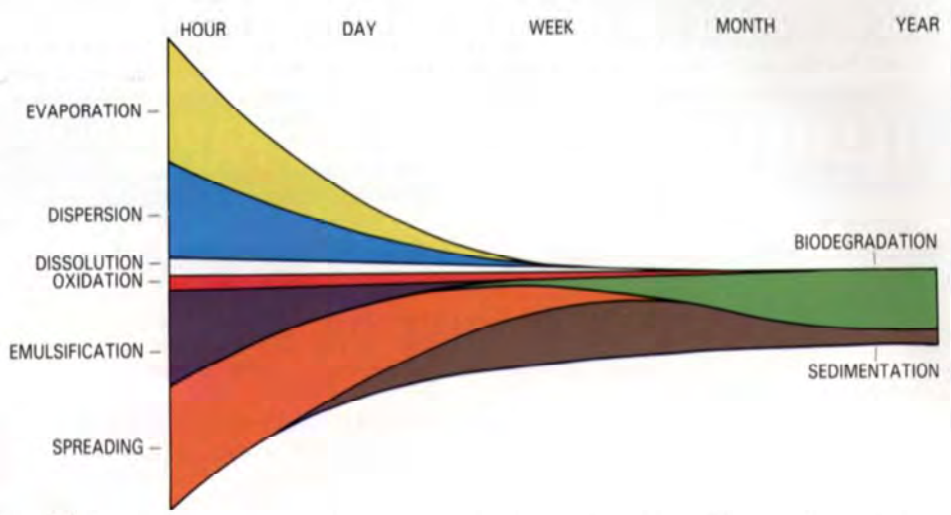


Fig.6.2: Schematic diagram of weathering process with time and typical fraction of Crude Oil

6.7 Identifying Resources Immediately at Risk, Informing Parties

The resources immediately at risk can be mangroves adjacent to the Port area, nearby Port Area. Depending upon the place of spill, the resources at risk will be found out.

Based on initial observations & assessment of oil spill and inputs from oil spill modelling studies, the resources at risk is to be identified by OSC. Relevant stakeholders/ parties to be informed to take appropriate action.

Continuous watch on working frequencies used by ships, port and terminal for POL cargo ops

- Watch on Ch 16 at all times
- Log all information on in respect of an oil spill (with maximum details) received through keeping watch or from any other source
- In case of first receipt of information, pass all the details regarding spill to CMT leader to facilitate complete or partial activation of team or response actions by OSRO
- Pass all information regarding spill to OSRO and duty vessel or Tug assigned response duties
- Remain in constant touch with designated response team leader and response/support vessels as per working channel decided for operations
- Collect weather information on from MET dept on weather conditions in the area including wind direction & speed, tide condition and other weather parameters (all received information is to be logged)
- Provide weather data to operational teams as demanded

6.7.1 Oil Spill Modeling Studies

The fate weathering characteristics of spilled oil is predicted for various hydrological, Meteorological and oceanographical conditions. The details of computational various sceneries are presented in detail (Report-Part-B)

10. DATA DIRECTORY

10.1 MAPS/CHARTS

10.1.1 Coastal facilities, Access roads, Telephones, Hotels, etc.

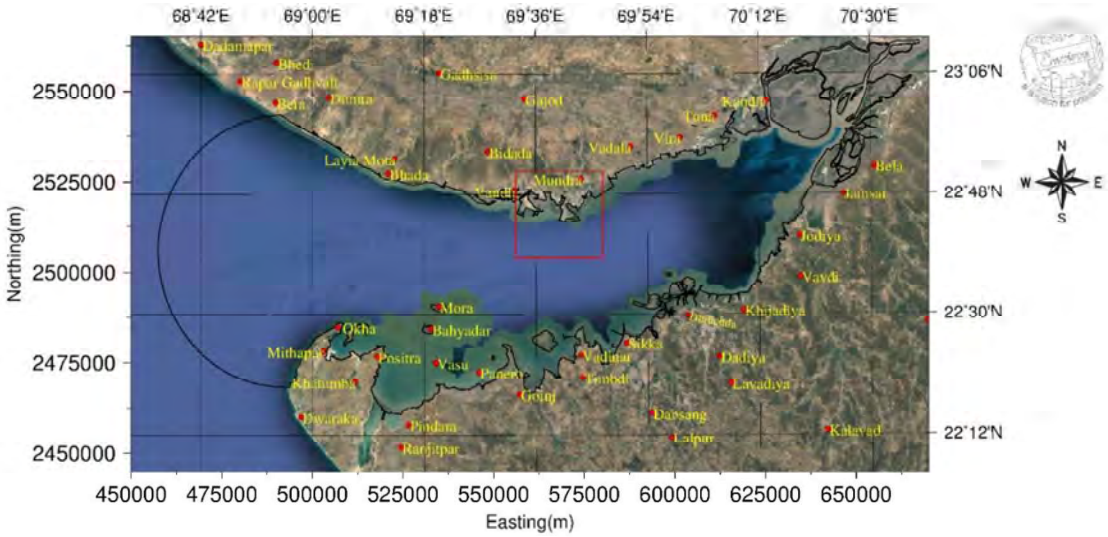


Fig.10.1 Google Map showing Adani Port & SEZ facilities in the Mundra region

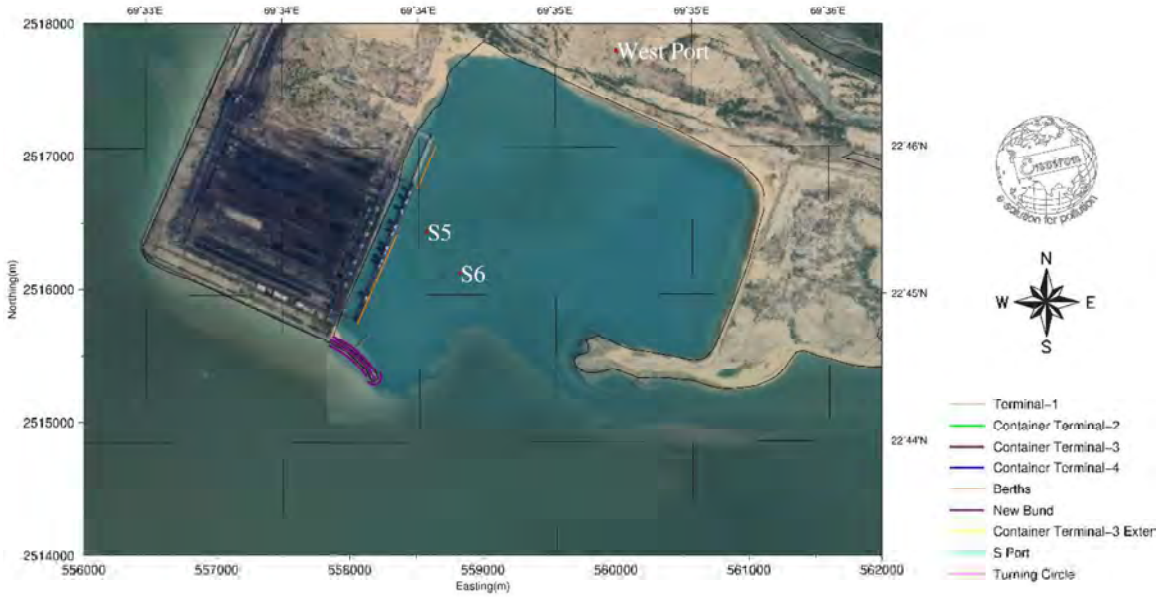


Fig.10.1(a) Google Map showing Adani West Port facilities in the Mundra region

Fig.10.1(b) Google Map showing Adani south Port facilities in the Mundra region

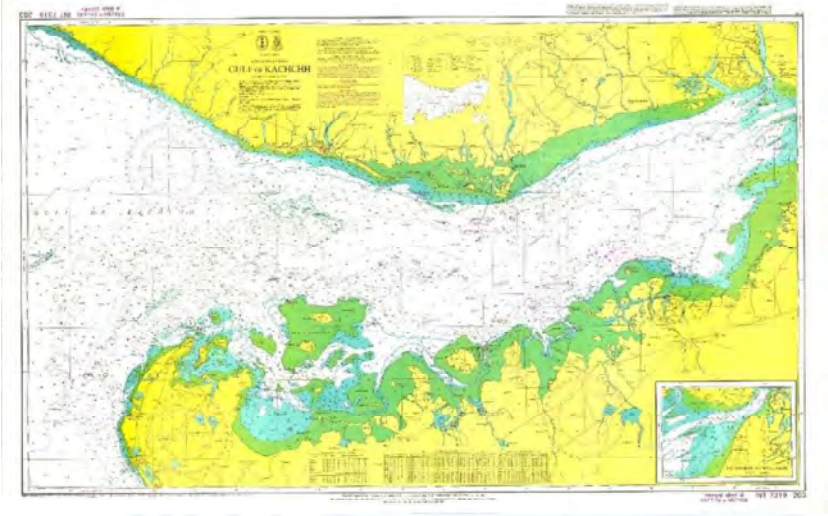


Fig.10.2 NHO Chart Showing Mundra region, Gulf of Kutch

Table.10.1 Contact Details of Spill Information Center

Sl No	Address of Centre	Contact Details
1	Indian Coast Guard Headquarters. National Stadium Complex Coast Guard DHQ -1(GJ). Near RGT College ... Okha Port, Gujarat – 361 350	Tel: 02892 263421. Fax: 0-22 24333727
2	Indian Coast Guard Headquarters. CP25+RRF, Vadinar, Gujarat 361010	Tel: 0-22 – 24222696 Fax: 0 – 22 - 24222696
	Indian Coast Guard Headquarters. gh-4 garden, udhyog bhavan, Sector 11, Gandhinagar, Gujarat 382011	

Table.10.2 Contact Details of District Administrative Authorities

Place Name	Address of Centre	Contact Details
Bhuj (Kutch)	District Collector Office Near Circuit House, Mandvi Road, Nr. Mota Bandh, Bhuj (Kachchh) Gujarat – 370001	Phone: +91 2832 250650 Fax: +91 2832 250430 Email: collector-kut@gujarat.gov.in
Jamnagar	District Collector Office, Jilla Seva Sadan, Sharu Section Road, Jamnagar - 361002	Collector, Jamnagar • +91 288 2555869 • +91 288 2555899 • collector-jam@gujarat.gov.in
Khambhalia	District Collector Office 1st Floor, Lalpur Bypass Road, Dharampur, Khambhalia, Gujarat - 361305	91 2833 232805 +91 2833 232102 collector-devbdwarka@gujarat.gov.in

Table.10.3 Contact Details of Gujarat Fisheries Development Council

Sl No.	Address of Centre	Contact Details
1	Commissioner of Fisheries 3rd Floor, Block no-10, Jivraj Mehta Bhavan, Gandhinagar, Gujarat 382010	Phone No: -079- 232-53729 Fax No:- 079-232-53730

Table.10..4 State Pollution Control Board – Regional Offices

	Address of Centre	Contact Details
Gandhi nagar	**Gujarat Pollution Control Board** Paryavaran Bhavan, Sector-10A, Gandhinagar-382010.	**Phone:** (079) 2323 2152 **Fax :** (079) 2323 2156, 2322 2784, 2323 2161 gpcbchairman@gmail.com, chairman-gpcb@gujarat.gov.in **Member Secretary**:
Morbi	Regional Center RR4F+6P7, Scientific Vadi, Sardar Nagar, Morbi, Gujarat 363641	Tel : 02822 228 001
Jamnagar	Regional Center Sardar Patel Commercial Complex, Rameshwar Nagar regional centre Kasturba Gandhi Vikas Gruh Marg, Bedi Bandar Road Jamnagar- 361 008	**Telephone** (0288) 2752366 **Fax:** (0288) 2753540 **Email:** ro-gpcb-jamn@gujarat.gov.in
Bhuj	Regional Centre Katira Commerical Complex-1, Nr.Manglam 4 Rasta,Sanskar Nagar, Nr.I.Tax Ofic,Bhuj 370001	**Telephone: (02832) 250620** **Fax: -** **Email:** ro-gpcb-kutw@gujarat.gov.in

10.1.2 Coastal Charts, Currents, Tidal Information Prevailing Winds

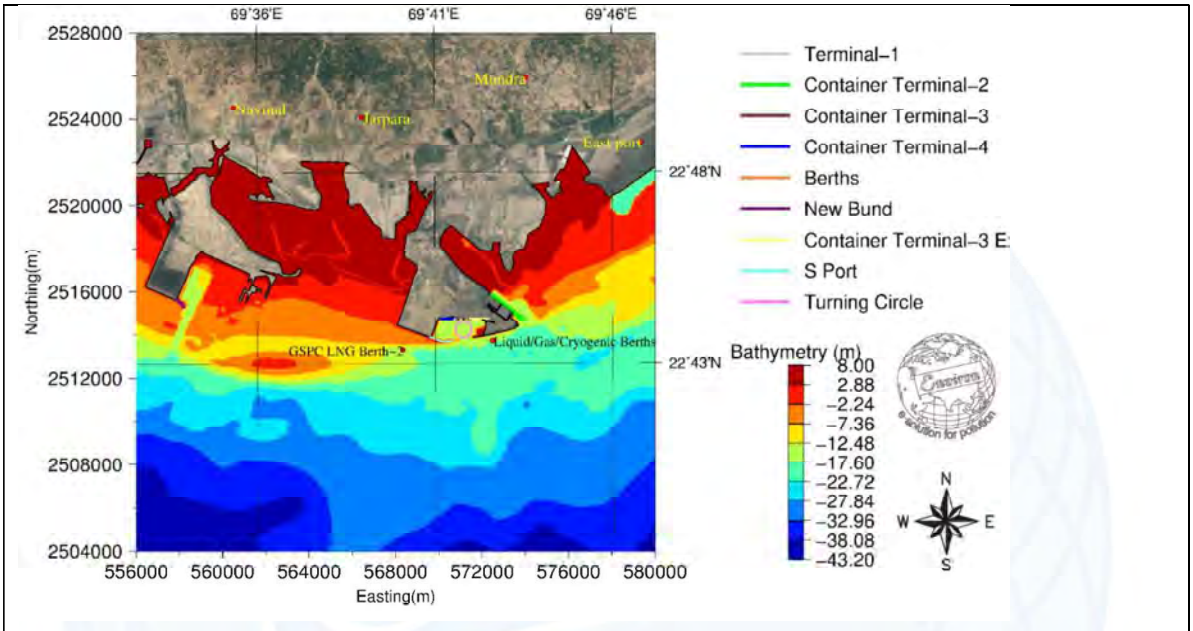


Fig.10.3 Map showing interpolated bathymetry of Adani Ports and surrounding areas.

Tide and Current information

Tide:

The tidal planes were assessed and 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.

Table: Tidal information at Mundra

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 Kachchh 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 (ºN)	Return Period (years)	Inshore Direction (ºN)	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

Cyclones

Cyclonic disturbances strike North-Gujarat, particularly the Kachchh and Saurashtra regions, periodically. These disturbances generally originate over the Arabian Sea. 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 northeast to strike Gujarat-north Mekran coast.

Wind

There are strong winds at times at Mundra Port. The wind directions are shown in Figure 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. 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.

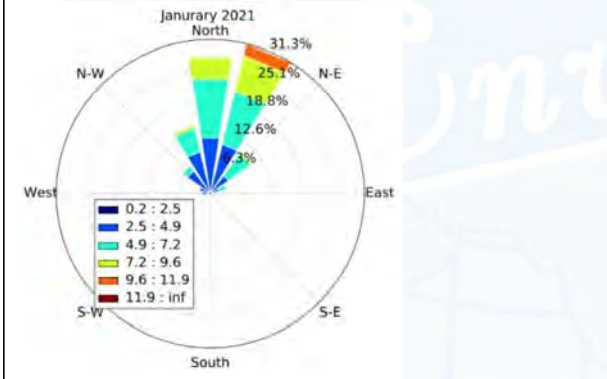


Fig.10.4(a) Wind Rose diagram for Pre-monsoon in 2021

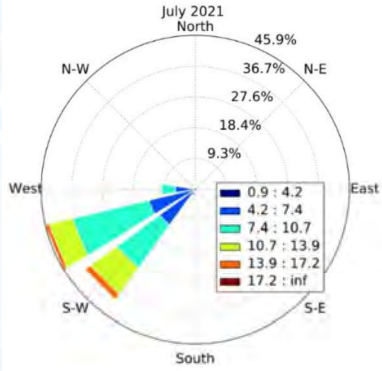


Fig.10.4(b) Wind Rose diagram for Monsoon in 2021

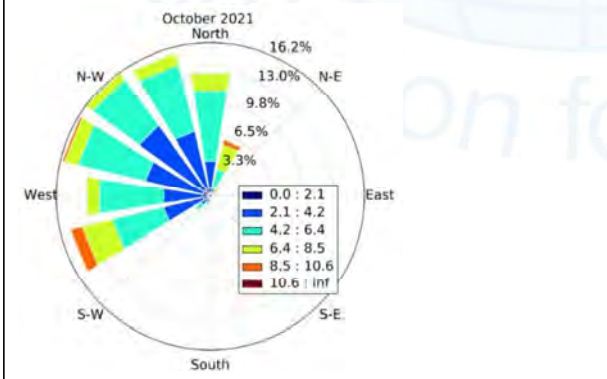


Fig.10.4© Wind Rose diagram for Post-monsoon season in 2021

Rainfall:

The climate of the region has a regular seasonal variation determined by the occurrence of 2 Annual monsoons. The southwest monsoon period extends from June to September. November

to March is the period for the North East monsoon. Most of the Annual rainfall occurs during the south west monsoon, the average monthly rainfall being about 45 cm. The average annual rainfall over 20 years is 193 cm.

Humidity & Temperature:

Relative humidity ranges from 61% to 87% being the highest in the monsoon period. During the winter months (Nov-Jan) relative humidity ranges from 61% to 72%. Mean daily temperature ranges from 24 Degrees C to 33 Degrees C except during the winter period when the minimum temperature may fall to about 19 Degrees. The hotter months are March, April, May and June.

10.1.3 Risk Locations and probable Fate of Oil

As with any oil transportation, oil spill risks are associated with Adani port operations. They may vary from a few litres of accidental spill of crude oil / Fuel Oil from offshore vessels to several thousands of tons of oil during collision / grounding situations. In line with the standard industry practice, APSEZL, Mundra is also prepared to mitigate spills of importance from routine operations (Tier-1), while oil spill situations of higher magnitude are dealt with industry co-operation and external intervention. However, it is required to have a fair understanding of the risks and probability of spills arising out of its operations and their consequences due to movement and landing along the coast.

The operations of APSEZL, Mundra are broadly defined under the following:

- Vessel operations- loading / unloading
- Vessel collision, or grounding
- Bunker/ fuelling operations
- Vessel distress / sinking
- Pipeline ruptures /accidental spills from sub-sea/over the sea/shore approach (in the tidal zone) pipelines
- Rupture of export line

The exact quantity of spill from each of the above incident is difficult to predict due to the variables of operating conditions and the length of risk exposure. Maximum risks associated with the events may be considered while devising the oil spill contingency plan. The spill scenarios 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. The software is intended to use for specific scenarios, through a few hypothetical simulations are made in this report considering the worst-case scenarios.

Instantaneous spills (Ref. Fig.11.5)

- Crude oil spill of 700t at selected SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Fuel oil spill of 700t at selected West Port(S5), Vessel route(S7), LNG Jetty(S8), South basin (S9), Mundra Ports(S11), MICT/AMCT(S12)
- Crude oil spill of 10000t at SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Crude oil spill of 25000t at SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Fuel oil spill of 100t at selected West Port (S5, S6), LNG Jetty(S8), South basin (S9,S10), Mundra Ports(S11), MICT/AMCT(S12)
- HSD oil spill of 50t at selected West Port(S5), LNG Jetty(S8), South basin (S9), Mundra Ports(S11)
- HSD oil spill of 20t at selected West Port(S6), South basin (S10)

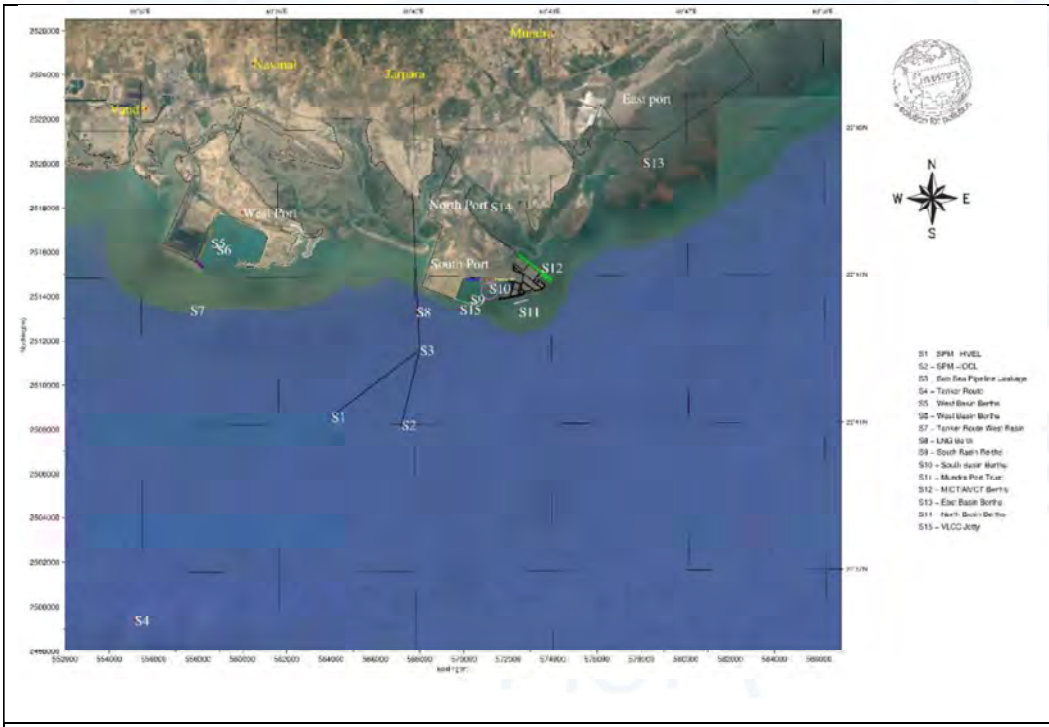


Fig.10.5 Spill Locations considered in APSEZL Mundra region

Continuous spills (Ref. Fig.11.5)

- Crude oil spill of 10000 m3/hr for 1 min at selected SPM-HMEL(S1), SPM-IOCL(S2)
- Crude oil spill of 10000 m3/hr for 1 min at selected VLCC Jetty (S15)
- Crude oil spill of 10000 m3/hr for 1 min at sub-sea pipeline route (S3)

The spill scenarios 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 the magnitude of impact zone and the quantity involved in such impacts.

Detailed Maps and charts for all spill scenarios including probable fate of oil are discussed extensively in PART-B of the report (PART-B: OIL SPILL FATE AND TRAJECTORY MODELING STUDIES)

The following are the risk locations in the Harbour zones of APSEZL, Mundra

- RIL Ports & Terminals, New Bedi Port, Essar Jetties in southern side of Gulf
- Bedi Port, Kalubar Tapu, mora island, Narara Reff, Pirotan Island
- Vadinar Oil Terminal, Borl, Mandvi Beach, Modhva Beach, Tata power Limited (CGPL) intake and outfalls, Adani West Port, Adani South Port, Tuna Port, Kandla Ports, BTC Port Navlakhi
- Sikka coast
- Adani Ports (South, East, West and North)

10.1.4 Sensitivity Area Mapping of Gulf of Kutch

The coast of Gulf of Kutch has tidal flats, mangroves and sand bars etc (Fig.11.6). There is a need to protect the ecosystem and marine environment during the oil handling activities.

The resources likely to be threatened discussed in the PART-C of the Report:

The coastal areas of Gulf of Kutch coast abound in marine wealth and industrial activities. It is endowed with a great diversity of natural ecosystems, of which the major systems are salt pans, intertidal zones, sand dunes, mangroves, creeks and Open Ocean. Vulnerability index of shores in order of increasing vulnerability to oil spill damages as per Gundlach and Hayes 1978.

SENSITIVE AREAS

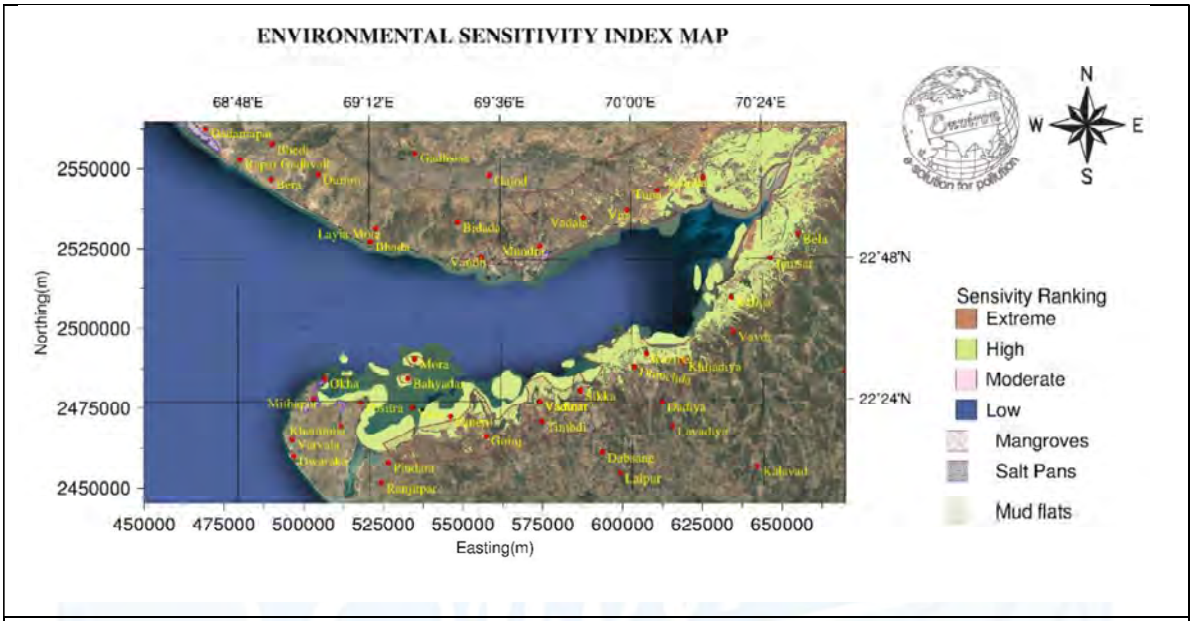


Fig.10.6 Sensitivity Index Mapping for coast of Gulf of Kutch

10.1.5 Sea Zones and Response Strategies

Sea zones can be classified based on depth of water i.e. deep water and shallow water zones. The response strategy will be different for different sea zones. The response options i.e. dispersant and burning can be done for deep water zones where there are not much marine life and the same response options cannot be used for shallow water since the marine activities will be exist along the coasts.

Response strategy for sea zones has been discussed in section 3.3

10.1.6 Coastal

Response strategy for coastal zones has been discussed in section 3.5

10.1.7 Shoreline zones and clean-up strategies

A number of shoreline response strategies are available as per table below, but shorelines should be assessed so see whether these are suitable. This will depend on:

- Rate and likelihood of natural cleaning
- Access for personnel and machinery

- Nature and distribution of the Oil/HNS
- Shoreline character
- Availability of personnel and machinery
- Safety issues
- Environmental sensitivity to Oil/HNS and cleanup methods

Table 10.5: Application of techniques to different shoreline types

	PRIMAY CLEANUP				
	Pumping / skimming	**Mechanical removal**	**Manual removal**	**Natural recovery**	**Comments**
Rocks, Boulders and Artificial structures	V	NA	V	+	Poor access may prevents pumping /skimming. Exposed/ remote shorelines best left to natural recovery
Cobbles, Pebbles and shingle	V	X	V	+	Exposed / remote Shorelines best left to natural recovery
Sand	V	+	V	+	Heavy equipment only applicable on firm beaches
Mud flats marshes and mangroves	+	X	+	V	Operation preferably carried out on the water from small, shallow drought vessels.

	FINAL CLEANUP						
	Low pressure flushing	**High Pressure washing/Sand**	**Dispersants**	**Natural organic sorbents**	**Batch recovery**	**Natural recovery**	**Comments**
Rocks, Boulders and Artificial structures	NA	V	+	+	NA	V	Avoid excessive abrasion of rocks/artificial structures. Cleanup of boulders difficult and often gives poor results.
Cobbles, Pebbles and shingle	V	X	+	+	+	+	If load bearing character good, consider pushing oiled material to surf zone to enhance natural recovery

Sand	V	X	+	NA	+	+	Solid oil can be recovered using beach cleaning machines. Enhance natural recovery by ploughing/harrowing
Mud flats marshes and mangroves	+	X	X	+	NA	V	Operations should preferably be carried out on the water from small, shallow-drought vessels.

V : Viable + = Possibly useful X = Not recommended NA : Not Applicable

10.1.8 Oil and Waste storage disposal sites

An efficient and monitored disposal of waste includes immediate classification, segregation, packing and labelling source.

	Packaging	Storage Capacity$_{(m3)}$
ON WATER	On board Storage	100 to >1,000
	Barges	10 to 10000
	Flexible / towards bladders or tanks	500 to 15000
SHORELINE	Plastic bags or sacks	0.25 to 15,000
	Super sacks	0.5 to 2.5
	Barrels or drums	~0.2
	Portable tanks	1 to 5
	Skips or dumpsters	10 to 40
	Lined pits	Up to 200
	Vacuum trucks	7.5 to 20

WASTE DISPOSAL OPTIONS

WASTE	PRIMARY OPTION	SECONDARY OPTION	ALTERNATE OPTION
Fresh Oil	Refining	Fuel blending	Ex-Situ burning
Weathered	Fuel blending	Land Treatment	Landfill
Emulsions	Fuel Blending	Land Treatment	Landfill
Hydraulic Fuels	Refining		
Oil debris	Incineration	Open burning	Landfill
Oily PPE	Incineration	Landfil	

Oily Sand / Gravel	Ex-situ burning	Land treatment	Landfill
Oily sorbents	Fuel blending	Incineration	Landfill
Oily Wastewater	Electrocoagulation treatment		
Animal car cases	For research	Incineration	
Domestic c waste	Incineration	Landfill	
Non oily debris	Incineration	Landfill	
Pallets	Recycle/reuse	Open burning	Landfill
Paper board	Recycle/reuse	Open burning	Landfill
Drums	Recycle/reuse	Landfill	
Hazardous wastes	Social handling storage treatment		

Table 10.6: Approved Waste Handling Contractors:

Sl. No.	Name	Waste Permitted and Quantity allowed
1	M/s. Daya Lubricants Pvt. Ltd. Bldg. No. 11, Waliv Phata, Prime Industrial Estate, Sativali Road, Village Valiv Phata, Vasai (E), Thane 401208	Used Oil 3000 KLA Waste Oil 14400 KLA
2	M/s. North East Lubrica Pvt. Ltd. S. No. 404, Abitghar, Tal- Vada, Dist. Thane – 421 303	Used Oil 9000 KLA Waste Oil 9000 KLA
3	M/s. Deepak & Company B 20, Road No. 16, Wagle Industrial Estate, Thane – 400 604	Used Oil 18500 KLA
4	M/s. Tax Oil Lubricants Pvt. Ltd. R-591, MIDC Industrial Area, Rabale, Navi Mumbai – 400 701	Waste Oil 12960
5	Chemicals Pvt. Ltd. Plot No. A-10, MIDC Industrial Area, Ambernath, Dis. Thane	Used Oil 6000 KLA Waste Oil 8550 KLA
6	M/s. Meghani Enterprises H-14, Shah & Diwan Industrial Complex, Udyognagar Chintupada, Mahim Village, Palghar, Dist. Thane	Used Oil 4500 KLA
7	M/s. Al Ali Mohammed Industrial Sr. No. 57-1/2, Village Ghatesh Khurd Khanivali Road, Tal- Wada, Dist – Thane - 421303	Used Oil 6000 KLA Waste Oil 18000 KLA
8	M/s. Tribo Lubes Pvt. Ltd. Takai Adoshi Road, Village Honad, Post- Saigaon Survey No. 13/7A, 14/3, 15/16, Tal – Khalapur, Dist – Raigad	Used Oil 7500 KLA Waste Oil 9000 KLA
9	M/s. Spear Petroleum Pvt. Ltd. 152, A, 15th Floor Maker Chamber No. III, Nariman Point, Mumbai – 400 021	Waste Oil 11000 KLA

10	M/s. Balaji Rang Udyog Pvt. Ltd. Plot No. 44, MIDC Taloja Industrial Area Taloja, 410 208 Dist. Raigad	Waste Oil 15000 KLA
11	M/s. Shiva Petrochem Synth Specialists Ltd. Plot No. 2/3, Shah & Divan Indl Area, Opp. BIDCO Studio, Vill –Mahim, Palghar, Dist. Thane	Used Oil 10800 KLA

10.1.9 Sensitive Maps / Atlas

Environmental Sensitive Maps has been prepared based on available data of environmental, biological and industrial sensitive areas of various seasons covering the entire coast of Gulf of Kutch and Adani port regions. The study covers the region between longitudes of 68°E and 71°E and the latitudes of 22°N and 23°N. The sensitivity map as shown in Fig.11.6.

The detailed description of mapping of sensitive areas has been discussed in Part-C of report (**PART-C: OF THE OSCP**)

10.2 LISTS

10.2.1 Primary oil spill equipment

Table 10.7: LIST OF OSR EQUIPMENT/ITEMS AT Adani Ports & SEZL

SL No	Description of Resources	Qty
1	Canadine fence boom (reel model 7296/8496 with power pack,towing bridles and tow lines-235 meter)	1 no
2	Power pack with boom reel with hydraulic hoses	2no
3	Power pack-20kv with boom reel with hydraulic hoses	2no
4	Lamor side collector system (recovery capacity 123 m^3 /hr (side collector LSC-3C/2300(01C02-P536). Oil transfer pump OT A 50 with oil transfer hose set	2no 2sets
5	Lamor minimax 12m3 skimmer	2sets
6	Power pack for skimmers with hydraulic hoses	4no
7	Power pack -20 KV for skimmers with hydraulic hoses	1no
8	Floating tank(25m3)	1no
9	Foot pumps for floating tank	6no
10	Oil spill dispersants	5000ltr
11	Portable dispersant storage tank: 1000 ltr capacity	1no

12	Portable pumps	2no
13	Two -way hydraulic maneuvering panel	2no
14	Oil containment boom -length 2000 meters, height-1500 mm, draft-900mm, free board-600mm	2000 mtr
15	Current buster room -fasflo-75 (for response in fast current)	2no
16	Skimmer -KOMARA 15 duplex skimmer system with floating IMP 6 PUMP	4no
17	12.5T flexible floating storage tank (PUA).	3no
18	Diesel driven transfer pump for flex barge	2no
19	Site hose kit for the transfer pump for flex barge	2no
20	3" and 2" hose adaptor for transfer pump and hose	2no
21	Shoreline cleanup equipment	
22	Mini vac system	5no
23	OSD applicator =oil dispersant spry unit (20 ltr) for use on beach and inter tidal zones	2no
24	Startank with capacity 1000 liter(10m3)	2no
25	Sorbent boom pack (12.5cm*4m)	500 mtr
26	Sorbent pad	2000 nos

In the event of oil spill, Traffic, Mechanical as well as Civil department of APSEZL Mundra shall provide required facility with regard to catering, housing, transportation, field sanitation and shelter etc

Additional support equipment's shall be hired as per requirement by emergency coordinator and Mumbai Port will be delegated this duty.

10.2.2 Sources of manpower

Sources of Manpower:

The following are the sources of manpower to combat any oil spill incident in APSEZL, Mundra:

A. OSR Manpower
B. Adani Port Fire Department
C. Adani Port Employees and Workers
D. Adani Crisis Management Team
E. Volunteers from Colleges and Other Maritime Collegs near to shore.

A: OSR Manpower:

MANPOWER		
1	IMO Level 3	3
2.	IMO Level 2	1
3.	IMO Level 1	24
4.	Other	

1. Adani Ports SEZ Limited, Mundra:

DESIGNATION	APPOINTED MEMBER
Chief Incident Controller (C IC)	Head-Marine
Commander	HOS Marine & DPC
Member Admin & Finance	Head Admin and Head Finance
Member HSE & Media	Head HSE and Head Corporate
Member legal	Head Legal
Member Tech	Head ES

2. DISTRICT ADMINISTRATION

Place Name	Address of Centre	Contact Details
Bhuj (Kutch)	**District Collector Office** Near Circuit House, Mandvi Road, Nr. Mota Bandh, Bhuj (Kachchh) Gujarat – 370001	Phone: +91 2832 250650 Fax: +91 2832 250430 Email: collector-kut@gujarat.gov.in
Jamnagar	District Collector Office, Jilla Seva Sadan, Sharu Section Road, Jamnagar - 361002	Collector, Jamnagar • +91 288 2555869 • +91 288 2555899 • collector-jam@gujarat.gov.in
Khambhalia	District Collector Office 1st Floor, Lalpur Bypass Road, Dharampur, Khambhalia, Gujarat - 361305	91 2833 232805 +91 2833 232102 collector-devbdwarka@gujarat.gov.in

Contact Details of Gujarat Fisheries Development Council

Sl No.	Address of Centre	Contact Details
1	Commissioner Of Fisheries 3rd Floor, Block no-10, Jivraj Mehta Bhavan, Gandhinagar, Gujarat 382010	Phone No: -079- 232-53729 Fax No:- 079-232-53730

State Pollution Control Board – Regional Offices

	Address of Centre	Contact Details
Gandhi nagar	**Gujarat Pollution Control Board** Paryavaran Bhavan, Sector-10A, Gandhinagar-382010.	**Phone :** (079) 2323 2152 **Fax :** (079) 2323 2156, 2322 2784, 2323 2161 gpcbchairman@gmail.com, chairman-gpcb@gujarat.gov.in **Member Secretary** :
Morbi	Regional Center RR4F+6P7, Scientific Vadi, Sardar Nagar, Morbi, Gujarat 363641	**Tel** : 02822 228 001
Jamnagar	Regional Center Sardar Patel Commercial Complex, Rameshwar Nagar regional centre Kasturba Gandhi Vikas Gruh Marg, Bedi Bandar Road Jamnagar- 361 008	**Telephone** (0288) 2752366 **Fax:** (0288) 2753540 **Email:** ro-gpcb-jamn@gujarat.gov.in
Bhuj	Regional Centre Katira Commerical Complex-1, Nr.Manglam 4 Rasta,Sanskar Nagar, Nr.I.Tax Ofic,Bhuj 370001	**Telephone:** (02832) 250620 **Fax:** - **Email:** ro-gpcb-kutw@gujarat.gov.in

10.2.3 Local and National Government contacts

Emergency Contact Directory

Note: Below is the contact detail for Emergency Contact directory. Radio officer will circulate the emergency contact detail through email for any changes in contact details. Final update copy of contact detail will available in Radio Room. Entire document will not be revised due to change in contact details.

	VHF CHANNELS	
	VTMS VHF CH	16/73
	MUNDRA VHF CH	16/77

List of Important Telephone Numbers of Govt. Officials and other neighboring Organizations (Expert and Advisors) related to Spill Combating Plan

SN.	Company	Name and Designation	Telephone Numbers
1.	APSEZL, Mundra	Chief Operating Officer Head Marine Pollution Response Officer Port Control	02838-6272602838-255727 02838-255727 02838-255761 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
12	Ministry of Environment	Director (Environment)	079-23252154 / 23251062

	Govt. of Gujarat		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. Sachin Srivastava, Head – Marine	02838 - 255727	+91 6359883102
02	Head of Section 1 - Marine	02838 – 255730	+91 6359631088
03	Head of Section 2 - Marine	02838- 255947	+91 6357160037
04	Mr. Sanjay Kewalramani, Head-Marine Technical	02838- 255844	91 9925150056
05	Mr. Yogesh Nandaniya, Manager-SPM	02838- 2562379	91 6359775168
06	Mr. Hari Govindan V	91-2838 - 285072	91 9879104805
07	Marine control, APSEZL	02838 – 255333 / 255761	91 9825228673
08	Port Operation center, APSEZL	02838 –255762	91 9825000949
09	Port security Control, APSEZL	02838 – 289322	91 9825000933
10	Head - Security, APSEZL		+91 9109988165
11	Head - Health, safety & Environment, APSEZL	02838 - 255718	+91 9884869471
12	Head - Fire Dept. APSEZL	02838 – 255857	91 7069083035
13	Occupational Health Centre	02838 - 255710	91 8980015070
14	Head-Admin Department	02838 – 255159	+91 8660183841
15	Head Finance	02838 – 255711	+91 9879114993
16	Head Corporate	NA	+91 6358940500

10.2.4 Specification of Oil commonly traded:

OIL HANDLED AT APSEZL, MUNDRA

1. Qatar Crude
2. Persian Gulf Crude
3. Motor Spirit
4. High Speed Diesel Oil
5. Naphtha
6. Furnace Oil
7. Light Diesel Oil
8. Industrial Furnace Oil
9. Reformate / Benzene
10. Maya Crude Oil
11. Arabian Crude Oil
12. Russian Crude Oil

CHARACTERSTICS OF DIFFERENT CLASS OF OILS

OIL TYPE	DENSITY	Viscosity	Pour point C	Flash point C
	(kg/l) At 15C	mPas at 20C		
Crude oil	0.8- 0.95	1-100	+10 to – 35	Variable
Gasoline	0.70 – 0.78	0.5	NA	Less than 0
Kerosene	0.8	2	Less than – 40	38-60
Jet fuel	0.8	1.5-2	Less than – 40	38-60
Diesel oil	0.85	5	-5 to -30	More than 55
Light FO IFO60	0.9	60 at 50 C	+ 50 to -20	More than 60
Medium FO IFO 180	0.9	180 at 50 C	+ 30 to – 20	More than 60
Heavy FO IFO 380	0.99	380 at 50 C	+ 30 to – 20	More than 60

10.2.5 Information sources

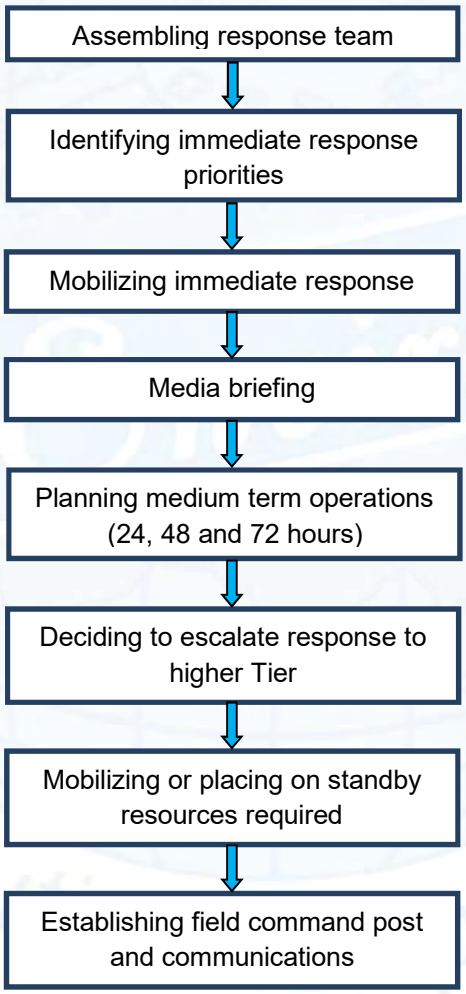
APSEZL, MUNDRA OIL SPIL CONTIGENCY PLAN-2019

NATIONAL OIL SPILL DISASTER CONTIGENCY PLAN

IPECA GUIDELINES

7. OPERATION PLANNING

The response operations planning will follow the initial response actions. The procedures to be adopted have been discussed below:



1) After assessing the Tier of response based on the size, type and fate of spill, the CMT will initiate the response operations. The immediate response priorities will be identified and immediate response options will be mobilized. The response priorities for APSEZL, Mundra will be in the following order:

People residing in fishing villages and other establishments along the coastline and personnel on board the vessels

a. Environmentally sensitive areas
b. Assets i.e. rig/supply vessels
c. Minimum reputational damages

2) The CMT will release a media briefing for ensuring that the information pertaining to the spill event is well communicated to the relevant authorities and coastal communities. The onshore response base at the nearest Ports (Adani) will also notify the coastal communities/stakeholders through verbal and written communication channels.

3) Once the spill has been assessed thoroughly, the decision on which response strategy to use is crucial in the first few hours of the spill. The preferred strategy for an offshore spill has been presented below and detailed subsequently:

RESPONSE OPS 1: Monitor, Evaluate and Sample: when spill is drifting away from coast and if the oil is headed towards the shore
RESPONSE OPS 2: Containment and Recovery
RESPONSE OPS 3: Dispersant Application
RESPONSE OPS 4: Shoreline Protection and Deflection Booming
RESPONSE OPS 5: Shoreline Clean-up: *in case the spill reaches the shore*
RESPONSE OPS 6: Waste Management

4) The response operations will be monitored by the OSC on continuous basis through records and hourly reports from the response team. Based on the ongoing response operations, it will be the responsibility of the CMT Leader, in consultation with OSC, to decide whether the response Tier has to be escalated to the next level and intervention of relevant authorities such as Indian Coast Guard will be required to handle the spill event.

7.1 Assembling full Response Team

Area of operation of this Plan being confined to Adani Ports and SEZ Limited, Mundra. All responses and actions would get limited to coastal zone and within the Mundra region.

7.1.1 Crises Management Team /s (CMT)

The core operating team discharging the functions of Incident control, administration and management is designated as Crises Management Team/s(CMT) operating from the identifier control center located within in the port Administrative Building.

7.1.2 CMG

Apart, from the designated CMT, another senior level team designated as Core Management Group (CMG), headed by the respective head of APSEZL, Mundra, will get activated in times of major spill crises that may require liaison with senior level state, center authorities or other

agencies. The functions of CMG will be same as CMT (as mentioned in 9.1) with a view to provide support to operations in terms of administrative requirements, CMG will assemble on the recommendations of Chief Incident Controller.

This Plan formulates the polices and strategies to be followed on case of a response and to be executes on the ground by CMT along with response team or Oil Spill Response Operation (OSRO)

The operational spill prevention provision of the CP will be discharges by three CMTs – headed by Chief Incident Controller, one each for the area of Jurisdiction of Adani Ports and SEZ Limited, Mundra. Duties and responsibilities of all the three teams would largely remain the same – as spelled in this Contingency Plan (CP), with additions and amendments undertaken by each team as per operational situation and requirements particular to their area of operation. Each team would be responsible for operations in their respective area of jurisdiction.

7.2 Identifying Immediate Response Priorities

Major actions that would be required to be taken when a spill occurs are mentioned below. While, some actions like containment are required to be initiated immediately following a spill, some actions like shore line clean up etc. will get initiated in due time. The purpose of fast response is to minimize hazards to human health and environment the following response is accordingly addressed through the Contingency Plan and Operational Manual.

- Stoppage of discharge and containing spill within a limited area
- Defining size, position and content of spill, direction, and speed of movement and likelihood of affecting sensitive habitants
- Notification to private companies or governments agencies responsible for cleanup actions
- Movement of trained personnel and equipment to site.
- Initiation of Responsibility
- Ensuring safety of responsible personnel and public
- Oil Removable and disposal

Crises Management Team (CMT), with the help of oil slick movement simulation data and prevailing weather condition, would priorities which are to be protected first. By selecting the appropriate strategy, the CMT can derive an indicative strategy path to mitigate the effects of an oil spill, consistent with safe practice and net environmental benefit.

7.3 Mobilizing Immediate Response

The moment oil spills detected; the actions initiated should be part standard drills carried out i.e

i. Operation department to sound alert to various departments to start preparing for OSR activities.
ii. HOD-Marine to muster ERT, carry out briefing about nature of oil spill, start preparations for the movement of OSR equipment's. Safety equipment's, teaches, lifelines life jackets working gloves rain coat, communication equipment sect be checked for their corrections
iii. Security department to mobilize vehicles at the assembly place i.e. Near port head office building
iv. ECT to coordinate with ECR to take stock of the situation.

The OSR equipment, both on-board vessel and onshore, have been sourced keeping in mind a Tier-1 response of 700 tons of crude that can be responded to, in one full day of ten working hours. This equipment will be operated keeping existing weather conditions in mind. For adverse conditions, no response will be effective. During normal weather conditions, advancing skimming system will be operated from the vessel that will keep on operating at 3 knots speed. Once the advancing system is in place and the recovery started, the oily water mixture will be pumped into the vessel tanks or the floating towable tank as per the availability. CMG Officers at Administrative office and OSC will exchange internal communication and keep incident appraised. Clean-up actions must begin as soon as possible to minimize the effect on natural and other resources. These actions shall include locating the source of the discharge and preventing any further spillage, placement of containment boom to control the spread of oil and to protect sensitive areas, measuring and sampling, physical removal of the oil from water and land, the use of chemicals to disperse the oil. The official coordinating response to the spill must address many questions, including:

- How large an area will the spill cover?
- How thick will the slick be?
- How fast and in what direction will the slick drift?
- When and where will the oil hit the shoreline?
- What will happen to the oil if it is not removed?
- What is the value and sensitivity of the resources at risk?
- The answers to these questions will determine what response actions are taken.

Dispersants shall be used as per the Indian Coast Guard policy and Guidelines for use of Oil Spill Dispersants (OSD) in Indian waters. The OSC must obtain clearance from the Indian Coast Guard before applying chemical dispersants.

RESPONSE OPS 1: MONITOR, EVALUATE AND SAMPLE

1) This is the preliminary action that must be taken once a spill has been confirmed. Following a Oil Spill on water this should be CMG first response as it must be recognized that sometimes

the safest and most efficient response will be to let the product naturally dissipate, whilst at the same time employing safety measures.

2) Aerial surveillance provides the best option for monitoring a spill; however visual observation from sea level may be the only option initially. This will not give a reliable overall picture especially for larger oil spill events. As practically possible, aerial surveillance will commence to monitor and assess the oil spill. Aerial surveillance will enable:

   a. Determine the size, quantity and location of the slick
   b. Determine the movement of the slick
   c. Noting of any changes in appearance and distribution of the slick
   d. Forecasting of areas at risk
   e. Reporting of effectiveness of response measures

3) Aerial surveillance will be used to direct containment, recovery operations and offshore dispersant. It can also be used to assess and monitor the successfulness of these strategies.
   a. Before take-off:
      i. take the equipment: Map/Chart, polarizing sunglasses, stopwatch, calculator, notebook, pencils, GPS (handheld with remote aerial and spare batteries), digital camera and spare batteries, and multiple surveillance reporting forms,
      ii. Obtain latest weather forecasts and current conditions

   b. During the flight:
      i. start observation at an altitude of >1500ft or >450m for a good overall picture
      ii. ensure there is a good viewing window, or consider flying with door open
      iii. ensure there are communications with the pilot

4) Prior to flying, obtain information last known position of slick(s) and plot on a map. Manual plotting or oil spill modelling can provide an estimation of the slick position. On water oil moves at approximately 100% of current speed and direction, and 3% of wind speed and direction. Computer modelling of oil fate and trajectory will have to be undertaken, if required.

5) If there is an uncertainty as to the exact location or extent of spill, a spiral pattern can be used to investigate the area of interest. The shape and thickness distribution of fairly fresh oil spills depend on the oil properties, wind and currents. The wind spreads and elongates the spill, eventually cutting it into windrows and finally fragmenting. The thickest patches move furthest downwind to what is termed the "leading edge" of the slick. Where practical, long search legs should be aligned at 90 deg. to the direction of the prevailing wind to increase the chances of oil detection as wind rows will lie parallel to the wind direction.

6) Fly the length and width of the slick and record the time taken and the aircraft speed. Once the speed and times to fly the length and width are recorded, the area can then be calculated.

7) The next step is to conduct an oil spill sampling. The technique for oil spill sampling has been presented below:

Table 7.1: Technique for Oil Spill Sampling

S. No.	Technique for Oil Spill Sampling	
1	Equipment	Sampling from an oil slick itself and submission of the samples require use of correct and necessary equipment (oil sample boxes). Each oil sample box contains detailed instructions with a description of sampling including gathering, referencing, labelling storage and forwarding procedure.
2	Frequency	For offshore spills a minimum of 1 sample per slick per day where possible.
3	Sample Size	• Un weathered oils that are liquid and subsequently free of water - 10ml; • Oil exposed to sea surface and forming water-in-oil emulsion 'chocolate mousse'-10ml; • Over size water discharge of 100 ppm from a moving tanker or 15 ppm from a fixed source is suspected- 1litre of discharge; • If such quantities cannot be collected, sampling of any quantity should still be attempted;
4	Collection method	• Skim the oil off the surface of the water with great care, ensuring maximum oil content and minimum water. A bucket may be required to collect the sample initially; • Avoid using metal tools containing nickel / vanadium-based alloys to collect the sample, as these are contained naturally within any crude oils and therefore may cause problems when analysed; • Any collection of lumpy tar/waxy pollutant should be placed directly into sample containers, with no attempt to hear or melt these samples; • Oil collected attached to floating debris, or seaweeds etc., should be placed along with the debris/seaweeds directly into the sampling container; • The sample containers should be sealed and labelled as soon as possible to minimize the evaporation of the oil's higher fractions.
5	Container Sealing, packing and Transporting	• Where possible, all samples should be securely packed, and sealed using screw topped containers and fireboard boxes to ensure safe carriage of the samples; • Sample containers should be glass with a large neck and a screw cover and a seal which would not be affected by oil, e.g. no waxed caped seals; • All sample containers should be sealed with a tamper proof seal; • Any bags should be sealed with a label which is signed with overlap on bag and label; • Plastic/metal containers are discouraged as can react with the sample and interfere with analysis; • Samples should be stored in a refrigerator/ cold room at less than 5°C in the dark; • When transporting the materials, dangerous good instructions should be followed;

S. No.	Technique for Oil Spill Sampling	
		• Vermiculite should be used to surround the samples in the box for protection and to absorb any seepage; • Each sample should be clearly labelled with an identification number, date, time, location, and signature of the sampler, these details should also be recorded on a log form.

8) The weather conditions will be continuously monitored. Factors that should be considered when assessing oil spill movement and weathering include:
   a. Currents
   b. Tides
   c. Weather (including wind direction and speed)
   d. Wave height (sea state)
   e. Sea temperature, salinity
   f. Spill size / volume (m^3)
   g. Spill thickness (estimated by colour e.g. sheen, rainbow)
   h. Type of oil spilt (viscosity, pour point, specific gravity, dispersion, evaporation)

RESPONSE OPS 2: OFFSHORE CONTAINMENT AND RECOVERY

1) Effective offshore recovery requires trained operators, suitable equipment, well maintained equipment, vessel logistics, aerial support, temporary storage, transportation and waste disposal.

2) Even in the most ideal conditions recovery rates will never be and are actually more likely to be around 10 — 20%. The faster the response, the better the recovery rate as the spill will have had less time to spread and fragment.

3) Operations are unlikely to be possible in wave heights exceeding 2m (failure of boom with oil being washed over) or in winds of more than 35 km/hr.

4) Vessels suitable to deploy offshore boom must have sufficient deck space to house boom reels and power packs and sufficient vessel power rating (bollard pull) to tow the boom. Typically, these vessels need to have a low smooth stern without a rail. In addition, vessels need sufficient deck space to allow safe crew movement. To accommodate these arrangements minimum deck sizes are:
   a. Deck space to stow 2 x 10 ft containers safely and allow personnel movement
   b. At least 2m stern to deploy and inflate the boom.
   c. Offshore boom towing vessel at least a 1.5 tones bollard pull and 400 hp engine

5) Steps to carry out offshore containment and containment techniques are listed below:

a. Identify the thickest concentrations of oil. Aerial surveillance is the best method of directing vessels to the most concentrated area of the spill to conduct containment and recovery operations.
b. Sites for containment and recovery operations should be selected where the collection will reduce the likelihood of the oil impacting sensitive sites.
c. Ensure communication can be established between the aircraft and the vessel either or via the command team.
d. Deploying containment boom will limit further of the oil and concentrate the oil for recovery. Eddies behind the booms are an indication that they are towed too fast. Maximum speed is dependent on the amount of oil contained in the boom, boom characteristics and wave conditions. Typically, a speed of 0.5 – 1.0 knots is required for effective operations.
e. Oil lost under the boom will appear as or droplets rising 2-10m behind the boom. Sheens will often be present even when the boom is functioning well.
f. When towing a sectioned boom that has been joined in a 'U' configuration, an odd number of sections of boom should be used to prevent having a join in the center of the boom from which oil can more easily escape.
g. To avoid sharp stress or snatching on a towed boom, lines between boom ends and the vessel should be of sufficient length. 50 m or more would be appropriate for towing a 400 m length of boom.

6) Steps to carry out recovery of spilled oil and recovery techniques are listed below:

a. Skimmers that are used to recover oil from the water all incorporate:
    i. an oil recovery element
    ii. notation or support
    iii. pump or vacuum device to transfer recovered oil and water to a temporary storage device
b. Skimmers will need continuous maintenance by specially trained staff with a supply of spare parts
c. The effectiveness of a skimmer is determined by how quickly it can collect the oil, and how well it minimizes the water to oil ratio collected.
d. Recovered oil could be pumped into an inflatable storage barge or the recovery oil tank of a standby vessel.
e. Wave motion reduces the effectiveness of most skimmers. In calm waters better performance can be achieved if the skimmer is suited to the viscosity of the oil in question.
f. Floating debris, both natural (e.g. sea weeds, sea grasses, trees and branches) and manmade (e.g. plastic, glass, timber) can affect a skimmer's performance. Skimmers

may need trash screens and regular unblocking where debris is common, such as near urban areas or the mouths of river.

RESPONSE OPS 3: DISPERSANT APPLICATION

1) The use of dispersants should be the primary response strategy to prevent the oil from coming onshore due to the limitations of booming operations offshore, the time taken to deploy the booms, the encounter rate due to the spreading of the oil and also sea conditions. However, dispersants will be used only on crude oils which do not disperse naturally and after obtaining the approval from the Indian Coast Guard.

2) The effectiveness of the dispersant on the oil slick must be monitored, and this is best done by observing the sprayed area. Where there is a coffee-colored plume in the water, this generally indicates effective dispersion of the oil. Where the oil has resurfaced there will be black patches.

3) Dangers to consider during dispersant operations are - fire or explosion risk, exposure of personnel to dispersant, weather conditions allow safe operation of vessels and aircraft and ability to control aircraft in the aerial spraying zone.

4) For effective use of dispersants, following considerations to be noted:

    a. Dispersant should only be applied to crude and not light oils such as diesel or heavy oil such as HFO.
    b. Dispersant effectiveness will decrease as the viscosity of oil increases.
    c. It is unlikely that dispersant will be effective on emulsified crudes.

5) Steps to carry out dispersant application by vessel has been outlined below:

    a. Aerial surveillance should be utilized for all dispersant application operations to direct operations and monitor the effectiveness. The dispersant operation must be at the thickest portion of the slick (leading edge) and not the thinner iridescent silvery sheen areas. Dispersant application should be considered in offshore and near shore to prevent oil entering environmentally sensitive areas onshore.

    b. The following techniques should be utilized during dispersant application:
        i. Vessel speed should normally be between 5 - 10 knots.
        ii. The spray arms or spray nozzle should be mounted at the bow to avoid the effect of the bow wave which can push the oil beyond the spray width. The bow wave will also provide the required mixing energy. Dispersant should be applied when steaming into the wind.

iii. Agitation will be required to produce the required mixing energy. In calm sea states the bow wave of the vessel should be sufficient. Applying dispersant in conditions above a Force 5 is not recommended as the turbulence will cover the oil and spray droplets will be blown away.

iv. Typically, the most efficient dispersant to oil ratio (DOR) is 1:20, but on fresh oils, this can be a lot less (1:100). The correct application is determined by the pump rate and the vessel speed (knots). For most modern chemical dispersants, an application rate of approximately 1:30-1:50 (DOR) should be applied. Refer to the manufacturer's information for application rates

v. A visual check of the Spray area will indicate dispersant effectiveness. A grey / coffee colour plume indicates successful dispersion. Spraying too much dispersant will result in a cloudy white plume, too little and there will be no effect.

c. Below guidelines should be followed during dispersant application:

i. Do not spray if the slick gets close to fishing boats

ii. Dispersant should be applied by trained operators, with proper safety equipment, and with experience in use of the spray equipment

iii. Do not use dispersants in water depths LESS THAN 20m. Reason: insufficient depth for adequate dilution and possible impacts on seabed (benthic) marine life

iv. Ensure the dispersant has been approved for use and any necessary authorization has been granted

v. All dispersants should be clearly labelled and stored with the appropriate supporting documents.

RESPONSE OPS 4: SHORELINE PROTECTION AND DEFLECTION BOOMING

1) Areas that should be protected include environmental and socio-economic sensitivities, with consideration of the time of the year. Protection booming is generally feasible across small bays, inlets and river mouths with currents (< 1 knot) and breaking waves < 1.5 ft (0.5 m) and on straight coastline areas to protect specific sites, where breaking waves <1.5 ft (0.5 m).

2) Deployment of shoreline protection will be supervised by trained Response Teams deployed to location that can assist in training and local personnel such as the Fire Service and volunteers. A local workforce would be to provide manpower.

3) Due to the long inter-tidal zone of the coastline, it will not be practical to use booms from the shoreline for protection. If any deflection booming is to be done, it has to be deployed beyond the surf zone from the coastline. This can be done by deploying the offshore booms in a

deflection configuration which will require two boats - however the limitation will be the area covered by a single length of boom.

4) For deflection booming the length of the boom has to be towed in a straight line between two vessels and angled in such a manner to deflect the oil away from the coastline concerned. Deflection booming operations must be done as far away from the shoreline as possible. Knowledge of the depth of the water is important to allow for sufficient under keel clearance for the vessels and also the draft of the boom.

5) Where possible, protective booms should be deployed at an angle to the approaching slick to divert oil away from any sensitive area, for example bird breeding grounds. When wave amplitude exceeds 1.5ft (0.5m) or currents exceed 3 knots, protective booms should be moved to calmer waters if possible as boom are likely to fail. Booming will be ineffective if the current speed at right angles to the face of the boom (due to water current or speed of towing vessels) exceeds 0.75 knots.

6) The use of oil snares strung on ropes is also a practical strategy to prevent or minimize oil from stranding on the shoreline. In order to implement this strategy, the following need to be considered.
    a. The snares need to be deployed beyond the low water mark of the inter-tidal zone and surf zone.
    b. Suitable shallow draft boats will be required - Using the fishermen and their boats will be the most practical approach.
    c. The snares attached to ropes will have to be tied to stakes at intervals of about 50 meters, parallel to the coastline.

RESPONSE OPS 5: SHORELINE CLEAN-UP

1) The purpose of shoreline clean-up should be to produce a net environmental benefit. Clean-up techniques can be damaging and, in some circumstances, oiled shorelines are best left to recovery naturally.
2) In many areas, bays and other inshore areas may also be somewhat protected from the extensive contamination by the flushing action of tidal currents and the natural outflow of streams and rivers. As a result, much of the shoreline may not require a widespread active cleaning effort unless it is heavily contaminated.
3) Where active shoreline clean-up is required, priorities for restoration can be established based on both the environmental sensitivity and oil persistence factors. Preference should be given to in-situ cleaning techniques such as in-place washing of rocky shores, use of shoreline cleaning agents, in-situ burning and bioremediation. Use of these techniques will minimize the amount of oily material collected and subsequent hauling requirements.

4) In general, heavily contaminated areas should be cleaned first so that bulk oil is not remobilized impacting Other areas:
    a. Stage 1: Removal of heavy contamination and floating oil
    b. Stage 2: Clean-up of moderate contamination, stranded oil and oiled beached materials.
    c. Stage 3: Clean-up of lightly contaminated shorelines and removal of oily stains.
5) Appropriate techniques to use will depend on the characteristics of both the area oiled and of the oil, but include:
    a. Natural recovery
    b. Low or high pressure ambient or warm water flushing
    c. Manual clean-up
    d. Mechanical removal, e.g. graders, scrapers, vacuum systems
    e. Sediment relocation
    f. Absorbents
    g. Washing
6) Following options for shoreline oil recovery and temporary storage will be considered:

a. Vacuum trucks

i. Vacuum trucks are a highly effective and rapid means of recovering and transporting liquid oil.
ii. They are most effective when there are large volumes of oil contained in a particular location, can be used to recover oil from land or water, but may be limited by difficult access to the spill areas.
iii. Vacuum skimmers should not to be used with volatile oil. Ideally a duckbill or manta ray skimmer head should be fitted to the suction nozzle as these provide the most efficient means of recovering a thin layer of oil.

b. Portable skimmers and pumps

i. Portable skimmers and pumps are used to collect small to moderate concentrations of oil, or to pump larger volumes from areas where trucks are unable to go.
ii. Hand held vacuum units are ideal for recovering oil that is floating on a very shallow layer of water.
iii. Weir Skimmers require calm, still water and are good for all low viscosity oils. Oleophilic skimmers can be used in 'choppy' water, recover 90% oil to water, and are good for low to medium viscosity oils.
iv. Oil should be pumped to a temporary storage location (tank, 55-gallon drums, pillow tanks, lined pit) which is safe, above flood levels, protected from rain, and sited to allow ease of access for future collection and transfer of the oil.

c. Manual recovery and sorbents

i. Sorbents are produced in a variety of forms (booms, pads, sweeps, snares, granules etc.) for use in specific locations and for specific types of oil spill clean-up.

ii. Sorbents are generally best used for absorbing minor spills of oil on hard surfaces, and for final clean-up of spills (e.g. helping to remove sheen or to wipe oily residue off solid objects).

d. Temporary storage

i. Fast tanks can be used for collecting recovered oil/water mixtures. Containers used for temporary storage must be tough and resistant to puncturing. Free-standing containers must be adequately strong to contain the weight of oil.

ii. Excavated pits may be used for storage and should be lined with heavy gauge plastic (PVC) sheeting to minimize soil contamination.

7) In the stage of final clean-up, the endpoint should be determined for each oiled site. Endpoints should be realistic and obtainable for the spill conditions.

RESPONSE OPS 6: WASTE MANAGEMENT

1) Oil spill response operations have the potential to generate liquid and solid wastes. The types and quantities of waste materials largely depends on the amount of oil that reaches the shoreline and on the specific clean-up methods employed.
2) Waste from an oil operation includes:
   a. recovered oily wastes
   b. non-oily materials generated from the operation and supporting activities
   c. materials contaminated with solvents, dispersants and fuels, gray water and unoiled wastes.
3) The types and volumes of waste generated by response activities are determined by the response objectives set during the spill management.

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Table.7.2: Techniques for Waste Disposal

Technique	Effect on waste stream	Type of Waste
At-sea response options	Recovery operations will give potentially rise to a large quantity of waste oil and water for treatment. The type of oil spilled will have an effect on resultant waste; in particular viscous and waxy oils will entrain debris and can create large volumes of waste. They can also	• Oiled equipment/ vessels/ PPE • Recovered oil/ oily water • Oiled vegetation • Oiled sorbent materials • Oiled flotsam and jetsam/ debris

	present severe handling difficulties.	• Animal carcasses
Dispersant Application	Waste concentrations are minimal as the oil is dispersed in the water column and allowed to biodegrade naturally.	• No hydrocarbon waste is generated • PPE • Empty dispersant drums/ considerations
Shoreline Clean up	The type of oil spilled will often have an effect on the amount of oily waste generated. Waste segregation and minimisation techniques are critical to ensure an efficient operation. These should be established at the initial recovery site and maintained right through to the final disposal site. Waste sites should be managed in such a way as to prevent secondary pollution.	• Oiled equipment/ vessels/ PPE • Animal carcasses • Recovered oil/ oily water • Oiled vegetation • Oiled sorbent materials • Oiled beach material • Oiled flotsam and jetsam/ debris

7.4 Media Briefing

Adani Ports and SEZ Limited, Mundra has designated staff that will interact with press, public, govt. and media briefing during emergency. The most important aspect of retaining the credibility of a company is to release the first press statement immediately after a major incident. As the news channels and print media are expected to react quickly to an incident for the purpose of "first reporting" and "breaking news", it is important to get prepared to issue the first press statement at the earliest possible moment. The EMT and CMT leaders shall coordinate with the site team to get as much information as possible to draft a press statement with the help of Public Affairs Coordinator. The information must be:

- Specific and accurate to the extent of the event at the time of reporting
- Activities currently hand to minimize and control
- Immediate projected plans for mitigation Information should not reflect any projections or perceptions of consequences or damage details (as they require assessment)
- No contradictory points in the statement
- Not attributing to a particular cause (as it would require investigations later)
- The key facts and messages to be included in further statements will be agreed between Group media, Business and country crisis Team leaders during conference calls.
- Group media will then distribute final statements to all crisis teams and other internal audiences as appropriate. NB: only final drafts should be used to minimize confusion.
- Additional useful facts on the specific crisis as well as relevant background information and generic Q and A's should be proactively sent to group media by Business and country communications colleagues as quickly as possible.

- Group media will disseminate agreed answers or statements on board questions areas being asked by the media. Business and country communications colleagues will ensure the necessary information is provided as quickly as possible.
- Group media will provide a synopsis of key issues in media coverage to all crisis teams Business and country communications colleagues will provide input as appropriate.

The draft statement prepared by the Public Affairs coordinator must be vetted by the EMT/ CMT Leader (as the case may be) and seen by the Head of Departments perspective before release. As the time is the essence of the effectiveness to deal with the media, all these actions must be parallel worked out with consultations among the leaders irrespective of their locations and timelines. The authorized personnel of Corporate Communication dept. shall release the statement through the applicable outlets (viz. print/ TV or web). The format of the press release statement is placed in "APPENDIX-12"

7.5 Planning Medium-Term Operations (24-, 48- And 72-Hours)

The likelihood of oil spill taking place are from two factors mostly, during vessel operations and secondly due to collision / grounding.

Since, during vessel operation, OSRO personnel as well as vessel staff present at the site, any spill taking place could be tackled immediately as response time will be less and spill damage control could be done quickly. Therefore, quantity of oil spilling into water is expected to be minimum and the spill could be controlled easily. In this case, dispersants, sorbents may be used and whole operation is likely not to last more than 24 hours. In fact, OSR items are kept handily in OSRV to use any time.

However, in case of oil spill occurring due to collision, it is certainly going to be at a higher magnitude. As, when the collision takes place, every body's attention is likely towards safety of the vessel i.e. to avoid vessel getting grounded, avoid colliding with other vessels, preventive actions against fire or carryout firefighting, damage control action against folding as soon. It is anticipated that in case of collision the oil spoil is likely to occur due to rupture of or crack in fuel tanks.

In case of rupture fuel tanks, a sudden gush of oils will be there, and for some time it would be incontrollable. By that time any effective damage control action is taken, a substantial amount of oil would have already gone overboard. This would necessitate immediate oil containment measures, as well as starting oil recovery action. This spill recovery action may go well beyond 48 hours, keeping weather and sea condition in mind, because one does not know at what time of

the Day or Night accident takes place which will determine the time delay in appreciation of the situation and mobilization of OSR team and equipment's. It may clearly be understood that appreciation of oil slick between sunset and sunrise is quite difficult and at times it may be fully incorrect, hence slight time delay may be anticipated.

Such incidents don't happen quite often, but very rarely. Hence regimes of OSR and equipment's shall be maintained at all times.

Ii The oil spill scenario through crude fuel tank / tanks is not very different than previous one, because due to cracked / fractions / material failure occurred in the fuel oil tank / tanks, oil would continue leaking in a small /moderate rate. But it would be difficult to locate the source / point of oil leak and by the time source / point of leak is detected, suitable action is initiated and leak is arrested, a sizable quantity of oil would have already been over board. Detection of oil leak will become more difficult if the crack / fracture develops after some time due collision realter structural stress and ship is secured alongside jetty with the damaged / leaking side situated between ships ode and jetty. The problem will become more compounded if the accident takes place after sunset during sever monsoon conditions and detection of oil slick in the night would be really quite difficult. Like above aerial (i) here also one cannot deploy OSR men and equipment's preciously and reaction time to deploy OSR men and equipment, subsequently recovery of spilled oil is going to take more or less the same time.

Here are the vessels taken on consideration are visiting ships of various sizes in all weathering conditions but not the minor vessels or tug boats

7.6 Deciding to Escalate to Response to Higher Tier

When the spill response action has been initiated by ECT and ERT has started the recovery action, spill incident reporting has been made to concerned authorities, and then if OSC feels that quantum of oil spilled appears to be much more than what was reported earlier and the oil spill needs to be re-assessed and deserves a higher response, he informs the same to ECT.

At this juncture, the OSC and members of ECT should re-inspect the spill site and assess the oil slick thickness, its size, status of spilled oil and decide accordingly. If ECT is convinced that spill report deserves upwards revision and the level of Tier Response needs to be raised, it should take necessary steps to raise the oil spill reporting level. This decision will help to initiate higher oil spill response activities as well as alert other neighboring agencies, with whom Adani Ports and SEZ Limited, Mundra has the MOU with oil companies, Coast Guard Authorities, Port authorities, Pollution Control Board, Hospitals, and other organizations.

The procedure of informing all concerned agencies / organizations of higher spilled oil threat perception remains the same. However, care is to be taken in spill assessment and giving exact quantum of oil spilled as large difference in quantity of spilled in water and oil recovered from water may not be interpreted in a correction fashion.

7.7 Mobilizing or Placing on Standby Resources Required

When the decision to raise the Tier level of oil spill has been/ is being taken, a review of Adani Ports and SEZ Limited, Mundra own spill response capability is also to be done simultaneously. Once it is felt that additional resources are required, the concerned agencies are to be alerted immediately, and mobilization action for those equipment/ items should be initiated without losing any time. It should be borne in mind that mobilization of resources from out stations is a time consuming and cumbersome exercise, therefore it should be calculated well before the anticipated arrival time of the Pollution Response Equipment on account of:

(i) Transportation time by rail/ road/ sea/ air.
(ii) Time taken by Custom/ Government formalities.
(iii) Time taken in loading/ unloading.
(iv) Availability of specialized loading / unloading machineries and accessories.
(v) Availability of suitable berthing facility for the craft intended to be used.

It is also very important to keep in mind as who is going to operate that pollution response equipment which are being mobilized. In case the equipment is coming with one set of man power, then from where their relief would come and in case only equipment is provided then, do we possess required trained manpower for operating this equipment? All such matters are to be deliberated upon in detail by the OSC and ECT together during operation/ exercise planning stage itself. Otherwise, it would be very difficult to mobilize desired manpower at the eleventh hour.

For obtaining additional equipment the local Oil Companies and nearby ports, with which Adani Ports and SEZ Limited, Mundra may have a contact, are to be contacted. Requirement of extra manpower to meet the requirement of running this equipment has to be thought off well in advance.

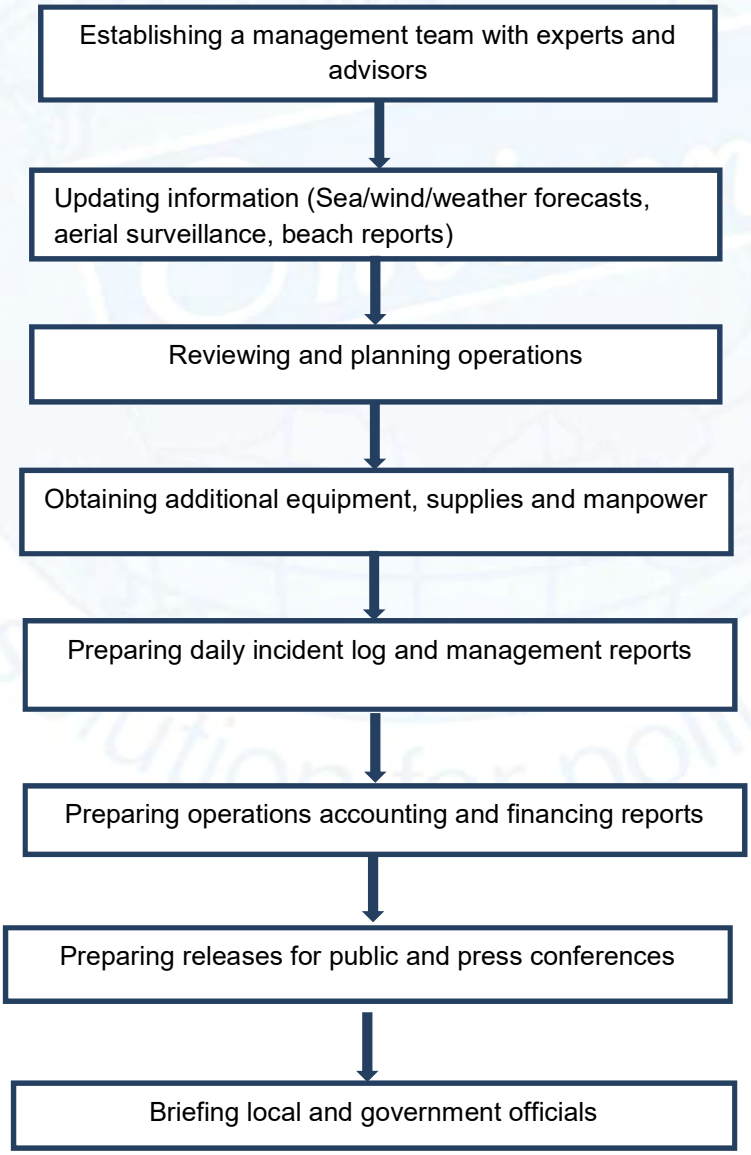
Adani Ports and SEZ Limited, Mundra has having all oil spill equipment readily placed nearby the ports, which can be mobilized at any eventuality. The Indian Coast guard is fully equipped and trained to deal with TIER II and TIER III spills.

7.8 Establishing field Command Post and Communications

The OSC will be equipped with portable VHF and mobile phone. The OSR team leaders would also be having hand held VHF sets (They can also be provided with mobile phones). Therefore, establishing filed command post is considered not necessary, unless the spill of large magnitude.

8. CONTROL OF OPERATIONS

Local control of operation will rest with Expert selected within the Adani (OSC) and work in the coordination with Indian Coast Guard and internal Port Administration expert groups (CMT). Security aspect of the pollution area should be considered and unauthorized persons gaining access to the area to be restricted. A safety zone (Exclusion Zone) of 500mtrs surrounding oil slick will be established to avoid hindrance in the oil spill cleaning process.



1) Once the response action mechanism is decided, the OSC will establish a response management team with experts and advisors who will support Adani Ports and SEZ Limited, Mundra with the response operations. The team will consist of wildlife and marine experts to provide inputs with respect to ecologically sensitive areas.

2) The OSC will maintain updated information on sea, wind and weather forecasts, aerial surveillance, beach reports, etc. to ensure smooth response operations. Ready reckoners will be maintained for reference by the response team. The response operations will be reviewed on ongoing basis by the OSC and ECT Leader and any changes in planning will be communicated to the response team.

3) If case additional equipment, supplies and manpower will be required for the response operations, the OSC will notify the ECT. The Logistics Controller will be responsible for ensuring that the resources reach the contaminated site at the earliest from the resource base.

4) Daily incident log and management reports will be prepared and maintained by the OSC till the spill is completely under control. Subsequent accounting and financing reports will also be developed and shared with the corporate ECT.

5) The CMT will be responsible for preparing releases for public and press conferences on the response operations. All local and government officials will be briefed on periodic basis under the spill is controlled and the shoreline clean up works are completed.

8.1 Establishing Management Team with Experts and Advisors

Incident management team comprises of well-trained high-level professionals, experts in the field. Adani Ports and SEZ Limited, Mundra has access to the national and internal special training related to oil spill response and emergency management. Adani Ports and SEZ Limited, Mundra has MOU with HMEL for supporting Oil Spill Response operation. For attending to spills of higher magnitude (Tier-2 and above) will inform Coast Guard and support for oil spill response Plan.

The OSR have a stock of equipment available at their Base which is ready on round the clock basis for mobilization on an authorized call from the members. A list of APSEZL Advisor Committee is

1. COO 2. HOD-Marine 3. HOS-Marine 4. Duty Port Captain.

8.2 Updating information (Sea/ Wind/ Weather Forecasts, Aerial Surveillance, Beach Reports)

The Marine Control (MMPT) is entrusted the responsibility of providing initial information of area pertaining to wind direction & speed, water current, tide position at the time of oil spill, high water & low water timings, sea condition, swell and wave heights, weather forecasts & existing weather warning, navigational warnings, any Coast Guard in contact, any other relevant information

available. All this information is to be provided to ECR automatically the moment information about the oil spill is received.

All this information is to be automatically updated as and when they are received. In addition, regular inputs on the state of coastal areas are to be obtained from local sources.

8.3 Reviewing and Planning Operations

The ongoing operations will be assessed and reviewed as, when the ECT considers it necessary or suggested by OSC. This is necessary to upgrade the level of operations or scale down the operations due to different prevailing factors. Review of operations is an ongoing process and accordingly the planning is to be reoriented to maximize the utilization of men and machinery without compromising on safety of both. Here operational rest to men and machinery should also be kept in mind, because response teams can be rotated at regular intervals but continuous running machinery also needs rest after certain stipulated continuous running hours.

8.4 Obtaining additional Equipment, Supplies and Manpower

Logistic support is one of the key functions of ECT, which work under Logistic Department of Adani Ports and SEZ Limited, Mundra, which provides and maintains personnel, materials, facilities and services as and when required by EMT. The assignment of any member of the ECT to a function will be made by OSC, of substitute, taking in consideration the sponsor competencies available at any time at site and the type of incident. These assignments will be likely to change during the action as and when additional staff becomes available. The ECT may contact any other staff and in case they are reachable, request their involvement in incident Management activities at site or elsewhere.

In the event of an ongoing spill or a spill that requires declaring of Tier 2 or 3 responses, the additional equipment and manpower held with any other OSRO or facility will be sourced in an accelerating manner including resourcing from the National / international spill handling companies. Contact details of companies holding equipment in India and International OSROs are listed below.

LIST OF ADDITIONAL RESOURCES AND INTERNATIONAL OSROs

1. **Australian Marine Oil Spill Centre**

   PO Box 305
   Victoria 3214
   Australia
   Tel + 61 3 5272 1555 Fax + 61 3 5272 1839
   Mail: amose@amosc.com.au
   Web: http://www.aip.com.au

2. **Fast Oil Spill Team**

   C/o PIM 40 G 23 Tour Elf
   92078 Paris- La Defense Cedex France
   Tel: + 33 1 4744 5636
   Fax : + 33 1 4744 2677
   Mail : giefost@club-internet.fr

3. **Oil Spill Response Ltd**

   Oil Spill Services Centre
   Lower William Street Northam
   Southampton SOI 1 QE, UK
   Tel: + 44 1703 331 551 Fax: + 44 1703 331 972
   Mail: osrl@osrl.co.uk
   Web: http://www.oilsillresponse.com

4. **Petroleum association of Japan**

   Oil Spill response Department Keidanren Building
   9-4, 1 – Chome, Ohtemachi Chiyoda- Ku,
   Tokyo 100, Japan
   Tel: + 81 3 3279 3819
   Fax: + 81 3 3242 5688
   Mail: mail@pcs.gr.ip
   Web : http://www.pcs.gr.ip

8.5 Preparing Daily Incident Log and Management Reports

OSR is overall in-charge of operations, he will delegate suitable and available persons to carry out the above function. Log sheets are to be filled for running of all operations and equipment as early as possible, since filling it later increases the chances of vital information getting missed. However at the end of the day, preferably time ending at 20:00 hours starting from 20:01 hours of the previous day, (or it may be from 08:01 hours to 08:00 hours of the previous day) a Daily Summery of events is to be prepared and submitted to the leader of ECT, who in turn would prepare the report consulting all the members of the ECT and forward it to management.

This report should cover following details as minimum:

(a) Manpower deployed
(b) Equipment deployed
(c) Weather conditions encountered
(d) Amount of oil recovered from sea
(e) Amount of oil transferred for storage & disposal
(f) Progress on shore cleaning efforts (as the case may be)
(g) Difficulties encountered
(h) Lessons learnt

The details of log sheet to mention action taken daily and observations made is furnished in **"APPENDIX-5"**

8.6 Preparing Operations Accounting and Financing Reports

ECT Leader is overall in charge of operation. It will be financial responsibility to prepare accounting and financing report. Claims should be based on expenses actually incurred that these are made as a direct expense of an incident and that the expense incurred are reasonable. The following aspects are to be considered while assessing cost of an oil spill combating, operating and prepare of claims:

a) Delineation of the area affected describing the extent of pollution and identifying the most heavily contaminated. This may be best presented as a map or chart accompanied with photographs.
b) Summary of events including a description of work carried out in different areas and the working methods chosen in relation to the circumstantial evidence linking as pollution with the ship involved in the incident (e.g. chemical analysis).
c) Labour costs (numbers and categories of workers, rates of pay days, hours worked, total Costs etc.).
d) Data on which work was carried out (daily or weekly costs).
e) Material costs (consumable materials, utilized fuel, food shelter facilities, etc.).
f) Finance shall assist ECT Leader in (preparing /scrutinizing) settling claims under the Guidance of CFO.

8.7 Preparing Releases for Public and Press Conferences

Information to media is to be release by the person identified through respective Media policy of the Organization. In the event of non-authorization of any one person, the Media release will be made by person nominated by him after authorization of the Organization.

The daily report of actions taken on a particular day as prepared by COC and OSC is to be shared with the person nominated to brief the media. Each press brief is too cleared by authorized person prior being provided to media.

While, providing factual details and information to media assists in passing the situation reports to public likely to be affected by a spill, it is advisable not to sensualize information with unwanted figures or actions that could shock or distress the public.

Most of the factual information like precautions required by public to be taken with respect to fishing activity, closure of beaches, demand for beach cleaning volunteers could be disseminated through media.

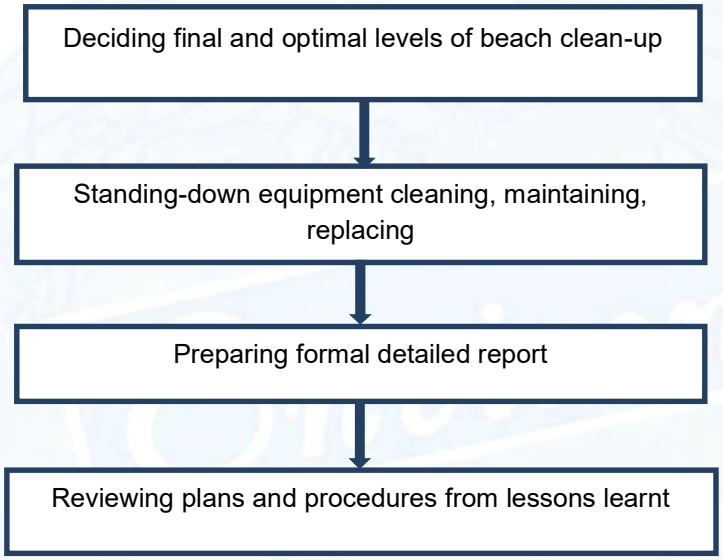
8.8 Briefing Local and Government Officials

Port has designated staff who will interact with press, public, Govt. and media briefing the details of emergency after clearance from ECT. In case of oil spill designation will be addressed to Incident Commander for managing the Media some of the General Guidelines that need to be followed:

- Ensure that in all communication care for Human Life and welfare is demonstrated Above everything else;
- Provider as much information as possible based upon facts only and refrain from Assigning any cause or speculation towards the incident;
- In case a suitable reply cannot be framed for the caller taker a number and offer to call back later or transfer to an individual who would be able to answer;
- Avoid any comments or statement that could be constructed as anger or distaste for a person or persons or any particular policy;
- Treat the media with respect – they need to be on our side.
- Be precise and to the point.
- Ensure that the Media is aware that they would be able to get accurate information only from the Company and that they would like the facts to be known.
- Anticipate in advance what queries may come and be prepared.
- The ECT or any other authorized personnel, must issue press releases and statements only.
- Ensure that relatives are advised prior to the names of any personnel being made public.
- Prior to the Next of Kin being informed by the police DO NOT release the names of any casualties to next of kin, the press or the public.

9. TERMINATION OF OPERATIONS

9.1 Termination of response operations



1) After obtaining the mutually agreed & desired outcome of the spill operations, the response operations will be terminated. A post spill evaluation will be conducted. The final and optimal levels of beach clean-up will be decided and recorded.

2) All the equipment used for the spill response operations will be cleaned and maintained accordingly. An inventory of items that has been consumed will be prepared and list of supplies that need to be replaced will be made.

3) The OSC in consultation with the CMT Leader and onsite response team will prepare a formal detailed report including the details of the spill, actions taken, levels of clean up, etc. The report will be used for internal reference purpose within the organization. The current OSCP and related procedures will be reviewed and updated based on lessons learnt.

9.2 Deciding final and optimal level of Beach Clean-up

The coastal stretches of Gulf of Kutch are varied in terms of biologically, industrially and socio-economically sensitive. The coast also having large stretches of Mangroves with mud flats. The tidal flats will be exposed during low tide conditions and currents are stronger during flood and ebb in the central channel. Hence, the hydrological features of the estuary will influence the distribution / spread of spilled oil and rapidly moves towards the coastal stretches.

The cleaning up of shoreline beaches are the most important in view of public interventions. Since, the clean-up of shoreline is very tedious and complex in execution alone, Adani Ports and SEZ Limited, Mundra will coordinate the local administration, to involve local authorities (e.g. PCB and other civic bodies) in decision making process.

It would always be borne in mind that while in effort to clean up it should not end up doing more harm than good. It will be also be prudent to seek the advice of ecology experts from State Pollution Control Board and from other authorities/ agencies i.e. Indian Coast Guard, Central Pollution Control Board, State Forest and Fisheries department officials.

NEBA (Net Environmental Benefit Analysis) shall be taken into account deciding on selecting the best response option or optimal clean-up of beaches, Mangroves and other environmentally sensitive locations. Inspect segments/ section of shoreline that Clean-up Operations team declare ready for sign-off before final approval. Some stretches are required booms for protections of Adani Ports, SEZ Limited Mundra and marine sensitive area along the Gulf of Kutch.

Responsibility: Shoreline Assessment Team.

Methods:

- Operations notify the Shoreline Assessment Team Coordinator that a segment is ready for inspection.
- Inspect the segment against agreed-upon clean-up endpoints (preferably using the same team that did the original survey). The original field sketch can be very helpful for evaluating effectiveness of the clean-up.
- Identify additional clean-up needed using standard shoreline assessment terminology forms and sketches, or develop special forms for this purpose
- Recommend segment for final inspection.
- Recommend any longer-term monitoring or iterative procedures needed.

9.3 Standing-down equipment, cleaning, maintaining, replacing

It is important to remember that emergencies can be immediately followed by another one, hence it is of utmost importance to maintain the inventory of equipment. Hence, used equipment will be cleaned and maintained, if required to be replaced at the earliest. It will be the direct responsibility of the operators of the equipment to restore after the operations. All the spill equipment and machines are to be cleaned as per the OEM's guidelines, necessary maintenance to be carried out and then equipment stored in in their respective places.

9.4 Preparing formal Detailed Report

After the operations are complete, the OSC is to be prepare the detailed report covering all the aspects of the oil spill cleanup, which will include success and failures as well as per the prescribed format. The report contains all detailed elements of incidents, including daily actions, response and Communication, parties involved, equipment used also containing financial and strategy report summary. The report is to be forwarded to HOD-Marine for submission to CMT.

9.5 Reviewing Plans and Procedures from Lessons Learnt

A detailed and comprehensive review of plans will be carried out in the light of the incident will immensely help in improving standards of safety quality of response and quickness of the response. A through debriefing, brain storming and lesson learning session will be held under the guidance of CMT Leader. The report received from IC/OSC and gives its recommendations to the CMT of port administration for further action.

9.6 Investigation

Every oil pollution incidence is followed by investigation both by the Port as well as Nodal agencies in order to assist such investigations complete and accurate records, as specified below, shall be maintained

1. Certificates and records of equipment issued by regulatory authorities.
2. Log Book showing weather and details of the incidents.
3. Chronological record of loading / discharging bunkering including agreed plans of such loading/ discharging/ bunkering.
4. Brief report on spill including: i) Time, ii) Location, iii) Cause and, iv) Type of oil.
5. Samples of spilled oil shall be taken as per procedures described.
6. Estimate of amount spilled and the process of such estimation
7. Copies of notification & update reports
8. Record relating to direction and rate of spread
9. Weather reports and recorded weather in log book and
10. Where possible photographic evidence shall also be collected. Such photograph records shall be identified with date, time and location.

Where any original evidence is demanded by Nodal Authorities, photocopies of such evidence be retained and the concerned authority shall request to certify the same as true copy of the original.

10. DATA DIRECTORY

10.1 MAPS/CHARTS

10.1.1 Coastal facilities, Access roads, Telephones, Hotels, etc.

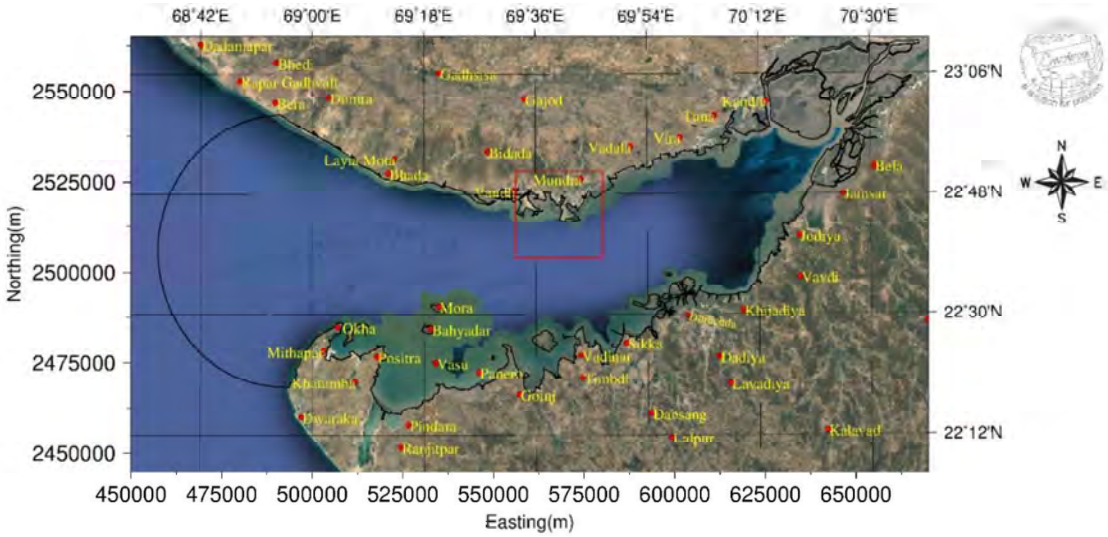


Fig.10.1 Google Map showing Adani Port & SEZ facilities in the Mundra region

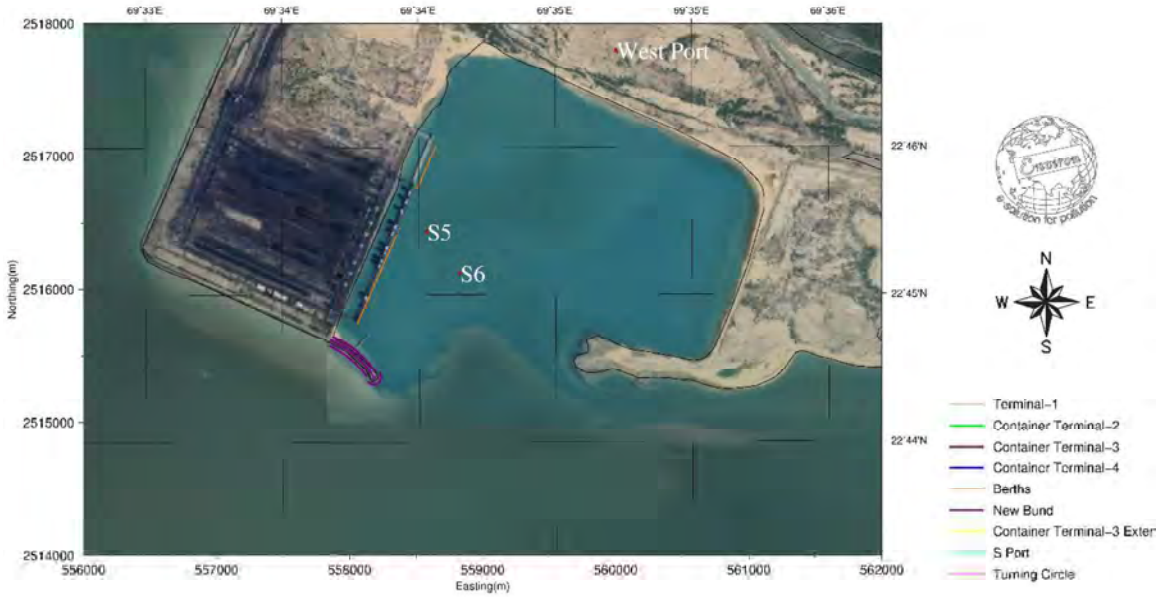


Fig.10.1(a) Google Map showing Adani West Port facilities in the Mundra region

Fig.10.1(b) Google Map showing Adani south Port facilities in the Mundra region

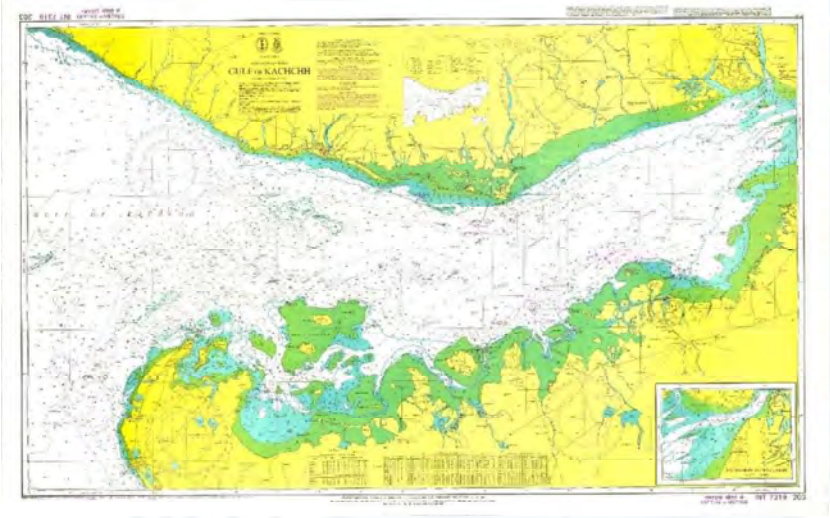


Fig.10.2 NHO Chart Showing Mundra region, Gulf of Kutch

Table.10.1 Contact Details of Spill Information Center

Sl No	Address of Centre	Contact Details
1	Indian Coast Guard Headquarters. National Stadium Complex Coast Guard DHQ -1(GJ). Near RGT College ... Okha Port, Gujarat – 361 350	Tel: 02892 263421. Fax: 0-22 24333727
2	Indian Coast Guard Headquarters. CP25+RRF, Vadinar, Gujarat 361010	Tel: 0-22 – 24222696 Fax: 0 – 22 - 24222696
	Indian Coast Guard Headquarters. gh-4 garden, udhyog bhavan, Sector 11, Gandhinagar, Gujarat 382011	

Table.10.2 Contact Details of District Administrative Authorities

Place Name	Address of Centre	Contact Details
Bhuj (Kutch)	District Collector Office Near Circuit House, Mandvi Road, Nr. Mota Bandh, Bhuj (Kachchh) Gujarat – 370001	Phone: +91 2832 250650 Fax: +91 2832 250430 Email: collector-kut@gujarat.gov.in
Jamnagar	District Collector Office, Jilla Seva Sadan, Sharu Section Road, Jamnagar - 361002	Collector, Jamnagar • +91 288 2555869 • +91 288 2555899 • collector-jam@gujarat.gov.in
Khambhalia	District Collector Office 1st Floor, Lalpur Bypass Road, Dharampur, Khambhalia, Gujarat - 361305	91 2833 232805 +91 2833 232102 collector-devbdwarka@gujarat.gov.in

Table.10.3 Contact Details of Gujarat Fisheries Development Council

Sl No.	Address of Centre	Contact Details
1	Commissioner of Fisheries 3rd Floor, Block no-10, Jivraj Mehta Bhavan, Gandhinagar, Gujarat 382010	Phone No: -079- 232-53729 Fax No:- 079-232-53730

Table.10..4 State Pollution Control Board – Regional Offices

	Address of Centre	Contact Details
Gandhi nagar	**Gujarat Pollution Control Board** Paryavaran Bhavan, Sector-10A, Gandhinagar-382010.	**Phone:** (079) 2323 2152 **Fax :** (079) 2323 2156, 2322 2784, 2323 2161 gpcbchairman@gmail.com, chairman-gpcb@gujarat.gov.in **Member Secretary**:
Morbi	Regional Center RR4F+6P7, Scientific Vadi, Sardar Nagar, Morbi, Gujarat 363641	Tel : 02822 228 001
Jamnagar	Regional Center Sardar Patel Commercial Complex, Rameshwar Nagar regional centre Kasturba Gandhi Vikas Gruh Marg, Bedi Bandar Road Jamnagar- 361 008	**Telephone** (0288) 2752366 **Fax:** (0288) 2753540 **Email:** ro-gpcb-jamn@gujarat.gov.in
Bhuj	Regional Centre Katira Commerical Complex-1, Nr.Manglam 4 Rasta,Sanskar Nagar, Nr.I.Tax Ofic,Bhuj 370001	**Telephone: (02832) 250620** **Fax: -** **Email:** ro-gpcb-kutw@gujarat.gov.in

10.1.2 Coastal Charts, Currents, Tidal Information Prevailing Winds

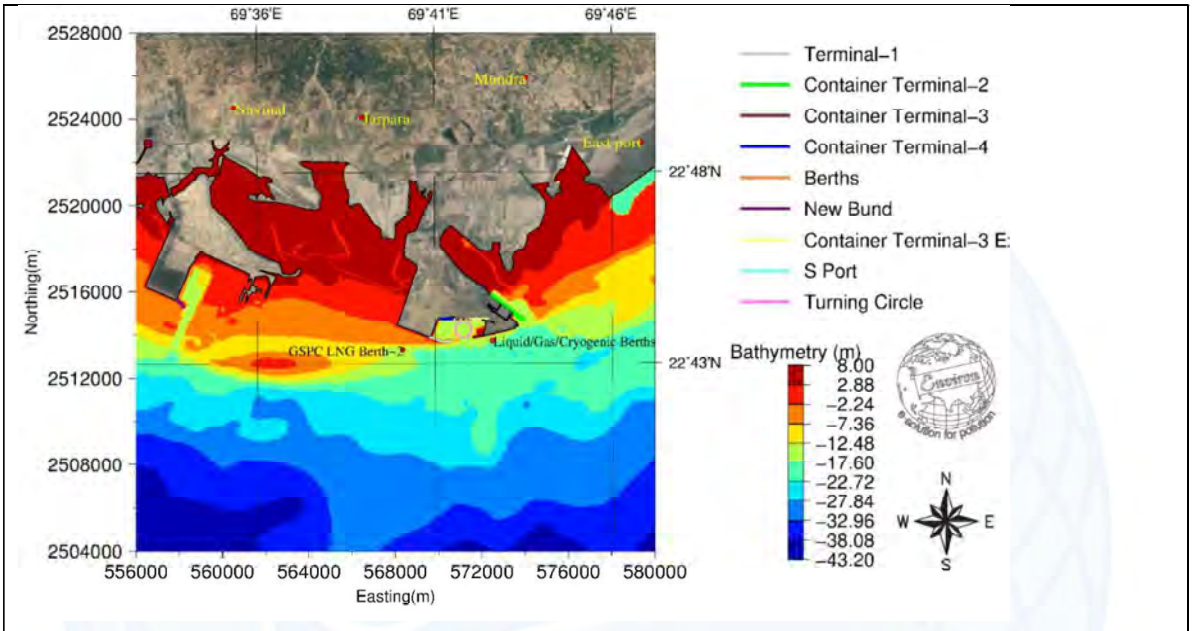


Fig.10.3 Map showing interpolated bathymetry of Adani Ports and surrounding areas.

Tide and Current information

Tide:

The tidal planes were assessed and 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.

Table: Tidal information at Mundra

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 Kachchh 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 (ºN)	Return Period (years)	Inshore Direction (ºN)	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

Cyclones

Cyclonic disturbances strike North-Gujarat, particularly the Kachchh and Saurashtra regions, periodically. These disturbances generally originate over the Arabian Sea. 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 northeast to strike Gujarat-north Mekran coast.

Wind

There are strong winds at times at Mundra Port. The wind directions are shown in Figure 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. 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.

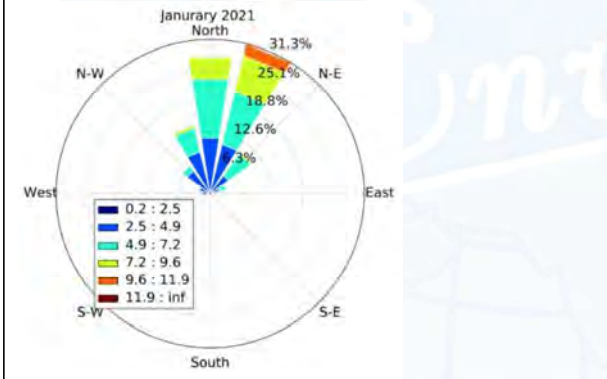


Fig.10.4(a) Wind Rose diagram for Pre-monsoon in 2021

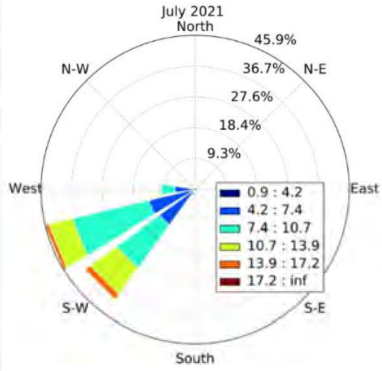


Fig.10.4(b) Wind Rose diagram for Monsoon in 2021

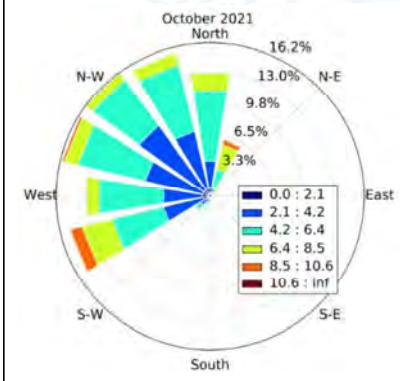


Fig.10.4© Wind Rose diagram for Post-monsoon season in 2021

Rainfall:

The climate of the region has a regular seasonal variation determined by the occurrence of 2 Annual monsoons. The southwest monsoon period extends from June to September. November

to March is the period for the North East monsoon. Most of the Annual rainfall occurs during the south west monsoon, the average monthly rainfall being about 45 cm. The average annual rainfall over 20 years is 193 cm.

Humidity & Temperature:

Relative humidity ranges from 61% to 87% being the highest in the monsoon period. During the winter months (Nov-Jan) relative humidity ranges from 61% to 72%. Mean daily temperature ranges from 24 Degrees C to 33 Degrees C except during the winter period when the minimum temperature may fall to about 19 Degrees. The hotter months are March, April, May and June.

10.1.3 Risk Locations and probable Fate of Oil

As with any oil transportation, oil spill risks are associated with Adani port operations. They may vary from a few litres of accidental spill of crude oil / Fuel Oil from offshore vessels to several thousands of tons of oil during collision / grounding situations. In line with the standard industry practice, APSEZL, Mundra is also prepared to mitigate spills of importance from routine operations (Tier-1), while oil spill situations of higher magnitude are dealt with industry co-operation and external intervention. However, it is required to have a fair understanding of the risks and probability of spills arising out of its operations and their consequences due to movement and landing along the coast.

The operations of APSEZL, Mundra are broadly defined under the following:

- Vessel operations- loading / unloading
- Vessel collision, or grounding
- Bunker/ fuelling operations
- Vessel distress / sinking
- Pipeline ruptures /accidental spills from sub-sea/over the sea/shore approach (in the tidal zone) pipelines
- Rupture of export line

The exact quantity of spill from each of the above incident is difficult to predict due to the variables of operating conditions and the length of risk exposure. Maximum risks associated with the events may be considered while devising the oil spill contingency plan. The spill scenarios 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. The software is intended to use for specific scenarios, through a few hypothetical simulations are made in this report considering the worst-case scenarios.

Instantaneous spills (Ref. Fig.11.5)

- Crude oil spill of 700t at selected SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Fuel oil spill of 700t at selected West Port(S5), Vessel route(S7), LNG Jetty(S8), South basin (S9), Mundra Ports(S11), MICT/AMCT(S12)
- Crude oil spill of 10000t at SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Crude oil spill of 25000t at SPM-HMEL(S1), SPM-IOCL(S2), VLCC Jetty (S15)
- Fuel oil spill of 100t at selected West Port (S5, S6), LNG Jetty(S8), South basin (S9,S10), Mundra Ports(S11), MICT/AMCT(S12)
- HSD oil spill of 50t at selected West Port(S5), LNG Jetty(S8), South basin (S9), Mundra Ports(S11)
- HSD oil spill of 20t at selected West Port(S6), South basin (S10)

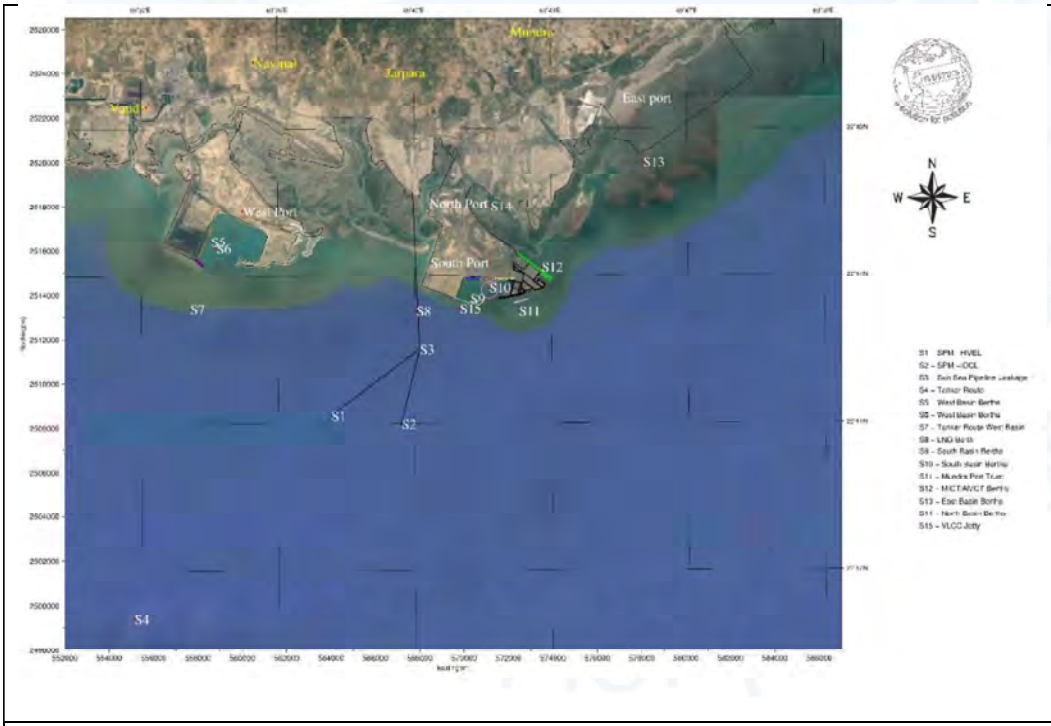


Fig.10.5 Spill Locations considered in APSEZL Mundra region

Continuous spills (Ref. Fig.11.5)

- Crude oil spill of 10000 m3/hr for 60 sec at selected SPM-HMEL(S1), SPM-IOCL(S2)
- Crude oil spill of 10000 m3/hr for 60 at selected VLCC Jetty (S15)
- Crude oil spill of 10000 m3/hr for 60 sec at sub-sea pipeline route (S3)

The spill scenarios 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 the magnitude of impact zone and the quantity involved in such impacts.

Detailed Maps and charts for all spill scenarios including probable fate of oil are discussed extensively in PART-B of the report (PART-B: OIL SPILL FATE AND TRAJECTORY MODELING STUDIES)

The following are the risk locations in the Harbour zones of APSEZL, Mundra

- RIL Ports & Terminals, New Bedi Port, Essar Jetties in southern side of Gulf
- Bedi Port, Kalubar Tapu, mora island, Narara Reff, Pirotan Island
- Vadinar Oil Terminal, Borl, Mandvi Beach, Modhva Beach, Tata power Limited (CGPL) intake and outfalls, Adani West Port, Adani South Port, Tuna Port, Kandla Ports, BTC Port Navlakhi
- Sikka coast
- Adani Ports (South, East, West and North)

10.1.4 Sensitivity Area Mapping of Gulf of Kutch

The coast of Gulf of Kutch has tidal flats, mangroves and sand bars etc (Fig.11.6). There is a need to protect the ecosystem and marine environment during the oil handling activities.

The resources likely to be threatened discussed in the PART-C of the Report:

The coastal areas of Gulf of Kutch coast abound in marine wealth and industrial activities. It is endowed with a great diversity of natural ecosystems, of which the major systems are salt pans, intertidal zones, sand dunes, mangroves, creeks and Open Ocean. Vulnerability index of shores in order of increasing vulnerability to oil spill damages as per Gundlach and Hayes 1978.

SENSITIVE AREAS

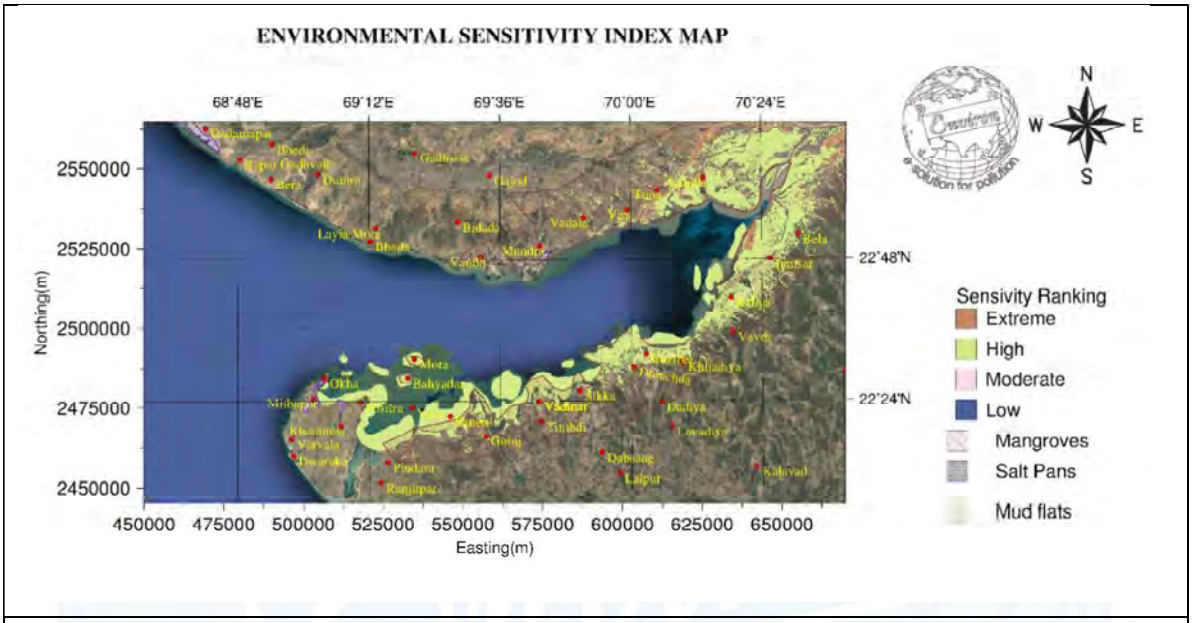


Fig.10.6 Sensitivity Index Mapping for coast of Gulf of Kutch

10.1.5 Sea Zones and Response Strategies

Sea zones can be classified based on depth of water i.e. deep water and shallow water zones. The response strategy will be different for different sea zones. The response options i.e. dispersant and burning can be done for deep water zones where there are not much marine life and the same response options cannot be used for shallow water since the marine activities will be exist along the coasts.

Response strategy for sea zones has been discussed in section 3.3

10.1.6 Coastal

Response strategy for coastal zones has been discussed in section 3.5

10.1.7 Shoreline zones and clean-up strategies

A number of shoreline response strategies are available as per table below, but shorelines should be assessed so see whether these are suitable. This will depend on:

- Rate and likelihood of natural cleaning
- Access for personnel and machinery

- Nature and distribution of the Oil/HNS
- Shoreline character
- Availability of personnel and machinery
- Safety issues
- Environmental sensitivity to Oil/HNS and cleanup methods

Table 10.5: Application of techniques to different shoreline types

	PRIMAY CLEANUP				
	Pumping / skimming	**Mechanical removal**	**Manual removal**	**Natural recovery**	**Comments**
Rocks, Boulders and Artificial structures	V	NA	V	+	Poor access may prevents pumping /skimming. Exposed/ remote shorelines best left to natural recovery
Cobbles, Pebbles and shingle	V	X	V	+	Exposed / remote Shorelines best left to natural recovery
Sand	V	+	V	+	Heavy equipment only applicable on firm beaches
Mud flats marshes and mangroves	+	X	+	V	Operation preferably carried out on the water from small, shallow drought vessels.

	FINAL CLEANUP						
	Low pressure flushing	**High Pressure washing/Sand**	**Dispersants**	**Natural organic sorbents**	**Batch recovery**	**Natural recovery**	**Comments**
Rocks, Boulders and Artificial structures	NA	V	+	+	NA	V	Avoid excessive abrasion of rocks/artificial structures. Cleanup of boulders difficult and often gives poor results.
Cobbles, Pebbles and shingle	V	X	+	+	+	+	If load bearing character good, consider pushing oiled material to surf zone to enhance natural recovery

Sand	V	X	+	NA	+	+	Solid oil can be recovered using beach cleaning machines. Enhance natural recovery by ploughing/harrowing
Mud flats marshes and mangroves	+	X	X	+	NA	V	Operations should preferably be carried out on the water from small, shallow-drought vessels.

V : Viable + = Possibly useful X = Not recommended NA : Not Applicable

10.1.8 Oil and Waste storage disposal sites

An efficient and monitored disposal of waste includes immediate classification, segregation, packing and labelling source.

	Packaging	Storage Capacity$_{(m3)}$
ON WATER	On board Storage	100 to >1,000
	Barges	10 to 10000
	Flexible / towards bladders or tanks	500 to 15000
SHORELINE	Plastic bags or sacks	0.25 to 15,000
	Super sacks	0.5 to 2.5
	Barrels or drums	~0.2
	Portable tanks	1 to 5
	Skips or dumpsters	10 to 40
	Lined pits	Up to 200
	Vacuum trucks	7.5 to 20

WASTE DISPOSAL OPTIONS

WASTE	PRIMARY OPTION	SECONDARY OPTION	ALTERNATE OPTION
Fresh Oil	Refining	Fuel blending	Ex-Situ burning
Weathered	Fuel blending	Land Treatment	Landfill
Emulsions	Fuel Blending	Land Treatment	Landfill
Hydraulic Fuels	Refining		
Oil debris	Incineration	Open burning	Landfill
Oily PPE	Incineration	Landfill	

Oily Sand / Gravel	Ex-situ burning	Land treatment	Landfill
Oily sorbents	Fuel blending	Incineration	Landfill
Oily Wastewater	Electrocoagulation treatment		
Animal car cases	For research	Incineration	
Domesticc waste	Incineration	Landfill	
Non oily debris	Incineration	Landfill	
Pallets	Recycle/reuse	Open burning	Landfill
Paper board	Recycle/reuse	Open burning	Landfill
Drums	Recycle/reuse	Landfill	
Hazardous wastes	Social handling storage treatment		

Table 10.6: Approved Waste Handling Contractors:

Sl. No.	Name	Waste Permitted and Quantity allowed
1	M/s. Daya Lubricants Pvt. Ltd. Bldg. No. 11, Waliv Phata, Prime Industrial Estate, Sativali Road, Village Valiv Phata, Vasai (E), Thane 401208	Used Oil 3000 KLA Waste Oil 14400 KLA
2	M/s. North East Lubrica Pvt. Ltd. S. No. 404, Abitghar, Tal- Vada, Dist. Thane – 421 303	Used Oil 9000 KLA Waste Oil 9000 KLA
3	M/s. Deepak & Company B 20, Road No. 16, Wagle Industrial Estate, Thane – 400 604	Used Oil 18500 KLA
4	M/s. Tax Oil Lubricants Pvt. Ltd. R-591, MIDC Industrial Area, Rabale, Navi Mumbai – 400 701	Waste Oil 12960
5	Chemicals Pvt. Ltd. Plot No. A-10, MIDC Industrial Area, Ambernath, Dis. Thane	Used Oil 6000 KLA Waste Oil 8550 KLA
6	M/s. Meghani Enterprises H-14, Shah & Diwan Industrial Complex, Udyognagar Chintupada, Mahim Village, Palghar, Dist. Thane	Used Oil 4500 KLA
7	M/s. Al Ali Mohammed Industrial Sr. No. 57-1/2, Village Ghatesh Khurd Khanivali Road, Tal- Wada, Dist – Thane - 421303	Used Oil 6000 KLA Waste Oil 18000 KLA
8	M/s. Tribo Lubes Pvt. Ltd. Takai Adoshi Road, Village Honad, Post- Saigaon Survey No. 13/7A, 14/3, 15/16, Tal – Khalapur, Dist – Raigad	Used Oil 7500 KLA Waste Oil 9000 KLA
9	M/s. Spear Petroleum Pvt. Ltd. 152, A, 15th Floor Maker Chamber No. III, Nariman Point, Mumbai – 400 021	Waste Oil 11000 KLA

10	M/s. Balaji Rang Udyog Pvt. Ltd. Plot No. 44, MIDC Taloja Industrial Area Taloja, 410 208 Dist. Raigad	Waste Oil 15000 KLA
11	M/s. Shiva Petrochem Synth Specialists Ltd. Plot No. 2/3, Shah & Divan Indl Area, Opp. BIDCO Studio, Vill – Mahim, Palghar, Dist. Thane	Used Oil 10800 KLA

10.1.9 Sensitive Maps / Atlas

Environmental Sensitive Maps has been prepared based on available data of environmental, biological and industrial sensitive areas of various seasons covering the entire coast of Gulf of Kutch and Adani port regions. The study covers the region between longitudes of 68°E and 71°E and the latitudes of 22°N and 23°N. The sensitivity map as shown in Fig.11.6.

The detailed description of mapping of sensitive areas has been discussed in Part-C of report (**PART-C: OF THE OSCP**)

10.2 LISTS

10.2.1 Primary oil spill equipment

Table 10.7: LIST OF OSR EQUIPMENT/ITEMS AT Adani Ports & SEZL

SL No	Description of Resources	Qty
1	Canadine fence boom (reel model 7296/8496 with power pack,towing bridles and tow lines-235 meter)	1 no
2	Power pack with boom reel with hydraulic hoses	2no
3	Power pack-20kv with boom reel with hydraulic hoses	2no
4	Lamor side collector system (recovery capacity 123 m^3 /hr (side collector LSC-3C/2300(01C02-P536). Oil transfer pump OT A 50 with oil transfer hose set	2no 2sets
5	Lamor minimax 12m3 skimmer	2sets
6	Power pack for skimmers with hydraulic hoses	4no
7	Power pack -20 KV for skimmers with hydraulic hoses	1no
8	Floating tank(25m3)	1no
9	Foot pumps for floating tank	6no
10	Oil spill dispersants	5000ltr
11	Portable dispersant storage tank: 1000 ltr capacity	1no

12	Portable pumps	2no
13	Two -way hydraulic maneuvering panel	2no
14	Oil containment boom -length 2000 meters, height-1500 mm, draft-900mm, free board-600mm	2000 mtr
15	Current buster room -fasflo-75 (for response in fast current)	2no
16	Skimmer -KOMARA 15 duplex skimmer system with floating IMP 6 PUMP	4no
17	12.5T flexible floating storage tank (PUA).	3no
18	Diesel driven transfer pump for flex barge	2no
19	Site hose kit for the transfer pump for flex barge	2no
20	3" and 2" hose adaptor for transfer pump and hose	2no
21	Shoreline cleanup equipment	
22	Mini vac system	5no
23	OSD applicator =oil dispersant spry unit (20 ltr) for use on beach and inter tidal zones	2no
24	Startank with capacity 1000 liter(10m3)	2no
25	Sorbent boom pack (12.5cm*4m)	500 mtr
26	Sorbent pad	2000 nos

In the event of oil spill, Traffic, Mechanical as well as Civil department of APSEZL Mundra shall provide required facility with regard to catering, housing, transportation, field sanitation and shelter etc

Additional support equipment's shall be hired as per requirement by emergency coordinator and Mumbai Port will be delegated this duty.

10.2.2 Sources of manpower

Sources of Manpower:

The following are the sources of manpower to combat any oil spill incident in APSEZL, Mundra:

A. OSR Manpower
B. Adani Port Fire Department
C. Adani Port Employees and Workers
D. Adani Crisis Management Team
E. Volunteers from Colleges and Other Maritime Collegs near to shore.

A: OSR Manpower:

MANPOWER		
1	IMO Level 3	3
2.	IMO Level 2	1
3.	IMO Level 1	24
4.	Other	

1. Adani Ports SEZ Limited, Mundra:

DESIGNATION	APPOINTED MEMBER
Chief Incident Controller (C IC)	Head-Marine
Commander	HOS Marine & DPC
Member Admin & Finance	Head Admin and Head Finance
Member HSE & Media	Head HSE and Head Corporate
Member legal	Head Legal
Member Tech	Head ES

2. DISTRICT ADMINISTRATION

Place Name	Address of Centre	Contact Details
Bhuj (Kutch)	**District Collector Office** Near Circuit House, Mandvi Road, Nr. Mota Bandh, Bhuj (Kachchh) Gujarat – 370001	Phone: +91 2832 250650 Fax: +91 2832 250430 Email: collector-kut@gujarat.gov.in
Jamnagar	District Collector Office, Jilla Seva Sadan, Sharu Section Road, Jamnagar - 361002	Collector, Jamnagar • +91 288 2555869 • +91 288 2555899 • collector-jam@gujarat.gov.in
Khambhalia	District Collector Office 1st Floor, Lalpur Bypass Road, Dharampur, Khambhalia, Gujarat - 361305	91 2833 232805 +91 2833 232102 collector-devbdwarka@gujarat.gov.in

Contact Details of Gujarat Fisheries Development Council

Sl No.	Address of Centre	Contact Details
1	Commissioner Of Fisheries 3rd Floor, Block no-10, Jivraj Mehta Bhavan, Gandhinagar, Gujarat 382010	Phone No: -079- 232-53729 Fax No:- 079-232-53730

State Pollution Control Board – Regional Offices

	Address of Centre	Contact Details
Gandhi nagar	**Gujarat Pollution Control Board** Paryavaran Bhavan, Sector-10A, Gandhinagar-382010.	**Phone :** (079) 2323 2152 **Fax :** (079) 2323 2156, 2322 2784, 2323 2161 gpcbchairman@gmail.com, chairman-gpcb@gujarat.gov.in **Member Secretary** :
Morbi	Regional Center RR4F+6P7, Scientific Vadi, Sardar Nagar, Morbi, Gujarat 363641	**Tel** : 02822 228 001
Jamnagar	Regional Center Sardar Patel Commercial Complex, Rameshwar Nagar regional centre Kasturba Gandhi Vikas Gruh Marg, Bedi Bandar Road Jamnagar- 361 008	**Telephone** (0288) 2752366 **Fax:** (0288) 2753540 **Email:** ro-gpcb-jamn@gujarat.gov.in
Bhuj	Regional Centre Katira Commerical Complex-1, Nr.Manglam 4 Rasta,Sanskar Nagar, Nr.I.Tax Ofic,Bhuj 370001	**Telephone:** (02832) 250620 **Fax:** - **Email:** ro-gpcb-kutw@gujarat.gov.in

10.2.3 Local and National Government contacts

Emergency Contact Directory

Note: Below is the contact detail for Emergency Contact directory. Radio officer will circulate the emergency contact detail through email for any changes in contact details. Final update copy of contact detail will available in Radio Room. Entire document will not be revised due to change in contact details.

	VHF CHANNELS	
	VTMS VHF CH	16/73
	MUNDRA VHF CH	16/77

List of Important Telephone Numbers of Govt. Officials and other neighboring Organisations (Expert and Advisors) related to Spill Combating Plan

SN.	Company	Name and Designation	Telephone Numbers
1.	APSEZL, Mundra	Chief Operating Officer Head Marine Pollution Response Officer Port Control	02838-6272602838-255727 02838-255727 02838-255761 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
12	Ministry of Environment	Director (Environment)	079-23252154 / 23251062

	Govt. of Gujarat		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. Sachin Srivastava, Head – Marine	02838 - 255727	+91 6359883102
02	Head of Section 1 - Marine	02838 – 255730	+91 6359631088
03	Head of Section 2 - Marine	02838- 255947	+91 6357160037
04	Mr. Sanjay Kewalramani, Head-Marine Technical	02838- 255844	91 9925150056
05	Mr. Yogesh Nandaniya, Manager-SPM	02838- 2562379	91 6359775168
06	Mr. Hari Govindan V	91-2838 - 285072	91 9879104805
07	Marine control, APSEZL	02838 – 255333 / 255761	91 9825228673
08	Port Operation center, APSEZL	02838 –255762	91 9825000949
09	Port security Control, APSEZL	02838 – 289322	91 9825000933
10	Head - Security, APSEZL		+91 9109988165
11	Head - Health, safety & Environment, APSEZL	02838 - 255718	+91 9884869471
12	Head - Fire Dept. APSEZL	02838 – 255857	91 7069083035
13	Occupational Health Centre	02838 - 255710	91 8980015070
14	Head-Admin Department	02838 – 255159	+91 8660183841
15	Head Finance	02838 – 255711	+91 9879114993
16	Head Corporate	NA	+91 6358940500

10.2.4 Specification of Oil commonly traded:

OIL HANDLED AT APSEZL, MUNDRA

1. Qatar Crude
2. Persian Gulf Crude
3. Motor Spirit
4. High Speed Diesel Oil
5. Naphtha
6. Furnace Oil
7. Light Diesel Oil
8. Industrial Furnace Oil
9. Reformate / Benzene
10. Maya Crude Oil
11. Arabian Crude Oil
12. Russian Crude Oil

CHARACTERSTICS OF DIFFERENT CLASS OF OILS

OIL TYPE	DENSITY	Viscosity	Pour point C	Flash point C
	(kg/l) At 15C	mPas at 20C		
Crude oil	0.8- 0.95	1-100	+10 to – 35	Variable
Gasoline	0.70 – 0.78	0.5	NA	Less than 0
Kerosene	0.8	2	Less than – 40	38-60
Jet fuel	0.8	1.5-2	Less than – 40	38-60
Diesel oil	0.85	5	-5 to -30	More than 55
Light FO IFO60	0.9	60 at 50 C	+ 50 to -20	More than 60
Medium FO IFO 180	0.9	180 at 50 C	+ 30 to – 20	More than 60
Heavy FO IFO 380	0.99	380 at 50 C	+ 30 to – 20	More than 60

10.2.5 Information sources

APSEZL, MUNDRA OIL SPIL CONTIGENCY PLAN-2019

NATIONAL OIL SPILL DISASTER CONTIGENCY PLAN

IPECA GUIDELINES

11. CONCLUSIONS AND RECOMMENDATIONS

Based on the relevant studies, carried out Risk Assessment of spills, Contingency Plan for Adani Ports and SEZ Limited, Mundra the following conclusions can be drawn:

- The hydrodynamic model runs have been made for prediction of tides and currents for Pre-monsoon, SW-monsoon and Post-monsoon seasons.
- Sensitivity mapping has been done for the study area considering environmental, ecological, social, economic and other factors.
- Oil Spill Modeling studies have been carried for various spill scenarios for fortnight computational for Pre-monsoon, SW-monsoon and Post-monsoon seasons.
- NEBA Study has been carried for selecting best response options based on coastal information and spill scenarios.
- The details of spill volume and time taken to reach the coast and losses during its movement have been furnished in the report for preparedness.
- The percentage of spill volume reaching the coast, extent of oiling on the coast in metres, likely vulnerable areas, spill analysis, have been furnished in the report to estimate the fate of the spill.
- Oil spill contingency plan has been prepared as per NOS-DCP 2018 guidelines and presented in Strategy Plan. Strategy plans have been discussed in detail and formulated based on the risk analysis. Resources required to combat oil spills have been identified and furnished along with specifications.
- Prepared the environmental sensitivity Maps based on biological, environmental and socio-economic sensitive areas.
- Sensitivity Atlas has been prepared for coastal areas of Gulf of Kutch.
- Adani Ports and SEZ Limited, Mundra will be placed an Oil Spill Response Plan and is equipped with certain items like adsorbents / absorbents etc for combating small spills in case of any accidental leakages if any. Certain additional combating equipment's are suggested in the report to cater for the oil spill risk.
- Strategy plan has been discussed in detail and formulated based on the risk assessment study.
- Response plan has been formulated based on the contingency plan.

General Recommendations

- Priority should be given to combat the oil spills by physical means such as booms and skimmers. Oil Spill dispersants should be used only if necessary, depending on the clean-up situation and assessment of damage that is likely to occur to the environment. Only those dispersants recommended and approved by Indian Coast Guard (ICG) should be put into use only after obtaining permission from ICG.
- Training as per IMO guidelines should be given to the concerned operating staff involved in oil spill combating.
- Mock drills should be conducted twice in a year.

12. REFERENCES

.No	Title	Year	Client_Name
1	Oil spill contingency plan for offshore oil & gas exploration and appraisal in KG_DWHP_2017/1 & KG_OSHP_2017/1 Blocks in Bay of Bengal, East Godavari District, Andhra Pradesh, Gulf of Kutch, Gujarat , Gulfof Khambhat, Maharashtra and Tamil Nadu Blocks	2019	ABC Techno Labs Pvt Ltd, Chennai
2	Oil spill modeling studies for oil field development in KS Block, East Coast and West Coast of India for ONGC, Mumbai	2019	Oil and Natural Gas Corporation (ONGC), Mumbai
3	Modeling studies for predicting the changes in flow regime, sedimentation and in water qualities for the proposed laying of sub-sea pipelines off Modhva Coast, Gulf of Kutch, Gujarat	2019	Eco Chem Sales and Services-Surat, Gujarat
4	Modeling studies for change in flow regime, and oil spill for the proposed Laying of sub-sea Pipelines from Mumbai Refinery to Rasayani through Thane Creek, Maharashtra	2019	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai & BPCL
5	Numerical modeling studies for the hydrodynamic behavior, ship navigation simulation studies and oil spill contingency management plan due to the proposed LNG Terminal at Port Blair, Andaman & Nicobar Islands, India	2018	Vimta Labs, Hyderabad & SEIL Nellore
6	Hydrodynamic modeling studies for predicting the changes in flow regime, erosion / deposition due to the proposed development of marine facilities for conveyor belt at Virpur Village, Devbhoomi Dwarka	2017	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai
7	Oil spill risk analysis and modeling studies for GSPC LNG Ltd (GLL), at Mundra in Gujarat State, India.	2017	Vimta Labs, Hyderabad
8	Numerical modeling studies for the hydrodynamic behavior, ship navigation simulation studies and oil spill contingency management plan due to the proposed LNG Terminal at Port Blair, Andaman & Nicobar Islands, India	2017	Vimta Labs, Hyderabad
9	Modeling of fate and trajectory of oil spill	2016	BG Exploration and Production (India) Limited, Mumbai
10	Hydrodynamic modeling studies for changes in the flow regime, erosion / deposition due to the proposed development of Cargo Jetty at Vadinar, Gulf of Kutch	2016	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai
11	Numerical modelling studies for predicting the impacts on the flow regime & morphology due to the proposed development of cargo berth at MbPT, Thane Creek	2016	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai
12	Mathematical modeling for simulation of trajectory, fate and weathering characteristics of HSD oil spill in the coastal waters of Bedi, Gulf of Kutch	2016	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai
13	Oil spill modeling studies for an offshore oil & gas exploratory drilling project in the Palar Block in the Bay of Bengal	2016	AECOM & Cairn India Limited, Noida
14	1. Stochastic oil spill modelling, net environment benefit analysis studies and response plan for Adani Hazira Port, Hazira, Surat 2.	2015	Adani Hazira Port Private Limited, Hazira

	Mapping of marine sensitive areas in the coastal areas of Hazira, Gujarat 3. Net environment benefit analysis studies and response plan for Adani Hazira Port, Hazira, Surat		
15	Oil spill response plan development for Cairn CB/OS-2 Suvali onshore and offshore facility, Gulf of Khambhat , Gujarat	2015	Cairn Energy Pvt. Ltd., Suvali
16	1. Oil spill risk assessment, net environment benefit analysis studies and response plan for Reliance Industries Limited SPM at Hazira, Surat.2. Mapping of marine sensitive areas in the coastal areas of Hazira, Gujarat. 3. Net environment benefit analysis studies and response plan for Reliance Industries Limited SPM at Hazira, Surat	2015	Reliance Industries Ltd., Hazira
17	1. Oil spill risk analysis and modelling studies for ESSAR Bulk Terminal Ltd at Hazira in Gulf of Khambhat, Gujarat 2. Mapping of marine sensitive areaa in the coastal areas of Hazira, Gujarat 3. Net environment benefit analysis studies and response plan for ESSAR Bulk Terminal Limited, Hazira	2015	ESSAR Bulk Terminal Limited, Hazira.
18	Oil spill risk assessment study and contingency planning for Panna-Mukta Oil Fields of BGEPIL, West Coast of India	2015	BG Exploration and Production (India) Limited, Mumbai
19	Oil spill risk assessment for Panna Field	2015	BG Exploration and Production (India) Limited, Mumbai
20	Risk analysis of fuel oil spills during service vessel operations at and around the proposed jetty in the offshore of Bhogat, Arabian Sea	2015	Bhagavathi Anna Lab Pvt. Ltd. Hyderabad
21	Numerical modeling studies for predicting the impacts on flow regime and morphology due to the marine facilities for LNG Jetty, oil spill contingency planning and ship navigation studies at Krishnampatnam, Eastcoast of India	2014	Vimta Labs Pvt. Ltd., Hyderabad
22	Oil spill risk assessment study and contingency planning for Panna-Mukta Oil Fields of BGEPIL, West Coast of India	2014	BG Exploration and Production (India) Limited, Mumbai
23	1. Modeling studies for changes in the flow regime, sedimentation processes due to the proposed development of marine facilities in Chhara Port 2. Mathematical modelling for simulation of trajectory, fate and weathering characteristics of oil spills in the coastal waters off Chhara	2014	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai
24	Modelling and simulation of oil spill trajectory for Ravva Oil Field, East Coast of India	2013	Cairn India Limited, Noida
25	1. Oil spill modeling studies for oil field development in Andaman Nicobar Basin in East Coast of India for ONGC, Mumbai. 2. Oil spill modeling studies for oil field development in Cauvery Basin in East Coast of India for ONGC, Mumbai. 3. Oil spill modeling studies for oil field development in Mahanadi Basin in East Coast of India for ONGC, Mumbai.	2013	Oil and Natural Gas Corporation (ONGC), Mumbai
26	Oil spill risk assessment and contingency planning for the marine facilities of Adani Ports and Special Economic Zone Limited, Mundra	2013	Adani Port & Special Economic Zone Limited, Mundra
27	Oil spill risk assessment study and contingency planning for Panna-Mukta Oil Fields of BGEPIL, West Coast of India	2013	BG Exploration and Production (India) Limited, Mumbai
28	Oil spill risk assessment study and contingency planning for Krishna	2013	Oil and Natural Gas

	- Godavari Basin, East Coast of India - oil spill trajectory and weathering characteristics for spills at well locations GS-15 -1, GS-15-4 and G-1.		Corporation (ONGC), Eastern Offshore Asset
29	Oil spill risk assessment and contingency planning for the coal jetty facility of RIL at Dahej, Gujarat	2013	Reliance Industries Ltd., Mumbai
30	Numerical modeling studies for predicting the impacts on the shore line and morphology due to proposed marine infrastructure activities at Sikka, Gulf of Kutch and validating the changes / impacts with respect to CRZ Regulations 2011	2012	Reliance Industries Ltd., Mumbai
31	Mathematical modeling for simulation of trajectory, fate and weathering characteristics of oil spills and pesticide spills in the coastal waters off Mumbai / Dahanu	2012	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai & ICMAM, Chennai
32	Mathematical modeling for simulation of trajectory, fate and weathering characteristics of oil spill and pesticide dispersion in the coastal waters of Thane	2012	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai & Maharashtra Pollution Control Board (MPCB)
33	Oil spill risk assessment and contingency planning for the existing marine facilities of Reliance Industries Limited Jamnagar , Gujarat	2012	Reliance Industries Ltd., Jamnagar
34	Risk assessment study of marine oil spills for KPT SPMs and Product Jetty, Vadinar, Gulf of Kutch	2012	CSIR-National Institute of Oceanography (NIO) , Goa & Kandla Port Trust (KPT), Vadinar
35	Oil spill risk assessment study and contingency planning for Krishna - Godavari Basin, East Coast of India	2012	Asian Consultant Engineers Ltd & Oil & Natural Gas Corporation (ONGC)
36	Oil spill risk assessment study and contingency planning for Panna-Mukta Oil Fields of BGEPIL, West Coast of India	2012	BG Exploration and Production (India) Limited, Mumbai
37	Oil spill risk assessment and contingency planning for KG Basin, East Coast of India	2012	Senes consultants India Limited, Hyderabad & Oil and Natural Gas Corporation (ONGC), Mumbai
38	Oil spill risk assessment and contingency planning for KG , East Coast of India	2012	Oil and Natural Gas Corporation, Mumbai
39	Oil spill risk assessment study for the accidental pipeline ruptures of the 203 km long 30" dia trunk line.	2012	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai
40	Oil spill risk assessment and contingency planning for the augmented marine facilities of RDMT Jetty, Dahej, Gujarat	2012	Reliance Industries Ltd., Mumbai
41	Report on numerical modeling studies for predicting the oil spill trajectories & weathering for select cases of spill at FPSO location in KG Basin, East Coast of India for RIL	2012	Reliance Industries Ltd., Mumbai
42	Mathematical modeling for simulation of trajectory, fate and weathering characteristics of oil spills and pesticide spills in the coastal waters off Mumbai / Dahanu- Phase I & II	2012	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai & ICMAM, Chennai

43	Oil spill risk assessment due to crude oil leak from the ruptures in the 30" oil trunk pipeline from Mumbai High to Uran	2012	Oil and Natural Gas Corporation (ONGC), Mumbai
44	Oil spill risk assessment due to oil spill in the offshore waters off Mumbai Port	2012	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai
45	Numerical modelling studies for oil spill risk assessment and response plan for RIL Jamnagar marine facilities	2012	Reliance Industries Ltd.
46	Risk assessment study of marine oil spills for existing & proposed extension of jetties & SPMs of Vadinar Oil Terminal Limited at pathfinder inlet, Gulf of Kutch, Jamnagar	2011	Vadinar Oil Terminal Limited (VOTL), Jamnagar
47	Oil spill risk assessment study for IOCL at Vadinar Coast, Gulf of Kutch, Jamnagar	2011	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai & Indian Oil Corporation Limited
48	Risk assessment study of marine oil spills for KPT SPMs and Product Jetty, Vadinar, Gulf of Kutch	2011	CSIR-National Institute of Oceanography (NIO), Goa & Kandla Port Trust, Vadinar
49	Comprehensive risk analysis study of existing SPM facilities of IOCL in Gulf of Kutch at Vadinar, Gujarat	2011	Indian Oil Corporation Limited, Pipelines Division, Noida
50	Oil spill risk analysis and contingency plan for Multi Cargo Port by Adani Hazira Port Private Limited, Hazira, Surat	2011	Adani Hazira Port Pvt. Ltd., Surat
51	Oil spill risk analysis and contingency plan for ESSAR Bulk Terminal Limited, Hazira	2010	ESSAR Bulk Terminal Limited, Hazira.
52	Oil spill assessment studies for the oil spill occurred at SPM in the Panna Oil Field	2009	BG Exploration and Production India Limited, Mumbai
53	Oil spill risk assessment study for the extension of proposed marine facilities of Vadinar Oil Terminal Limited product jetties at Vadinar coast of Kutch Jamnagar.	2009	Vadinar Oil Terminal Limited (VOTL), Jamnagar
54	Oil spill assessment studies for the oil spill occurred at coastal waters of Goa	2009	CSIR-National Institute of Oceanography (NIO), Goa
55	Oil spill risk analysis and contingency plan for GMB Ports	2009	Gujarat Maritime Board, Gujarat
56	Oil spill risk analysis and contingency plan for single point mooring off Mundra	2008	CSIR-National Institute of Oceanography (NIO), Goa & HPCL-Mittal Pipelines Limited, New Delhi
57	Oil spill risk analysis for all the operational facilities of Cairn Energy, Gulf of Kutch	2008	Cairn Energy India Pvt. Ltd. (CEIL), Rajasthan
58	Risk analysis of Algeria crude oil spills during unloading operations at and around SPM and pipeline corridor in the offshore of Bhogat, Arabian Sea.	2008	CSIR-National Institute of Oceanography (NIO), Goa & Cairn Energy India Pvt. Ltd (CEIL)
59	Oil spill risk analysis and contingency plan for all the operational facilities of ONGC and its associated operations with respect to oil spill in Bombay High	2008	CSIR-National Institute of Oceanography (NIO), Goa & Oil and Natural Gas Corporation (ONGC)
60	Oil spill risk analysis and contingency plan for container berths at	2008	CSIR-National Institute of

	JNPT, Navi Mumbai		Oceanography (NIO), Goa & Jawaharlal Nehru Port Trust, Navi Mumbai
61	Oil spill risk analysis and contingency plan for all the operational facilities of BG Exploration and Production India Limited and its associated operations with respect to oil spill in Panna-Mukta Oilfield	2007	BG Exploration and Production India Limited, Mumbai
62	Oil spill risk analysis and contingency plan for proposed SPM of HPCL Visakhapatnam	2007	CSIR-National Institute of Oceanography (NIO), Goa & Hindustan Petroleum Corporation Ltd., Mumbai
63	Oil spill risk analysis and contingency plan for liquid cargo jetty at JNPT, Navi Mumbai	2007	CSIR-National Institute of Oceanography (NIO), Goa & Bharat Petroleum Corporation Limited, Mumbai
64	Oil spill risk assessment study and predicting the shoreline impact due to RIL's SPM operations at Hazira	2007	Reliance Industries Ltd., Hazira
65	Oil spill risk analysis and preparation of oil spill contingency plan for Paradip Port, Bhubaneswar	2006	CSIR-National Institute of Oceanography (NIO), Goa & Indian Oil Corporation Limited, Bhubaneswar
66	Oil spill risk analysis and oil spill contingency plan for IOCL,Port Blair Port	2006	CSIR-National Institute of Oceanography (NIO), Goa & Indian Oil Corporation Limited, Port Blair, Andaman
67	Oil spill risk analysis and preparation of oil spill contingency plan for Budge-Budge Port of Indian Oil Corporation, Kolkata	2006	CSIR-National Institute of Oceanography (NIO), Goa & Indian Oil Corporation Limited, Kolkata
68	Oil spill risk assessment study for marine facilities of ESSAR Oil Ltd at Vadinar Coast off Gulf of Kutch, Jamnagar	2005	Essar Oil Limited, Refinery Division, Jamnagar
69	Oil spill risk analysis and contingency plan for CB/OS-2 block, Gulf of Khambhat	2004	Cairn Energy Pvt. Ltd., Chennai
70	Oil spill risk analysis and contingency plan for Hazira Port, Hazira	2004	Hazira Port Trust Private Limited (HPPL), Hazira
71	Oil spill risk analysis and contingency plan for Ravva Oil Field, East Coast of India	2004	Cairn Energy Pvt. Ltd., Chennai
72	Oil spill risk analysis and contingency plan for BPCL, Mumbai	2003	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai & Bharat Petroleum Corporation Ltd., Mumbai
73	Quantitative oil spill risk analysis studies and Oil spill contingency planning for HPCL	2003	CSIR-National Institute of Oceanography (NIO), Goa & Hindustan Petroleum Corporation Ltd. Visakh Refinery
74	Marine emergency management plan for Crude Oil and Pol Jetty of CPCL	2002	CSIR-National Institute of Oceanography (NIO), Goa &

			Chennai Petroleum Corporation Ltd., Nagapattinam, Tamilnadu
75	Oil spill risk assessment study for IOCL operations at SBMS at Vadinar Coast, Gulf of Kutch, Jamnagar	2002	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai & IOCL, Vadinar
76	Oil spill modelling and shoreline sensitivity mapping	2001	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai & Dabhol Power company, Dabhol

14. APPENDIX

APPENDIX-1: MODELING OF HYDRODYNAMIC PROCESSES

Modeling the hydrodynamic processes is an integral part of modeling of fate and transport of oil spills. The basic oil-spill model which was used earlier for risk analysis of oil spills (Ref. Projects completed : www.environsoftware.com) and to track the oil-spill trajectories has been further improved to be used in the present work to estimate risks due to oil spills for various weathering and meteorological conditions.

Adani Ports bounded on the coast of Gulf of Kutch, on the north, south and east by Navalakhi. The currents of the region are tide-driven and assumed the water column is well mixed. These features make the numerical modeling task, as a 2-D hydrodynamical model is sufficient to accurately reproduce the tides and currents of the Gulf of Kutch.

The computational runs in order to obtain better accuracy in the prediction of oil spill trajectory and weathering processes, a finer mesh is adopted to represent the study area for modeling purpose. The study covers the region between latitude 22° N and 23°N and longitude 68° 42' E and 70°30' E is in Gulf of Kutch, West coast of India. The model simulated for all months and results are presented graphically. The detailed description of Hydrodynamic Processes is discussed in the report **(PART-A: REPORT ON HYDRODYNAMIC MODELING STUDIES)**

APPENDIX-2: MODELING OF FATE AND TRAJECTORY OF SPILLED OIL

Knowledge of probable movement of an oil slick gives a distinct advantage while planning response strategies. Thus, for instance, no major clean-up operation is necessary if the modeling results indicate that the spilled oil would remain at sea thereby sparing the shore ecology. On the contrary, if modeling results are suggestive of shoreward drift and predict that particular ecologically sensitive or important areas would be hit, effective counter measures such as deployment of deflection booms, containment and recovery of oil etc. can be effectively taken.

Hydrodyn-OILSOFT dedicated software for oil spill trajectory modeling is used for prediction of oil spill scenarios at i) Undetected pipeline leakage (ii)Hose-failure (iii) Spills at Oil Jetties (iv)Collision / Grounding (v)Leakages in creeks (vi)Major accident at oil Jetty / collision & Grounding in the channel route for various meteorological and hydrological conditions. The detailed description of Fate and weathering characteristics of spilled oil for various hydrodynamic and meteorological conditions are discussed in the report **(PART-B: REPORT ON OIL SPILL FATE AND TRAJECTORY MODELING STUDIES)**

APPENDIX-3: SENSITIVITY INDEX MAPPING AND ATLAS

There is a pressing need of having marine sensitive area Atlas of coastal areas of Gulf of Kutch, West coast of India which can fulfill the requirement of various organizations including the state governments in taking policy decisions. **Environ Software Pvt. Ltd** has been prepared marine sensitive area Atlas of the Gulf of Kutch regions as well as Adani ports with technical inputs from the available data sources. Latest satellite data has been used to map various coastal lands, biological, environmental and geographical features and prepared the sensitivity index mapping with regards to oil spill risk assessment and management. The detailed description of marine sensitive areas discussed in the report **(PART-C: REPORT ON SENSITIVITY INDEX MAPPING AND ATLAS)**

APPENDIX-4: NET ENVIRONMENT BENEFIT ANALYSIS

Net Environmental benefit Analysis Table for selecting suitable response equipment's & Strategy. The spills at selected locations stranded the coast of Gulf of Kutch, West coast of India for various seasons of year 2021. The weathering will take place based on oil on surface.

Zonal representation of the spill standard to the coast or at open sea, volume of oil floating on the surface and oil losses for various tidal conditions are furnished in the Appendix-2 (**Part-B of the report**). The suitable response equipment's will be selected based on NEBA studies discussed in the report **(PART-D: NET ENVIRONMENT BENEFITS ANALYSIS)**

APPENDIX -5: OIL SPILL REPORT FORM

INITIAL OIL SPILL REPORT FORM PARTICULARS OF PERSON / ORGANIZATION REPORTING INCIDENT

OIL SPILL REPORT FORM
Particular of Person/Organization
Reporting Incident Title: Risk Assessment Study, Sensitivity Area Mapping and Preparation of Oil Spill Contingency Plan and Allied Works for Tier-1 Oil Spill Response (OSR) Facility For Adani Port & SEZ Limited **Organization: APSEZL, Mundra** **Telephone/ Mobile / Telex / Fax number:** **Date / Time: ...** ➢ Spill Location: SPMs (S1, S2) ➢ VLCC Jetty (S15) ➢ Sub-sea pipeline(S3) ➢ Tanker entry into the Ports (S4) ➢ Adani West Port berths (S5, S6, S7) ➢ LNG Berth (S8) ➢ Adani South Port berths (S9, S10) ➢ Mundra Port (S11) ➢ MICT / AMCT Berths (S12) **Type and quantity of oil spill: ...** Type: HSD, Fuel oil and crude oil **Scenarios:** Instantaneous and continuous **Quantity:** 700t, 10000t and 25000t and 10000 m3/h for 60 sec, 10000m3/h for 1 min.. **Cause of oil spill : .** By accidents involving loading and unloading operations at berth, VLCC, barges, pipelines, storage facilities, Vessel breaking down, transportation, handling, routine maintenance activities etc.... **Response to spillage, if any : .....** **Any other information : .....** **.....**

DAILY INCIDENT LOG

DAILY INCIDENT LOG - TEAM LEADER - OIL SPILL RESPONSE GROUP

Name..... Rank .....

Notification received. ONSHORE / OFFSHORE / INSIDE HARBOUR

Time ..... Date .....

Day ..... Shift .....

LOCATION OF THE INCIDENT

Name of the VESSEL / PLACE ..... Area.....

Latitude ..... Longitude .....

Distance from North Breakwater .....NM Sounding .....

.....

Incident occurred Incident Severity (tick one)

Time ..... Date ..... Minor / Major / Tier I / Tier II / Tier III

Brief details of incident and action taken

.....

.....

WEATHER DATA

Wind Speed ..... Wind Direction ..... Sea State .....

Current Speed ..... Current Direction ..... Visibility .....

Sea Temperature..... Air Temperature ..... Fog / Mist.....

Rain / Precipitation ..... Humidity ..... Cloud cover .....

OPERATION DATA

Type of Boom / Booms deployed..... Total Length .....In Depth .....

Power Pack Running hrs ..... Skimmer Running hrs .....

Oil Recovered from water ..... Liters / Tons Oil transferred ashore .....Litres/Tons

Oil / Sludge cleared from shore .....Kg Sorbents pads use .....Nos.

O.S.D used .....Liters Saw Dust used .....Kg

LOGISTICS AND MANPOWER

Name and type of the vessel / boats available for assistance .....

Name and type of the vehicles available for assistance .....

Manpower utilized ...

Fireman ..... Security Services men ..... Casual Labourers .....Others.....

FORM COMPLETED BY

Name .....

Rank / Designation.....

Signature .....

Time ..... Date .....

On completion, this form is to be handed over to OSC, who in turn after his comments would hand over this form to ECR Team Leader. In absence of any OSC it may be handed over to ECR Team Leader directly

PERSONAL LOG FORM (To be forwarded to HSE Manager)

Form Completed By:

Name .....

Designation .....

Signed ..... Date ...../...../.....

TIME (24 hour Clock)	COMMUNICATION (To / From)	ACTION / MESSAGE

APPENDIX –6: POLREP INFORMATION

The following information must be provided to the coast guard as and when the facts when becomes available. The information is required to generate POLREP reports to government through the coast guard.

1. Identity of informant
2. Time of information receipt
3. Source of spill
4. Probable Cause of spill
5. Type of oil
6. Color 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

APPENDIX -7: POLAR MESSAGES FORMAT

Address		
Date		From To
Identification		Time Group
Serial Number		
Part I (POLAR WARN)	1	Date and time
	2	Position
	3	Incident
	4	Overflow
	5	Acknowledge
Part ii (POLINF)	1	Date and Time
	2	Position
	3	
	4	
	5	Characteristic of Pollution
	6	Source and Cause of pollution
	7	Wind direction and speed
	8	Current or tide
	9	Sea state and visibility
	10	Drift of pollution
	11	Forecast
	12	Identify of observer and ships on scene
	13	Action taken
	14	Photograph or samples
	15	Name of other agencies informed
Part iii (POLFAC)	1	Date and time
	2	Request for assistance
	3	Cost
	4	Pre-arrangements for the delivery
	5	Assistance to where and how
	6	Other agencies requested
	7	Change of command
	8	Exchange of information
	9	Names and number of personnel
	10	Description of equipment
	11	ETA and arrival information
	12	Place of embarkation
	13	Place of disembarkation

APPENDIX -8: OIL SPILL PROGRESS REPORT

Incident name	
Updated by :	
Date :	Time (Local)
Summary of Incident Response Operation :	
Summary of Incident Response Resource Utilization :	
Number of Aircraft:	Number of Vessels m
Dispersant used: Liters	Length of Boom in use
Number of recovery devices:	Number of storage devices
Sorbent used: Kg	Bioremediation Used
Number of personnel:	Number of Vehicles:
Specialist Equipment:	
Oil Spill Balance Sheet:	
Total amount of oil spilled:	Tonnes
Total amount of oil recovered:	Tonnes
Outstanding amount of spilled oil:	Tonnes
Mass balance:	Tonnes
Estimated natural weathering:	Tonnes
Mechanically agitated	Tonnes
Chemically dispersed	Tonnes
Skimmer recovered	Tonnes
Sorbent recovered	Tonnes
Manually recovered	Tonnes
Bioremediated::	Tonnes
Other….	Tonnes

APPENDIX – 9: LIST OF IMPORTANT TELEPHONE NUMBERS

List of Important Telephone Numbers of Adani Group Personnel

SN.	Company	Name and Designation	Telephone Numbers
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),	PRT (W) Officer-in-Charge	022-23722438 (Tel) 022-23728867 (Fax)

	Mumbai		
11	Gujarat Maritime Board	Vice Chairman & CEO Chief Nautical Officer	079-23238346 / 23238363 079-23234716
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. Sachin Srivastava, Head – Marine	02838 - 255727	+91 6359883102
02	Capt. Divya Gupta, HOS-Marine	02838 – 255730	+91 6359631088
03	Capt. Rajat Garg. , HOS-Marine	02838- 255947	+91 6357160037
04	Mr. Sanjay Kewalramani, Head-Marine Technical	02838- 255844	91 9925150056
05	Mr. Yogesh Nandaniya, Manager-SPM	02838- 2562379	91 6359775168
06	Mr. Hari Govindan V	91-2838 - 285072	91 9879104805
07	Marine control, APSEZL	02838 – 255333 / 255761	91 9825228673
08	Port Operation center, APSEZL	02838 –255762	91 9825000949
09	Port security Control, APSEZL	02838 – 289322	91 9825000933
10	Head - Security, APSEZL		+91 9109988165
11	Head - Health, safety & Environment, APSEZL	02838 - 255718	+91 9884869471
12	Head - Fire Dept. APSEZL	02838 – 255857	91 7069083035
13	Occupational Health Centre	02838 - 255710	91 8980015070

14	Head-Admin Department	02838 – 255159	+91 8660183841

Agencies for Supplying Shore Cleanup Equipment and Safety Gears		
Agency	**Addres**	**Contact Number**
M/s Envirocare Systems	4-B, Apeejay surrendra House, 4th Floor, 24, Baroda Street, Mumbai – 400009 Email: envirocaresystems1@gmail.com Web: www.envirocaresystems.net	Phone: (022)23486637.23485474, 23487400. Fax: (022) 23488284
M/s HiTech Elastomers Ltd. Works	798, Rankapur, Nr. Santej Sola-Kalol State Highway, Ta. Kalol Dist. Gandhinagar – 384002. Email: sales@hitechelastomers.com	Phone: +91-2764-286010, 286806,268112. Cell: 9824654669 Fax: +91-2764-286010
M/s Sadhav Shipping Limited	521, Loha Bhavan, P. D'Mello Road, Masjid (East), Mumbai – 400 009. Email:shipping@sadhav.com, osv@sadhav.com Web: www.sadhav.com	Tel: 022-2348 25/24 Fax: 022-2348 25/26

CONTACT DETAILS OF LOCAL ADMINISTRATIVE AUTHORITIES

1. DISTRICT ADMINISTRATION

Place Name	Address of Centre	Contact Details
Bhuj (Kutch)	**District Collector Office** Near Circuit House, Mandvi Road, Nr. Mota Bandh, Bhuj (Kachchh) Gujarat – 370001	Phone: +91 2832 250650 Fax: +91 2832 250430 Email: collector-kut@gujarat.gov.in
Jamnagar	District Collector Office, Jilla Seva Sadan, Sharu Section Road, Jamnagar - 361002	Collector, Jamnagar • +91 288 2555869 • +91 288 2555899 • collector-jam@gujarat.gov.in
Khambhalia	District Collector Office 1st Floor, Lalpur Bypass Road, Dharampur, Khambhalia, Gujarat - 361305	91 2833 232805 +91 2833 232102 collector-devbdwarka@gujarat.gov.in

2. FISHERIES

Sl No.	Address of Centre	Contact Details
1	Commissioner of Fisheries 3rd Floor, Block no-10, Jivraj Mehta Bhavan, Gandhinagar, Gujarat 382010	Phone No: -079- 232-53729 Fax No:- 079-232-53730

3. STATE POLLUTION CONTROL BOARD – REGIONAL OFFICES

	Address of Centre	Contact Details
Gandhinagar	**Gujarat Pollution Control Board** Paryavaran Bhavan, Sector-10A, Gandhinagar-382010.	**Phone:** (079) 2323 2152 **Fax** : (079) 2323 2156, 2322 2784, 2323 2161 gpcbchairman@gmail.com, chairman-gpcb@gujarat.gov.in **Member Secretary**:
Morbi	Regional Center RR4F+6P7, Scientific Vadi, Sardar Nagar, Morbi, Gujarat 363641	Tel : 02822 228 001
Jamnagar	Regional Center Sardar Patel Commercial Complex, Rameshwar Nagar regional centre Kasturba Gandhi Vikas Gruh Marg, Bedi Bandar Road Jamnagar- 361 008	**Telephone** (0288) 2752366 **Fax:** (0288) 2753540 **Email:** ro-gpcb-jamn@gujarat.gov.in
Bhuj	Regional Centre Katira Commerical Complex-1, Nr.Manglam 4 Rasta,Sanskar Nagar, Nr.I.Tax Ofic,Bhuj 370001	Telephone: (02832) 250620 Fax: - Email: ro-gpcb-kutw@gujarat.gov.in

APPENDIX-10: OIL SPILL REPORT FORM

Complete the oil spill report form as under using the details of notifications and information known and report to the Adani Ports & SEZL.

Spill Notification Pro Forma

Fax To: Tele No:

IDENTITY OF OBSERVER / REPORTER		
Full Name:	Organization Company:	
Contact Telephone No,:	Contact E-mail:	
INCIDENT DETAILS		
Operator / organization / company responsible for incident:		
Date of Incident:	Time of incident:	
Installation / facility:	Fixed/Mobile(delete as applicable)	Field Name:
Latitude:	Longitude:	Quad & Block no:
Oil release / Chemical release or permitted discharge Notification (tick below and complete column details as applicable).		
Oil release	Chemical release Notification	Permitted discharge Notification
Max Released (tones):	Quantity Released (kgs):	Max oil discharged (tones):
Min released (tones):	Chemical Name:	Min oil discharged (tones):
Type of oil:	Chemical Use:	Type of oil:
Tier of response (1,2 or 3):	%Oil if OBM or base oil:	Oil conc. In discharge:
(as per Oil pollution emergency Plan)	Warning Label:	Discharge rate M3 / hr
Appearance:	Appearance:	Appearance:
Approx. release area on sea surface (m2 or km2):	Approx. release area on sea surface (m2 or km2):	Approx. release area on sea surface (m2 or km2):
Is release ongoing? YES/NO (if YES notification must be updated & reported each 24 hr period unless otherwise directed by Indian Coast Guard)		
Release since last report (tones):	Total Release till date (tones):	
Source of pollution		
Cause of pollution:		
Steps taken to prevent re occurrence / respond to incident:		
Release likely to reach Median Line YES/NO: Shore YES/NO If YES approx location/ time:		
Photograph Taken: YES/NO	Samples taken for analysis:	
WEATHER CONDITIONS		
Wind Speed (knots):	Wind Direction (0-360):	
Beaufort scale (1-12):	Wave Height (Meters):	

APPENDIX-11: APPLICATION FOR SEEKING COASTGUARD APPROVAL

FOR OSD APPLICATION

Fax To: Tele No:

IDENTITY OF OBSERVER / REPORTER			
Full Name:		Organization Company:	
Contact Telephone No		Contact E-mail:	
DETAILS OF SPILLS			
Quantity	Particulars of oil	Date of incident	Time of Incident
LOCATION			
Latitude:	Longitude:	Depth of Water	
LOCATION			
Landmark			
Oil Type:			
QUANTITIES OF OIL SPILLED AND SOURCE:			
DESCRIPTION OF SLICKS			
Dimensions		Color	
OTHER METHODS OF RESPONSE BEING APPLIED OR CONSIDERED			
WEATHES CONDITIONS			
Wind Speed (Knots):		Wind Direction (0-360)	
Beaufort scale (1-12):		Wave Height (Meters):	
SENSITIVE AREAS IN PROXIMITY AND TYPE			
PARTICULARS OF OSD			
Name of OSD Held with	Quantity held with	Whether the OSD approved for use in Indian waters-	
Toxicity (LC50 value for 96 hours)	Efficiency	Solubility	

APPENDIX – 12 : PRESS RELEASE FORMAT

INITIAL PRESS STATEMENT FORM - POLLUTION INCIDENT
Public Statement Number 1. An oil spill occurred at ..... hours of date in the facilities of Adani port, West coast of India. The location of the incident is ...../..... in the offshore of Adani facilities. ..... The situation is under control / not yet under control / out of control. The installation involved in the incident / accident is in a stable and safe / unstable and unsafe condition. The Oil spill Response Team in being / has already mobilized to deal with the situation. So far ..... litres/ tonnes of Oil has been recovered. Further statement will be issued in light of any further developments. The news media should contact **HSE Manager** of the Adhani for any additional information. Signature ..... Name of the installation Manager ..... Date ..... Time ..... Place: .....
NOTE: When, Typed, this Form must be signed by the installation Manager / Emergency Control Team Leader and forwarded to General Manager. Under no circumstances the press statement be released to the NEWS Media without the approval of the concerned authority.

APPENDIX–13: CONTINGENCY PLANNING COMPLIANCE CHECKLIST

Port Authority: Adani Ports & SEZL

	Description	Complied Yes/ No	Remarks
RISK ASSESSMENT			
1	Whether the facility produces/ handles/ uses/ imports/ stores any type of petroleum product	Yes	Petroleum products are directly transferred from vessels through pipelines
2	Whether risk assessment is done	Yes	Chapter-2 Page No. 17 & Chapter-4 Part-B report
3	Who did the risk assessment		Environ Software Pvt Ltd
4	Whether maximum volume of oil spill that can occur in the worst-case scenario is considered	Yes	25000 T Chap2, refer Para 2.5.3-page No: 21 & Chapter-4 Part-B report
5	Whether relative measure of the probability and consequences of various oil spills including worst case scenario are taken into account	Yes	Chapter2 refer para 2.5.3 Page No. 23 & Chapter-4 Part-B report
6	Whether all types of spills possible in the facility are considered including Grounding, Collision, Fire, Explosion, Rupture of hoses	Yes	Chapter2 refer para 2.1.1 Page No. 17 & Chapter-4 Part-B report
7	Please specify the list of oils considered for risk assessment	Crude, HSD & Fuel Oil	Chapter2 refer para 2.8 Page No. 24 & Chapter-4 Part-B report
8	Whether the vulnerable areas are estimated by considering maximum loss scenario and weather condition	Yes	Chapter2 refer para 2.12 Page No. 31
9	Whether impacts on the vulnerable areas are made after considering the Marine protected areas, population, fishermen, saltpans, mangroves, corals and other resources within that area	Yes	Chapter2 refer para 2.12- & 2.13-Page No. 31,32 & Chapter-3 Part-C report
10	Whether measures for reduction of identified high risks are included by reducing the consequences through spill mitigation measures	Yes	Chapter7 refer fig.7.1 Page No. 66
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	Yes	Chapter 7 refer fig 7.1 Page No. 66
12	Whether risk levels are established for each month after considering the probability with tide and current and consequences of each such spill	NA	
13	Whether prevention and mitigation measures are included in the plan	Yes	Chapter8 refer para 8.1 Page No 84
14	Whether the spill may affect the shoreline.	Yes	Part-B report, chapter 5-OS

	(length of the shoreline with coordinates)		modelling tables (Jan, July, Oct) page nos. 58-66
15	Whether time taken the oil spill to reach ashore in each quantity of spill in various months are mentioned in the plan	Yes	Part-B report, chapter 5-OS modelling tables (Jan, July, Oct) page nos. 58-66
16	Whether sensitivity mapping has been carried out	Yes	Part-C report, chapter 3, refer para 3.1-page no. 5
17	Does the sensitivity mapping clearly identify the vulnerable areas along with MPAs, corals, fishermen community, saltpans, mangroves and other socio- economic elements in the area	Yes	Part-C report chapter 3, refer para 3.1-page no. 5
18	Do the sensitivity maps indicate area to be protected on priority	Yes	Part-C report Annexure-1 refer fig A.1.8-page no. 37
19	Does the map indicate boom deployment locations	Yes	Part-C report Annexure-1 refer fig A.1.1(a), (b)-page no. 35
20	Whether any Marine. Protected Area will be affected	Yes	Part-C report chapter 3, refer para 3.15-page no. 17
21	Whether total number of fishermen likely to be affected is mentioned in the plan	No	
22	Whether any saltpan in the area is going to be affected	No	
23	Whether any mangroves in the area will be affected by a spill	No	
Preparedness			
24	Whether any containment equipment is available	Yes	Chapter4, refer para 4.2 Page No. 43
25	Whether any recovery equipment is available	Yes	Chapter4 refer para 4.2 Page No. 43
26	Whether the facility is having any temporary storage capacity	Yes	Chapter4 refer para 4.1 Page No. 43
27	Whether location of the oil spill response equipment is mentioned in the plan	Yes	Chapter4 refer para 4.1 Page No. 43
28	Whether suitable vessels available for deploying the boom, skimmer etc	Yes	Chapter4 refer para 4.4 Page No. 44
29	Whether OSD held with facility	Yes	5000 Ltrs – Page No: 50
30	Whether the OSD held with the facility is approved for use in Indian waters	Yes	
31	Whether the facility has MoU with other operators for tier-1 preparedness	Yes	Oil companies, HMEL Operators
32	Whether the list of oil spill response equipment available with each agency in MoU is deliberated	Yes	Chapter 9 refer para 9.1 page no. 89
33	Whether the facility has any MoU with private OSRO	Yes	Chapter 9 refer para 9.4 page no. 91
34	Whether the procedure for evoking the mutual aid is clearly described in the plan	Yes	
35	Whether additional manpower is available	Yes	Chapter 10 refer para 10.2.3 page no. 106

36	Whether list of approved recyclers is mentioned in the plan	Yes	Chapter 10 refer para 10.2.1 Page No 105
37	Whether NEBA (Net Environmental Benefit Analysis) has been undertaken	Yes	Part-D report, chapter 1, refer 1.2-page no. 2
38	Whether the areas from priority protection have identified in the plan	Yes	Part-D report, chapter 2, refer para 2.2-page no. 13
39	Whether relevant authorities and stakeholders were consulted for NEBA and during the areas for priority protection	Yes	Part-D report chapter 3
40	Whether District administration has been appraised of the risk impact of oil spills?	Yes	Part-D report
Action Plan			
41	Whether the plan outlines procedure for reporting of oil spills to Coast Guard	Yes	Chapter 2, refer para 2.6-page no. 22
42	Whether the oil spill response action is clearly mentioned	Yes	Chapter 3, refer para 3.1-page no. 36
43	Whether the action plan includes all duties to be attended in connection with an oil spill	Yes	Chapter 3, refer para 3.1 page no. 36
44	Whether the action plan includes key personnel by their names and designation viz. COO, ICO	Yes	Chapter 5-page no. 54
45	Whether alternate coverage is planned to take care of the absence of a particular person [in cases where action plan is developed basis names]	Yes	
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	Chapter 10 page no. 93
47	Whether contact directory containing numbers of key response and management personnel is intimated in the plan	Yes	Chapter10 Page No. 93
48	Whether approved recyclers are identified for processing recovered oil and oily debris	Yes	Chapter10 Page No. 104
49	Whether the shoreline likely to be affected is identified	Yes	
50	Whether final report on the incident is submitted to CGHQ as per NOS-DCP 2015	NA	
51	Whether the spill incident and its consequences are informed to fishermen and other NGOs for environment protection through media	NO	
Training and Exercises			
52	Whether mock fire I emergency response drills are specified in the plan	Yes	Chapter 5 refer para 5.2, page no. 54
53	Whether the mock drills cover all types of probable oil spills	Yes	Chapter 5 refer para 5.2, page no. 54
54	Whether the plan mentions list of trained manpower	Yes	Chapter 5 refer para 5.3, page no. 55

55	Whether records for periodic mock drills are maintained in a well defined format	Yes	Quaterly
56	Whether the plan to updated according to the findings in mock-drills and exercises	Yes	
57	What is the frequency of updatron / review of contingency plan?	Yes	As an when required
58	Periodicity of joint exercise with mutual aid partners	Yes	
59	Frequency of mock-drills for practice	Yes	Twice in a year Chapter 12 Page no.131
60	Whether the records for periodic mock drills are maintained in a well defined format	Yes	Chapter 5
61	Frequency of updation / review of contingency plan	Yes	As an when required

We, hereby, declare that the all information appended above and true and correct to my knowledge or belief

Date Chief Conservator / Installation Manager

VERIFIED

Date (District Commander ICG) or his representative

Date Regional Commander ICG)or his representative

APPENDIX–14: TRAINING AND COMPETENCY

The Installation Manager in consultation with the Head, HSE shall determine the oil spill training needs and priorities on a regular basis.

Attendance

All the Site ERT members shall attend oil spill response awareness training. Personnel having specific roles to play in the plan shall be trained in areas specific to their needs. IMO divides the OSR training in three different levels, as given below

Level-1

To provide field personnel and Supervisor, responsible for undertaking on site cleanup operations, an overview of the techniques available for recovering spilled oil and cleaning polluted shorelines.

Level-2

Supervisor I On-scene Commander I Incident Controller: To provide senior personnel with the skills necessary to co-operate and supervise response operations, in a timely, organized and effective manner.

Level-3

Administrators and Senior Managers: to provide senior personnel with an awareness of the role and responsibilities requires in the management of spills of national signification.

Training courses are required to meet both statutory and Adani Ports and SEZ Limited, Mundra requirements for oil spill response preparedness and safe operations.

Records

Records demonstrating that personnel have satisfactorily completed the designated training course shall be maintained.

APPENDIX-15: COMPILATION LIST OF OIL SPILL RESPONSE EQUIPMENT AS PER NOS-DCP-2018 AND AVAILABLE EQUIPMENT WITH Adani Ports & SEZL

Sr. No.	ITEM	As per NOS-DCP 2018	Available in the present
(1)	(2)	(3)	(4)
1	Operation and Management of OSR Centre at Adani Ports & SEZL as mentioned in column (3) including 2 VHF and 3 walkie talkie sets, computers & printers with furniture etc . and operating at 24 x 7 x 365 days	Operation Manager with Level 3 – 1 No. OSR I/c with Level 3 – 3 No. Shift I/c – 1 No. Radio Operator – 1 No. Responders – 10 Nos. Total Man power – 16 Nos.	1 3 1 1 10 Total: 16 Nos
2a	OSR Work Boat with crew as per column (3) as per detailed specifications	4 Nos	4 No
2b	Tugs	4 Nos	4 No
3a	inflatable boom with accessories (Material: Neoprene/ Neoprene Rubber/ Rubber) with freeboard of about 440mm, overall height 1200 mm and skirt of about 500 mm and length of 100/200 m in a bag/reel complete including 4 nos hydraulic air blowers etc complete as per Specifications.	2000 m	2000m
3b	Fence Boom (Material: Neoprene/ Neoprene Rubber/ Rubber) with freeboard of 450mm and over all height of 1200mm and length of 100m etc. complete as per specifications	1000m	235 m
3c	Current buster room-fasflo-75 (for response in fast current)		2 Nos
4a	Weir type oil skimmer of 50 m^3/hr capacity oil recovery free floating skimmer along with suitable pump and hydraulic Power Pack complete with all accessories.	3 Nos	2 Nos

4b	Drum/ brush type oil skimmer 50 m³/hr capacity oil recovery free floating skimmer, along with suitable pump and hydraulic Power Pack complete with all accessories etc. complete as per specifications.	3 Nos	2 Nos.
4c	Vacuum type oil skimmer 30 m³/hr capacity oil recovery pump coupled to a diesel engine complete with all accessories etc. complete as per specifications.	5 Nos	2 Nos.
5a	Bio Remediation (lit)	2KL	0
5b	Oil Spill Dispersant, Concentrate type-3 combined, approved by the Indian Coast Guard	3 KL	5 KL
6	Flex Barge of about 10 KLtrs. along with its accessories.	4 Nos	2 Nos
7a	Absorbent (oil only) 80 L Kit for quick oil spill response	0	1 Nos
7b	Sorbent pads 20 inch x 20 inch (nos)	2000 Nos	2000 Nos
7c	Sorbent Boom size min 5inch dia, min length 5 feet	500 Nos	500 Nos
8	Protective Equipment (PPE) kit for oil spill response.	Lev-A – 5 Nos Lev-B -10 Nos Lev-C -20 Nos Lev-D -30 Nos	15 Nos
9	VOC Portable Monitor	4 Nos	0

Additional equipment and location

LIST OF RESOURCES AVAILABLE-ADANI PORTS and SEZ LIMITED, MUNDRA						
Tugs Available for Oil Spill Containment						
Name of Tug	**Type**	**BHP**	**OSD**	**AFFF**	**Capacity (cum/Hr)**	**BP**
Dolphin No. 4	ASD	2200 X 2	3000 ltr	2000 ltr	1200	55
Dolphin No. 7	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
Bitarni	ASD	2000 x 2	3000 ltr	2000 ltr	1200	65
Khushboo	Fixed screw	401 X 2	-	-	-	10

Dolphin No. 4, 7, 11, 14, 15, 16, 17, 18, Brahmini and Bitarni 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.

All above ten Tugs have class notation as Harbour Tugs and are certified to work within the Harbour limits only.

2. Reception Facility: 12" pipe line, connected to a slop tank at chemical tank farm.

Dolphin 11 has firefighting system of 1200 m3/hr along with 20 ton lifting "A" frame and diving support facility.

Location of Oil Spill Equipment: The Oil Spill Equipment stored in SPM Store.

Environ Software Pvt. Ltd.

Corporate Office:

Environ Towers, 60/4, 4th Floor,
Hosur Road, Konappana Agrahara,
Electronic City, Bangalore-560 100. India.
Tel:+91-80-2852 2191, +91-94497 50282
Fax:+91-80-2852 2192
E-mail:environ@environsoftware.com, environ@environcs.com

Branch Office:

T.R Residency, No.A/T-1,
3rd Floor,Sao Paulo,
Taleigao, GOA-403 002. India.
Tel:+91-832-2452069

www.environsoftware.com

www.environinfotech.com

www.environtechnologies.com

Annexure – 10

FAX/EMAIL

FROM	INDIAN COAST GUARD STATION VADINAR	TELE FAX: 02833-256333 EMAIL: cgs-vdr@indiancoastguard.nic.in
TO	THE GENERAL MANAGER, IOCL, VADINAR	EMAIL: rsabharwal@indianoil.in
	THE VICE PRESIDENT, BORL, VADINAR	EMAIL: ramesh.thakkar@borl.co.in
	THE MARINE HEAD OF RELIANCE INDUSTRIES LTD, JAMNAGAR	EMAIL: mithilesh.k.singh@ril.com
	THE CHIEF OPERATIONS OFFICER , VOTL (NAYARA ENERGY LTD), VADINAR	EMAIL: alok.kumar@nayaraenergy.com
	THE CHIEF EXECUTIVE OFFICER, ESBTL, SALAYA	EMAIL: umakant.singh1@essarport.co.in
	THE MARINE HEAD, ADANI PORT & SEZ, MUNDRA PORT	EMAIL: yogesh.nandaniya@adani.com
FILE	761	NO OF PAGE(S): 01
DATE	04/04/2022	

REGIONAL LEVEL POLLUTION RESPONSE EXERCISE:11-13 APR 2022

Sir,

1. Refer to this station fax 761 dated 17 Mar 22.

2. Table top exercise will be held on 11 Apr 22. It is requested that 03(three) representatives be nominated by 06 Apr 22 with mobile no & email, the nominees preferably being those who are OPRC IMO qualified.

3. Venue & time of the exercise will be intimated.

Regards,

(Shipra Chaudhary)
Commandant(JG)
Executive Officer
for Commanding Officer

REGIONAL LEVEL POLLUTION RESPONSE EXCERCISE REPORT

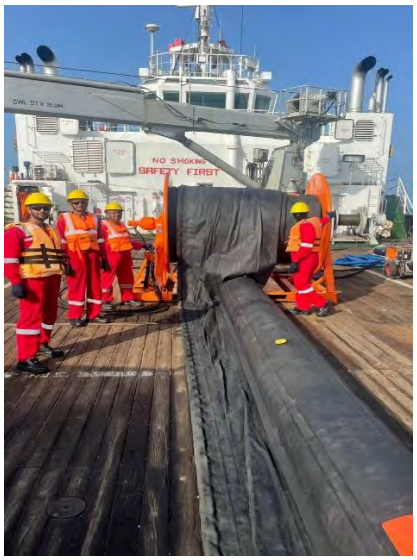
Venue: 22 Deg 32.6 N,069 Deg 36.0 E , 8 Nm off Vadinar

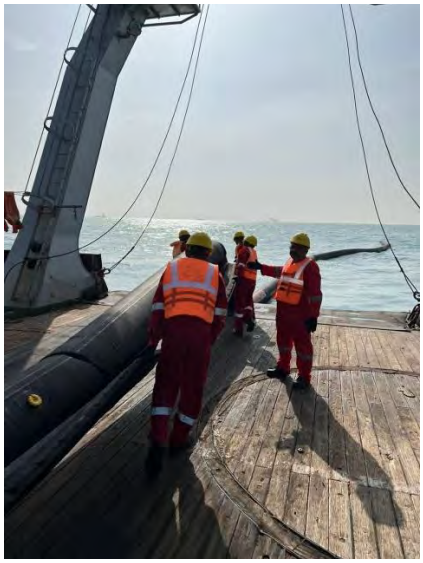
Date: 12th Apr 2022

Oil Handling Agencies involved: RELIANCE, ESBTL, OOCL, APSEZ, BORL, VOTL(NAYARA)

Statement of facts

0700 : Dol-11 cast off from Tug berth, Mudra. Proceeding to given position 22 Deg 32.6 N,069 Deg 36.0 E, 13 nm off Mundra Port.
0845 : Dol-11 reached at the given position with Victor alongside and reported to OSC CG 152.
0915 : CG 152 advised Dol-11 to deploy the boom with form J formation and lower skimmer for contamination of the spilled oil.
0915 : Dol-11 commenced deploying 250m boom in the water.





Dol 11 deploying the boom

0951 : Dol-11 completed deployment of 250m boom with J formation and skimmer lowered in water. The floating tank for skimmer was kept ready on Dol 11 deck. The Overside OSD spray was pressurized. Same was reported to CG 152. CG advised that it would come close for inspection and throw saw dust in water to create oil spill scenario.

Boom, Skimmer and OSD spray Deployment

0954 – CG 152 came close for inspection and threw Saw dust in water.

1000 – CG 152 completed the inspection and appreciated the quick and professional response from Dol-11.

1015 : CG 152 advised all participants to hold position and keep the equipment deployed. Meanwhile CG 152 continued to inspect the deployment by all participants.
1100 : Coastguard Dornier aircraft and chopper took the aerial rounds.
1118 : OSC CG 152 appreciated all participants and advised all craft to call off the drill, pick up the deployed equipment and return to base.
1210 : All deployed equipment recovered and secured. Dol-11 and victor commenced passage to Mundra.
1405: Dol-11 arrived Tug berth, Mundra.

Team Adani

REGIONAL LEVEL POLLUTION RESPONSE EXCERCISE REPORT

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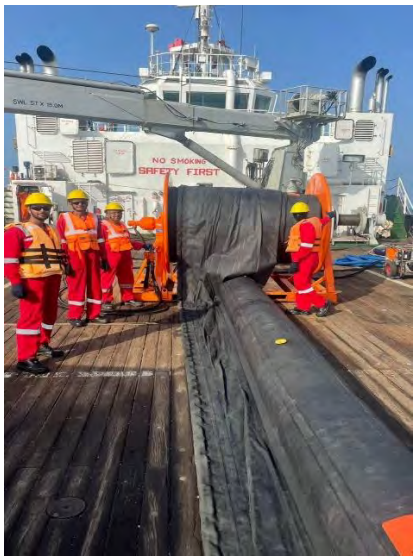

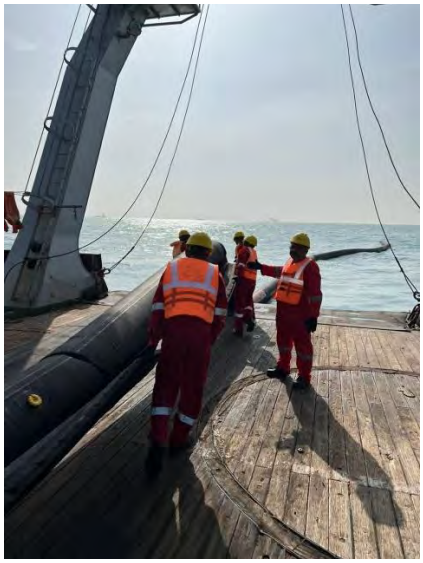

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1405: Dol-11 arrived Tug berth, Mundra.

Team Adani

Annexure – 11


International Day for The Conservation of Mangrove Ecosystem
adani Foundation
"Blue economy and Sustainable use"
26th July 2022
OPPO A9 2020
2022/07/26 11:18

OPPO A9 2020
2022/07/26 11:17

Annexure – 12

डॉ. एम. सुरेश कुमार /Dr. M. Suresh Kumar
मुख्य वैज्ञानिक तथा प्रमुख/Chief Scientist & Head
प्रोफेसर एसीएसआईआर/Professor AcSIR
पर्यावरणीय प्रभाव एवं संधारणीय प्रभाग
Environmental Impact & Sustainability Division
Ph/Off : (91) (712) 2247844
EPABX : (91) (712) 2249885-90(Ext.354)
Fax : (91) (712) 2249896
E.Mail : ms_kumar@neeri.res.in
eisd@neeri.res.in

सीएसआईआर–राष्ट्रीय पर्यावरण अभियांत्रिकी अनुसंधान संस्थान
नेहरू मार्ग
नागपुर 440 020
(भारत)

CSIR-National Environmental Engineering Research Institute
Nehru Marg
Nagpur 440 020
INDIA

No: ECCA-AP&SEZ/CSIR-NEERI/06

Date: 08/06/2022

To,
Head-Environment,
M/s. Adani Ports and Special Economic Zone Limited,
Adani House, P.O. Box No.1,
Mundra, Kutch - 370421.

Sub: Status of SEZ Environment Clearance Compliances
Ref:

1. SEZ Environment Clearance bearing MoEF letter No. 10-138/2008-I A.III, dated 15th July, 2014 (Specific Condition No. vii)
2. SO No. 5702004926, dated: 27.01.2022
3. Site Visit dated 23-24.05.2022

With reference to the above stated subject and references, work has been awarded to us for studies through Environment Clearance compliance audit at Multi Product SEZ of M/s. Adani Ports & SEZ Limited, Mundra with reference to EC Specific Condition No. (vii).

Accordingly, the site visit was conducted on 23rd to 24th May, 2022 and the compliance report (April 2021 - September, 2021) was reviewed by us. It was further assessed from the monitoring reports submitted to us and site visit carried out, as part of the compliance report that all the environmental norms meet the applicable standards.

It has been concluded all the conditions stipulated in Environment Clearances are being complied and there is no violation of any condition. The existing practices shall be continued in future as well to ensure meeting with the applicable norms.

With Regards,

(M. Suresh Kumar)

Annexure – 13

Expense Details for Fisherfolk Amenitites work in different core areas										
Sr. No.	Details	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	Apr'22 to Sep'22	TOTAL	AMT IN LACS
Expenditure Details (Amount in Rs.)										
1	Vidya Deep Yojana	2,069,300	193,000	2,087,000	1,771,000	110,225	580,103	82,865	6,893,493	68.93
2	Vidya Sahay Yojana	552,580	495,000	691,000	708,000	504,336	659,709	511,996	4,122,621	41.23
3	Adani Vidya Mandir – Shaping Lives	4,200,000	4,030,000	3,472,000	6,434,020	1,593,805	3,737,700	2,486,787	25,954,312	259.54
4	Senio Citizen Health Card	--	8,430,000	1,750,000	2,975,000	1,750,000	-	-	14,905,000	149.05
5	Financial Support to Poor Patients	4,439,507	1,275,000	813,000	1,296,063	763,800	1,255,000	716,906	10,559,276	105.59
6	Machhimar Kaushalya Vardhan Yojana	188,708	200,000	397,000	73,000	--	226,000	-	1,084,708	10.85
7	Machhimar Sadhan Sahay Yojana	--	--	315,000	522,000	--	-	-	837,000	8.37
8	Machhimar Awas Yojana	4,592,106	1,165,000	--	2,311,000	2,424,016	2,480,000	-	12,972,122	129.72
9	Machhimar Shudhh Jal Yojana	2,236,050	2,700,000	2,038,000	1,773,000	2,348,300	1,936,575	421,800	13,453,725	134.54
10	Sughad Yojana	1,367,300	170,000	--	192,000	30,000	-	-	1,759,300	17.59
11	Machhimar Akshay kiran Yojana	860,850	100,000	68,000	--	--	-	-	1,028,850	10.29
12	Machhimar Ajivika Uparjan Yojana-Mangroves plantation	1,558,800	500,000	1,382,000	1,400,000	1,900,272	2,069,432	1,914,432	10,724,936	107.25
13	Bandar Svachhata Yojana	106,400	50,000	--	--	367,000	145,000	-	668,400	6.68
14	Cricket league and Cycle Marathon	432,000	657,119	638,000	610,800	--	-	-	2,337,919	23.38
15	Sports Material For Children & Youth at Vasahats	197,797	--	--	--	--	-	-	197,797	1.98
16	New Pilot Initiative for Polyculture	398,240	160,000	--	--	--	-	-	558,240	5.58
17	New Pilot Initiative for Cage farming Asian Seabass & Lobster	864,000	660,000	--	--	--	-	-	1,524,000	15.24
18	Sea Weed Culture Project	--	--	--	200,000	--	-	-	200,000	2.00
19	Mangrove Biodiversity Project	--	--	1,890,000	684,000	499,210	997,642	-	4,070,852	40.71
20	Approach Road restoration at 9 vasahat	--	--	--	--	599,000	942,780	170,000	1,711,780	17.12
21	Community trening Centor & Maintenance work						6,022,000	1,531,000	7,553,000	75.53
	TOTAL	24,063,638	20,785,119	15,541,000	20,949,883	12,889,964	21,051,941	7,835,786	123,117,331	1,231.17

Annexure – 14

Consultancy Proposal for Grassland Development
Proforma for Submitting Consultancy Proposals

1.	Name of the Institute	**ICAR- Indian Grassland and Fodder Research Institute (IGFRI)**	
	Project Code (to be given by PME Cell)		
2.	Title of the proposed Project (including brief of the project):	**Enhancing/upscaling the forage production in Gauchar Land by Grassland Development in Mundra Region, Gujarat**	
3.	Scope of the Consultancy work**:**		**400 acres**
i.	Preparation of literature/survey/feasibility studies/state of art project/technology forecasting/evaluation reports		--------
ii.	Interpretation of test results and data, advising on risks and hazards or similar skilled advice		--------
iii.	**Advisory tasks in evaluation and implementation of a project-** This Consultancy work about providing technical guidance and evaluation of ongoing grassland developmental activities in 400 acres of Gauchar land in Jarpara village, Mundra region of Gujarat. Mr. Anshul Sanduja; Manager-Environment, Adani Ports & SEZ Ltd. contacted to Director ICAR-IGFRI through mail dated 01.12.2021 and 12.09.2022. Scope of work as requested by APSEZ (Host organization) • Site visit to the Gaucher land (if required) • Testing of representative soil samples of Gaucher land • Review of Approach & Methodology adopted by APSEZ • Submission of the technical report on the approach & methodologies submitted by APSEZ along with the recommendations • Technical Guidance by ICAR - IGFRI Jhansi		**Annexure I**
iv.	Design engineering related to agriculture		--------
v.	Assistance in management of pests and other entomological problems		--------
vi.	Technical advice in the form of one-time assistance to help in trouble shooting, or problem-solving, mainly advisory in nature		---------
vii.	Any other (specify)		
4.	**Detailed objectives of the consultancy project:**		
	• Technical Guidance by ICAR - IGFRI Jhansi reg Grassland Development • Review of Approach & Methodology adopted by APSEZ • Submission of the technical report on the approach & methodologies submitted by APSEZ along with the recommendations • Monitoring of the progress and mid-term review, improved strategies if any required		
5.	Duration of the project (give specific dates and period):		1 Year

		(Date of start will be the date of receiving the first installment)
6.	Programme of work and phasing of milestones	**Annexure II**

7. Whether the physical or other infrastructural facilities available at the Institute are required for carrying out project: Yes/No **Yes**

8. Name and address of the consultant(s) undertaking the project:

Name	Designation	Postal address	Email & Phone
Dr Amit K Singh	PI	Scientist, GSM Division ICAR-IGFRI Jhansi	amit09bhu@gmail.com Mobile no:8800422419
Dr Sunil Kumar	Co-PI	Principal Scientist, GSM Division ICAR-IGFRI Jhansi	sunilhort66@yahoo.co.in Mobile no: 9451169021
Dr RV Kumar	Co-PI	Principal Scientist & Head GSM Division; ICAR-IGFRI Jhansi	rvkumar4444@gmail.com Mobile no: 829978945
Dr AK Roy	Co-PI	Project Coordinator, Forage Crops ICAR-IGFRI Jhansi	royak3333@gmail.com Mobile no: 9415412144
Dr Amaresh Chandra	Co-PI	Director, ICAR-IGFRI Jhansi	amaresh.chandra@icar.gov.in Mobile no:9450041285

9. Previous consultancy work undertaken by the consultant(s) during the past one year

Title of Project	Sponsoring agency	Period			Total cost of project	Total Intellectual fee received	
		From (date)	To (date)	Duration (days)		In the project	By the consultant
Development of Grassland	MPSRLM	2018	2020	2 years	9.60 lakhs	**2.52 lakhs**	

10.	Whether the project requires foreign visit by the consultant(s): Yes/No If yes, attach the check-list for foreign deputation-	**No**
11.	Whether the consultant(s) would require leave for carrying out the work: Yes/No If Yes: whether he/she has required leave in balance: If No: provide justification as to how the consultancy would be done while discharging official duties	**Number of man-days per officer for proposed consultancy work as per guidelines of ICAR. It will not affect the official duties.**
12.	**Sponsoring Agency**	

a.	Name and address:	**Adani Ports & SEZ Ltd. Mundra, Gujarat**
b.	Status	**Private Organization**
Indian: Central Government/Government Undertaking/State Government/Private Organization/ NGO/other (specify)		
Foreign: U.N agency/CGIAR Institute/Private Organization/or other International Agency (specify)		

13. **Activities of sponsor in brief**: Adani Port & Special Economic Zone Ltd (APSEZ) is India's largest private port and special economic zone which was incorporated as Gujarat Adani Port Limited in the year 1998. APSEZ has presence across 13 locations along the Indian coast which plays a major role in contributing to India's economy. APSEZ has presence across six maritime states of Gujarat, Goa, Kerala, Andhra Pradesh, Tamil Nadu, Maharashtra and Odisha with the most widespread national footprint with deepened hinterland connectivity. APSEZ has evolved into a provider of integrated port infrastructure services of which the Special Economic Zone (SEZ) of Mundra in Gujarat is the landmark validation. Integrated services across three verticals ports, logistics and SEZ have enabled it to forge alliances with leading Indian businesses making APSEZ an undisturbed leader in the port sector. APSEZ being an environmental & sustainability responsive organization has undertaken many projects such as Renewable power installation; Implementation of energy conservation projects; State-of-the-art waste reception facility; Material Recovery Facility; Water conservation projects; Wastewater treatment system; Zero waste-to-landfill certified port; Certified single-use plastic-free port; Rainwater harvesting; Ecosystem restoration projects that can support livelihoods, fight the climate crisis and enhance biodiversity; Grassland development projects; Mangrove plantation and conservation.

13 (a).**Additional information in case of foreign sponsoring/collaborating agency: N/A**	
i.	Details of past collaborations, if any, by the collaborator/sponsor with the applicant Institute/other ICAR institutes/other Indian institution(s), whatever is known
ii.	Details, if any, available on R&D projects of sensitive nature and concerned with national security, taken up and/or funded by the sponsor/collaborator in the past in its own country or any other country, whatever is known
iii.	Genesis of the project
iv.	Foreign support/collaboration (details):
v.	Financial support (Rs. & Foreign Exchange)
vi.	Any other support
vii.	Justification/need and likely benefits (scientific, economic, societal, strategic etc.)
14. Does the project involve?	

a.	Referring to or sourcing of strategic/sensitive material/information	**No**
b.	Transfer of biological material(s) to the collaborator/sponsor	**No**
c.	Use of genetically modified organisms	**No**
d.	Use of environmentally or otherwise hazardous material(s)	**No**
e.	Use of radioactive materials	**No**
f.	Field surveys/trials/proving/collection/testing (give location)	**No**
g.	Ethical issues in conduct of the project	**No**
If answer to any of the points from (a) to (g) is 'yes', the consultant to give undertaking to abide by relevant and extant ICAR/national regulations and guidelines on the subject.		

15. Total outlay of the project: **4,91,400 Rs.**

(Provide break-up for different Operational Heads as given below)

(i)	**Direct Expenses**	**Amount (Rs.)**
a.	**Salary**	
	Salary of Scientific staff	1,40,000 Rs. (Approx)
b.	TA/DA cost	1,00,000 Rs.
c.	Stationary and Miscellaneous	10,000 Rs.
d.	Training/Workshop	------
e.	Seed Procurement	------
g.	Consumables (Chemicals and Glassware)	------
h.	Contingencies (outsourcing of samples, article processing charges and urgent requirement for execution of project etc.)	Services chargeable as per institute rate
(ii)	**Intellectual Fee**	1,40,000 Rs.
(iii)	**Any Other cost specific to the project**	
	Institutional charges	31,200 Rs.
(iv)	**GST (18% of the cost of project)**	70,200 Rs.
	Total Cost	4,91,400 Rs.

(Intellectual fees will be divided between the consultancy team and institute in the ratio of 70:30 as per ICAR Norms)

16. Schedule of payment of fees (indicate amount of each installment, due date of payment and bank guarantees)

Total 3 installments will be released from APSEZ Mundra to IGFRI during project period:

First Installment	70% at the start of the project
Second Installment	20% at the time of submission of the draft report
Third Installment	10% after submission of the final project report

17.	Intellectual fees payable to the consultant(s), a brief of calculations with reasons: **Annexure III**

18.	Whether Intellectual Property Rights issues are involved in the consultancy project. If yes, are they in conformity with ICAR's IPMTT/C Guidelines; if not, the variation be indicated and explained with justification for approval of the competent authority. IGFRI technical expertise will be shared. Yes they are in conformity with ICAR's IPMTT/C Guidelines
19.	Whether a written communication/Agreement indicating the Terms of Reference has been received from the external agency as indicated in Chapter 1 para 1.3. If yes, enclose a copy along with comments- **Yes, Enclosed** if no, provide justification.

Certified that the overall institutional/ organizational or national interests do not suffer in any way with the acceptance of the consultancy project.

Consultant Team	(Signature) Consultant(s)
Amit Kumar Singh	
Sunil Kumar	
RV Kumar	
AK Roy	
Amaresh Chandra	

Recommendation of PME cell

1. Certified that the proposal has been considered as per procedure and is found to be in conformity with the ICAR rules and guidelines.

2. It has been examined and ensured that:

   i. the acceptance of the project is befitting the academic status of the Institute. Yes/No

   ii. the amount of all charges and intellectual fee offered is commensurate with fees chargeable as per costing guidelines. Yes/No

   iii. the return to the Council/Institute is commensurate with the potential and likely gains to the client as a result of transfer of in-house knowledge, skill or technology. Yes/No

   iv. the project would contribute to the knowledge and professional competence in the Institute. Yes/No

   v. In case(s) the answer to any of the questions from i to iv is 'no', please provide justification. N.A.

3. Any other comment: Agreement with terms of reference needs to be made.

(Signature) 10/10/22
PME cell I/c

In cases where Director is the competent authority for Approval

Approval of the Director of Institute:

(Signature)
Director of the Institute
निदेशक / Director
भा.कृ.अ.प.–भा.च. एवं चा.अ.सं., झाँसी (उ.प्र.)
ICAR-I.G.F.R.I., JHANSI (U.P.) 284003

Annexure I

Advisory tasks in evaluation and implementation of a project- This consultancy work providing technical guidance and evaluation of ongoing grassland developmental activities in 400 acres of gauchar land in village Jarpara, Mundra; Gujarat.

Technological support from ICAR- IGFRI

ICAR- IGFRI pioneered in the pasture establishment and utilization techniques for various sub-agro-climatic regions and have excellent expertise in pasture grasses like *Cenchrus ciliaris, Cenchrus setigerus, Lasiurus sindicus, Dichanthium annulatum, Stylosanthes spp., Panicum antidotale etc.* A large number of exotic and indigenous trees including fodder trees have been introduced by the IGFRI. The most promising amongst the fodder trees are *Ficus infectoria*, *Morus alba*, *Albizzia lebbek, Acacia nilotica, Hardwickia binata, Azadirachta indica, Ailanthus excelsa and Prosopis cineraria*. Some of these trees have been successfully propagated in silvipastoral system, suitable model have been developed for different rainfall situation, and simultaneously dissemination of pasture improvement technology is in progress for different categories of animals (both large and small ruminants).

Different models of **S**ilvo-pasture systems, improved model pastureland and grassland developed at IGFRI have good production potential of forage from 5-10 t DM/ha on degraded /rangelands of the country. Silvi-pasture systems can serve the purposes of forage and firewood production and ecosystem conservation. This system support 2-4 ACU /year depending upon species of tree, pasture combinations and agro-climatic conditions. It also conserves soil moisture and reduces soil erosion as well as builds up soil in long rotation. This technology is being disseminated with line departments of forestry, soil water conservation, NGOs, Gaushalas, KVKs through NIFTD programme (National Initiative on fodder technology demonstration) etc. Research conducted at IGFRI showed that improved natural pastureland/ rangeland can support four times of the present livestock population. Protection, reseeding and soil-water conservation measures are the essential components for establishment of pastures. Further utilization of pasture through controlled grazing increases the life and productivity of pasture.

Envisaged Outputs:

1. Development of pastureland in targeted areas of specified states
2. Increased fodder availability
3. A general framework for quantification and valuation of ecosystem services in tropical grasslands/pasturelands
4. Quantification of tangible and non-tangible benefits such in changed land use systems

Envisaged Outcomes:

1. Enhanced Supply of green fodder to local animals
2. Improvement in animal health and productivity
3. Enhanced environmental benefits and services

4. Research publications (IPR of ICAR-IGFRI)
5. Policy for future works on the development of tropical grasslands/pasturelands.

ANNEXURE II

Grassland development depends on monsoon and before onset of monsoon activities like field preparation, procurement of suitable grass/legume species seed & planting material of fodder tree species, soil & water conservations measures and cattle proof trenches work etc. are to be completed. These operations must be completed by mid-June so that during July demonstration on sowing of grasses, legume and transplanting of rooted slips and fodder trees work etc. can be completed. The major activities and milestone will be discussed in the technical report.

Annexure III

Intellectual fees payable to the consultant(s), a brief of calculations

Consultant	Gross salary (INR)	Per day Gross Salary (INR)	No of Visits (Approx.)*	No. of days per visit (Approx.)**	Total Salary (INR) (Approx)
Amit Kumar Singh	1,06,241	3541	1	3	10624
Sunil Kumar	3,02,120	10071	1	3	30212
RV Kumar	2,93,478	9783	1	3	29348
AK Roy	2,90,558	9685	1	3	29056
Amaresh Chandra	2,77,458	9249	1	3	27746

*** As Distance between selected site and ICAR-IGFRI more than 1000 km, one visit may take a duration upto one week hence project cost has been calculated on that basis.**

****Expected no of visit for individual consultant may vary during the course of project.**

Annexure – 15

adani
Ports and Logistics

20th July, 2022

The Member Secretary
Gujarat Pollution Control Board
Paryavaran Bhavan, Sector – 10A,
Gandhinagar – 382010.

Sub: Cumulative Impact Assessment report for Waterfront, SEZ and Ancillary Developments along Mundra Coast, Kutch District, Gujarat.

Ref : Letter from GCZMA vide Ref. No. ENV/10/2019/HC-10/T dated 12th July, 2022 (Annexure – 1)

Dear Sir,

This has reference to the above stated subject matter, APSEZ would like to inform that Cumulative Impact Assessment (CIA) study has been carried out for Waterfront, SEZ and Ancillary Developments along Mundra Coast, Kutch District, Gujarat by NABET accredited consultant in the year 2016-18 and the final report of CIA study to GCZMA (copy to MoEF&CC) vide dated 30th April, 2018 for their comments and consideration. The complete chronology of the CIA study & its further corresponds enclosed as **Annexure – 2** and copy of CIA study report as **Annexure – 3**.

In this regard, APSEZ has received letter from GCZMA vide its letter dated 12th July, 2022 through post stating that "project proponent has to co-ordinate with various departments for follow-up in the matter of CIA with Gujarat Pollution Control Board as Nodal Agency".

In line with receiving of above said letter, APSEZ is requesting for consideration of this matter for detailed deliberation and suitable action / way forward.

Thanking You,
Yours Faithfully,
For, Adani Ports and SEZ Limited

Snehal Jariwala
Head – Environment

Encl. As Above

RECEIVED
Forests & Environment Dept.
Sachivalaya, Gandhinagar.
22 JUL 2022
No.:
Sign.:

22/07/22

CC To:
The Director (Environment),
Gujarat Coastal Zone Management Authority,
Forests and Environment Department,
Government of Gujarat, Block no. 14/8,
Sachivalaya, 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 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

adani

Ports and Logistics

20th July, 2022

The Member Secretary
Gujarat Pollution Control Board
Paryavaran Bhavan, Sector – 10A,
Gandhinagar – 382010.

Gujarat Pollution Control Board
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Thanking You,
Yours Faithfully,
For, Adani Ports and SEZ Limited

Snehal Jariwala
Head – Environment

Encl. As Above

CC To:
The Director (Environment),
Gujarat Coastal Zone Management Authority,
Forests and Environment Department,
Government of Gujarat, Block no. 14/8,
Sachivalaya, Gandhinagar – 382010.

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

Annexure – 16

Compliance Report of CIA Study Environment Management Plan

S. No.	Identified environmental and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitude1	Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.	Additional Risk Mitigation Measures/ESMP	Responsible agency	Timeframe for implementation	Compliance
1	**Land Use Change**						
1.1	It is predicted that the built up land in the rural areas would increase by an order 50% from the baseline 2015. New settlements near the SEZ area might create slums. Unorganized urban development leading to poor sanitation and proliferation of vectors and disease.	Level - 1	APSEZ has developed two townships (Shantivan and Samudra) presently accommodating 1668 households. Necessary permissions from concerned authorities were already obtained for the development of townships and Associated infrastructure facilities.	The existing townships will be expanded to accommodate about 4 lakh people when the APSEZ is fully developed.	APSEZ	As and when Required	APSEZ has developed two townships (Shantivan and Samudra) accommodating 2057 households and associated infrastructure facilities. Accommodation is made available for all interested employees working within Adani group & SEZ industries. Out of which 98.15% Occupancies are accommodated within the townships and rest are available for employees working within APSEZ. At present 70 nos. of industries (processing & non-processing) are present within the SEZ (52 nos. are in operation). Township facilities are also made by some of SEZ industries within Mundra town for their employees with basic infrastructure facilities and requirements. Most of the employees working in SEZ industries are residing in Mundra township having all basic requirements and associated facilities. The existing social infrastructure facilities are adequate for present development at APSEZ. The existing townships with associated facilities will be expanded as per requirement.

S. No.	Identified environmental and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitude1	Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.	Additional Risk Mitigation Measures/ESMP	Responsible agency	Timeframe for implementation	Compliance
							APSEZ has also been granted permission for receiving domestic sewage @ 2.5 MLD from Mundra village (which was earlier discharged into open area within Mundra region) in to wastewater treatment plant for treatment and disposal. APSEZ has already started receiving of domestic sewage from Mundra, which abates the poor sanitation and unhygienic condition within Mundra region. Total project cost for laying domestic sewage underground pipeline with other associated facilities from Mundra to APSEZ is 362 Lacs.
1.2	Once the project is fully developed, due to increase in built up land in the APSEZ area, there will be an increase in the storm water runoff from the facility.	Level-1	The study area experiences scanty rainfall less than 400 mm/year. Considering the natural gradient, ASPEZ have designed and implemented storm water drains in the existing facility to meet the	Technical feasibility study can be carried out to explore the possibility of developing storm water collection ponds to utilize maximum possible storm water runoff for dust suppression in the coal yard areas during non-rainy days.	APSEZ	Technical Study - one time, Implementation - Continual process	Presently, ~ 51.7 % of the total SEZ is developed. Based on technical studies, At present all existing coal yards are designed with drain, for collection of water during water sprinkling and rainfall, which is carried away to dump pond. Supernatant water from dump pond is being collected and used for dust suppression activities or after sedimentation, discharged to sea. Details of drain and dump pond has been submitted in along with EC compliance report (Oct 19 to March 20). Analysis of said water discharging into sea during monsoon season is being carried out (twice in a year during monsoon) through NABL / MoEF&CC accredited laboratory. Analysis report of the same shows there is no any contamination. The report is attached herewith as **Annexure – i**. During compliance period FY 2022-23, the maximum

S. No.	Identified environmental and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitude1	Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.	Additional Risk Mitigation Measures/ESMP	Responsible agency	Timeframe for implementation	Compliance
			peak daily rainfall of 440 mm/hr. Hence flooding of water in the neighboring areas is not envisaged.				recorded rain fall was **4.33 mm/hr** observed, which was much less than the design capacity of existing storm water drainage system. So our existing storm water management facility is adequate to handle the storm water runoff from the area. Hence flooding of water in the neighboring areas is not envisaged.
			As per the directions given in the environmental clearance issued for the proposed Multi-Product SEZ and CRZ clearance for Desalination, sea water intake, outfall facility and pipeline project, the master plan of the project was	The channel depth in all the natural streams shall be maintained to accommodate peak flood flow during the monsoon and periodical de-silting activities in the natural steams passing through the APSEZ area	APSEZ, District Administration* and Irrigation department	As and When Required	Presently there is no Desalination plant, sea water intake and outfall facility developed as part of EC & CRZ clearance of Multiproduct SEZ. The project will be designed and implemented as per requirement without disturbing the natural flow of rainwater in all the seasonal streams.

S. No.	Identified environmental and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitude1	Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.	Additional Risk Mitigation Measures/ESMP	Responsible agency	Timeframe for implementation	Compliance
			designed and being implemented without disturbing the natural flow of rainwater in all the seasonal streams.				
1.3	Due to conservation and protection of mangroves in the designated conservation area, it has been predicted that the current mangrove footprint area would marginally increase in next 15	Positive Impact with ecological benefits	In addition to conservation of the identified 1254 ha mangrove areas around Mundra port and SEZ, APSEZ has taken up large scale mangrove afforestation activities in an area of more than 2800 ha at various locations	APSEZ will continue mangrove afforestation as per the commitment made with concerned regulatory authority	APSEZ	Short Term	APSEZ has carried out mangrove afforestation in 3140 ha. area across the coast of Gujarat till date. Total expenditure for the same till date is INR 847.8 lakh. No further mangrove afforestation is pending w.r.t. commitment made with concerned regulatory authority for APSEZ, Mundra project. As per study conducted by NCSCM, Chennai in 2017, mangrove cover in and around APSEZ, Mundra has increased from 2094 Ha to 2340 ha (as compared between 2011 to 2017). The analysis has shown an overall growth of 246 ha. The cost for said study was INR 3.15 Cr. Recently study was carried out in the year 2019 and based on that there is an increase of mangrove cover between **March 2017 (Total 2340) and September 2019** with an extent of **256 Ha (Total 2596 Ha Area)** which is about **10.94%** rise in growth rate, also It

<table>
<tr><th>S. No.</th><th>Identified environmental and social impacts for the fully developed scenario (year 2030)</th><th>Type of Impact & Magnitude1</th><th>Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.</th><th>Additional Risk Mitigation Measures/ESMP</th><th>Responsible agency</th><th>Timeframe for implementation</th><th>Compliance</th></tr>
<tr><td></td><td>years due to natural growth. This will enhance the overall biodiversity in the local coastal eco-system.</td><td></td><td>across the coast of Gujarat state in consultation with various organizations</td><td></td><td></td><td></td><td>reveals that the mangrove and the tidal system in the creeks remained undisturbed over this period.

Hence, there is an overall growth of mangroves in creeks in and around APSEZ, Mundra is 502 Ha between 2011 and 2019.

Analysis of data between categories indicated that there was an increase in dense mangroves along with the conversion of scattered into sparse, that shows the growth of mangroves in a progressive direction.

As a part of GCZMA recommendations and NCSCM mangrove conservation action plan, APSEZ has undertaken following activities.
<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>• APSEZ entrusted NCSCM, Chennai to carry out Monitoring of mangrove distribution in creeks in and around APSEZ and shoreline changes in Bocha island.
• As a part of this study, overall growth of mangroves in the creeks</td></tr>
</table></td></tr>
</table>

S. No.	Identified environmental and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitude1	Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.	Additional Risk Mitigation Measures/ESMP	Responsible agency	Timeframe for implementation	Compliance		
									in and around APSEZ was assessed comparing Google earth images of 2017 & 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%. • 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. • Hence, there is an overall growth of mangroves in creeks in and around APSEZ, Mundra is 502 Ha between 2011 and 2019. • The cost of the said study was INR 23.56 Lacs incurred by APSEZ.

S. No.	Identified environmental and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitude1	Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.	Additional Risk Mitigation Measures/ESMP	Responsible agency	Timeframe for implementation	Compliance		
							2.	Tidal observation in creeks in and around APSEZ	• APSEZ carried out the tidal observations at locations similar to 2017 in Kotdi, Baradimata, Navinal, Bocha and Khari creeks under the guidance of NCSCM. • The observed tidal ranges indicate that the creeks experience normal tidal ranges, adequate for the growth of mangroves. • The cost of the said activity was INR 1.0 Lacs.
							3.	Removal of Algal and Prosopis growth from mangrove areas	• 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. • The cost of the said activity was INR 2.8 Lacs. The details of Removal of Algal and Prosopis growth from mangrove areas was submitted during the last compliance period Oct'21 to Mar'22.

S. No.	Identified environmental and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitude1	Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.	Additional Risk Mitigation Measures/ESMP	Responsible agency	Timeframe for implementation	Compliance		
							4.	Awareness of mangroves importance in surrounding communities	• Adani Foundation – CSR Arm of Adani group has done awareness camps/activities created in the community regarding importance of mangroves. • Celebrated the International Mangrove Day for the Conservation of the Mangrove Ecosystem every year on 26th July, • Adani Foundation provides good Quality dry and green fodder to 29 Villages. Project is covering total 33072 Cattels / 2747 farmers and hence enhancing cattle productivity during last FY 2022-23 (Till Sep'22). • Awareness of mangroves importance in surrounding communities & Fodder support - The expenditure for fodder supporting activities was approx. 200.89 Lacs during FY 2022-23 (Till

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									Sep'22), which was incurred by APSEZ. • 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 Grassland development in Siracha – 85 Acre & Zarpara – 25 Acre done which resulted in total production of 82 ton. • 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. • APSEZ has celebrated the International Day for the Conservation of the Mangrove Ecosystem on July 26th to raise awareness of the importance of mangrove ecosystems as "a unique, special and vulnerable

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							ecosystem". The photographs of celebration are attached as **Annexure-16.** • Refer CSR report attached as **Annexure – 1**. To comply with the GCZMA recommendations regarding mangrove monitoring at every 2 years, APSEZ awarded work order vide order no. 4802018994, dated 29/07/2022 to the NCSCM, Chennai for mangrove mapping in and around APSEZ, Mundra. The cost of said work is 23.77 Lacs, which will be paid by APSEZ. 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. During current FY 2022-23, 03 ha area coastal stretches have been planted with mangrove species. Total 16 Ha. multi-species mangrove plantation has been carried out till March-22 association with M/s. GUIDE, Gujarat. Current year 4 Hector plantation is in progress which will be resulted in 20 Hector.
1.4	Development activities along the coast might cause		Detailed hydro-dynamic modelling and	It is recommended to map the coastal morphology (Shoreline) at	APSEZ	Continual Process	Shore line change study was carried out by M/s. Chola MS, Chennai (NABET accredited consultant) as a part of Waterfront Development Project – Expansion EIA study. The summary of the said study is as below.

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	certain changes in hydro-dynamic characteristics along the shoreline. Shoreline of any area also can be influenced by storm surges and other natural processes.		shoreline change prediction for a fully developed APSEZ facility has been studied. The study reveals that the erosion and accretion in the study area at the end of 15th year will be within the designated criteria of ± 0.5 m/year. which reconfirms that the waterfront development activities of APSEZ would pose insignificant	least once in three years			To estimate the shoreline change due to the earlier approved waterfront development plan, a historical shoreline change assessment has been undertaken using the satellite imagery for a period of 2008 to 2018. In order to avoid any major errors in estimating the shoreline, the satellite data for similar tidal condition was considered for 2008, 2013 and 2018. AMBUR Methodology was used to study the historical analysis 10km radius stretch of shoreline on either side of the APSEZ project boundary has been considered for assessing the historical shoreline change scenario. The baseline shoreline change assessment depicts the influence of both natural causes and also possible changes in the shore due to various development activities in the study area during the designated period. For the purpose of this study, shoreline on left side of APSEZ is termed as West Side Shoreline and that of the right side as East Side Shoreline for ease of recognition. The maximum accretion and erosion rate of the west side shoreline over a period of 10 years during the year 2008 – 2018 are observed to be 4.78 m/yr and 1.93 m/yr respectively. The maximum accretion and erosion rate of the east side shoreline over a period of 10 years during the year 2008 – 2018 are observed to be 05 m/yr and 0.82 m/yr respectively. APSEZ has already awarded work to the agency namely

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			impact on the Mundra shoreline.				M/s. Gujarat Institute of Desert Ecology, Bhuj for carrying out Shoreline Change Assessment Study for Mundra region vide P.O. No. 4802013270 dated 30.03.2022. The cost of said study is INR 17.39 Lacs. The said study is under process.
2	**Regional Traffic Management Plan**						
2.1	The projected traffic data as per the EIA Report of Multi-Product Special Economic Zone, the peak vehicular traffic from the port and SEZ operations (including supporting facilities and colony) could be in the order of 18,300 and 10,400	Level-1	As per the master plan of APSEZ, eight artillery roads will be connected to either state highway or national highway for evacuating the goods from APSEZ. None of these roads are passing through settlements, thereby avoiding traffic Congestions in the respective	Additional road as per master plan will be built in future based on the overall progress of the project. Currently about 25% of cargo from APSEZ is transported by Rail and the same will be enhanced to 40% when the facility is fully developed in future. This will further reduce the traffic volumes on the regional road network.	APSEZ	As and When Required	Presently, ~ 51.7 % of the total SEZ is developed. Based on technical studies, Existing road/rail/conveyer infrastructure facilities are adequate to evacuate the existing cargo. Further, APSEZ's cargo evacuation through rail / conveyer / pipeline has increased to ~39.44%, thereby reducing the usage of road. Additional road facilities will be built as per master plan considering future development. The facilities for transportation of cargo other than road will be enhanced considering future development, which will reduce the traffic volumes on the regional road Network.

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	vehicles per day respectively. There could be a possible increase in traffic congestions on village-highway intersections and road accidents.		villages. The carrying capacity of the eight artillery roads connecting APSEZ is estimated to be about 16,000 PCU/hr as against the envisaged peak traffic volume of 4,500 PCU/hr. Out of eight artillery roads considered in APSEZ master plan, seven roads were already developed and functional.				

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			APSEZ has been imparting Driver Training Programs to all their contractors to enhance awareness on road safety.	APSEZ can undertake technical feasibility of implementing Intelligent Transport System (ITS) for the freight carriers associated with their development activities.	APSEZ & GSRDC*	Long Term	APSEZ is being imparting the regular in-house classroom and on-job training to all drivers and employees on below topics: ✓ ✓ Basic induction Training for drivers ✓ ITV Driver Training ✓ ITV Driver Induction for Supervisor ✓ Defensive Driving for LMV & HMV ✓ Defensive Driving & BBS ✓ Driver Assessment ✓ Road accident & rescue ✓ Traffic Management & Road Signage ✓ Driving safety training ✓ RORO Driver training ✓ Road Safety ✓ Defensive Driving & Emergency Action Plan ✓ Drivers Responsibilities & Safe driving ✓ Emergency Rescue (Vehicle) Training Approx. 5600 Participants (On roll and contractual manpower) were benefitted from above trainings in compliance period Apr 22 to Sep 22. The same will be continued in future also. APSEZ has also implemented the Remote traffic management system (RTMS) to manage the traffic movements and capturing the violations to further improve the system. Following steps were taken by APSEZ to reduce the

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							accidents. ✓ Handling and escorting of the ODC for ensuring the smooth movement on the roads. ✓ Traffic Awareness programs for the drivers and regular briefing of the drivers in the parking areas. ✓ Incident handling and root cause analysis for taking necessary action in order to avoid such incidents. ✓ BAC checks for the drivers in order to identify the intoxicated drivers and necessary action is being taken against them. ✓ Water spray drive at gates are being conducted on regular basis during night hours to avoid doziness by the driver while driving. ✓ RTMS devices are being installed at 08 critical locations in order to capture speed violations and enforcing road safety regulations. ✓ Display of traffic signages and lane markings on road in coordination with the Civil team for ensuring road safety rules are being followed by the road users. ✓ We have approx. 100+ cameras which are being utilized for monitoring of traffic movement through CCTV and timely response in order to avoid any congestion and during traffic incidents. ✓ Regular traffic checks by Traffic Marshalls in order to ensure road safety rules (Wearing seat belt/Wearing helmet/Carrying driving license/Speed checks/Documents) is being followed by the drivers. ✓ Installation of Road furniture's (Cones/Water filled barriers/Cats eye/Spring Posts/Jersey Barriers) for

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							lane segregation, Channelizing the traffic, at Junctions and indicating Caution for the road users.
3	**Water resources Management and sewage treatment & disposal Plan**						
3.1	For a fully developed APSEZ facility, water demand will be in the order of 4,30,000 m3/day (430 MLD). APSEZ will be sourcing majority of the water from the captive desalination plants, which will be developed in progressive manner.	No-Impact	APSEZ is meeting the current water demand through Narmada water supply scheme and 47 MLD captive desalination plant at site. Necessary water allocation from concerned authorities was obtained and the same will be renewed from time to time as per the	As per the master plan and permissions granted under EC, APSEZ will be developing progressively 4,50,000 m3/day (450 MLD) of desalination plants to meet the future demand. Hence stress on regional water resources due to these developmental projects will be less significant.	APSEZ	As and When Required	Currently there are two fresh water sources available with APSEZ. **Desalination Plant** – 47 MLD **Narmada water through GWIL** – 9 MLD (sanctioned capacity). Current water demand for APSEZ along with SEZ industries including Adani Power Plant is an avg. of 23.18 MLD. So presently, these sources are adequate to fulfill the current freshwater requirement of entire APSEZ including member units. The desalination plant of additional capacities will be installed on modular basis considering future requirement of APSEZ.

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			directions of state government.				
3.2	Existing water demand in the Mundra taluk is estimated as 8500 m3/day (@55 lpcd) and the potable and sanitation water needs would increase to 37,000 m3/day (@125 lpcd) in future when the area is fully grown into larger municipality due to induced economic	Level-2	Adani Foundation has been contributing to various watershed development projects in the Mundra region to enhance ground water resources in the area. Adani Foundation has contributed about Rs. 300 Lakhs so far for the development of 18 check dams.	Adani Foundation is planning to implement the various water resource conservation programs in next ten years under various schemes.	APSEZ and CGWB*	Long Term	Water needs of APSEZ is being met through existing Desalination Plant of APSEZ and GWIL which may be further enhanced on modular basis, At present Ground water is not utilized for any activities within APSEZ. However various works are being carried out by Adani Foundation continuously under Water Conservation Work to achieve water security in Mundra region by Adani Foundation. Following works are carried out as a part of water conservation work since April – 2018. 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. 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. 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 increased in coastal belt of Mundra as per Government Figures.

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	growth. Water demand of the local communities is met through Narmada water supply system to some extent, but largely depending on the ground water in the study area. Mundra block is reported to be a safe ground block as on date. Due to influx of people and rapid urbanizatio						**Our water conservation work is as below.** • Large number of water harvesting structure (18 Nos. of check dams in coordination with salinity department) and Augmentation of 3 check dams • Ground recharge activities (pond deepening work for more than 56 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 145 Nos. (40 Nos. current FY 2022-23) which is having 10,000 litre storage which is sufficient for one year drinking water purpose for 5 people family. • Recharge Borewell 201 Nos (12 Nos. current FY 2022-23) which is best ever option to. • Drip Irrigation approx. 1156 Farmers benefitted in coordination with Gujrat Green Revolution Company till date. • 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.

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	n due to the economic development, there could be some stress on the ground water resources in future.						• Pond Pipe line work at Prasla Vistar Zarpara which increase recharge capacity more than 25% in 100 hector area. • Check dam gate valve construction at Bhujpur which controlled more than 350 MCFT water to go into sea and get recharged current year. • Luni Pond Bund Repairing Work is completed. • FY 2022-23FY 2022-23FY 2022-23 With the objective of to preserve the rainwater 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. Adani foundation has spent approx. INR 6542.70 lakhs from April – 2018 to Sep – 2022 for CSR activities which also includes water conservation projects as mentioned above.
3.3	It is estimated that about 60,000 m3/day (60 MLD) of sewage will be generated from the APSEZ	No Impact	Seven sewage treatment plants with an aggregate capacity of 3.1 MLD have already built at APSEZ. Treated sewage is	APSEZ is permitted to develop decentralized sewage treatment plants of total 62 MLD capacities. Existing sewage treatment facilities will be	APSEZ	As and When Required	Current installed capacity of wastewater treatment plants is 6.255 MLD (ETP, STPs & CETP) for treatment of effluent & sewage generated at various locations of APSEZ excluding wastewater treatment plants installed within induvial member units. Out of 52, only 4 operational industries within the SEZ are sending their partially treated industrial as well as domestic effluent to the CETP confirming to CETP inlet norms for further treatment and final disposal. Other SEZ industries have their own STPs / ETPs for treatment of wastewater generated from their

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	facility when the project is fully developed.		utilized for greenbelt development and sewage is not discharged into either seasonal natural streams or marine environment.	augmented progressively based on the development at APSEZ in future. Similar to existing practices, treated sewage will be utilized for greenbelt development.			industrial operation and discharging the treated water on land for horticulture purpose within their premises as per specific permission granted by SPCB. APSEZ also granted permission to treat 2.5 MLD of sewage generated from Mundra village through CETP and STP. Presently avg. 2.19 MLD of wastewater (in to ETP, STPs & CETP) is treated and being utilized on land for horticulture purpose within APSEZ premises during Apr'22 to Sep'22. Existing wastewater treatment plants are adequate to treat and handle the total effluent / sewage load considering current development. Existing wastewater treatment facilities will be augmented, or new plants will be developed on modular basis considering future requirement.
4	**Air quality management Plan**						
4.1	Although all the regulated activities in the study area will be adopting promulgated emission norms, total air emission	Level-2	APSEZ and other thermal power plants have obtained valid consent to operate and have been operating	All existing and new industrial establishments will obtain requisite consents from GPCB and adhere to the stipulated emission norms regulations and guidelines issued	APSEZ And Other Industries	Continual Process	APSEZ has been granted requisite permissions from the concerned authorities with stipulated norms for air emission (flue gas as well as ambient air). Ambient Air Quality monitoring is being carried out by NABL accredited and MoEF&CC authorized agency namely M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi for APL as per NAAQ standards, 2009. Stack emission monitoring is also being carried out on regular basis. Reports of the same are being submitted to the concerned authorities on regular basis.

<table>
<tr><th>S. No.</th><th>Identified environmental and social impacts for the fully developed scenario (year 2030)</th><th>Type of Impact & Magnitude1</th><th>Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.</th><th>Additional Risk Mitigation Measures/ESMP</th><th>Responsible agency</th><th>Timeframe for implementation</th><th>Compliance</th></tr>
<tr><td></td><td>mass discharge from the study area would increase.</td><td></td><td>the facilities as per the emission norms stipulated in respective consent orders. APSEZ and other two power plants are monitoring the ambient air quality on regular intervals as per GPCB/CPCB guidelines and the data is analyzed and presented to GPCB on monthly basis. Both the thermal power plants located</td><td>by authorities from time to time.</td><td></td><td></td><td>Adani power plant has installed continuous emission and air quality monitoring instruments as per CPCB Directive and submitting the reports also. Another power plant of CGPL is outside APSEZ area.

The AAQM summary for last six months (Apr'22 to Mar'22) are as below.

Locations: 16 Nos. (APSEZ – 13 + APL – 3 including 4 villages)
Frequency: Twice in a week
<table>
<tr><th>Parameter</th><th>Unit</th><th>Max</th><th>Min</th><th>Average</th><th>Perm. Limit$</th></tr>
<tr><td>PM_{10}</td><td>$\mu g/m^3$</td><td>89.76</td><td>15.23</td><td>71.79</td><td>100</td></tr>
<tr><td>$PM_{2.5}$</td><td>$\mu g/m^3$</td><td>53.62</td><td>5.67</td><td>30.97</td><td>60</td></tr>
<tr><td>SO_2</td><td>$\mu g/m^3$</td><td>41.48</td><td>4.1</td><td>22.17</td><td>80</td></tr>
<tr><td>NO_2</td><td>$\mu g/m^3$</td><td>48.52</td><td>0.21</td><td>27.8</td><td>80</td></tr>
</table>
$ as per NAAQ standards, 2009
Values recorded confirms to the stipulated standards.

Approx. INR 6.37 Lakhs is spent by APSEZ for environmental monitoring activities during the FY 2022-23 (till Sep'22), which also includes ambient air quality monitoring for overall APSEZ, Mundra.

Other industries located within the SEZ have obtained requisite permissions from the competent authorities</td></tr>
</table>

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			within the study area have installed continuous emission and air quality monitoring instruments as per CPCB directive.				for their respective plant and they also carried out environmental monitoring within their premises to comply with the permission granted. The same has been ensured by APSEZ as well as SPCB during their regular visits. APSEZ carries out regular visits/inspections of member industries within SEZ and last visit was conducted during July to September 2022 for EMS & compliance verification. During compliance verification, it was verified that monitoring of air emission was well within the permissible standards based on analysis reports. Same will be continued in future also. The monitoring reports of industries within SEZ are also being submitted to the regulatory authorities as a part of half yearly Compliance report of EC for Multi-Product SEZ.
				A common air quality management committee may be framed under the guidance of the State Pollution Control Board and district administration to manage regional level emission	APSEZ and Other Industries, Stakeholders, District Administration and GPCB*	Long Term And Continual	APSEZ will co-operate and comply with the directions from concerned regulatory authorities for air quality management within APSEZ area. However, at present, APSEZ has formed Internal Environment Monitoring Committee, involving officials from APSEZ, Adani Power Limited and other SEZ member units with following role and responsibilities: • Identification of sources of air & noise emission and its dispersion in surrounding villages • Remedial measures to eliminate, control, reduce or capture air & noise emission • Identify available resource to abate the air and noise emission

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				inventory data that can help to manage regional level air quality management goals.			• Required additional resources for control of air and noise emission • Drinking water and its testing of all the available fresh water sources in surrounding villages • Identify any surrounding villages affected by organization's improper waste disposal mechanism. Last committee meeting was conducted on dated 28th September 2022, and below was the point of discussion for way forward. • Brief introduction about the Environment Management Plan (EMP) • All members conveyed his environment management practices, issue & suggestions • Discussed about the various ways to improve existing practice to control the emission in terms of Air, Water and Noise. • Discussed about the proper management of the canteen waste. • Discussed about the cleaning of outside of the SEZ units. • Discussed about the management of rain water & proper cleaning of the common storm water drainage system. • Discussed about proper segregation & disposal of solid waste material. • Discussed about to increase more green belt area inside plant premises of SEZ units

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							APSEZ and all the industries within SEZ are in compliance to NAAQS and same is being ensured by APSEZ. The monitoring reports of industries within SEZ are being submitted to the regulatory authorities as part of half yearly Compliance report of EC for Multi-Product SEZ.
4.2	Release of particulate emissions from handling and storage of coal at the port and power plants would influence PM10 and PM2.5 concentration in the background air. This could pose some health impacts such as asthma and COPD etc.	Health Impact	APSEZ has been implementing the following management plan to control emissions as per the applicable regulations and similar practices will be adopted in future: Entire bulk material handling facilities are mechanized. Regular water sprinkling on	All industries located in the APSEZ shall adhere to the emissions norms and minimum stack height guidelines issued by CPCB and consent to operate issued by Gujarat Pollution Control Board from time to time.	APSEZ and Other Industries	Continual Process	Following safeguard measures are taken by APSEZ for abatement of dust emissions. • Adequate stack heights to the Boilers, D.G. Sets, TFHs & HWGs for proper dispersion of pollutants within APSEZ • Using of liquid & Gaseous fuels instead of solid fuels in Boilers, Thermic fluid heaters and hot water generators. • Regular sprinkling on road and other open area • Regular cleaning of roads • Dry fog Dust Suppression System (DSS) in hopper, transfer towers and conveyor belts • Use of water mist canon • Closed type conveyor belts • Regular sprinkling on coal heaps • Covering other types of dry bulk cargo heaps • Installation of wind breaking wall • Development of greenbelt along the periphery of the storage yards/back up area • Mechanized handling system for coal and other dry bulk cargo • Wagon loading and truck loading through closed silo

<table>
<tr><th>S. No.</th><th>Identified environmental and social impacts for the fully developed scenario (year 2030)</th><th>Type of Impact & Magnitude1</th><th>Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.</th><th>Additional Risk Mitigation Measures/ESMP</th><th>Responsible agency</th><th>Timeframe for implementation</th><th>Compliance</th></tr>
<tr><td></td><td>among the local communities.</td><td></td><td>road and other open areas, regular cleaning of roads, dry fog dust suppression systems (DSS) in hoppers, transfer towers and conveyor belts, use of water mist canon, covered conveyor belts, regular sprinkling on coal heaps,</td><td></td><td></td><td></td><td>Adequate air pollution control measures like ESPs, FGDs, Bag Filters, etc. and adequate stack heights provisions are implemented within the thermal power plant.

The stack monitoring summary for last six months (Apr'22 to Mar'22) are as below.

Total Nos. of Stacks: 23 Nos.
Frequency: Monthly / Half Yearly
<table>
<tr><th>Parameter</th><th>Unit</th><th>GPCB Limit</th><th>Min</th><th>Max</th><th>Avrg.</th></tr>
<tr><td>PM</td><td>mg/ Nm^3</td><td>150</td><td>15.67</td><td>27.45</td><td>19.6</td></tr>
<tr><td>SO_2</td><td>Ppm</td><td>100</td><td>6.1</td><td>16.78</td><td>8.05</td></tr>
<tr><td>NO_x</td><td>ppm</td><td>50</td><td>17.85</td><td>29.67</td><td>22.7</td></tr>
</table>
Values recorded confirms to the stipulated standards.

Approx. INR 6.37 Lakhs is spent by APSEZ for environmental monitoring activities during the FY 2022-23 (till Sep'22), which also includes stack monitoring for overall APSEZ, Mundra.

All other industries located within SEZ are adhere to provide adequate stack height and pollution control measures for proper dispersion of pollutants as per respective permissions granted by the board. The same is being inspected and ensured by APSEZ as well as SPCB officials on regular basis.</td></tr>
<tr><td></td><td></td><td></td><td>covering of</td><td></td><td></td><td></td><td>As mentioned above, presently, APSEZ has formed</td></tr>
</table>

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			other types of dry bulk cargo heaps by protective materials, installation of wind breaking wall, development of greenbelt along the periphery of the storage yards/back up area and mechanized handling system for coal and other dry bulk cargo and Wagon loading and truck loading through closed silo. Both thermal power plants	An internal Coal Dust Management Working Group shall be formed by APSEZ to effectively co-ordinate the approach to coal dust management and monitoring	APSEZ and Other Industries, Concerned Stake holders, District Administration*	Long Term	Internal Environment Monitoring Committee, involving Officials of APSEZ, Adani Power Limited & other member units, with specific role and responsibilities as defined above. The dry cargo is being handled by mechanized system and transported by covered conveyer system, trucks and rail wagons. Wind breaking wall is provided around the coal storage yards of APSEZ as well as Adani Power Plant. Adequate air pollution control measures like ESPs, FGDs, Bag Filters, etc. and adequate stack heights provisions within the thermal power plant for proper dispersion of pollutants. Green belt / plantation is provided around the periphery of dry cargo storage area and regular water sprinkling is also being done to abate the dust emission from coal hips. Last committee meeting was conducted on dated 28th September 2022, and below were the point of discussion for way forward. • Brief introduction about the Environment Management Plan (EMP) • All members conveyed his environment management practices, issue & suggestions

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			in the study area have installed electrostatic precipitators on the boilers and are meeting the emission norms as per the respective ECs granted. Due to installation of tall stacks as per CPCB guidelines and EC conditions, the relative air pollution impacts due to release of emissions from two power plants is insignificant.				• Discussed about the various ways to improve existing practice to control the emission in terms of Air, Water and Noise. • Discussed about the proper management of the canteen waste. • Discussed about the cleaning of outside of the SEZ units. • Discussed about the management of rain water & proper cleaning of the common storm water drainage system. • Discussed about proper segregation & disposal of solid waste material. • Discussed about to increase more green belt area inside plant premises of SEZ units
	Ships are						The ships coming to the APSEZ is complying with

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4.3	one of the significant sources of SO2 and NOX emissions in the study area. Marine diesel engines on the ships often utilize fuel oils that might contain higher sulphur content. As per the international best practices, these marine diesel engines are designed to meet MARPOL regulations	Level-2	A Standard Operating Procedure (SOP) has be developed to be included as a part of APSEZ environment management plan to verify that all ships anchored at the port are adopting the MARPOL4 regulations.	The current global limit for Sulphur content of ships fuel oil is 3.5 % m/m (mass by mass). According to MARPOL, the new global cap on sulphur in the marine vessel fuels will be 0.50% m/m by the 1st January 2025. APSEZ should explore the possibility of providing shore power to the ships at the port to reduce idling stage ship emissions.	APSEZ and Ship Owners	Long Term	MARPOL and other shipping rules and regulations. APSEZ has already started providing shore power supply to the tugs (11 Nos.), dredgers (2 Nos.) and barges (1 No.). The feasibility of shore power will be explored and implemented on large scale for the visiting vessels to reduce idling stage ship emissions.

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	with NOX emissions less than 14.4 gram/Kwhr of engine. Due to lower stack heights of the marine diesel engine, ship emissions often gets dispersed in the local environment and might pose risk of fumigation during the early morning and evening hours due to atmospheric inversion break-up periods.						

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4.4	Road vehicle emissions will be other major contributors to the air pollution in the region when the facility is fully developed.	Level-2	Not Applicable	Due to implementation of Bharat VI fuels (MoEF&CC)6 in near future the vehicular and diesel engine emissions will be reduced by about 50% from the current national levels. APSEZ should develop a robust contractor environmental policy to ensure that Bharat Stage VI emission norms are adopted by all their contractors and sub-contractors.	APSEZ and All Industries	Short Term	Presently, cargo evacuation through rail / conveyer / pipeline has increased to ~39.44 %, thereby reducing the usage of road. Vehicles having valid PUC certificate are only being allowed to enter within APSEZ area. In future, APSEZ will also explore the feasibility of using Electric Vehicles for internal cargo movement.
5	**Noise emissions**						
	Noise emissions		Due to adoption of various mechanized	APSEZ, all the tenant industries and facilities within APSEZ are			Below Safeguard measures are already taken for abatement of noise emissions. • Development of greenbelt along the periphery of the operational area.

<table>
<tr><th>S. No.</th><th>Identified environmental and social impacts for the fully developed scenario (year 2030)</th><th>Type of Impact & Magnitude1</th><th>Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.</th><th>Additional Risk Mitigation Measures/ESMP</th><th>Responsible agency</th><th>Timeframe for implementation</th><th>Compliance</th></tr>
<tr><td>5.1</td><td>are envisaged from port operations, industrial operations and power plants in the study area. Any increase in noise levels beyond three decibels from the background levels would be perceived as noise nuisance (USEPA)7.</td><td>Level-1</td><td>operations at the waterfront development, the noise emissions from the port cargo handling will be minimal. An adequate greenbelt is being developed by APSEZ to further reduce any residual impacts due to noise emissions from the facility. Periodic noise level monitoring programs were adopted by APSEZ.</td><td>required to undertake noise monitoring at their facilities to demonstrate the compliance with the Noise level standards. Continuous noise recording units can be installed by APSEZ at facility boundary to address the community grievances, when ever required. To assess the overall site wide compliance and also to address any community grievances related to noise issues due to operation of APSEZ facilities.</td><td>APSEZ</td><td>Continual Process</td><td>• D.G. Sets having Acoustic enclosures.
• Maintenance of plant machineries and equipment's on regular frequency.

Noise monitoring is being carried out by NABL accredited and MoEF&CC authorized agency namely M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi as per permission granted and reports are being submitted to the concerned authorities on regular basis.

The noise monitoring summary for last six months (Apr'22 to Mar'22) are as below.

Locations: 13 Nos.
Frequency: Once in a month (24 hourly)
<table>
<tr><th>Noise</th><th>Unit</th><th>Leq Max</th><th>Leq Min</th><th>Leq Avr.</th><th>Leq Perm. Limit[$]</th></tr>
<tr><td>Day Time</td><td>dB(A)</td><td>70.8</td><td>53.65</td><td>64.48</td><td>75</td></tr>
<tr><td>Night Time</td><td>dB(A)</td><td>67.8</td><td>50.98</td><td>59.4</td><td>70</td></tr>
</table>
[$] as per GPCB standards

Approx. INR 6.37 Lakhs is spent by APSEZ for environmental monitoring activities during the FY 2022-23 (till Sep'22) which also includes noise monitoring for overall APSEZ, Mundra.</td></tr>
</table>

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			Predicted noise levels were found to be well within the designated noise standards for Industrial facilities.				All the results are well within the standards. From this it can be inferred that there no impacts on the surrounding community. All other industries located in the APSEZ are adhere to monitor and control the ambient noise level as per permission granted by SPCB and same is being confirmed by APSEZ as well as SPCB on regular basis. Further, till date APSEZ has not received any grievances/notice for noise issues from any of the stakeholders.
				In order to address the public grievances related to noise from the facility, an internal Noise Management Committee can be formed by APSEZ to investigate the root cause and to develop and implement noise mitigation plans in the specific	APSEZ	Continual Process	As mentioned above, presently, APSEZ has formed Internal Environment Monitoring Committee, involving Officials of APSEZ, Adani Power Limited & other member units, having role and responsibilities as defined above. Last committee meeting was conducted on dated 28th September 2022, and below were the point of discussion for way forward. • Brief introduction about the Environment Management Plan (EMP) • All members conveyed his environment management practices, issue & suggestions • Discussed about the various ways to improve existing practice to control the emission in terms of Air, Water and Noise. • Discussed about the proper management of the canteen waste.

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				zones.			• Discussed about the cleaning of outside of the SEZ units. • Discussed about the management of rain water & proper cleaning of the common storm water drainage system. • Discussed about proper segregation & disposal of solid waste material. • Discussed about to increase more green belt area inside plant premises of SEZ units No grievance received for noise related issues, and it is observed that ambient noise level are well within the permissible standards.
6	**Surface water quality (Terrestrial and Marine)**						
6.1	In general, release of untreated wastewater from industrial facilities would pose threat to water quality of streams, estuaries and marine water bodies.	Level -1	As per the master plan of APSEZ, 67 MLD of wastewater is expected to be generated from the fully developed project scenario, for which necessary permissions to set up decentralize	As per the master plan of APSEZ, the existing CETP shall be augmented to 67 MLD in progressive manner based on the future demand. The facility should limit the marine discharge of treated industrial wastewater to 16 MLD as per the permits.	APSEZ	As and When Required	APSEZ has installed Common Effluent Treatment Plant (CETP) having 2.5 MLD capacities for treatment of partially treated effluent and sewage generated from industries within SEZ. Currently, CETP receives 1036.58KLD (Avg.) hydraulic load and considering the current development scenario, existing CETP is adequate to treat and handle the total effluent load coming from industries within SEZ. Out of 52 only 4 industries within SEZ are sending their partially treated industrial as well as domestic effluent to the CETP confirming CETP inlet norms for further treatment and final disposal. Other industries within SEZ have their own STPs / ETPs for treatment of wastewater generated from their industrial operation

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			d CETPs of various capacities are already obtained. Presently a CETP capacity of 2.5 MLD is in place. Presently member units treat their effluents to meet the CETP inlet norms and then send it to CETP. Treated wastewater from CETP meets the stipulated discharge norms for utilization for greenbelt development	Remaining treated wastewater shall be utilized for horticulture purpose.			and discharging the treated water on land for horticulture purpose within their premises as per permission granted by SPCB. The capacities of CETP will be enhanced on modular basis as per future requirement. Presently avg. 2.19 MLD (from CETP, ETP & STPs) of treated water is being utilized on land for horticulture purpose within APSEZ premises during period Apr'22 to Mar'22 and no discharge is made to any other source.

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			within the APSEZ areas.				
			Online wastewater quality monitoring systems are installed at CETP to ensure quality of treated effluent meets the requisite discharge norms. No wastewater from CETP is discharged into natural bodies as on date..	Efforts shall be made to recycle complete treated wastewater for port operations and industrial operations of APSEZ in future based on a detailed techno-economic feasibility study.	APSEZ	Based on outcome Techno-feasibility Study	Online continuous effluent monitoring system installed at the discharge point of CETP to track any deviation from discharge norms. Presently entire quantity of treated water from CETP is used for gardening / horticulture purpose within APSEZ premises.
			Runoff during monsoon from coal storage yards is collected in	Storm water runoff from the facility during the first rain shall be sampled and analyzed for the presence of	APSEZ	Continual	There are provision of drains around coal stack yard to carry to runoff water to dump ponds. This water is either used for dust suppression or after sedimentation (to remove residual dust), is allowed disposal to sea. Presently Marine monitoring is being carried out once in a month by NABL and MoEF&CC accredited agency

<table>
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<tr><td></td><td></td><td></td><td>sedimentation ponds (dump pond) to remove any residual dust particulates for further disposal into sea</td><td>heavy metals or other criteria pollutants to adopt corrective and preventive actions to protect the marine water quality.
All red and hazard category industry within APSEZ shall adopt spill prevention and control program and no effluents shall be discharged into storm water-drains.</td><td></td><td></td><td>namely M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi for APSEZ & APL both. The analysis reports of the same are being submitted to the concerned authorities on regular basis.

The marine water quality monitoring summary for last six months (Apr'22 to Mar'22) is as per below.

Locations: 14 Nos. (APSEZ – 9 + APL – 5)
Frequency: Once in a Month / Half Yearly
<table>
<tr><th rowspan="2">TEST PARAMETERS</th><th rowspan="2">UNIT</th><th colspan="3">Cumulative Surface</th><th colspan="3">Cumulative Bottom</th></tr>
<tr><th></th><th></th><th>Min</th><th>Max</th><th>Average</th><th>Min</th><th>Max</th><th>Average</th></tr>
<tr><td>pH</td><td>--</td><td>8.04</td><td>8.31</td><td>8.17</td><td>7.92</td><td>8.2</td><td>8.12</td></tr>
<tr><td>BOD</td><td>mg/L</td><td>2.4</td><td>6.02</td><td>3.47</td><td>3.9</td><td>5.1</td><td>4.3</td></tr>
<tr><td>TSS</td><td>mg/L</td><td>94</td><td>181</td><td>146.74</td><td>78</td><td>178</td><td>138.97</td></tr>
<tr><td>DO</td><td>mg/L</td><td>5.5</td><td>6.27</td><td>5.95</td><td>5.1</td><td>6.17</td><td>5.56</td></tr>
<tr><td>Salinity</td><td>ppt</td><td>35</td><td>36.8</td><td>35.53</td><td>35.68</td><td>37.3</td><td>36.35</td></tr>
<tr><td>TDS</td><td>mg/L</td><td>35810</td><td>36942</td><td>36246</td><td>35984</td><td>37624</td><td>36751</td></tr>
<tr><td>Temperature</td><td>oC</td><td>30.1</td><td>33</td><td>32.5</td><td>31.5</td><td>31.6</td><td>31.5</td></tr>
</table></td></tr>
</table>

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							Approx. INR 6.37 Lakhs is spent by APSEZ for environmental monitoring activities during the FY 2022-23 (till Sep'22), which also includes noise monitoring for overall APSEZ, Mundra.
			Detailed marine hydrodynamic modelling studies revealed that the current and proposed dredged soil disposal practices, sea water intake and outfall facilities and desalination plant outfall etc have shown insignificant impact on the marine eco-system. As part of the	Good dredging practices shall be adopted by APSEZ: (i).Improving the dredging accuracy (ii).Improving onboard automation and monitoring, (iii). Reduce spill and loss, (iv). evaluating the need for installing silt screens near mangrove areas during the dredging phase operations, (v). Environment friendly dredging activities can be undertaken in such a way that the overall	APSEZ	Long Term	No capital dredging has been done, since Apr 2015. Dredged material generated during maintenance dredging is being disposed at designated locations within deep sea as identified by NIO. Dredging Management plan is adopted for carrying out dredging and management of dredge material. Presently there are 3 nos. (2 Nos. Cutter suction + 1 No. Trailer suction) of dredgers are in operation for dredging. Marine monitoring is being carried out once in a month by NABL and MoEF&CC accredited agency namely M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi. The analysis reports of the same are being submitted to the concerned authorities on regular basis. Summary of marine water for the last six months is as mentioned above. The same practice will be continued in future also as per direction by MoEF&CC as well as GPCB. Monitoring will be focused near ecological sensitive area in case of need to carryout capital dragging near such areas.

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			comprehensive environmental monitoring program, APSEZ has been adopting marine water and sediment quality monitoring on monthly basis.	turbidity levels near the mangrove and ecologically sensitive zones shall not exceed 100 NTU or 200 mg/l of TSS (10% lethal level of fish) Existing marine monitoring program shall be continued as per the directions of MoEF&CC and GPCB.			
7	**Groundwater quality and salinity ingress**						
7.1	While Mundra block is enjoying safe ground water status as on date (based on the data published by CGWB), due to	Level-2	APSEZ is not utilizing ground water for any type of use. APSEZ is meeting the current water demand through Narmada	A dedicated desalination plant of capacity 4,50,000 m3/day (450 MLD) will be developed in progressive manner to meet the APSEZ requirements.	APSEZ	As and When Required	Present source of water for various project activities is desalination plant of APSEZ and/or Narmada water through Gujarat Water Infrastructure Limited (GWIL) and same is sufficient to meet the present water demand. APSEZ does not draw any ground water. The desalination plant of additional capacities will be installed on modular basis considering future development and requirement.

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	induced economic and population growth, use of ground water resources by the local people might increase in Mundra region. This might increase the TDS and chloride levels in the ground water in future.		water supply scheme and 47 MLD captive desalination plant at site.				
7.2	Due to induced growth in the region, pressure on the available ground	Level-2	Ground water is not drawn by APSEZ for its operations. Natural streams (seasonal	The Govt. of Gujarat, Narmada, Water Resources, Water Supply & Kalpsar Dept.,(WRD)12 has been implementing	District Administration*	Long Term	APSEZ will co-operate and comply with the directions from concerned regulatory authorities. APSEZ does not draw any ground water for the fresh water requirement. However, Adani Foundation – CSR arm of Adani Group has carried out rainwater harvesting activities in the

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	water source would increase and this could pose some threat to salinity ingress.		rivers) passing through the APSEZ area will not be disturbed, the micro-watershed in the area will not be disturbed. Due to the above reasons, the possibility of salinity ingress due to APSEZ development is not envisaged. Mundra and Anjar blocks fall under fresh water to medium salinity zones. It can be observed that little	various salinity ingress prevention projects			nearby villages for benefit of the locals. 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. 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. 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 increased in coastal belt of Mundra as per Government Figures. **Our water conservation work is as below.** • Large number of water harvesting structure (18 Nos. of check dams in coordination with salinity department) and Augmentation of 3 check dams • Ground recharge activities (pond deepening work for more than 56 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.

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			variation was observed in the ground water salinity levels from year 2013 to 2016 across the Mundra and Anjar blocks. This aspect confirms that the overall salinity ingress from the shore into the land due to existing APSEZ facilities and power plant outfalls are less significant.				• Roof Top Rain Water Harvesting 145 Nos. (40 Nos. current FY 2022-23) which is having 10,000 litre storage which is sufficient for one year drinking water purpose for 5 people family. • Recharge Borewell 201 Nos (12 Nos. current FY 2022-23) which is best ever option to. • Drip Irrigation approx. 1156 Farmers benefitted in coordination with Gujrat Green Revolution Company till date. • 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. • Pond Pipe line work at Prasla Vistar Zarpara which increase recharge capacity more than 25% in 100 hector area. • Check dam gate valve construction at Bhujpur which controlled more than 350 MCFT water to go into sea and get recharged current year. • Luni Pond Bund Repairing Work is completed. With the objective of to preserve the rainwater 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.

<table>
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<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Narmada Water Resources, Water Supply & Kalpsar Dept., (WRD)1 has been implementing various salinity ingress prevention projects. Under Sardar Sarovar canal project, Govt. of Gujarat has proposed to implement about 8200 Km stretch of water canal and the project is at various stages of implementation. Under this project about 112,000 ha of land in about 180 villages will be benefitted with irrigation needs. This will significantly reduce the pressure on the ground water resources in the region.</td></tr>
<tr><td></td><td></td><td></td><td></td><td>While the individual industries in the study area will continue to undertake ground water quality monitoring as per the environmental clearances issued for the respective projects, a regional level</td><td>All Concerned Stakeholders, District Administration and CGWB*</td><td>Continual Process</td><td>APSEZ (9 Locations – half yearly) & Adani Power Ltd. (5 Locations – quarterly) is carrying out ground water sampling and reports of the same are being submitted to the regulatory authorities on regular basis.

The summary of APSEZ ground water quality monitoring for last six months (Apr'22 to Sep'22) are as below.
Nos. of Location: 09

<table>
<tr><th>Parameters</th><th>Unit</th><th>Min</th><th>Max</th><th>Average</th></tr>
<tr><td>pH @ 25 ° C</td><td>--</td><td>6.77</td><td>8.44</td><td>7.66</td></tr>
<tr><td>Salinity</td><td>ppt</td><td>0.79</td><td>11.64</td><td>3.25</td></tr>
<tr><td>Oil & Grease</td><td>mg/L</td><td>BDL(MDL:2.0)</td><td>BDL(MDL:2.0)</td><td>BDL(MDL:2.0)</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>S. No.</th><th>Identified environmental and social impacts for the fully developed scenario (year 2030)</th><th>Type of Impact & Magnitude1</th><th>Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.</th><th>Additional Risk Mitigation Measures/ESMP</th><th>Responsible agency</th><th>Timeframe for implementation</th><th>Compliance</th></tr>
<tr><td></td><td></td><td></td><td></td><td>ground water conservation action committee can be formed under the guidance of state ground water board and district Administration.</td><td></td><td></td><td>
<table>
<tr><td>Hydrocarbon</td><td>mg/L</td><td>Not Detected</td><td>Not Detected</td><td>Not Detected</td></tr>
<tr><td>Lead as Pb</td><td>mg/L</td><td>0.02</td><td>0.08</td><td>0.05</td></tr>
<tr><td>Arsenic as As</td><td>mg/L</td><td>BDL(MDL:0.01)</td><td>BDL(MDL:0.01)</td><td>BDL(MDL:0.01)</td></tr>
<tr><td>Nickel as Ni</td><td>mg/L</td><td>0.06</td><td>0.33</td><td>0.12</td></tr>
<tr><td>Total Chromium as Cr</td><td>mg/L</td><td>0.06</td><td>0.06</td><td>0.06</td></tr>
<tr><td>Cadmium as Cd</td><td>mg/L</td><td>0.01</td><td>0.12</td><td>0.06</td></tr>
<tr><td>Mercury as Hg</td><td>mg/L</td><td>BDL(MDL:0.001)</td><td>BDL(MDL:0.001)</td><td>BDL(MDL:0.001)</td></tr>
<tr><td>Zinc as Zn</td><td>mg/L</td><td>0.12</td><td>0.29</td><td>0.18</td></tr>
<tr><td>Copper as Cu</td><td>mg/L</td><td>BDL(MDL:0.05)</td><td>BDL(MDL:0.05)</td><td>BDL(MDL:0.05)</td></tr>
<tr><td>Iron as Fe</td><td>mg/L</td><td>0.12</td><td>1.12</td><td>0.67</td></tr>
<tr><td>Insecticides/Pesticides</td><td>µg/L</td><td>Absent</td><td>Absent</td><td>Absent</td></tr>
<tr><td>Depth of Water Level from Ground Level</td><td>meter</td><td>1.9</td><td>2.3</td><td>2.1</td></tr>
</table>
BDL – Below Detection Limit
MDL – Minimum Detection Limit

Approx. INR 6.37 Lakhs is spent by APSEZ for environmental monitoring activities during the FY 2022-23 (till Sep'22), which also includes noise monitoring for overall APSEZ, Mundra.

The freshwater requirement of all the industries within SEZ is being satisfied through APSEZ. All the industries</td></tr>
</table>

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							are encouraged to monitor ground water quality as per the permissions granted by competent authorities. As mentioned above, presently, APSEZ has formed Internal Environment Monitoring Committee, involving Officials of APSEZ, Adani Power Limited and other member units, having role and responsibilities as defined above. APSEZ will co-operate and comply with the directions from concerned regulatory authorities for ground water management.
8	**Waste Management**						
8.1	Solid waste will be generated from industrial activities of APSEZ and other permitted facilities in the study area including Mundra town. These wastes would contain	Level-2	APSEZ has been adopting Zero waste Initiatives and the entire waste generated from existing operations is segregated and disposed to recycling vendors, thereby APSEZ has achieved zero landfill	APSEZ will continue to adopt Zero Waste Initiative and wastes will be segregated at source and disposed to various recycling vendors, co-processing in cement plants. This initiative helps not only to reduce the waste to landfill significantly, but also to recycle	APSEZ	Continual Process	Presently APSEZ has implemented Zero waste Initiatives as per 5R (Reduce, Reuse, Recycle, Recover & Reprocess) principles of waste management. At present, APSEZ has developed material recovery facility for 6.0 TPD capacities. A well-established system for segregation of dry & wet waste is in place. All wet waste (Organic waste) is being segregated & 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, Glass etc. are then sent to respective recycling units, whereas remaining non-recyclable waste is bailed and sent to cement plants for Co-processing as RDF (Refused Derived Fuel). The

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	recyclable material, construction debris, organic waste, inert material and e-waste etc. In the absence of any organized source segregation programs and material recycling strategies and infrastructure facilities, these wastes will enter into environment and would pose long term health impacts.		status as on date.	the materials there by avoiding ecological impacts.			same practice will be continued in future also. APSEZ has also been recognized for Zero Waste to Landfill certification from reputed organization. APSEZ, Mundra is certified for Zero Waste to Landfill management system (ZWTL MS 2020) by TUVRheinland India Pvt. Ltd. (valid up to 31.05.2024). Details of the same were submitted as part of compliance report submission for the duration of Apr'21 to Sep'21. APSEZ will continue proper solid waste management in his operational area.
			APSEZ has	The existing			

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8.2	Considering an average solid waste generation of 0.25 Kg/person/day, the estimated solid waste from facilities within APSEZ will be in the order of 100 TPD (36,500 TPA).	Level-2	made a provision for central waste management facilities within the existing site based on the future needs. As part of the Zero Waste Initiatives, no landfill facilities will be installed at APSEZ.	waste segregation and material recycling facilities will be augmented to dispose safely the wastes generated from APSEZ areas. Solid Waste Management Program shall be adopted and implemented as per Municipal Solid Waste Management Rules 2016 and Construction Waste Management Rules 2016	APSEZ	Continual Process	Industries located within the SEZ area are also complying with the waste management rules stipulated by statutory authorities and same is also being confirmed by APSEZ as well SPCB on regular basis.
8.3	About 35 TPD (13,000 TPA) of solid waste would be generated	Level-2	As per the MSW Rules 2016 all the industrial facilities and SEZs are	Solid Waste Management Program shall be adopted and implemented as per Municipal Solid Waste	All Industries	Continual Process	

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	from the proposed industrial areas located outside the APSEZ area.		required to adopt waste segregation facilities at the respective properties and non-recyclable waste shall be disposed to landfill sites.	Management Rules 2016 and Construction Waste Management Rules 2016			
9	**Ecological aspects (terrestrial and marine)**						
9.1	About 1576 ha of shrub forest land contiguous to APSEZ area is applied for land diversion for various	Level -1	It is noted that the designated forest land is free from any native vegetation and comprises of Prosopis juliflora. It is also	APSEZ has approached concerned authorities for diversion of designated forest land. Suitable compensatory afforestation plan shall be adopted based on the recommendation	APSEZ/State Forest Department*	Long Term	Stage – 1 forest Clearance for about 1576.81 Ha Forest land has been obtained. Presently APSEZ is in the process of compliance to the stage – 1 Forest Clearance conditions, for further submitting to Govt. authorities for issuance of Stage-2 Forest Clearance.

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	developmental activities. This might have certain level of changes in the biodiversity in the study area.		noted that no endangered species are present at the shrub forests that are applied for land diversion. It is also noted that no forest produce is reported from this designated forest land parcel due to lack of economic importance of plant species reported in the shrub forest. It is also noted that no tribal	s and directions of the concerned authorities. Due to adoption of compensatory afforestation program through a scientific manner, the overall ecological footprint in the district will be increased. Due to plantation of native tree species as part of greenbelt development, the overall biodiversity of the region will increase considerably when the project is fully developed.			

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			lands are located in the designated forest land parcel. Hence there will not be any change in biodiversity due to the proposed diversion.				
9.2	Mangrove conservation areas are located adjacent to the APSEZ area. Accidental discharges of industrial effluents into the marine environmen	Level -1	No development activities will be undertaken within mangrove conservation areas. APSEZ has taken up large scale mangrove afforestation activities in an area of	Mangrove footprint and health status shall be monitored annually	APSEZ	Continual Process	As per study conducted by NCSCM in 2017, mangrove cover in and around APSEZ, Mundra has increased from 2094 Ha to 2340 ha (as compared between 2011 to 2017). The analysis has shown an overall growth of 246 ha. The cost for said study was INR 3.15 Cr. Recently study was carried out in the year 2019 and based on that there is an increase of mangrove cover between **March 2017 (Total 2340) and September 2019** with an extent of **256 Ha (Total 2596 Ha Area)** which is about **10.94%** rise in growth rate, also It reveals that the mangrove and the tidal system in the creeks remained undisturbed over this period. Hence, there is an overall growth of mangroves in creeks in and around APSEZ, Mundra is **502 Ha**

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<tr><td></td><td>t would pose certain ecological risk.</td><td></td><td>more than 2800 ha at various locations across the coast of Gujarat state in consultation with various organizations
The Adani Foundation introduced 'Mangrove Nursery Development and Plantation' scheme in the area as an alternative income generating activity for the people of the region.</td><td></td><td></td><td></td><td>between 2011 and 2019.

Analysis of data between categories indicated that there was an increase in dense mangroves along with the conversion of scattered into sparse, that shows the growth of mangroves in a progressive direction.

As a part of GCZMA recommendations and NCSCM mangrove conservation action plan, APSEZ has undertaken following activities.
<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>• APSEZ entrusted NCSCM, Chennai to carry out Monitoring of mangrove distribution in creeks in and around APSEZ and shoreline changes in Bocha island.
• 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 & 2019 and it is observed that there was</td></tr>
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									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 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. • Hence, there is an overall growth of mangroves in creeks in and around APSEZ, Mundra is 502 Ha between 2011 and 2019. • The cost of the said study was INR 23.56 Lacs incurred by APSEZ.
							2.	Tidal observation in creeks in and around APSEZ	• APSEZ carried out the tidal observations at locations similar to 2017 in Kotdi, Baradimata, Navinal, Bocha and Khari

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									creeks under the guidance of NCSCM. • The observed tidal ranges indicate that the creeks experience normal tidal ranges, adequate for the growth of mangroves. • The cost of the said activity was INR 1.0 Lacs.
							3.	Removal of Algal and Prosopis growth from mangrove areas	• 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. • The cost of the said activity was INR 2.8 Lacs. The details of Removal of Algal and Prosopis growth from mangrove areas was submitted during the last compliance period Oct'21 to Mar'22.
							4.	Awareness of mangroves importance in	• Adani Foundation – CSR Arm of Adani group has done awareness camps/activities created in the community

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								surrounding communities	regarding importance of mangroves. • Celebrated the International Mangrove Day for the Conservation of the Mangrove Ecosystem every year on 26th July, • Adani Foundation provides good Quality dry and green fodder to 29 Villages. Project is covering total 33072 Cattels / 2747 farmers and hence enhancing cattle productivity during last FY 2022-23 (Till Sep'22). • Awareness of mangroves importance in surrounding communities & Fodder support - The expenditure for fodder supporting activities was approx. 200.89 Lacs during FY 2022-23 (Till Sep'22), which was incurred by APSEZ. • Village Gauchar land development for the fodder cultivation to made fodder sustain

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									village & Avail green fodder in scarcity phase. With the support of Gauchar Seva Samiti Grassland development in Siracha – 85 Acre & Zarpara – 25 Acre done which resulted in total production of 82 ton. • 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. • APSEZ has celebrated the International Day for the Conservation of the Mangrove Ecosystem on July 26th to raise awareness of the importance of mangrove ecosystems as "a unique, special and vulnerable ecosystem". The photographs of celebration are attached as **Annexure-16.** • Refer CSR report attached as **Annexure – 1**.

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							To comply with the GCZMA recommendations regarding mangrove monitoring at every 2 years, APSEZ awarded work order vide order no. 4802018994, dated 29/07/2022 to the NCSCM, Chennai for mangrove mapping in and around APSEZ, Mundra. The cost of said work is 23.77 Lacs, which will be paid by APSEZ. 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. During current FY 2022-23, 03 ha area coastal stretches have been planted with mangrove species. Total 16 Ha. multi-species mangrove plantation has been carried out till March-22 association with M/s. GUIDE, Gujarat. Current year 4 Hector plantation is in progress which will be resulted in 20 Hector. Mangrove plantation done at Luni sea coast with fisher folk community during World Environment Day Celebration. 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. 8th June is celebrated as world ocean day. Adani foundation had celebrated the world ocean day by coastal cleaning activity at Juna

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<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Bandar, Luni Bandar and Bavadi Bandar.

Mangroves nursery is developed in a Khari creek behind IOCL & 125000 Nos. of new saplings were planted in creek area by APSEZ.</td></tr>
<tr><td>9.3</td><td>Outfall from the thermal power plants desalination and CETP would pose certain level of impact on the marine environment.</td><td>Level-1</td><td>A detailed marine hydro-dynamic and dispersion modelling of the study area indicates that the background temperature and salinity at mangrove conservation area will not increase from the prevailing background levels as the outfalls are located far away. APSEZ and</td><td>All approved marine outfalls shall be monitored for salinity, temperature and other designated parameters as per consent to establish issued by GPCB. Existing marine environmental monitoring program shall be continued.</td><td>APSEZ and Concerned Industry</td><td>Continual Process</td><td>Presently marine monitoring is being carried out by the Adani power plant at the marine outfall locations and reports are being submitted to the concerned authorities on regular basis.

APSEZ is carrying out Marine monitoring once in a month at 9 locations in deep sea by NABL and MoEF&CC accredited agency namely M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi. The analysis reports of the same are being submitted to the concerned authorities on regular basis.

Adani power plant is also doing marine water quality at 5 locations (2 locations at outfall location) in deep sea by NABL and MoEF&CC accredited agency namely M/s. Unistar Environment & Research Labs Pvt. Ltd. The analysis reports of the same are being submitted to the concerned authorities on regular basis. The summary of marine water quality is shown above.

The comparison of marine water results between CIA and current monitoring data are as below.
<table>
<tr><th rowspan="2">Parameter</th><th rowspan="2">Unit</th><th colspan="2">Max</th><th colspan="2">Min</th></tr>
<tr><th>CIA</th><th>Present</th><th>CIA</th><th>Present</th></tr>
<tr><td>Temp.</td><td>^{0}C</td><td>30.2</td><td>30</td><td>28</td><td>29</td></tr>
<tr><td>Salinity</td><td>ppt</td><td>41.8</td><td>36.6</td><td>34.9</td><td>35.2</td></tr>
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			respective power plants in the study area have been monitoring the marine water quality status on monthly basis for the stipulated environmental and ecological parameters.				As per above results, it can be seen that there is no major deviation in the concentration of parameters and thus indicates that impacts are insignificant.
9.4	**Terrestrial Ecology:** Study area doesn't have any notified national parks or ecological sanctuaries. Since the area falls under dry	Level-1	APSEZ has developed greenbelt in an area of 550ha as against the committed area of 430ha. A dedicatenursery is set up to promote plantation. APSEZ have	The compensatory afforestation area to be monitored annually to check the survival rate of the plantation.	APSEZ	Continual Process	APSEZ has developed its own "Dept. of Horticulture" which is taking measures/ steps for terrestrial plantation/greenbelt development. APSEZ, Individual SEZ Industries and Adani Power Plant has developed more than 700 Ha. area as greenbelt within the APSEZ area including SEZ industries & Adani Power Plant. Dedicated horticulture department is maintaining and monitoring the terrestrial green belt development on regular basis to check the survival rate of plantation. Total expenditures of the horticulture dept. of APSEZ during the FY 2022-23 within APSEZ is INR 913 lakhs.

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	deciduous shrubs. Due to scanty rains in the area, the overall natural green-cover/vegetation in the area is very small.		undertaken a plantation with about 9.6 Lakh fully grown trees.				
10	**Socio-economic aspects**						
10.1	Population growth in the Mundra region was reported to be in the order of 85% during the past decade (2001-2011). Further expansion of the urban area could be possible due to induced economic	Level-1	Dedicated townships are developed within APSEZ area with necessary community infrastructures such as hospital, school, recreational facilities, sewage treatment and waste	The existing townships will be expanded to accommodate about 4lakh people when the project activity is fully developed.	APSEZ	As and When Required	APSEZ has developed two townships (Shantivan and Samudra) accommodating 2057 households and associated infrastructure facilities. Accommodation is made available for all interested employees working within Adani group & SEZ industries. Out of which 98.15% Occupancies are accommodated within the townships and rest are available for employees working within APSEZ. At present 52 nos. of industries (processing & non-processing) are operating within the SEZ. Township facilities are also made by SEZ industries within Mundra town for their employees having basic infrastructure facilities and requirements. Most of the employees working in SEZ industries are residing in Mundra township having all basic requirements and

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	growth in the region. Increase in population will have a additional need for public infrastructure in the region.		collection facilities. Adani Foundation has been undertaking various CSR programs under the principal themes such as education, community health, sustainable livelihood and rural infrastructure. About Rs. 97 Cr has been spent on various CSR activities in the Mundra region since 2010. Similar community development programs (based on need based assessment)				associated facilities. The existing social infrastructure facilities are adequate to accommodate the people considering present APSEZ development. The existing townships with associated facilities will be expanded as per requirement. Other infrastructure facilities have been developed for people are as follows. • Multi-Specialty Hospital • School • Commercial complex • Religious place APSEZ is actively working with local community (including fishermen community) around the project area and provides required support for their livelihood and other concerns through the CSR arm – Adani Foundation in the main five persuasions is mentioned below. • Community Health • Sustainability Livelihood – Fisher Folk • Education • Rural Infrastructures Adani foundation has spent approx. INR 6542.70 lakhs from April – 2018 to September – 2022 for CSR activities which also includes cost of rural infrastructure projects. Major works carried out since April 2018 as a part of CSR activities are as below. • Pond Deepening work at Vadala & Mota Bhadiya

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			will be continued in future as well with allocation of appropriate budget.				• Artificial recharge borewell in Borana, Mangara & Dhrub village. • Under Dignity of Drivers Project, Adani Foundation has constructed Resting Shed for Drivers entering in SEZ Premises. Total 50 beds are constructed, drinking water and sanitation plus recreational – TV Facilities. • Construction of 45 Toilet block and proper bathing place for labours. • RO Plant – Samaghogha, Siracha village & Vallabh Vidyalaya at Mundra • Basic sanitation facility (18 Nos) at Balvadi, medical centre and retiring places at labour settlements • Ground recharge activities (pond deepening work for more than 56 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 145 Nos which is having 10,000 litre storage which is sufficient for one year drinking water purpose for 5 people family. • Recharge Borewell 201 Nos which is best option to • Drip Irrigation 1158 Farmers (180 formers are supported with 15% of amount of total cost for maximum 4.0 lac. in current FY 2021-22) • Participatory Ground Water Management in ten villages with holistic approach for Kankavati Sandstone Aquifer Programme.

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							• 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. • Development of Prisha Park at Mundra. • Pond Bund strengthening at Zarpara Village • Approach Road Restoration at all Fisher folk vasahat. • Garden Development at Primary School Rampar village • Shed Development at Shukhpurvah Mundra • Under Gram Utthan Project, Adani Foundation is supporting home biogas to farmers to Uthhan Villages phase wise. till the date supported 225 home biogas in Dhrub, Zarpara and Navinal Villages. • 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. During FY 2021-22, 03 ha with M/s. GUIDE, Gujarat. Current year 4 Hector plantation is in progress which will be resulted in 20 Hector. • 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

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							the cultivation trials with red sea weeds 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. • Development Approach road Prasala vadi vistar Gogan Pachim at Zarpara. • Earthen bund Repairing work at Pond, Luni. • Pre-monsoon activity Approach repairing, Village Pond Lake strengthen, and river cleaning (babul cutting) work is ongoing in Various Villages • Approach Road repairing at Various Fishermen Vasahat (ARC). Similar community development programs (based on need based assessment) will be continued in future as well with allocation of appropriate budget.
10.2	The overall sex ratio was found to reduce by 28% in the Mundra taluk (study area) during the period 2001 - 2011. This could be attributed to increase in influx of	Level-2	Adani foundation is taking up several girl child education programs as part of CSR activities to create awareness about girl	Suitable regional level awareness programs on the girl child protection and encouragement programs in line with state and national policies shall be adopted under Corporate Social Responsibility programs in	APSEZ, Other development projects and District Administration*	Long Term	Major works carried out since April 2018 as a part of CSR activities to create awareness about girl child protection are as below. • The Adani Foundation provided scholarship support to motivation and encouragement of fishermen boys and girls for higher education under this program. APSEZ provide 100% fees support to girls as a scholarship. • Under Projects Uthhan More than 9106 Students are Getting benefit Of Education through 51 Government school Of Mundra Block. • Uthhan Project promotes girl child education, Creating awareness through various Govt schemes

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	working men in the region due to rapid economic development. Similar trend might continue in future due to induced economic growth in the region.		child protection.	association with district authorities.			i.e. Vahali Dikri Yojana, Sukanya Samriddhi Yojana etc. till date covered more than 1200 girl child to get benefit out of it. • AVMB School Bhadreswar where Free Of Cost education is provide to Poor and Needy Family Child up 10 standards More than 500 Students are benefiting every year. • Separate sanitation facilities for girl child in schools. • Beti Vadhavo Programme was organized in 32 Villages in the presence of Village Sarpanch and other leaders in year 2017-18. We explained people about the various topics i.e. importance of girl child, Sex Ratio, Gender Equality and laws regarding Child abortion. This initiative was well accepted by community and we have observed a visible change in their mindset. We have facilitated 560 daughters with Kit (Small Bed sheet, Mosquito net, Soap and Cream with nutritious food for mother) To create awareness about health, personal hygiene, child education and nutritional diet in fishermen community, various awareness programs have been organized. • 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. • Project Suposhan is initiated with the Motive to focus on adolescent and Reproductive age women nutrition part. Till date covered more than 12500

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							women and 8700 adolescents under this Project and brought them to considerable status. Curb malnutrition amongst Children, Adolescent girls and Women in our CSR villages. ✓ 100 beneficiaries covered in Menstrual Hygiene Day - with slogan called "RED-ACHHA HAI" ✓ 204 beneficiaries covered in Breastfeeding Week ✓ 320 beneficiaries covered in National Deworming Day ✓ 20 villages covered in celebration of NATIONAL NUTRITION MONTH ✓ 42 FAMILY COUNSELLING ✓ 2059 Women participated in celebration of Women's Day week. • To reduce malnutrition and anemia amongst Children 95 % & adolescent girls and pregnant & lactating women by 70 % in three years • Reduction IMR and MMR • Support Awareness & Cover 100 % Vaccination taken by Child & women. • SuPoshan Thanksgiving program was organized. In this webinar DDO, CDPO Mundra and other dignitiaries remained present and appreciated the efforts to overcome malnourishment in Mundra and Bitta. • 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

S. No.	Identified environmental and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitude1	Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.	Additional Risk Mitigation Measures/ESMP	Responsible agency	Timeframe for implementation	Compliance
							Mundra was remain present in this event. Total 61 forms has received approval letter from GOG and 15 forms filled upon the same day. • Adani Foundation is working with 15 Self help group and supporting to develop entrepreneur skills to become self reliant, sourcing more than 350 women to absorb in various job –this will give them identity, confidence and right to speak in any decision for home, village and working area. About INR 6542.70 lakhs has been spent on various CSR activities in the Mundra region since April 2018 to till Sep 2022 including cost of community health and education for woman and girl child.
10.4	Due to economic growth leading to rapid urbanization, which prompts the need for healthcare facilities in the region. For an influx of 6 lakh people from APSEZ operations	Level-2	Adani hospitals, Mundra is setup by Adani group near Samudra township with a goal to provide primary and secondary health care services to Adani group employees and the local populace of Mundra. The	APSEZ will explore other possibilities to augment the primary and secondary healthcare facilities in future depending on the growth scenario at APSEZ development.	APSEZ	Long Term	Adani hospitals (Multi-specialty), Mundra is having 110 bed facility and same is setup by Adani group near Samudra township. Primary health center and community health center are in place within the Mundra taluka. Other than this Adani foundation is doing various activities as part of community health. The details of last year are as below. Adani hospitals (Multi-specialty), Mundra is having 110 bed facility and same is setup by Adani group near Samudra township. Primary health center and community health center are in place within the Mundra taluka.

S. No.	Identified environmental and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitude1	Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.	Additional Risk Mitigation Measures/ESMP	Responsible agency	Timeframe for implementation	Compliance
	and additional 3 Lakh from induced growth by the year by 2030 (fully developed scenario), total hospitals facilities with about 540 beds would be required.		existing 100 bed Adani hospital at Mundra has been catering the services ranging from wellness and preventative care.				Other than this Adani foundation is doing various activities as part of community health. The details of last year are as below. • Mobile Heath Care Units and Rural Clinics • 12 Rural Clinics • 09 villages of Mundra, 03 villages of Anjar & Mandvi block has benefited by rural clinic service. • Support to 1409 vulnerable patients • 31 villages covered, with 94 types of general and lifesaving medicines through Mobile healthcare unit • Total 35397 People had benefited through Through various Health Projects of Preventive health care General and multispecialty camps Pediatric camp,. • 1370 Person Widows, Senior Citizens and Handicapped people linked with Government pension scheme • Other than this, Adani Foundation has also worked for fight against COVID – 19 pandemic situations for last two years. • Present Hospital facilities are adequate to avail the medical treatment for Mundra region considering present development. Other Occupational Health centres, primary health centres and community health centres are also in place in Mundra to take care the people residing in Mundra. Adani group is also operating high quality health care services to the people of Kutch at G. K. General Hospital, Bhuj having 750 beds facilities on public private partnership (PPP) model, which is 60 km far from Mundra.

S. No.	Identified environmental and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitude1	Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.	Additional Risk Mitigation Measures/ESMP	Responsible agency	Timeframe for implementation	Compliance
							APSEZ will explore other possibilities to augment the primary and secondary healthcare facilities in future depending on the future development at APSEZ.
10.5	Due to rapid economic development in the region, several employment opportunities can be generated to the local people. When the area is fully developed by the end of 2030, the working population of the Mundra taluk would increase from current level of 55,000 to as high as 4,00,000, which will be 45% of the total		APSEZ has been giving preferences to people from Gujarat for providing employment opportunities based on eligibility and skills. In Mundra, special programmes have been conducted by Adani Foundation to enhance the employability of youth from fisherfolk communities. Based on the need assessment results, several livelihood options have	APSEZ is committed to provide support for fishermen livelihood activities and has submitted a detailed 5 years plan to MoEF&CC with a total budget of Rs.13.5 Cr.	APSEZ	Short Term	• 1300 families has benefitted by water supply at nine fisher folk vasahats under Machhimar Ajivika Uparjan Yojana. • Engage more than 500 fisher folk youth in Skill Development Training to provide consistent scope of income. • 6000 fisherfolk direct or indirect benefitted with Education, Mangrove, Water and Livelihood. • Average 75 KL of water was supplied to 676 households at 5 fisherman vasahat on a daily basis under Machhimar Shudhh Jal Yojana and other 4 fisherman vasahat has linkaged with Narmada water through GWIL and Mundra Gram Panachayat from which 355 households get benefited. • 120 Fisher Youth were interviewed among that 5 have been selected. Our target is to support 60+ Fisherman in alternative livelihood till March 2022. • Facilitation of Pagadiya Welfare scheme & boat license sanction letter to 06 Fishermen. Till date 59 Form has been submitted to fisheries department, Bhuj for pagadiya and boat License. • During the Taukate cyclone fishermen family had been shifted to safe Places As well as support to disaster management team for advance preparation. • To promote Natural farming Adani Foundation has originated cow-based farming initiative with

S. No.	Identified environmental and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitude1	Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.	Additional Risk Mitigation Measures/ESMP	Responsible agency	Timeframe for implementation	Compliance
	envisaged population in Mundra Taluk by the end of 2030.		been introduced by the Adani Skill Development Centre, Mundra. In these centres, youth can join and get vocational training for a number of technical and non-technical skills. An industrial Training Institute is set up at APSEZ, Mundra, to enhance the skill levels of the local youth to maximum possible extent.				interconnected techniques which can increase farmer yield. • NB-327 Farmers had been supported WITH nb-21 Offsute to make them Fidder Sustain. • 186 Farmers had supported with Dates Tissue plants. • 23 wormicompost unit have been set-up. Which is facilitated through Government with farmer Contribution. • 150 Farmers have started to preparing Jiva Mrut & Gaukrupa Amrutam Bio-fertilizer and using in agricrop. Series of Training is arranged by ATMA and Adani Foundation. • Four Farmers Groups is registered with ATMA–Agricultural technology management Agency–it will leverage Government schemes. • Adani Foundation provides Good Quality dry and green fodder to 24 Villages. Project is covering total 14116 Cattels / 3008 farmers and hence enhancing cattle productivity. • 33086 Lumpy Skin,Brucellosis and Kharva (Foot & Mouth)Diseace to Cattle and Fitoda Vaccination to Cample. • Fodder Cultivation in 135 acre land of SIRACH AND Zarpara Villages to made fodder sustain villages Among that 08 acrea is Ploughed and cultivated where as 128 acre are simply seed Spreading25 Acre Gauchar land of Siracha village is being cultivated for the same. • Current year for the dates Packaging and Marketing, KKPC Started to sell 10 Kg capacity

S. No.	Identified environmental and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitude1	Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.	Additional Risk Mitigation Measures/ESMP	Responsible agency	Timeframe for implementation	Compliance
							packaging Box at Minimum Profit Margin At Rs.29/Boxes which resulted in turn over of Rs. 24 Lacs with Profit of 1 Lac. This initiative has supported more than 1800 farmers indirectly. • Dragon fruit farming is on going by Five farmers each farmer is doing in 2 Acre farm –Total 11000 plants. • Skill Development and Income Generation –Adani Foundation is working with 15 Self help group and supporting to develop entrepreneur skills to become self reliant, sourcing more than 350 women to absorb in various job. APSEZ is carrying out various initiatives specific to the Fisherfolk community which includes: • Vidya Deep Yojana • Vidya Sahay Yojana – Scholarship Support • Adani Vidya Mandir • Fisherman Approach in SEZ • Machhimar Arogya Yojana • Machhimar Kaushalya Vardhan Yojana • Machhimar Sadhan Sahay Yojana • Machhimar Awas Yojana • Machhimar Shudhh Jal Yojana • Sughad Yojana • Machhimar Akshay kiran Yojana • Machhimar Suraksha Yojana • Machhimar Ajivika Uparjan Yojana • Bandar Svachhata Yojana

S. No.	Identified environmental and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitude1	Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.	Additional Risk Mitigation Measures/ESMP	Responsible agency	Timeframe for implementation	Compliance
							These initiatives are planned for the period 2016 – 2021 with a committed expense of INR 13.5 Cr as submitted earlier in detail in the report namely "Silent Transformation of Fisher folk at Mundra", . Till, Sep'22 approx. 12.31 Cr. INR, has already been spent in support for fishermen livelihood activities. Further, details regarding the expenditure incurred against the commitment are attached as **Annexure – 13**.

Annexure – i

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TEST REPORT

Report No.	**URC /22/07/Water/APL-0001**		
Name & Address of Customer	**M/S. ADANI PORTS & SPECIAL ECONOMIC ZONE LTD. (WFDP-West Port)** PLOT NO: - NAVINAL ISLAND, Village - MUNDRA, Tal. – Bhuj, DIST. - KUTCH - 370421.	Date of Report	**26/07/2022**
		Customer's Ref.	**As Per W.O.**
Sample Details	**Pond Water**	Location	**B/h. Substation 8**
Sample Qty.	**5 Lit.**	Appearance	**Colorless**
Sampling Date	**18/07/2022**	Sample Received Date	**19/07/2022**
Test Started Date	**19/07/2022**	Test Completion Date	**25/07/2022**
Sampled By	**UERL Lab**	Sampling Method	**UERL/CHM/SOP/116**
UERL Lab ID. No.	**22/07/Water/APL-0001**		

TEST RESULTS:

Sr. No.	Parameters	Test Method Permissible	Unit of Measurement	Results
1.	Colour	IS 3025(Part 4)	Pt. Co. Scale	5
2.	Odour	IS 3025(Part 5)1983	--	Agreeable
3.	Total Suspended Solids	APHA 23rd Ed.,2017,2540 –D	mg/L	92
4.	pH @ 25 ° C	APHA 23rd Ed.,2017,4500-H^+B	--	6.97
5.	Temperature	IS 3025(Part 9)1984	^{0}C	29.5
6.	Oil & Grease	IS 3025(Part39)1991, Amd. 2	mg/L	BDL(MDL:2.0)
7.	Total Residual Chlorine	IS 3025(Part 26)1986,	mg/L	BDL(MDL:0.1)
8.	Ammonical Nitrogen	IS 3025(Part 34)1988,	mg/L	BDL(MDL:2.0)
9.	BOD (3 days at 27 ^{0}C)	IS 3025(Part 44)1993Amd.01	mg/L	7
10.	COD	IS 3025(Part 58)2006	mg/L	49.6
11.	Arsenic (as As)	APHA 23rd Ed.,2017,3114-C	mg/L	BDL(MDL:0.01)
12.	Mercury (as Hg)	APHA 23rd Ed.,2017, 3112-B	mg/L	BDL(MDL:0.001)
13.	Lead (as Pb)	IS 3025 (PART 47) 1994	mg/L	BDL(MDL:0.01)
14.	Cadmium (as Cd)	IS 3025(PART 41) 1992	mg/L	BDL(MDL:0.003)
15.	Hexavalent Chromium	APHA 23rd Ed.,2017,3500CrB	mg/L	BDL(MDL:0.05)
16.	Total Chromium (as Cr)	IS 3025 (PART 52) 2003	mg/L	BDL(MDL:0.05)
17.	Copper (as Cu)	IS 3025 (PART 42) 1992	mg/L	BDL(MDL:0.05)
18.	Zinc (as Zn)	IS 3025(PART 49) 1994	mg/L	BDL(MDL:0.05)

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TEST REPORT

Report No.	**URC /22/07/Water/APL-0001**		
Name & Address of Customer	**M/S. ADANI PORTS & SPECIAL ECONOMIC ZONE LTD. (WFDP-West Port)** PLOT NO: - NAVINAL ISLAND, Village - MUNDRA, Tal. – Bhuj, DIST. - KUTCH - 370421.	Date of Report	**26/07/2022**
		Customer's Ref.	**As Per W.O.**
Sample Details	**Pond Water**	Location	**B/h. Substation 8**
Sample Qty.	**5 Lit.**	Appearance	**Colorless**
Sampling Date	**18/07/2022**	Sample Received Date	**19/07/2022**
Test Started Date	**19/07/2022**	Test Completion Date	**25/07/2022**
Sampled By	**UERL Lab**	Sampling Method	**UERL/CHM/SOP/116**
UERL Lab ID. No.	**22/07/Water/APL-0001**		

TEST RESULTS:

Sr. No.	Parameters	Test Method Permissible	Unit of Measurement	Results
19.	Selenium (as Se)	IS 3025(Part 56)2003	mg/L	BDL(MDL:0.01)
20.	Nickel (as Ni)	APHA 23rd Ed.,2017,3111-B	mg/L	BDL(MDL:0.02)
21.	Cyanide (as CN)	IS 3025(Part 27)1986	mg/L	BDL(MDL:0.05)
22.	Fluoride (as F)	IS 3025(PART 60) 2008	mg/L	0.56
23.	Dissolved Phosphate (as P)	APHA 23rd Ed.,2017,4500-P, D	mg/L	0.5
24.	Sulphide as S	APHA 23rd Ed.,2017,4500 S^{-2} F	mg/L	1.9
25.	Phenolic Compound	IS 3025(Part 43)1992, Amd.2	mg/L	BDL(MDL:0.01)
26.	Bio Assay test (%)	IS:6582-1971	%	90 % survival of fish after 96 hrs. in 100% effluent
27.	Manganese (as Mn)	APHA 23rd Ed.,2017, 3500 Mn B	mg/L	BDL(MDL:0.1)
28.	Iron (as Fe)	IS 3025(PART 53) 2003	mg/L	0.113
29.	Vanadium (as V)	APHA 23rd Ed.2017-3500 – V	mg/L	N.D.
30.	Nitrate (as NO3-N)	APHA 23rd Ed.,2017,4500 NO3-B	mg/L	0.7

Remarks: BDL= Below Detection Limit, **MDL** = Minimum Detection Limit

Opinion & Interpretation (If required):

*******End of Report *******

Checked By

(Nilesh C. Patel)
(Sr. Chemist)

Authorized By

(Nitin B. Tandel)
(Technical Manager)

Note: This report is subject to terms and conditions mentioned overleaf.

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TEST REPORT

Report No.	**URC /22/07/Water/APL-0002**		
Name & Address of Customer	**M/S. ADANI PORTS & SPECIAL ECONOMIC ZONE LTD. (WFDP-West Port)** PLOT NO: - NAVINAL ISLAND, Village - MUNDRA, Tal. – Bhuj, DIST. - KUTCH - 370421.	Date of Report	**26/07/2022**
		Customer's Ref.	**As Per W.O.**
Sample Details	**Pond Water**	Location	**Near Yard H**
Sample Qty.	**5 Lit.**	Appearance	**Colorless**
Sampling Date	**18/07/2022**	Sample Received Date	**19/07/2022**
Test Started Date	**19/07/2022**	Test Completion Date	**25/07/2022**
Sampled By	**UERL Lab**	Sampling Method	**UERL/CHM/SOP/116**
UERL Lab ID. No.	**22/07/Water/APL-0002**		

TEST RESULTS:

Sr. No.	Parameters	Test Method Permissible	Unit of Measurement	Results
1.	Colour	IS 3025(Part 4)	Pt. Co. Scale	5
2.	Odour	IS 3025(Part 5)1983	--	Agreeable
3.	Total Suspended Solids	APHA 23rd Ed.,2017,2540 –D	mg/L	74
4.	pH @ 25 ° C	APHA 23rd Ed.,2017,4500-H^+B	--	7.12
5.	Temperature	IS 3025(Part 9)1984	^{0}C	29.5
6.	Oil & Grease	IS 3025(Part39)1991, Amd. 2	mg/L	BDL(MDL:2.0)
7.	Total Residual Chlorine	IS 3025(Part 26)1986,	mg/L	BDL(MDL:0.1)
8.	Ammonical Nitrogen	IS 3025(Part 34)1988,	mg/L	BDL(MDL:2.0)
9.	BOD (3 days at 27 ^{0}C)	IS 3025(Part 44)1993Amd.01	mg/L	3
10.	COD	IS 3025(Part 58)2006	mg/L	24.5
11.	Arsenic (as As)	APHA 23rd Ed.,2017,3114-C	mg/L	BDL(MDL:0.01)
12.	Mercury (as Hg)	APHA 23rd Ed.,2017, 3112-B	mg/L	BDL(MDL:0.001)
13.	Lead (as Pb)	IS 3025 (PART 47) 1994	mg/L	BDL(MDL:0.01)
14.	Cadmium (as Cd)	IS 3025(PART 41) 1992	mg/L	BDL(MDL:0.003)
15.	Hexavalent Chromium	APHA 23rd Ed.,2017,3500CrB	mg/L	BDL(MDL:0.05)
16.	Total Chromium (as Cr)	IS 3025 (PART 52) 2003	mg/L	BDL(MDL:0.05)
17.	Copper (as Cu)	IS 3025 (PART 42) 1992	mg/L	BDL(MDL:0.05)
18.	Zinc (as Zn)	IS 3025(PART 49) 1994	mg/L	BDL(MDL:0.05)

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TEST REPORT

Report No.	**URC /22/07/Water/APL-0002**		
Name & Address of Customer	**M/S. ADANI PORTS & SPECIAL ECONOMIC ZONE LTD. (WFDP-West Port)** PLOT NO: - NAVINAL ISLAND, Village - MUNDRA, Tal. – Bhuj, DIST. - KUTCH - 370421.	Date of Report	**26/07/2022**
		Customer's Ref.	**As Per W.O.**
Sample Details	**Pond Water**	Location	**Near Yard H**
Sample Qty.	**5 Lit.**	Appearance	**Colorless**
Sampling Date	**18/07/2022**	Sample Received Date	**19/07/2022**
Test Started Date	**19/07/2022**	Test Completion Date	**25/07/2022**
Sampled By	**UERL Lab**	Sampling Method	**UERL/CHM/SOP/116**
UERL Lab ID. No.	**22/07/Water/APL-0002**		

TEST RESULTS:

Sr. No.	Parameters	Test Method Permissible	Unit of Measurement	Results
19.	Selenium (as Se)	IS 3025(Part 56)2003	mg/L	BDL(MDL:0.01)
20.	Nickel (as Ni)	APHA 23rd Ed.,2017,3111-B	mg/L	BDL(MDL:0.02)
21.	Cyanide (as CN)	IS 3025(Part 27)1986	mg/L	BDL(MDL:0.05)
22.	Fluoride (as F)	IS 3025(PART 60) 2008	mg/L	0.61
23.	Dissolved Phosphate (as P)	APHA 23rd Ed.,2017,4500-P, D	mg/L	0.64
24.	Sulphide as S	APHA 23rd Ed.,2017,4500 S^{-2} F	mg/L	1.2
25.	Phenolic Compound	IS 3025(Part 43)1992, Amd.2	mg/L	BDL(MDL:0.01)
26.	Bio Assay test (%)	IS:6582-1971	%	90 % survival of fish after 96 hrs. in 100% effluent
27.	Manganese (as Mn)	APHA 23rd Ed.,2017, 3500 Mn B	mg/L	BDL(MDL:0.1)
28.	Iron (as Fe)	IS 3025(PART 53) 2003	mg/L	0.129
29.	Vanadium (as V)	APHA 23rd Ed.2017-3500 – V	mg/L	N.D.
30.	Nitrate (as NO3-N)	APHA 23rd Ed.,2017,4500 NO3-B	mg/L	0.5

Remarks: BDL= Below Detection Limit, **MDL** = Minimum Detection Limit

Opinion & Interpretation (If required):

*********End of Report *********

Checked By

(Nilesh C. Patel)
(Sr. Chemist)

Authorized By

(Nitin B. Tandel)
(Technical Manager)

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TEST REPORT

Report No.	**URC /22/07/Water/APL-0003**		
Name & Address of Customer	**M/S. ADANI PORTS & SPECIAL ECONOMIC ZONE LTD. (WFDP-West Port)** PLOT NO: - NAVINAL ISLAND, Village - MUNDRA, Tal. – Bhuj, DIST. - KUTCH - 370421.	Date of Report	**26/07/2022**
		Customer's Ref.	**As Per W.O.**
Sample Details	**Pond Water**	Location	**Near Yard F & G**
Sample Qty.	**5 Lit.**	Appearance	**Colorless**
Sampling Date	**18/07/2022**	Sample Received Date	**19/07/2022**
Test Started Date	**19/07/2022**	Test Completion Date	**25/07/2022**
Sampled By	**UERL Lab**	Sampling Method	**UERL/CHM/SOP/116**
UERL Lab ID. No.	**22/07/Water/APL-0003**		

TEST RESULTS:

Sr. No.	Parameters	Test Method Permissible	Unit of Measurement	Results
31.	Colour	IS 3025(Part 4)	Pt. Co. Scale	5
32.	Odour	IS 3025(Part 5)1983	--	Agreeable
33.	Total Suspended Solids	APHA 23rd Ed.,2017,2540 –D	mg/L	56
34.	pH @ 25 ° C	APHA 23rd Ed.,2017,4500-H^+B	--	7.24
35.	Temperature	IS 3025(Part 9)1984	^{0}C	29.5
36.	Oil & Grease	IS 3025(Part39)1991, Amd. 2	mg/L	BDL(MDL:2.0)
37.	Total Residual Chlorine	IS 3025(Part 26)1986,	mg/L	BDL(MDL:0.1)
38.	Ammonical Nitrogen	IS 3025(Part 34)1988,	mg/L	BDL(MDL:2.0)
39.	BOD (3 days at 27 ^{0}C)	IS 3025(Part 44)1993Amd.01	mg/L	2
40.	COD	IS 3025(Part 58)2006	mg/L	20.2
41.	Arsenic (as As)	APHA 23rd Ed.,2017,3114-C	mg/L	BDL(MDL:0.01)
42.	Mercury (as Hg)	APHA 23rd Ed.,2017, 3112-B	mg/L	BDL(MDL:0.001)
43.	Lead (as Pb)	IS 3025 (PART 47) 1994	mg/L	BDL(MDL:0.01)
44.	Cadmium (as Cd)	IS 3025(PART 41) 1992	mg/L	BDL(MDL:0.003)
45.	Hexavalent Chromium	APHA 23rd Ed.,2017,3500CrB	mg/L	BDL(MDL:0.05)
46.	Total Chromium (as Cr)	IS 3025 (PART 52) 2003	mg/L	BDL(MDL:0.05)
47.	Copper (as Cu)	IS 3025 (PART 42) 1992	mg/L	BDL(MDL:0.05)
48.	Zinc (as Zn)	IS 3025(PART 49) 1994	mg/L	BDL(MDL:0.05)

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TEST REPORT

Report No.	**URC /22/07/Water/APL-0003**		
Name & Address of Customer	**M/S. ADANI PORTS & SPECIAL ECONOMIC ZONE LTD. (WFDP-West Port)** PLOT NO: - NAVINAL ISLAND, Village - MUNDRA, Tal. – Bhuj, DIST. - KUTCH - 370421.	Date of Report	**26/07/2022**
		Customer's Ref.	**As Per W.O.**
Sample Details	**Pond Water**	Location	**Near Yard F & G**
Sample Qty.	**5 Lit.**	Appearance	**Colorless**
Sampling Date	**18/07/2022**	Sample Received Date	**19/07/2022**
Test Started Date	**19/07/2022**	Test Completion Date	**25/07/2022**
Sampled By	**UERL Lab**	Sampling Method	**UERL/CHM/SOP/116**
UERL Lab ID. No.	**22/07/Water/APL-0003**		

TEST RESULTS:

Sr. No.	Parameters	Test Method Permissible	Unit of Measurement	Results
49.	Selenium (as Se)	IS 3025(Part 56)2003	mg/L	BDL(MDL:0.01)
50.	Nickel (as Ni)	APHA 23rd Ed.,2017,3111-B	mg/L	BDL(MDL:0.02)
51.	Cyanide (as CN)	IS 3025(Part 27)1986	mg/L	BDL(MDL:0.05)
52.	Fluoride (as F)	IS 3025(PART 60) 2008	mg/L	0.66
53.	Dissolved Phosphate (as P)	APHA 23rd Ed.,2017,4500-P, D	mg/L	0.69
54.	Sulphide as S	APHA 23rd Ed.,2017,4500 S^{-2} F	mg/L	1.3
55.	Phenolic Compound	IS 3025(Part 43)1992, Amd.2	mg/L	BDL(MDL:0.01)
56.	Bio Assay test (%)	IS:6582-1971	%	90 % survival of fish after 96 hrs. in 100% effluent
57.	Manganese (as Mn)	APHA 23rd Ed.,2017, 3500 Mn B	mg/L	BDL(MDL:0.1)
58.	Iron (as Fe)	IS 3025(PART 53) 2003	mg/L	0.135
59.	Vanadium (as V)	APHA 23rd Ed.2017-3500 – V	mg/L	N.D.
60.	Nitrate (as NO3-N)	APHA 23rd Ed.,2017,4500 NO3-B	mg/L	0.6

Remarks: BDL= Below Detection Limit, **MDL** = Minimum Detection Limit

Opinion & Interpretation (If required):

*******End of Report *******

Checked By

(Nilesh C. Patel)
(Sr. Chemist)

Authorized By

(Nitin B. Tandel)
(Technical Manager)

Note: This report is subject to terms and conditions mentioned overleaf.