Bhagwat Swaroop Sharma

From:	Bhagwat Swaroop Sharma
Sent:	Wednesday, November 30, 2022 10:26 PM
То:	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 Submission - APSEZ, Mundra - MPT T2 2007 (April'22
	to Spt.'22)
Attachments:	2007 - EC Compliance Report April 22 to Sep'22_T2 MPT APSEZ Mundra.pdf



Ports and Logistics APSEZL/EnvCell/2022-23/077

То

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-gui@gov.in, iro.gandhingr-mefcc@gov.in

Sub : Half yearly Compliance report of Environment Clearance for the p Multipurpose berth (Terminal- 2) at Mundra Port, Dist. Kutch"

Ref : Environment clearance under CRZ notification granted to M/s Adani dated 5th February, 2007 bearing no. 11-84/2006- IA.III

Dear Sir,

Please refer to the above cited reference for the said subject matter. In connectic copy of the compliance report for the Environmental and CRZ Clearance for September 2022 is being submitted through soft copy (e-mail communication & C

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 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 | <u>www.adani.com</u>



Our Values: Courage | Trust | Commitment



Ports and Logistics

APSEZL/EnvCell/2022-23/077

Date: 21.11.2022

То

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-quj@gov.in, iro.gandhingr-mefcc@gov.in

- Sub : Half yearly Compliance report of Environment Clearance for the project namely "Development of Multipurpose berth (Terminal- 2) at Mundra Port, Dist. Kutch"
- Ref : Environment clearance under CRZ notification granted to M/s Adani Ports & SEZ Limited vide letter dated 5th February, 2007 bearing no. 11-84/2006- IA.III

Dear Sir,

Please refer to the above cited reference for the said subject matter. In connection to the same, it is to state that copy of the compliance report for the Environmental and CRZ Clearance for the period of 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.
- 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, 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, Guiarat. India



Environmental Clearance Compliance Report of



Multipurpose Berth (Terminal -2) at Mundra Port, Dist. Kutch, Gujarat

of

Adani Ports and SEZ Limited

Period: April – 2022 to September – 2022



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EC & CRZ Clearance Compliance Report



• Chronology of company name change from **M/s. Gujarat Adani Port Limited** to **M/s. Adani Ports and Special Economic Zone Ltd.** was submitted along with half yearly EC Compliance report for the period Oct'20 to Mar'21.



Half yearly Compliance report of Environment and CRZ Clearance for the project namely "Development of Multipurpose berth (Terminal – 2) at Mundra Port, Dist. Kutch" issued vide MoEF letter no. 11-84/2006-IA.III dated 5th February 2007.

Sr.	Conditions as per		(Compliance SI	tatus as on	
No.	clearance letter		30-09-2022			
A. Sp	ecific Condition					
(i)	All the conditions stipulated by Forests Environment Department, Government of Gujarat vide their letter no. ENV-10- 2005-222-P dated 12/10/2006 should be strictly implemented.	Com Poin issue 12/10	plied. t wise comp ed vide le 0/2006 is enc	liance report tter No. E losed as Anne	of CRZ recom ENV-10-2005-22 exure – A.	nmendations 22-P dated
(ii)	No Objection Certificate	Com	olied.			
	from Gujarat State Pollution Control Board should be obtained before initiating the project.	APSE lette Cons vide The subm perio Cons obta time in-fo	EZL had obta r No. GPCB/U eent to opera consent no. A copy of rend hitted along od Oct'21 to N eent to Establi ined from GF as per the pro rce CtE / CtO	ined No Obje nit-1/FT-139/1 te (CC&A) has WH-117045 v ewed Consen with last EC Nar'22. ish (CtE) and C PCB and rene ogress of the are mentione	ction Certificat 1944 dated 27 th s been renewed alid till 20 th Nov at to operate (Compliance re Consent to Opera wed/amended f project activity.	e vide GPCB April 2005. I from GPCB ember 2026. CC&A) were port for the ate (CtO) are from time to The present
		Sr.	Permission	Project	Ref. No. /	Valid till
				Mundra Port		20.11.2225
			CtO – Renewal	Terminal	AVVH-11/045	20.11.2026
		2	CtE – Amendment	WFDP	17739 / 15618	18.05.2027
		The Cearlie Cons with Mar'	CtE – Amendr er compliance ent to operat last EC Com 22.	ment (Sr. No. 2 e report subm e (CC&A) (Sr. apliance repo	2) was submitte ission. The copy No. 1) were sub rt for the perio	d along with of renewed mitted along od Oct'21 to
(iii)	The proposed project	Com	plied.			
	should not handle any					



Sr.	Conditions as per	Compliance Status as on
No.	clearance letter	30-09-2022
	hazardous goods and cargo.	Only containers and dry cargo is being handled on Multi- Purpose Berth (Terminal – 2).
		During the compliance period, no hazardous cargo / goods are handled at the Multi-Purpose Berth (Terminal – 2).
(iv)	Quarantine condition should be provided for keeping the hazardous containers if they are accidentally received.	Complied. Only containers and dry cargo is being handled on Multi- Purpose Berth (Terminal – 2). During the compliance period, no hazardous cargo / goods
(v)	Green belt area should be developed along the project and budget earmarked.	Complied. Green belt was developed 72.81 ha. Total 149959 trees were planted with the density of 2060 trees per hectare within the port area. So, far APSEZ has developed 486.19 ha. area as greenbelt with plantation of more than 9.5 Lacs saplings within the APSEZ area.
		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 date is annexed as
		Annexure – 1. 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 selected mangrove species. Total 16 Ha. multi-species mangrove plantation has been carried out till March-22 association with M/s. GUIDE, Gujarat. 4 Hector plantation is in progress which will be resulted in 20 Hector within one year.



Sr.	Conditions as per	Compliance Status as on	
NO.	clearance letter	30-09-2022	
		Please refer attached Annexure - 2 for USR act	civity report
(<i>j</i> , <i>j</i>)	A disastas magagamagt		
	plan covering emergency evacuation mechanisms etc. to deal with natural disaster event should be prepared and furnished to the ministry.	Disaster Management plan is in place and imple deal with natural disasters such as cyclone, e flood/heavy rain and tsunami. Updated DMP was to the MoEF & CC along with half yearly complia for the period from Apr – 2016 to Sep – 2016 a no further change in that. On Site Emergency Response Plan and Crisis M Plan is in place and implemented. The upda emergency plan was submitted along with compliance report submission for the period o	emented to earthquake, s submitted ance report and there is anagement oted Onsite h last EC of Oct'21 to
()		Mar'22.	
	and earmark adequate funds for the socio- economic development and for welfare measures in the area including drinking water supply, vocational training, fishery related development programmes (like cold storages)	RO Plants are provided at Samaghogha, Sirach Vallabh Vidyalaya at Mundra village. To reduce disease and women drudgery to get water, Potal provided to the fishermen communities at differe through water tanker since 10 years. APSEZ is actively working with local community project area and provides required support livelihood and other concerns through the CSR a Foundation. Adani Foundation is working in persuasions as below.	a village & water born ble water is ent vasahat around the for their arm – Adani main four
		 Education Community Health Rural Infrastructure Sustainability Livelihood Brief information about activities in the persuasions is mentioned below. Activities carr the same are summarized as below. Area Activity Community Mobile Heath Care Units and Rural Clini 09 Rural Clinics O6 villages of Mundra, 02 villages of Anj Mandyi block has benefited by rural clini 	main four ried out for ics jar & 01 village nic service.



From : Apr'22 To : Sep'22

Sr.	Conditions as per		Compliance Status as on
No.	clearance letter		30-09-2022
Sr. No.	Conditions as per clearance letter		 Compliance Status as on 30-09-2022 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
			 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 labtest. 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. 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



From : Apr'22 To : Sep'22

Sr.	Conditions as per	Compliance Status as on
No.	clearance letter	30-09-2022
		 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 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.



From : Apr'22 To : Sep'22

Sr. No.	Conditions as per clearance letter		Compliance Status as on 30-09-2022
NO.		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. Mork 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.
			 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



From : Apr'22 To : Sep'22

Sr.	Conditions as per	Compliance Status as on
No.	clearance letter	30-09-2022
		Junitation 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 III March- 22 association with WS. GUIDE, Gujarat. Current year 4 Hector plantation has been carried out till March- 22 association with WS. 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/vear. Total 360 farmers can save Rs.234000/- in a year. • 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 Sujam 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 N
	ļ	



From : Apr'22 To : Sep'22

Sr.	Conditions as per	Compliance Status as on
No.	clearance letter	30-09-2022
		 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



From : Apr'22 To : Sep'22

Sr.	Conditions as per	Compliance Status as on	
No.	clearance letter	30-09-2022	
		 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 – 2 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 current the compliance period (Till Sept' 2022). Till Sep'22, Adani Foundation has done total expenditure of	
		INR 152.65 Cr. for CSR activities in Kutch region since its inception.	
(viii)	The fishing activities by the fishermen living in the settlement along the creek should not be hindered and a mechanism may be	Complied. No commercial fisheries are prevailing in this area except Pagadia and fishermen with small boats. Unhindered access is provided to the fishing boats.	
	evolved for the movement of fishing boats vis-a-vis shipping activities.	During project proposal, APSEZ proposed to provide four (4) dedicated accesses at Juna Bandar, Luni, Bavdi Bandar and Zarpara for the fishermen to approach the sea for fishing activity. However, during construction as well as operation, through fishermen consultative process, APSEZ has provided seven (7) access roads. Total length of all the approach roads is approx. 23 Kms and expenditure involved is Rs. 637 Lacs. There is no hindrance to the movement of fisherman boats. Details of the same were submitted along with EC Compliance report for the period Apr'18 to Sep'18.	
		Communication mechanisms have been developed for the smooth movement of fishing boats vis-à-vis shipping activities. Please refer point no. vii above for further details regarding CSR activities being carried out by Adani Foundation.	
(ix)	The relocation of the fishermen and local community if any, in the area should be done strictly in accordance with	Complied. The project was conceptualized in such a way that there are no fishermen or local community settlements in the project proposal.	



Sr.	Conditions as per	Compliance Status as on
No.	clearance letter	30-09-2022
	the norms prescribed by the State Government. The relocated communities should be provided with all facilities including health care, education, sanitation and livelihood.	 APSEZ performs a large-scale socio-economic upliftment program in consultation with FOKIA (Federation of Kutch Industries Association) chaired by District Collector quarterly. APSEZL have provided necessary facilities including health care, education, sanitation, livelihood, drinking water & other infrastructural support to fisher folk community in the region. Please refer point no. vii above for further details regarding CSR activities being carried out by Adani
(\mathbf{v})	The excient economic	
(x)	should not undertake any destruction of mangroves during construction and operation of the project.	Complied. Construction phase is already completed and the project is in operation phase. All developments are carried out as per permissions granted.
		 Conservation of mangroves: 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



Sr.	Conditions as per	Compliance Status as on						
No.	clearance letter	30-09-2022						
		(with a copy to MoEF&CC vide letter dated 04.06.2018 & reminder letter vide dated 4 th Jan, 2019). Presentation on the findings of the report was made to GCZMA committee on 4 th October 2019 and the recommendation for the same has been received vide email dtd 22 nd Sept, 2020 with conditions, which was submitted as a part 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. Recommendations Compliance						
		2.	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	•	APSEZ carried out the tidal			
			creeks in and around APSEZ		observations at locations similar to 2017 in Kotdi, Baradimata, Navinal,			



Sr.	Conditions as per	Compliance Status as on					
No.	clearance letter			30-	09-2022		
				•	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 26 th 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		



Sr.	Conditions as per	Compliance Status as on				
No.	clearance letter			30-09-2022	2	
				 Other til guard w APSEZ a no an allowed mangrov APSEZ Internat Conserv Ecosyste awarene mangrov special The pho attachee Refer Annexue 	han this ith gate s across th y unau within v re areas. has ional ation o em on J ses of t ve ecosys and vuln otographs d as Anne CSR rep re - 2 .	dedicated security system deployed by the coastal area and uthorized persons coastal as well as celebrated the Day for the f the Mangrove luly 26 th to raise the importance of stems as "a unique, herable ecosystem". s of celebration are exure-3. port attached as
		Details or recomment action pla compliance To comply	of activition adations a on were su e report fo y with the	es done as nd NCSCM i bmitted as a the period Oc GCZMA reco	a p mangro part c ct'20 to mmend	art of GCZMA ve conservation of half yearly EC Mar'21. lations regarding
		order vide NCSCM, C APSEZ, Mu will be pai	order no. 4 Chennai fo Jndra. The d by APSEZ	802018994, (mangrove r cost of said w	dated 2 napping vork is 2	9/07/2022 to the g in and around 23.77 Lacs, which
(xi)	Sewage arising in the port area should be disposed off through septic tank – soak pit system or should be treated along with the	Complied. Sewage generated from port is being treated in designated ETP and treated sewage is used for horticulture purposes.				
	industrial effluent to conform to the standards stipulated by Gujarat Pollution Control Board	Location	Capacity	Quantity of T Water (Avg. from Ap Sep'22)	reated r'22 to	Type of ETP / STP
	and should be utilized / recycled for gardening,	LT	265 KLD	106 KLD)	Activated Sludge
plantation and irrigation. Summary of ETP treated water analysis compliance period as mentioned below.						s results during
		Frequency	of Analysi	s: Once in a m	onth	



Sr. No.	Conditions as per clearance letter	Compliance Status as on 30-09-2022								
		Parameter	Unit	Min	Max	Average	Perm.			
		рН		7.14	7.46	7.32	6.5 – 8.5			
		SS	mg/L	36	46	41.67	100			
		TDS	mg/L	1462	1524	1496	2100			
		COD	mg/L	72.6	89.1	82.63	100			
		BOD	mg/L	20	25	22.83	30			
		Ammonical Nitrogen as NHz-N	mg/L	22.2	28.6	25.23	50			
		The quality of r and noise leve	narine els are	water, tre being r	s as r ated effl egularly	ber CC&A gra uents, air analyzed	emissions by NABL			
		 accredited and MoEF&CC approved agency. Please refer Annexure – 4 for detailed analysis reports. INR 6.37 Lakh is spent for all environmentoring activities during the FY 2022-23 till Sep'2 overall APSEZ. It is also noted that GPCB is doing regular site inspection along with wastewater sampling and analysis. The last sample analysis report was submitted as part of complement submission for the duration of Apr'21 to Sep'21 with the permitted and the parameters are well within the permitted as part of complement submission for the duration of Apr'21 to Sep'21 within the permitted as part of complement submission for the duration of Apr'21 to Sep'21 within the permitted as part of complement submission for the duration of Apr'21 to Sep'21 within the permitted as part of complement and the parameters are well within the permitted as part of complement submission for the duration of Apr'21 to Sep'21 within the permitted as part of complement submission for the duration of Apr'21 to Sep'21 within the permitted as part of complement submission for the duration of Apr'21 to Sep'21 within the permitted as part of complement submission for the duration of Apr'21 to Sep'21 within the permitted as part of complement submission for the duration of Apr'21 to Sep'21 within the permitted as part of complement submission for the duration of Apr'21 to Sep'21 within the permitted as part of complement submission for the duration of Apr'21 to Sep'21 within the permitted as part of complement submission for the duration of Apr'21 to Sep'21 within the permitted as part of complement submission for the duration of Apr'21 to Sep'21 within the permitted as part of complement submission for the duration of Apr'21 to Sep'21 within the permitted as part of complement submission for the duration of Apr'21 to Sep'21 within the permitted as part of complement submission for the duration of Apr'21 to Sep'21 within the permitted as part of complement submission for the duration of Apr'21 to Sep'21 within the permitted								
(xii)	Project proponent should prepare and regularly update the disaster management plan from time to time.	Complied. Disaster Management plan to deal with natural disasters such as cyclone, earthquake, flood/heavy rain and tsunami is in place and implemented. Copy of the same was submitted to MoEF & CC along with half yearly compliance								
(xiii)	There should be no withdrawal of ground water in CRZ area, for this project. The proponent should ensure that as a result of the proposed constructions, ingress of saline water into ground	Complied. There is no withdrawal of ground water in CRZ area, for this project. Entire water requirement is sourced from GWIL and desalination plant of APSEZ. Average water consumption for entire APSEZ area is 4.23 MLD during compliance period i.e. Apr'22 to Sep'22.								
	water does not take place.	TO MONITOR THE	ground	i water dt	Jancy, DOF	e wens are	e hi ovided			



Sr.	Conditions as per	Compliance Status as on							
No.	clearance letter	30-09-2022							
	Piezometers should be	at various location in the port and SEZ areas. Third party							
	installed for regular	analysis of the gro	analysis of the ground water is being carried out twice a						
	monitoring for this purpose	year by NABL and I	year by NABL and MoEF&CC accredited agency namely M/s.						
	at appropriate locations on	Unistar Environme	ent and	d Researc	h Labs Pvt	. Ltd., Vapi.			
	the project site.	Summary of the sa	Summary of the same for duration from Apr'22 to Sep'22 is						
		mentioned below.	Moni	toring Re	, ports are	attached as			
		Annexure – 4 for t	he sam	e.					
		Number of Samplin	ng Loca	tions: 5					
		Parameter	Unit	Minimum	Maximum	Average			
		рН @ 25 ° С		7.60	8.44	7.98			
		Salinity	ppt	0.79	11.64	3.55			
		Oil & Grease	mg/L	ND*	ND*	ND*			
		Hydrocarbon	mg/L	ND*	ND*	ND*			
		Lead as Pb	mg/L	0.03	0.07	0.05			
		Arsenic as As	mg/L	ND*	ND*	ND*			
		Nickel as Ni mg/L 0.07 0.11 0.10 Table Observice on Observice mg/L ND* ND* ND*							
		I otal Chromium as Cr mg/L ND* ND* ND*							
		Cadmium as Cd	mg/L	ND*	ND*	ND*			
		Mercury as Hg	mg/L	ND*	ND*	ND*			
			mg/L	0.12	0.25	0.17			
			mo/l	0.12	1 12	0.76			
		Insecticides/Pesticides		0.12 ND*	1.12 ND*	0.70 ND*			
		Depth of Water Level	meter	1.90	2.15	2.02			
		from Ground Level							
			l	L	ND*=	Not Detectable			
		Please refer Anne	xure –	4 for de	tailed anal	ysis reports.			
		Approx. INR 6.37	Lakh	is spent	for all er	nvironmental			
		monitoring activit	ies du	ring the	compliance	e period i.e.			
		Apr'22 to Sep'22 ti	I Sep'2	2 for overa	ell APSEZ, Λ	Nundra.			
(xiv)	The project should not be	Complied.							
	commissioned till the								
	requisite water supply and	Construction activ	ity is a	lready con	npleted and	the project			
	electricity to the project	is in operation pha	ase. Ne	ecessary a	greement f	or supply of			
	are provided by PWD/	Electricity is done	e throu	igh MPSE	Z Utilities	Ltd. (MUL).			
	Electricity Department.	Copies of agreeme	ents we	ere submit	ted to Mo	EF&CC along			
		with half yearly co	mpliand	e report f	or the perio	d from Apr –			
		2016 to Sep - 2010	5.						
(xv)	Specific arrangements for	Complied.							
	rainwater harvesting								
	should be made in the								



Sr.	Conditions as per	Compliance Status as on		
No.	clearance letter	30-09-2022		
	project design and the rain water so harvested should be optimally utilized. Details in this regard should be furnished to this	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.		
	Ministry's Regional Office at Bhopal within 3 months.	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 FY 2022-23 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 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.		



Sr.	Conditions as per	Compliance Status as on
No.	clearance letter	30-09-2022
		 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.
		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.
		Please refer Annexure - 2 for full details of CSR activities
		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 till Sep'22.
(xvi)	The facilities to be	Complied.
	constructed in the CRZ	Construction activities are completed in accordance with
	area as part of this project	the prevailing laws.
	conformity with the	
	novisions of the CP7	
	Notification. 1991 as	
	amended subsequently.	



From : Apr'22 To : Sep'22

Sr.	Conditions as per	Compliance Status as on			
No.	clearance letter	30-09-2022			
(xvii)	No product other than	Complied.			
	those permissible in the	APSEZ store only those product / cargo within CRZ area,			
	coastal Regulation Zone	which are permissible as per Coastal Regulation Zone			
	Notification, 1991 should	Notification, 1991 & its amendments.			
	be stored in the Coastal				
	Regulation Zone area.				
B. Ge	neral Condition				
(i)	Construction of the	Complied.			
	proposed structures				
	should be undertaken	All construction activities are carried out confirming to the			
	meticulously confirming to	existing rules and regulation and as per the CRZ			
	the existing Central / local	notification.			
	rules and regulations				
	including Coastal	Required details on No Objection Certificate from Gujarat			
	Regulation Zone	State Pollution Control Board and applicable consent are as			
	Notification 1991 and its	provided in Specific Condition No. 2 above.			
	amendments. All the				
	construction designs /				
	drawings relating to the				
	proposed construction				
	activities must have				
(ii)	Adoquato provisions for	Complied			
	infrastructure facilities	complied.			
	such as water supply fuel	Construction activity is completed and the project is in			
	sanitation etc should be	operation phase			
	ensured for construction				
	workers during the	No construction camps were located in CR7 area. Most			
	construction phase of the	workers came from nearby villages however for others			
	project so as to avoid	construction camps were located outside CR7 area			
	felling of trees / manoroves	All necessary infrastructure and facilities like mobile toilets.			
	and pollution of water and	safe drinking water, medical health care etc, were provided.			
	the surroundings.	5 ····· 7 ···· ···· ····· P····· ····			



From : Apr'22 To : Sep'22

Sr.	Conditions as per	Compliance Status as on		
No.	clearance letter	30-09-2022		
(iii)	The project authorities	Complied.		
	must make necessary	Linuid Effluent O. Courses this hairs have had at ETD/CTD		
	arrangements for disposal	Liquid Effluent & Sewage - It is being treated at EIP/SIP		
	treatment of effluents by	being used for borticultural ournoses. Please refer point op		
	providing a proper waste	xi of the specific conditions above for further details.		
	water treatment plant			
	outside the CRZ area. The	All attributes of environment viz. air; water; soil and noise		
	quality of treated effluents,	are being regularly analyzed by NABL and MoEF&CC		
	solid Wastes and noise	accredited agency M/s. Unistar Environment and Research		
	the standards laid down by	analysis report.		
	the competent authorities			
	including the Central /	Waste Management - APSEZ has adopted 5R concept for		
	State Pollution Control	environmentally sound management of different types of		
	Board and the Union	solid & liquid wastes. Please refer below details about		
	and Forest under The	management of each type of waste.		
	Environment Protection	Non-Hazardous Solid Waste: A well-established system for		
	Act, 1986, whichever are	segregation of dry & wet waste is in place. All wet waste		
	more stringent.	(Organic waste) is being segregated & utilized for compost		
		nurnose 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		
(i)	The economic should	different types of solid waste. Segregated recyclable		
(17)	provide for a regular	Glasses etc. are then sent to respective recycling units		
	monitoring mechanism so	whereas remaining non-recyclable waste is bailed and sent		
	as to ensure that the	to cement plant (M/s. Ambuja Cement Ltd., Kodinar) for Co-		
	treated effluents conform	processing as RDF (Refused Derived Fuel).		
	to the prescribed	ADGET Mundra is postified for Zoro Wasta to Loadfill		
	analysis reports must be	management system (ZWTL MS 2020) by TUVRheinland		
	properly maintained and	India Pvt. Ltd. (valid up to 31.05.2024). Details of the same		
	made available for	were submitted during the last half yearly EC compliance		
	inspection to the	report during period Apr'21 to Sept'21.		
	officials during their visits	Hazardous & Other Waste		
		Bin medical waste generated from OHCs and Adapt		
		Hospital is being disposed at Common Bio Medical Waste		



Sr.	Conditions as per	Compliance Status as on
No.	clearance letter	30-09-2022
		 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 coprocessing / incineration through common facility i.e. M/s. Saurashtra Enviro Projects Pvt. Ltd., Bhachau, Safe Enviro Private Limited, Bharuch and/or cement industries of Ambuja Cement Ltd., Kodinar. The 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 patricles 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 an



From : Apr'22 To : Sep'22

Sr. No.	Conditions as per clearance letter	Co	mpliance Statu 30-09-202	is as on 2			
		premises. Details of permissi authorized vendors	ons / agreeme s were submiti	nts of hazardous waste ted along with pervious			
		half yearly EC Comp change. The following table	oliance Reports e summarizes	the waste management			
		practice (from Apr wastes at APSEZ:	'22 to Sep'22)) for different types of			
		Type of Waste	Quantity in MT	Disposal method			
		Hazardous Waste		L			
		Pig Waste	5.93				
		ETP Sludge	1.91	- Co-processing at cement			
		Oily Cotton waste	53.03	industries			
		Used / Spent Oil	74.13	Sell to registered recycler			
		Glass Wool 24.09 Send to Authorized common TSDF					
		Other Waste					
		Bio Medical Waste 4.02 To approved CB					
		E-Waste	58.49	Sell to register recycler			
		Non-Hazardous Waste					
		Recyclables Dry Waste / Scrap	1583.10	After recovery sent for recycling / Reuse within premises			
		Non-Recyclable Dry Waste (RDF)	314.16	Co-processing at Cement Industries			
		Wet Waste (Food waste + Organic waste)	431.96	Converted to Manure for Horticulture use / Biogas for cooking purpose			
		Horticulture Waste	397.00	Used for making of manure and utilize for horticulture purpose			
(v)	In order to carry out the	Complied.					
	during the operational phase of the project, the project authorities should provide an environmental laboratory well equipped	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. Summary of the same for duration from Apr'22 to Sep'22 is mentioped					
	with standard equipment and facilities and qualified	below.	Noiso Samalia	a Looptions: 4 Nos			
	manpower to carry out the		Noise Samplin				
	testing of various	Parameter Unit AAQM	Min Max	Average Perm. Limit ^s			
	environmental parameters.						



Sr. No.	Conditions as per clearance letter			Complian 30-	ce Status 09-2022	as on			
		PM10	µg/m³	25.67	89.73	74.2	100		
		PM _{2.5}	µg/m³	8.65	46.26	32.02	60		
		SO ₂	µg/m³	5.89	41.48	26.89	80		
		NO ₂	µg/m³	8.24	47.24	32.46	80		
		Noise	Unit	Leq Min	Leq Max	Leq Avg.	Leq Perm. Limit*		
		Day Time	dB(A)	58.50	69.80	65.16	75		
		Night Time	dB(A)	53.70	64.70	60.47	70		
		* as per NAAQ standards, 200 * as per CC&A granted by GPCI Values recorded confirms to the stipulated standards							
		Please refer Annexure – 4 for detailed analysis reports. M/s. Unistar Environment and Research Labs Pvt. Ltd., Vapi has an environmental laboratory well equipped with standard equipment and facilities and qualified manpower to carry out the testing of various environmental parameters.							
		Approx. IN monitoring overall APS	IR 6.3 activii SEZ.	7 Lakh ies durin	is spent g the FY	for all en 2022-23 ti	ivironmental II Sep'22 for		
(vi)	The sand dunes and mangroves, if any, on the site should not be disturbed in any way.	Complied. There are no sand dunes and mangroves within the project area. However mangrove conservation plan has been developed by NSCSM and same has been submitted. Please refer Condition No. x of specific conditions for							
(vii)	A copy of the clearance letter will be marked to the concerned Panchayat / local NGO, if any, from whom any suggestion / representation has been received while processing the proposal.	Not applica	able at	present					
(viii)	The Gujarat Pollution Control Board should display a copy of the clearance letter at the Regional Office, District	Not Applic	able tion do	es not be	long to pr	oject propc	onent.		



From : Apr'22 To : Sep'22

Sr. No.	Conditions as per	Compliance Status as on 30-09-2022	
	Industries center and Collector's Office / Tehsildar's Office for 30 days.		
(ix)	The funds earmarked for environment protection measures should be maintained in a separate account and there should be no diversion of these funds for any other purpose. A year wise expenditure on environmental safeguards should be reported to this Ministry'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. No separate bank account is maintained for the same however, all the expenses are recorded in advanced accounting system of the organization. Budget for environmental management measures (including horticulture) for the FY 2022-23 is to the tune of INR 1414.23 lakh. Out of which, Approx. INR 757.85 lakh are spent during the year FY 2022-23 till Sep'22. Detailed breakup of the expenditures for the past 3 years is attached	
(x)	Full support should be extended to the officers of this Ministry's Regional Office at Bhopal and the officers of the Central and State Pollution Control Board 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.	Complied. APSEZL is always extending full support to the regulatory authorities during their visit to the project site. Last visit of Regional Office, GPCB was done on 07.03.2022 for Main port and compliance of the same has been submitted vide our letter dated 11.03.2022. Details of the same were submitted as part of compliance report submission for the duration of Oct'21 to Mar'22. Inline to the compliance certification process of Environment Clearance condition of Waterfront Development Plan, RO, MoEF&CC Bhopal had visited the site on 27 th & 28 th 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	



Sr.	Conditions as per	Compliance Status as on
No.	clearance letter	30-09-2022
		Development Plan, RO, GPCB, Gandhidham had visited the site on 17 th 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 18 th September, 2015, Joint Review Committee (JRC) comprising officials from various competent authorities visited the APSEZ, Mundra from 1 st to 3 rd 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- compliance observed.
(xi)	In case of deviation or alteration in the project including the implementing agency, a fresh reference should be made to this Ministry for modification in the clearance conditions or imposition of new one for ensuring environmental protection.	Complied. Construction phase is completed and the project is in operation phase. There is no deviation or alteration in project including implementing agency.
(xii)	This Ministry reserves the right to revoke this clearance, if any of the conditions stipulated are not complied with to the satisfaction of this Ministry.	Point noted.
(xiii)	This Ministry or any other competent authority may stipulate any other additional conditions subsequently, if deemed necessary, for environmental protection, which should be complied	Point noted.



From : Apr'22 To : Sep'22

Sr.	Conditions as per	Compliance Status as on	
NO.		30-09-2022	
	with.		
(xiv)	The project proponent should advertise in at least in two local newspapers widely circulated in the region around the project, one of which should be in the vernacular language of the locality concerned informing that the project has been accorded environmental clearance and copies of clearance letter are available with the State Pollution Control Board and may also be seen at the website of the Ministry of Environment & Forests at http://www.envfor.nic.in.	Complied	
	The advertisement should be made within seven days from the date of issue of the clearance letter and a copy of the same should be forwarded to the Regional office of this Ministry at Bhopal.		
(xv)	The projects proponents	Complied.	
	should inform regional	The construction phase is complete and the project is in	
	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.		

Annexure – A



Status of the conditions stipulated under CRZ Recommendation

Half yearly Compliance report of CRZ recommendation for the project namely "Development of Multipurpose berth (Terminal – 2) at Mundra Port, Dist. Kutch" issued by DoEF, GOG vide letter no. ENV-10-2005-222-P dated 12th October, 2006.

Sr. No.	Conditions	Compliance Status as on 30-09-2022	
Specific Condition			
1	The provision of the CRZ notification of 1991 and subsequent amendments issued from time to time shall be strictly adhered to by the GAPL. No activity in contradiction to the provision of the CRZ Notification shall be carried out by the GAPL.	Complied. Construction activities are completed and the project is in operation phase. All stipulations with respect to the CRZ notification and its subsequent amendments are complied with.	
2	All permissions from different Government Departments / agencies shall be obtained by the GAPL before commencing the expansion activities.	Complied. Please refer to specific condition no. 2 of the EC and CRZ clearance above for details upon NOC & CC&A obtained from GPCB. Construction activity is already completed and the project is in operation phase. APSEZ had obtained No Objection Certificate vide GPCB letter No. GPCB/Unit- 1/FT-139/11944 dated 27 th April 2005.	
3	No Dredging and /or reclamation activity shall be carried out in the CRZ area categorized as CRZ (i) and it shall have to be ensured that the mangrove habitats and other ecologically important and significant areas are not affected due to any of the project activities.	Complied. No dredging or reclamation is carried out in CRZ – 1 (A) area. Capital dredging is completed and only maintenance dredging is being carried out, Please refer to specific condition no. x of the EC and CRZ clearance for mangrove conservation.	
4	The dredge material shall be disposed of into pre- designated areas duly identified and got approved through the Gujarat Coastal Zone Management Authority	Complied. Construction and capital dredging activities are completed and the project is in operation phase. Impact assessment was done for the same and EIA report was submitted to GCZMA and MoEF&CC based on which the final Environmental and CRZ clearance was granted.	



Status of the conditions stipulated under CRZ Recommendation

Sr.	Conditions	Compliance Status as on	
No.	Conditions	30-09-2022	
	for which the company shall have to make separate application along with proper EIA indicating the exact location of the dredge material disposal area on the CRZ map of the region prepared by the Space Application Center, Ahmedabad, as there exists best mangrove area in and around Bocha and Navinal islands, which requires to be protected.	Detail on study for conservation and monitoring for natural mangrove stands at Mundra is as provided in condition no. 3 above.	
5	Massive mangrove plantation activity in at least 1200 ha. Area shall be carried out within a time frame of 5 years commencing from July, 2006 without any delay whatsoever.	Complied. It may be noted that 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 date is annexed as Annexure – 1 . Please refer condition no. v of specific conditions (EC & OPZ Clease age) for further details	
6	No effluent or sewage shall be discharged into the sea / creek or in the CRZ area and shall be treated to conform the norms prescribed by the Gujarat Pollution Control Board and would be reused/ recycled within the plant premises.	Complied. Entire quantity of sewage generated is being treated in designated ETP/STPs and treated sewage is used for gardening. Please refer to specific condition no. xi of the EC and CRZ clearance above for more details.	
7	All the recommendation and suggestions given by the NIO in its Comprehensive Environment Impact Assessment report for conservation / protection and betterment of	Complied. All the recommendation and suggestions for conservation / protection and betterment of environment given by the NIO in its comprehensive EIA have been implemented. Few examples are provided below.	



From : Apr'22 To : Sep'22

Status of the conditions stipulated under CRZ Recommendation

Sr. No.	Conditions	Compliance Status as on 30-09-2022	
	environment shall be implemented strictly by the	Few Marine EIA recomme	endations:
	GAPL.	Operational protocols and safety procedure should be printed and freely available to concerned staff. The employees must be adequately trained to inculcate a high level of competence not only in day to day operations but also during emergency situations. Periodic refresher courses must also be organized to maintain the level of their competence.	The company has written the operational protocols and safety procedures as a part of ISO 14001:2015, ISO 45001:2018 and ISO 9001:2015 certifications. APSEZ has established training department to impart training to its employees. IMO module course organized by OSCT India, ICG & Sea Care Marne Services are conducted & 24 personnel have achieved IMO level 1, 01 personnel have achieved IMO Level 2 and 03 personnel have achieved IMO Level 3. Different training modules as Oil Spill, Oil Spill Equipment, Oil spill Management course, Notification exercise, Table Top, Incident are conducted at different frequency.
		Temporary colonies of workforce should be located sufficiently away from the HTL with proper sanitation. Adequate arrangement of fuel supply to the workers should be made to discourage them from using mangroves for firewood.	Construction activity is already completed. Most of the construction labours were residing in the nearby villages where all basic facilities are easily available. However, for those residing near the construction site, infrastructure facilities such as water supply, fuel, sanitation, first aid, ambulance etc. were


From : Apr'22 To : Sep'22

Sr. No.	Conditions	Compliar 30	nce Status as on)-09-2022
		Adequate vigilance is required to adherence of ships to Marpol protocol and related regulations.	provided by APSEZ. During the vessel declaration compliances with respect to Air Pollution and Oil are monitored by the Port Authority. The ships are certified with international certification bodies only after complying with the Marpol protocol.
		Procedure for conducting ship movement operations in the port area must be available to the concerned staff.	Structure is made available for conducting ship movement to the concerned staff and made available on web link www.adaniports.com/pdfs/ PIB_06122013.pdf Port Information Booklet is also made available on web link www.adaniports.com/Port_ Operations_Port_Tariffs.aspx
8	The construction and operational activities shall be carried out in such a way that there is no negative impact on mangroves and other coastal / marine habitat. The construction activities and dredging shall be carried out only under the constant supervision of the NIO.	Complied. Construction and capit completed. All operation out in such a way that nearby mangroves. Details on mangrove cor provided against Specific	al dredging activity is already nal activities are being carried t there are no impacts on the nservation and afforestation are c Condition No. 5 above.
9	The GAPL shall strictly ensure that no creeks are blocked due to any activity at Mundra Port and the mangrove habitats are neither disturbed nor destroyed due to any activity.	Complied. As per Marine EIA carried creek system (main ca creeks) in the study regi (3) Navinal (4) Bocha Bandar) leading to Bhukh All above creeks are in	d out by NIO in 2008, prominent reeks and small branches of ion are: (1) Kotdi (2) Baradimata (5) Mundra (Oldest port (Juna hi river). existence allowing free flow of



From : Apr'22 To : Sep'22

npliance Status as on 30-09-2022
no filling or reclamation of any creek so far constructed 19 culverts having rox. 1100 m with total cost of INR 20 Bridges have been constructed over otal length of 230 m and cost of INR raphs of the same have already been of the compliance for the period of
concluded that there are sufficient ek mouths and all creek mouths are ning of water.
ctions given by MoEF&CC vides order 5, following studies were conducted. In comprehensive and integrated plan in and conservation of mangroves and eks in and around APSEZ and the hitted to the GCZMA on 04.06.2018. Same were submitted along with half pliance report for the period Apr'19 to t of said study was 3.15 Cr, which was SEZ. If urther submitted to GCZMA and for their examination and on vide (with a copy to MoEF&CC vide .06.2018 & reminder letter vide dated Presentation on the findings of the ade to GCZMA committee on 4 th and the recommendation for the same ved vide email dtd 22 nd Sept, 2020 ZMA recommendations and NCSCM rvation action plan, APSEZ has ng activities with expenditure.



From : Apr'22 To : Sep'22

	Conditions	Sr. No.
und APSEZ – ve area - The s. The details growth from ing the last n surrounding penditure for prox. 200.89 which was		
ons regarding SEZ awarded 3994, dated or mangrove e cost of said SEZ.		
f the EC and t. Mangrove		
 v to identify as proposed nline to ToR ared inline to submitted to to same were Compliance The cost of d by APSEZ. ort was made O19 and after decided to details of the O9.2020 & Gandhinagar 		
subm ne san Com The d by A ort wa D19 ar decid Jetails .09.20 Gand nding:		



From : Apr'22 To : Sep'22

Sr. No.	Conditions	Compliance Status as on 30-09-2022
11	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 debris shall be removed from the construction site immediately after the construction is over	 CIA report in detail. Details were submitted along with last half yearly 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. Details are attached as Annexure - 6. 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 - 7. Complied. Construction activity is already completed. Project is in operation phase.
12	The construction camp shall be located outside the CRZ area and the construction labour shall be provided the necessary amenities, including sanitation, water supply & fuel and it shall be	Complied. The construction activity of said project is already completed. Project is in operation phase. No construction camps were located in CRZ area. Most workers came from nearby villages however, for others; construction camps were located outside CRZ area.
	ensured that the environmental conditions are not deterioted by the construction labours.	All necessary infrastructure and facilities like mobile toilets, safe drinking water, medical health care etc. were provided.
13	The GAPL shall prepare and	Complied.



From : Apr'22 To : Sep'22

Sr. No.	Conditions	Compliance Status as on 30-09-2022
	regularly update their local Oil Spill Contingency and Disaster Management Plan in for their all activities in Mundra Port consonance with the National Oil Spill	Oil spill contingency response plan is being updated on regular basis and the same was last updated on 31.07.2022 is in place and implemented. The Oil spill contingency response plan is enclosed as Annexure - 8 .
	and Disaster Contingency Plan and shall submit the same to this department after having it vetted through Indian Coast Guard.	Latest Regional Level Pollution Response exercise "SWACHCHH SAMUDRA-NW 2022" was carried out by Indian Coast Guard on 12 th 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 - 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) prepared by APSEZ is in accordance with the NOSDCP.
		Disaster Management Plan is updated regularly and the updated DMP was submitted to the MoEF & CC along with half yearly compliance report Apr – 2016 to Sep – 2016.
		On Site Emergency Response Plan and Crisis Management Plan is in place and implemented. The updated On site emergency plan were submitted along with EC compliance report submission for the period of Oct'21 to Mar'22.
14	The Gujarat Maritime Board	Point noted.
	for the Gulf of Kutch and would work out the modus	APSEZ is practicing well defined traffic control procedure.
	operandi for cost sharing by the different players in the Gulf indicating the GAPL. The GAPL shall contribute	A VTMS service for Gulf of Kutch is operated by Directorate General of Lighthouses and Lightships (DGLL), Govt. of India.
	for the same as may be	Marine Control of APSEZ provides traffic update to



From : Apr'22 To : Sep'22

Sr. No.	Conditions	Compliance Status as on 30-09-2022
	decided by the Gujarat Marine Board or any other competent authority for this	vessels in Mundra Port Limit on VHF Channel- 77. Arrival and departure information before arrival and
	purpose.	departure respectively in Gulf of Kutch is provided to VTMS information cell through agent or by directly sending mail to vtsmanagergulfofkutch@yahoo.com and <u>vtsgok@yahoo.com</u> .
		Mundra port has subscribed and taking VTMS feed from Kandla from link <u>www.vts.gov.in</u>
15	The GAPL shall bear the cost of the external agency that	Complied
	may be appointed by this Department for supervision / monitoring of proposed activities and the environmental impacts of the proposed activities.	Please refer to condition no. 10 of the CRZ recommendations above for details upon cost incurred for various proposed studies and activities.
Gen	eral Condition	
16	The ground water shall not be tapped by the GAPL to	Complied.
	meet with the water requirement in any case.	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 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.
17	The GAPL shall take up	Complied.
	development activities in consultation with Forest and Environment Department.	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.
		Please refer condition no. v of specific conditions (EC & CRZ Clearance) for further details.
18	The GAPL shall have to contribute financially for	Complied.
	taking up the socio- economic upliftment activities in this region in	APSEZ performs a large-scale socio-economic upliftment program and shares with FOKIA (Federation of Kutch Industries Association) chaired by District



From : Apr'22 To : Sep'22

Sr. No.	Conditions	Compliance Status as on 30-09-2022
19	consultation with the Forests and Environment Department and the District Collector / District Development officer. A separate budget shall be earmarked for the purpose of socio-economic upliftment activities and details thereof shall be furnished to this department as well as the MoEF&CC, GOI from time to time. The details with respect to the expenditure from this budget head shall also be	Collector quarterly. APSEZL have provided necessary facilities including health care, education, sanitation, livelihood, drinking water & other infrastructural support to Local community in the region. For further information related to the CRS activities being carried out by Adani Foundation in Mundra region, please refer to specific condition no. 7 of the EC and CRZ clearance above.
20	A separate environment management cell with qualified personnel shall be created for environmental monitoring and management during construction and operational phases of the project.	Complied. APSEZL has a well-structured Environment Management Cell, staffed with qualified manpower for implementation of the Environment Management Plan at site. Site team report to Sr. Manager (Environment) at Corporate, who heads the Environment Management Cell who directly reports to the top management. Environment Management Cell Organogram were submitted as part of compliance report submission for the duration of Apr'21 to Sep'21. And there is no further change.
21	Environmental Post Project Monitoring report indicating the changes, if any, with respect to the baseline environmental quality in the coastal and marine environment shall be submitted every year by the GAPL to this department as well as to the MoEF&CC, GOI.	Complied. The quality of treated effluent, emission and noise level is being monitored regularly by a MoEF&CC/NABL accredited agency namely M/s. Unistar Environment and Research Labs Pvt. Ltd. Monitoring results are confirming to the applicable norms. Marine monitoring (Surface, Bottom & Sediment) is being carried out once in a month. Summary of the same for duration from Apr'22 to Sep'22 is mentioned below.



Sr. No.	Conditions	Compliance Status as on 30-09-2022							
		Total S	Total Sampling Locations: 09 Nos.						
		Param		Surface	1 -		Bottom		
		eter	eter Unit	Min	Max	Averag e	Min	Max	Avera ge
		рН		8.04	8.31	8.21	7.92	8.16	8.07
		BOD (3 Days @ 27 oC)	mg/L	2.4	6.02	2.89	BDL (MDL:1. 0)	BDL (MDL: 1.0)	BDL (MDL:1 .0)
		TSS	mg/L	94	156	126.28	78	132	107.94
		DO	mg/L	5.85	6.27	6.08	5.7	6.17	5.91
		Salinit y	ppt	35.06	35.74	35.34	35.68	36.92	35.93
		TDS	mg/L	35810	36942	36246	35984	37624	36751
							*BDL – *MDL – Mir	Below Dete nimum Dete	ection Limit ection Limit
22	The GAPL shall have to contribute financially to support the National Green Corps Scheme being implemented in Gujarat by the GEER foundation, Gandhinagar in consultation with Forests and Environment Department.	Please Approx monito for ove Compli Necess hearing	refer ring a rall Af ed. sary c g from	Annexi 6.37 activitie PSEZ, N ontribu	ure – 4 Lakh is es durin <u>Aundra.</u> Ition if foundat	for deta spent g the F require ionto su	ailed an for all (Y 2022) will be upport N	alysis r environ -23 till e provio IGC sch	ded on neme.
23	A six monthly report of compliance of the conditions mentioned in this letter shall have to be furnished by the GAPL on a regular basis to this department without fail.	Compli Six Mo being s Compli regular monito submit Office Baroda of Fore 27.05.2	ed. nthly submil ance ly. La ring c ted t (IRO) o, GPC ests 8 2022.	enviror ted reg report st com lata for o Regi @ Gar B @ Ga & Env., Copy c	nment cl gularly t pliance the pe onal Of ndhinag Gandhi of the s	learance o the co C con report riod of fice of ar, Zona gar & G nagar N ame is	e compli incerned ditions includi Oct'22 t Integra al Offic andhidh vide our also ava	ance re d autho is up ing res to Mar' ated Re ated Re a of C iam and r letter ailable	eport is rities. oloaded ults of 22 was egional PCB @ d Dept. dated on our



Sr. No.	Conditions		Compliance Status as on 30-09-2022				
		A soft copy of the same was also submitted through e- mail on 30.05.2022 to all the concern authorities. Please refer below for the details regarding past six compliance submissions.					
			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		
24	Any other condition that may be stipulated by this department from time to time for environment protection / management purpose shall also have to be complied with by the GAPL.	Co An pro AP	mplied. y othe otection SEZ.	r condition stipula / management purpo	ted for environment se will be complied by		

Annexure – 1



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			
ΜΙΤΑΡ	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: 9494	462.00 Nos.					



Details of Mangrove Afforestation done by APSEZ

SI. 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	Avicennia marina, 2007-08 & Rhizophora 2011-13 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 – 2



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 incomegenerating 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.

Inside

CSR Kutch

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CSR Tuna

CSR Bitta

Suposhan Tharad

Media coverage

Community Speaks

Awards and Accolades

Events and Day Celebration

Environment Sustainability Projects

Tree plantation Drive

Sustainable Livelihood Projects

Community Infrastructure Development

Adani Skill Development Center Mundra

Adani Skill Development Center Bhuj

Mangrove Biodiversity Park

Water Conservation Projects

Adani Vidya Mandir Bhadreshwar

Smruti Van

Home biogas

Education Projects

Uthhan Udaan

Farmers Fisherman Woman Community health Project

Miyawaki Forest Development, Nana Kapaya

22 23

33

48

63

53

57

59

43



CSR KUTCH



44

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 reenforcing 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

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 <u>four major</u> <u>compartments</u> (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.







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.





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	lpomoea biloba	Climber
6	Salvadora persica L.	Shrub
7	Urochondra setulosa	Herb



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				





2. Scartelaos histophorus



3. Periophthalmus waltoni



4. Austruca sindensis



5. Austruca lactea

6. Parasesarma plicatum

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

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

- 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



Community Contribution

Total Target for 2022-23

RRWHS Constructed in Q1

Population Impacted

Savings per household

RRWHS

40

25

300+

15000+



Impact



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 (10 th 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



૨૦૨૦-૨૧ના જિલ્લામાં તાલુકા વાઇઝ ગુણોત્સવના ગ્રેડ તાલુકા વાઇઝ ગુણોત્સવના ગ્રેડ									ગ્રેક				
તાલુકો	A+	Α	B	С	D	કુલ	તાલુકો	A+	A	B	С	D	કુલ
અબડાસા	09	25	११६	35	50	9.93	અબડાસા	OU	૧૫	૧૨૫	૨૫	00	290
અંજાર	00	OU	66	રપ	00	926	અંજાર	02	98	14	20	02	926
ભચાઉ	00	02	929	85	03	992	ભચાઉ	00	06	928	38	08	9.92
ભુજ	09	98	208	936	99	385	ભુજ	20	42	920	99	06	388
ગાંધીધામ	00	OU	83	09	09	પદ	ગાંધીધામ	00	09	32	99	00	પદ
લખપત	00	00	43	89	09	909	લખપત	09	99	53	રપ	50	206
માંડવી	00	OC	૧૨૫	33	00	959	માંડવી	OE	29	909	રપ	09	१हह
મુન્દ્રા	00	50	63	20	00	904	મુન્દ્રા	98	૪૫	30	09	00	904
નખત્રાણા	09	20	258	29	00	9.90	નખત્રાણા	OF	38	998	28	09	299
રાપર	00	08	920	63	29	286	રાપર	03	08	950	904	22	268
કુલ	03	66	११२ह	४५०	૫૧	1996	કુલ	૫૭	239	1083	383	४१	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.
- \checkmark 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

■ Male ■ Female



Impact **INSPIRE TO ASPIRE**

Igniting thoughts for the bright **EXPERIENCE** future.

INDUCING KNOWLEDGE

Widening of knowledge

horizon.

UNFORGETABLE

Visitors get to observe and experience the operations on dreams come true if we sites.

THOUGHT PROVOKING

Stimulating young minds to think out of the box.

ENCOURAGE TOWARDS GOAL

APSEZ existence proves that 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


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.



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.



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.



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.



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.



- 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





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.





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 24^{th} 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.







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



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

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

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



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















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.



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.



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.



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.



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.



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.



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 cleanup 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



AWARDS



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વિષય - કચ્છ જિલ્લામાં ગીલંજામાં કેલાવેલ લાગો કવીન દીકીઝ રીતનાં વિયંત્રણ માટે વ્યપના તરકારી મહેલ ઉપરા સવલા માટે

લાલુ વર્ષે કમક જીલ્લાના ગોલેશના પાણીઓમાં ભાગી સીન ડીમીઝ નામનો મેંગથાળી ખુબ મેદર પ્રમાષ્ટમાં દેલાવે હતો. બ રીગ જીલ્લામાં પ્રથમ વખત જ જોવા મહેલ કોઇ પશુપાલકોમાં માન વિશે પછી દાકા-કુર્વાક તેમજ ભવની લાગણી પણ જોવા મહેલ રની લાખી છીન ડીસીઝાને વાવરસ-જાન્ય રીગ કીછ તેનાં નિરાયળ માટે ભારત સરકારશીની ચેડવાઇઝારી મુજબ Gom માટ રસીકરવ લે મુખ્ય અને ખાતિ આવશ્વક ઉપાય છે. જે માટે ભાર્ત્રિક કક્ષાએશી વૈક્ષીન ઉપણબ્ધ કરાવવું જરૂરી હતું.

का जापने आपनी संस्थानां भी मावकुलांध जारेवानी संपर्ड इरी अंत्रेसी देखिप्रेलित कास तरतां तेखी संस तरत क માગવીગની ખાતરી આપી ખડુ દેસ મમયમાં કુલ ૬૫,૫૦૦ દીઝ Gaar Par વેક્સીન રસીકરણ માટે ઉપલબ્ધ કરાવેલ કતું જેની 6 man inny meller for flamme from neur

લાગી રોગ નિયંત્રણનાં શહિવારા પ્રયત્નીમાં આપના તરકથી અપાવેલ આ ઉમદા સહયોગથી જીલ્લાનાં પશુપાલને માટ રોગ સામે રાકિત કરવા માટે ખુબ મદદ મહેલ છે. માસ જૂન-પુલાઇ ર૦૧૧-૨૨માં જીલ્લામાં ઉગ્રયક્ષે કેલ્લા સેસ્વા સેસવાહાને ત્વરિત રમોકરળને કારણે નિયમિન કરી સકાયલ છે અને સલ છેલ્લા એક મામ જેટલા મમથાથી જીલ્લામાં દીઇ નવાં કે એક્ટીવ કેસ નોંધારીલ નથી

લમ્પી રોગ નિયંત્રાદ માટે સાચીરૂપ લેવી શહ્ય જ્ય રક્ષીકરલની કામગ્રીરીમાં આપના તરકથી લપાલેલ બહુમુલ્લ સસ્વોગ બદલ પશુપાલન ગ્રામાં, જીલ્લા પંચાયત-કથક વતીથી આપની કદયપૂર્વક આભાર માનું છું. કરક જીલ્લાનાં પશુપાનને આરીગ્રાની જાળવાલી માટે આપના તરકથી આઝામી સમયમાં પણ આ પકારે શક્યોગ મહતો રઠેવે તેથી અપેક્ષ સાથે જાલકામનાઓ અને W Paul manifest

Hain of water

(12. 22 41 44 6552) નાંચલ પશુપાલન નિવામક 10001 UNLUA, 545-194

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

PRESS NOTE

મુન્દ્રાના 7 ગામના 51 ખેડૂતોએ ગાય આધારિત ખેતી અપનાવી અઘણી કાઉન્ડેશન 5000 જેટલા કિસાનોને પ્રોત્સાહિત કરશે

Golf . KOSO SESTIN

આધુનિક યુગ માં સસાયશિક ખાતરમુક્ત આહાર મેળવવો એ માનવમાત્ર માટે પડકારરૂપ બન્યું છે ત્યારે મુન્દ્રા પંથકના સાત ગામના 51 ખેડૂતોએ ગાય આધારિત ખેતીનો પ્રારંભ

કરી નવો રાહ ચીધ્યો છે.

આંગણે બે પ્રકારના

ખાતરો ઉત્પન્ન કરી ગાય

આધારિત ખેતી કરી શકે

ते माटे सतत प्रयत्नशील

પોતાના

ખેડતો



કાઉન્ડેશન અદાણી દારા એક દેશી ગાયથી 30 એકર જમીનમાં જીવામત ખેતી કરી શકાય જયારે સજીવ ખેતીમાં ૩૦ 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 કાર્મ બનાવી ગાય આધારિત ખેતી શરૂ કરવામાં આવી છે અને આ પ્રોજેક્ટનો વિસ્તાર કરવા

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

માં સ્વજલ પ્રોજેક્ટ અંતર્ગત રફટોપ

રેઇન વોટર ના 115 યુનિટ સ્થાપિત

કર્યા છે.31 કુવા 189 બોરવેલ

રિચાર્જ ઉપરાંત 56 તળાવો ઉડા

ભાસ્કર ન્યુઝ મેન્દ્રા

સમગ્ર જિલ્લામાં જળ સંરક્ષણ ક્ષેત્રે ઉત્કષ્ઠ કામગીરી બદલ અદાશી કાઉન્ડેશન ને જળશક્તિ મંત્રાલય તરકથી એવોર્ડ વડે સન્માનિત કરાયું હતું.

29 માર્ચ 2022 ના રોજ નવી દિલ્હી સ્થિત પ્લેનરી હોલ ખાતે રાષ્ટ્રપતિ રામનાથ કોવિંદ ફડ પ્રોસેસીંગ ઉદ્યોગ ના રાજ્યકલા ના મંત્રી ગજેન્દ્રસિંહ શેખાવત અને આદિ જાતિ બાબતોના મંત્રી બિશ્વેશ્વર ટુડુ ની ઉપસ્થતિમાં યોજાયેલ ત્રીજા નેશનલ વોટર Hate & watches in Hate

Bin in the fur while or Po in white form f to family મુંદરા પોર્ટની અદાણી વિલમાર કંપનીમાં વિશ્વ મેલેરિયા દિવસની ઉજવણી કરાઈ

બાળકો ને અસર કરતા પાણી

સંરક્ષણ ની દિશા માં કામ કર્ય

છે.જેના પરિણામે ભુગર્ભ જળના

ટીડીએસ માં 19.6 ટકા નો ઘટાડો



મેલેડિયા કેલાસ્તા એનોકિલીસ મચક તે ચોખ્લા અને બંધીયાર પાછીમાં પૈદા થય છે. • મચ્કાર દેખલિ અટકારવા પાછી સેસાના પાછી તાલુકાર તી કે લોકી રાખો. • ઘરની અજુભાજુ પાણીના નાના ભરવા ભાવાથી દો કે માટીથી સુવાર ટો. • પાછીના માટે ભાવવામાં વોત્તમાક ગયપી ભારતીએ અત્યર સુધાવી. કતા. આ બાળવા ભારત ખરાતામાં પ્રત્યામાં કરવા માટેલા અપરાંત મુશ્લા ભારતામાં આવ્યું છે. આ પ્રત્ય પ્રત્ય પ્રત્ય પ્રત્યામાં દ્વારા માં દેશકાર કરવાથા. આ વા ભારતામાં આવે પ્રત્ય પ્રત્ય પ્રત્યામાં આ પ્રત્ય પ્રત્ય પ્રત્ય પ્રત્ય પ્રત્ય આવ્યું છે. આ ગામ આ પ્રત્ય પ્રત્ય ચાંચી આ ગામ આ ત્યાર પ્રચાર માહે પર હમાર. કે ગુડ્ડમારા કે ચાલુકા અને અંગળવા માં ગુપાવું હમા. ૨૦ નાના બાળા એ અને સગળવા માત્રામાં તે સુધ્ય પ્રચાર અંગળવા માં પ્રચારતાનીની નિયમિત ઉપયોગ કરશે. ત્યાર આવે ત્યારે સૌધીની તપાસ બાથવા કારો. મેલોરિયાના હાલાકો પ્રચાર તો તરન્ત્ર તથીળી સારહાર હો. ત્યે સૌરીયણી બચાવાને હેલ જ ઉપાય લોહી નિકાર અને સારવાર. સ્ટાકલી દવાચાનામંહીસિરિયોમાં નિયાન અને સારવાર મહત કરવામાં આવે છે

જ્યારે જ ગાડીશભાઈ ગ્યાસે નવા સમગ્ર કાર્યક્રમનું આ યોજન અડાસ્ત્રી આ વતા શેળરની સંપૂર્વઆરોગ્યત પાસ કાઇન્ટેશનના સી.એસ.આ ર. હેડ કર્યાબાદ જ ગેટ્ પાસ બનાવી પંક્તિબેન શાહ અને વિલગાર કંપનીના ત્રાપ ગામ વ માટે પાસ બેવાયક પાછળ જે શાક્ષ ગામ સ્વાપ્ય ક્યાં પ્રાપ્ય આપવામાં આવે છે જેવા પ્રારથી એચ આગર હેડ સોનાલકુમાર અહેલના મહાઅંગ્રી રોગોને ફેલાતો અટકાવી માર્ગદર્શન હેઠળ પોલાપો હતો. જેમાં ગો ચાલ પંચાય પાછા પાછે પ્રાપ્ય પાછા પ્રાપ્ય છે. આ ગામ પ્રાપ્ય પ્રાપ્ય ગામ ગામ ગામ પ્રાપ્ય પ્રાપ્ય પ્રાપ્ય પ્રાપ કેલ્ટી તામ પ્રાપ્ય પ્રાપ્ય ને સંસાતની વાત સાથ છે. ગે ને વાત કેની કેનની વાતે વિરાગ છે પૈરિયા, ભૂલા ૨૫૫૩, કેલી તતી તાલુક્ર દી.બી. સુપરાઈઝર સૌનો આભાર માન્યો તતો. ક્રાર્થમનું ભૂપિત ગ્રામેટ, અરવિદ ઘરે, અસોક મેલજા બાઈ સોપપે આ તમલે દી.બી. સંચાલન મનતરભાઈ ચાવડાએ કર્ડુ સોપમ તથા જગારાજ સેમમ સાથોની det. ift alett.

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માટે શું કરવું જોઈએ •તાવ મને લોહીનું નિદાન કરાવી સંપૂર્લ સારવાર. • પાછ્યુના સંગ્રહતના મામ પાત્રો તવાચરત લેવ રાખવા. • ધરના ટાંકા હવાગ્રુસ્ત બંધ રાખવા, મોટા ટાંકા હોય તો તેમાં પોરાભગ્રાક માછલી મુક્રલી. • પછી ગયા બાદ પછી ભારવાની કુંદી કપડાથી કોરી કરી સાક કરવી. • ટાપર, ડબ્બા તથા અન્ય બંગારનો ચોગ્ય સાથે નિક્રલ કરવો. • પક્ષી કુંજ, પશુને પાણી પીવાની રાખેલી કુંડી-અવાદા નિયમિત સાફ કરવા. જ્યારે તાલુલ સુપરવાઈઝર તરિમાઈ

ભારીયાએ મેલોરેસા, ટેન્ગ્યુ જેવા લખારે જગારીશભાઇ ગયાને નવા વાહાજબ્પ સેગો અંગે સમજાવ આપી આવતા લેખરની સંપૂર્ભ આ સેગ્ય તપાસ હતી. તથા હેલ્થ સુપરવાઈઝર પ્રકાશભાઈ ઠક્કરે સારવાર અને કોલોઅપ બાબતે આરોગ્ય તંત્ર દ્વારા અંગે વિસ્તૃત માહિતી આપી હતી.

ઘતો રોગ છે. તેના લગ્નભોની વાત કરીએ તો મેલેરિયાના દર્દીને સખત ઠંદી લાગે છે. પ્રજારી આવે જે આવ્યો કલાકથી બે કલાક ચાલે છે, ત્યારબાદ ૮ થી ૧૨ કલાક તીવ્ર તાવ આવે છે. તાવ એક દિવસના આંતરે આવે અથવા દરરોજ આવે. માથ દુગ્ગે, શરીર દુગ્ગે, કળા તર થાય, ઉલટી થાય, ઉભાકા આવે, તાગ ઉતરે ત્યારે ખુખ પરસેથો વળો છે.

તરીકે ઉજાવે છે. ત્યારે મુંદરા પોર્ટપાતે નોસ્પિટલ માંદ્રો ચિતન લોથી અને આ તેલી અદાવી લિલામાર કેશનીમાં પ્રથાપિક આ રોગ્ય કેન્દ્ર ઝરપરાના અદાલી કાઇન્ડેશન અને તાલુપ્ર હેલ્થ મેંદિકલા ઓ કિસર છે. રુચિતાબેન મંદરા, સમગ્ર દુનિયા ખતરનાક એવી મેલીરિયા બીમારી, જેને આયથી મલાત્યા પાંચતા, જન આપય અસસા કાટ-ગળા અને લકુલા સચ્ચ પાંડલા આ કાસ ડે. ત્યાલવાનના 1ુ-પ્ર શેતર કુપ્ત, કળતર લગ્દ, સસ્ટા આવ્યું સાર છે ત્વાર હુપ ગુજરાતીય વચ્ચ કાસ્ટાસે સેચ, એની સાયે પ્રેમ્પનું આવેલના સામાં આવું હતું. વૈદ્યિક વૈસીસ્ય રોગનું પ્રચલા અનલાગૃતિ અને આનું સગત દર વર્ષે સાપ્રસિંગ સંસ્થાત પાંચ્યું હતું. વૈદ્યિક વૈસીસ્ય રોગનું પ્રચલા આ કે અંગતંત ઇપનીઓ વેલ શિવિરમાં વધ્યાલગાઈ ભારૂ સાલીએ વેસેસિપની રૂપ બેશિલ ને વિચય બેસિય સિંગ સંસ્થાતે કાર્યાસાય આવ્યું હતું. વૈદ્યિક વૈસીસ્ય રોગનું પ્રચલા આવે અંગતંત ઇપનીઓ વેલ શ્રીવર વિરાય વધ્ય વ્યવસાઈ ભારૂ સાલીએ વેસેસિપની

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

મતો ત્યવનો ઇપવથી કરી રહ્યું છે. ગામકે તેલું ઘઇં. આ સાથે ભાળકો જેવા કે દિશાળાં, આ રોગમ, સુવિધાઓ સુતલત કરળામાં આવે છે. છે. "છેત્યાન" પ્રોજે ક્ટમેતરેત દરેક તેના ઉપલબ્ધમાં આ દાશી શઉન્દેશના સરસ રીતે અભ્યાસ કરી શકેએ લાયવલીકા અને ઈન્શાસ્ટક્સરમાં ઉત્યાન પ્રોજે કટની મુન્દાના છા શાળામાં શિકાક તરીકે ઉત્યાન કારો શિક્ષવની માથે આવે એવીત હેતુથી વિવિધ જરૂરિયાત જેવી કે ઉપરા કાર્યથી રશે, રહ્યુ છે. નોંધનીય ગામની ૧૭ શાળામાં સરૂઆત થઇ. સહાયક સંધેલ છે. શે.ગે પદ્ય ભાળાકોમાં ભુષાયેલી આ ઇન્જ કીટ, ઉત્પાન નોટ્યુક, ધ્યાર્ટ છે. કે શિક્ષલના ક્ષેત્રમાં જે ઉત્પાન. હતી. જેનો લાભ્ય ૨,૩૨૪ આ ઈઠી અને ન

આભ્યા છે. જેમાં સાચેવિત્યમ, હતા. તમલત, કોશક, ખંજરી, મંજી રાંચ્યા આપના ઘરપચારી, આ ગેલાવનો, બ્રોડી છે. આ વીની લાગાચ્યા દરેક પ્રોવે છે કે વધુ ભાપકમવાવતા વ્યતિક દ્વીધિત્રાઓ પૂઢી માગાવતું થયે. તે સેજ પડેટ શરે બેન્ડ આપવામાં વડીલો, શાળાના પ્રયાનો થોપે, શાળાનો સંસદારે સરથી પટ્ટીપતાં વડેવટે વડે કપાંધુ ત્યાની ૬૦ ઉતાન પ્રોજી સ્ટલ્ગ બેલા સ્ટાથામાં આવે. લ પણ દેવું માટે અદ્યાર્થી વડે છે. આ ગામ પ્રત્યાવાં પ્રાથમિક દાવ તેમાં શાળવાં દ્વારા છે. કે પણ કુલ્લા પાડે છે આવયા પ્રકારના આવતા સ્વાપ્યાઓ આપવા છે. જેમાં દર્શાયના અને Banka આ આપવાં આવ્યું છે. પુદ્દ પ્રચાના ભાવે છે. પણ માં પ્રાથમાં માટે દાતાં ભાવીના છે દિવાર પ્રાદ્ધ બે આવતાં આવતાં છે. આ ગામ સામે આવ્યું છે. આ ગામ આ ગામ આ ગામ વડે રાજ્યના માટે આ ગામ આ ગામ આ ગામ આ આ પ્રતિભાષાં પક્ષ વધારો શરો. સર્વો હતો, એકશાળાને મળેલ આ ગઈકલ્ડ ઉત્ચાનગઈકલ્ડું એકકટી રૂપ ગામની ૧૦ કાળાઓ ઉપેસ્ટા રૂપ આવે છે. ઉત્વાન શાળામાં સિક્ષપ્ર સ્થતવયત્ત માટેના અલાયદી સાથન આગ ગરીનો અને ઉત્ચાન સહાયકનો કાર્યકોર્ટ છે. પંચ સાળા હવટાર વિદ્યાર્થીઓને આપાર્થ, આદી, વિધાથી અને સરદાઈ

સમાર્ગમાં માટળા વ્યવાચ્ય સામાં આપ્ય આપતાં માટે છોમાં સાસપાગા, પ્રયારાઝ. આ જોરીનો છે ખ્યુચામાં પ્રચાર્ગ માર્ચ પંચારે પાંચે પ્રચાર માટે આપતાં, માટે પ્રચારની લાખ થયેલે. આ પ્રચાર આ પ્રચાર સેટ પ્રચારે કાળાને આપવાં સેક સિચ્છ તેક એક એક પરેલ થશે. અને સાસીટિય સિક્રા સાથે સાથે ગાંધી આપતાં સાંધ્યુક ડિના પ આપતું છે. જે ના હરી પારારો જે તો પ્રચાર છે. શાસીટિક રીતે મળભૂત ઘશે અને ભાવિષ્ય ખેવા બાળકો નેથશે. ચમતી પ્રવૃત્તિ કરી શકે એ હેતુથી કાર્યરત છે. આ મ કુશ કચ્છતી પ્રહ છે.



અદાણી ફાઉન્ડેશન આઈસીડીએસ અને ઈન્નરવ્હીલ કલબ ઓફ મુંદરાના સંયુક્ત ઉપક્રમે મહિલા દિવસની અનોખી ઉજવણી મુંદર (બરુ પશ્રિછ) પાલીસ અનેનોનું સન્માન આ બાર્યક્રમના મુખ્ય પ્રવચનમાં લીઓને રાષ્ટ્રની સાથે ઉપસ્થિત સ્થા હતા.

મુંદરા ખાતે આંતરરાષ્ટ્રીય કરવામાં આવ્યું હતું. મહિલા દિવસની અનો ખી અદાણી ફાઉન્ડેશનના સી first birst in the first looped ઉપરોક્ત ત્રણેય સંસ્થાઓના સંયક્ત ઉપક્રમે મહિલા દિન ગઢવી તેમજ જાગતિબેન ઉત્સાહભેર ઉજવાયો હતો. આ પસંગે સામાજિક પ્રવતિઓમાં દિપ્રીબેન ગોર તેમજ ઉત્કૃષ્ટ યોગદાન ઓપનાર તેમની સમગ્ર ટીમે કહ્યું સપ્રારીઓનું સન્માન કરવામાં સ્વાસ્થ્યની સુરક્ષા પ્રદાન કરતી હેલ્ય કીટનું વિતરલ કરવામાં

શ્રીમતી દિપ્તીબેન દિલીપભાઈ

ઇમરબ્લીલે ગોર દ્વારા વિસંગના ફોર્સના કાર્યશક્તિને બિરદાવી હતી.

a But

હતાં. ઈશરવ્હીલ કલલ આવ્યું હતું. મહિલાઓને તરકથી ડો. પૂજાએન જોશી, આશાબેન ચાવડા, ગીતાબેન ઐયર, નીલીમાબેન આવ્યું હતું. ઇંગરવ્હીલ કલલના મમુખ્ ઇપસ્થિત રહ્યા હતા. ટીમ બહેનોની

ડો, પુજાબેન જોશી અને નગર પાલિકા મોહીનીબેન ચુડાસમા રહ્યા હતા. ત્રલેય બહેનોએ પોતાના 57 324 તર્ક મેડીકલ ટસ્ટ ધબ

સાથક્તિકરણના પ્રોજેક્ટ સાથે જોડાયેલા દેવલબેન જોશીનું સન્માન પ્રમુખ વક્તાઓ તરીકે રાષ્ટ્રસવિક સમિતા હેતલબેન ભક્ર તેમજ

મુખ્ય ગુણ ગણાવ્યું હતું. શે. પુજાબેને માચીન સમયથી શરૂ કરી buyfes anuel કાઇ-સેલર

ભારતીય સીઓનો ગૌરવાન્વિત ઇતિકાસનો ચિતાર આપેલો હતો. મોહિનીબેને આધુનિક સમયમાં નારીનું સમાજમાં સ્થાન એ

વિષય પર વક્તવ્ય આપેલ હતું. આ ઈસ્ડીડી એ સાના હતી. બહોળી સંખ્યામાં બહેનો

પાતારીયા, નયનાબેન કાનજી સુરા, ઉપસ્થિત રહ્યા હતા.

ખોજા.

31 501 નાધારભત ગણાવી તેમને સ્વસ્થ

હેતલબેન

અને નિરોગી જીવન

જીવવાની પ્રેરણા આપી

યુરવિસ્તાને સીઓનું

eff.

સીડીપીઓ બહેન તેમની ટીમ ઉપસ્થિત રહ્યા હતા.

સમગ્ર કાર્યક્રમનું સંચાલન सहाली हा निर्मातना हेवलकेल ગઢવી અને જાગતિબેન જોશીએ કર્યું હતું. કાર્યક્રમને સકળ બનાવવા શ્રી મનહરભાઈ પારસભાઈ, પ્રકાશભાઈ, હો ม้ใหม. ชุมวเชณเป રાજભાઈએ જહેમત ઉઠાવી

નિમિતાબેન

નગરપાલિકાના કાઉન્સીલવ

બહેનો રચનાબેન જોશી,

ત્રિબેન ઠક્કર, આશાબેન

સોરઠીયા, ચાગબાઈબેન

કકલ, નજમાં અલનશીસ

આઈટી ઓન બીલર્ટ, રમ


PRESS NOTE

लोकतेज epaper.loktej.com 09 Jul 2022 - Page 2 अदाणी फाउंडेशन द्वारा नियोजित उड़ान परियोजना के तहत

अदाणी हजीरा पोर्ट के शैक्षिक दौरे पर सूरत के छात्र



लोकतेज, सूरत। अदाणी प्रेरित होकर उड़ान प्रोजेक्ट ने दौरा किया और खाद्य तेल बनाने समूह को सामाजिक विकास अदानी फाउंडेंशन की शुरुआत की प्रक्रिया को देखा। एक गतिविधियों के लिए अदाणी की है। फाउंडेशन ने उडान पोलेक्ट उद्यन परियोजना मार्च 2020 अंतर्गत गजरात के स्कल से कोविड-19 के कारण स्थगित कॉलेजों के छात्रों को गुजरात में कर दी गई थी जो अब फिर से संचालित अदाणी समूह के शुक हो गई है। उडान प्रोजेक्ट के औद्योगिक प्रतिष्ठानों में तहत राज्य को पहली महिला

उपलब्ध सविधाओं के स्वयं विश्वविद्यालय वनिता विश्वाम की गणवत्ता अध्ययन के लिए 50 बांबीए छात्राओं ने अदाणी गजरात सरकार के साथ हजीरा पोर्ट का दौरा किया और समझौता जापन किया हुआ। इस यहां किए जा रहे कार्यों से आदिवासी इलाक में उकाई के

SHILL. ા અને ગામામ તાલીમ જાતન

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

સુવૃત, તા. ર. ઇપયોગ કરી સાહતે નથી. મોછભાવના આ વિસ્તારના લોકોના આધિક ધેરલોને ઈનોમર લાક્ષ્ય લોક ગિત્મદામાં વિશ્વર્ધ થયે તથાક પાછીની સુધારવામાં મહાકારો. આવેલાં સાહીત્વા, ધારોગ સંખે પર પારાસમાં કર્યું છે. ઉપયોગ, ન ગુરુવર્ષ જાવની ગુજરાવામાં છ બંને માળભાગત વરેસાદને સમયવધે અને ચોમાલા પછી કાંઠો ખેને ગુરાવે જાવની ગુજરાવામાં છ માટે તેનો ઉપયોગ કરવા એ સુધારો કરતે સાથરાના હાઠ વિસ્તારમ આ પ્રોટો ગાયેલો એક વિચય માટે લાખ અને એની મધ્યતા લાજા WILLIN MICHINE SAN STORY

दिवसीय यात्रा के दौरान, लात्र

जहाज को खंदरगाह और उससे जडी व्यावसायिक गतिविधियों

के साथ-साथ अदानी-विस्म

संयंत्र में खाद्य तेल के उत्पादन

और वितरण को देखका प्रसन्न

हुए और कहा कि यह उनका

पहला अनुभव था। उड़ान के

दसरे दिन, सोनगढ तालका के

માટી આ વ્યવૃત્તા મહત્વનો છે. મોદાં સ મતોત્સવ અંતર્ગત તેઠળ તળાવ બંને બાજુ દુધનો છે અને કેરિયાઓ કળ અકસ્માત નિવારણ માટે રેલીંગ, વૃક્ષારોપણ સહિત અનેક લોકોપયોગી કાર્યો થઈ રહ્યાં છે

તા કરવાનું પણ આધોજન કરી. ગાકભાજી વેચવા માટે બેસે કિ. જીતાને રતી છે. આગળે સામેન્સમાં પૂછા આવ્યું કે આ પ્રાથમિક સાથે મુખ્ય છે. માટે સાથે મુખ્ય છે છે છે છે છે છે છે. આગળે સાથ સાથે સાથે માટ્યમાં છે આ આવ્યું છે આ આવ્યું છે છે આ પ્રાથમિક સાથે મુખ્ય સાથે વિત્તનીને પર કોઈ સેન્સીય ન હતી. આના માટે માણીય સામય ક્યું છે. આ સામય માણ છે. આ પ્લાસ પ્લાસ પ્લાસ પ્લિયમાં પર કાઈ તેમથીન મ તાતી. તમામાં કાઈ તે પ્લાસ પ્લાસ



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

રાંક માળ્યું હોય ત્યાં રાખે આપણા માથે માર્કે દીધ. કે છે છે. છે છે છે છે છે કુવિદ્યાલ્ય લોકે પૂર્વાનું લોકેના કાયને માન્ય સમય બને પ્રયોગ નાર મુખ્ય દેવ

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મુંદરા મધ્યે આયોજીત નેત્ર નિદાન કેમ્પમાં ૭૦ દર્દી ુ અલગ તારવેલા મોતીયા, વેલના ૨૨ દર્દીના ઓપરેશન નિગ્નુલ્ક કરી અ मुख्य (अन्छ स्टिक) अन्य के सं, प्रदान की संस्थान

અદાણી ફાઉન્ડેશન ચોમાસામાં ટપકતી છત નીચે. રહેતી આદિવાસી કન્યાઓની વ્હારે આવ્યું

ઉમરપાણ તાલુકાના ખોબા જેવણ ઉમરદા ગામમાં આવેલી વનરાજ આ દમ દાળામાં રતીને આખ્યાસ કરતી ૭૫ જેટલી have insuring for their offer an inter-હતવાળા મધાનનો હોસ્ટેલ તરીકે ઉપયોગ કરતી હતી. છા તાઓ માટે હોસ્ટેલની જરૂરિયાન છે ખેની જાણ અદાવી કાઉન્ડેશન, રાજ્યાને થતાં આહ્ય કાળા અને વડીવર્ટ તંગ સાથે સંકલન સાધીને તાત્કાલિક હોસ્ટેલનું મકાન બનાવવાની શરૂઆત કરી હતી. હજીરા અદાવી પોર્ટના સીઈઓ થી કેપ્ટન બનિલ ઉશોર સિંહના હસ્તે બા

લેમાં ૭૫ વિદ્યાર્થીનીઓ રહી શહેશે. અગાઉ આ હોસ્ટેલ વિદ્યંગનું ઉદ્ધાટન કર્યું, તેમલે વિદ્યાર્થીઓ સાથે. વિદ્યાર્થીનીઓએ જૂની અને લર્જરીત ઈમારત નીચે રહેવું વાર્તાલાય કર્યો અને તેમને શ્રકળ પ્રદર્શિદી અને આગળ. પછ્યું હતું. ચોમાસાં દરમિયાન જયારે હોયમાં છત પરથી - સમુદ્ર જીવન માટેનો માર્ગ મોકળો કરવા પ્રોત્સાહિત કર્યા. આદ પાણી ઓવતું ત્યારે તેમના માટે રહેવું મુશ્કેલ થતું. નવી પ્રસંગે શાળાના પ્રિક્ષકો, આગે વાતોએ અદાણી કાઈનેશન, છરવાલયમાં એમની મુશ્કેલીનું નિરાકરેલ થતાં સમગ્ર વર્ષ હાજીરાના આ કાર્યને વિરદાવયુ હતું.



તરકો વધારતા માછીમાર યુવાનો પ્રગતિની બેચ-૧ પૂર્ણ અને બેચ-૨નો પ્રારંભ કરવામાં આવ્યો

ભુજ,તા. 3 હતી. ઉત્તીર્સ થયેલા સલમ માછીમાર વિલ્લા માં સ્થપાયેલા અદાણી કચ્છના મુન્દ્રામાં આધુનિક યુવકો યોગ્ય રોજગારી મેળવતા કાઉન્ડેશન આજે ૧૮ રાજયોમાં સ્કીલસેટ ધરાવતા યુવકોની સંખ્યા વ્યાપક કામગીરી ધરાવે છે, જેમાં તેમનું તથા સંલગ્ન સમાજના વધી રહી છે. અહીંના માછીમાર જીવનપોરસમાં સુધારો થશે. દેશના ૨.૪૯૦ ગામડા અને વિદ્યાર્થીઓએ આ તક પૂરી શહેરોનો સમાવેશ થાય છે. સંસ્થામાં યુવકો અદાણી કાઉન્ડેશન અંતર્ગત ચાલતા સ્ક્રીલ ડેવલપમેન્ટ પ્રોજેક્ટ પાડવા બદલ અદાવી કાઉન્ડેશન પ્રત્યે તજક્ષોની ટીમ નવીનતા, લોકભાગીદારી અને સહયોગને મત

પાસ કરી રોજગારીની તકો વધારી કદવસ્પર્શી કૃતજ્ઞતા વ્યક્ત કરી હતી. કચ્છની ૫૯ શાળાઓમાં 'ઇકો

ફ્રેન્ડલી' રક્ષાબંધનની ઉજવણી 📕 અદાણી ફ્રાઉન્ડેશન પ્રક્લ્પ ઉત્થાન પ્રોજેક્ટ અંતર્ગત વિવિધ દિવસોનો

કરવામાં આવતી અનોખી રીતે ઉજવણી

ા કચ્છ આજકાલ (ભુજ ભારત તહેવારોનો દેશ છે. તેમાં અનેક તહેવારોની ઉજવણી થાય છે. આપવે ધાર્મિક, સામાજિક અને રાષ્ટ્રીય તહેવારો ઉજવીએ છીએ. તેમાં રક્ષાબંધન એ ભાઇ-બહેનનો ખુબ મહત્વનો તહેવાર માનવામાં આવે છે. અદાણી ફાઉનોશન દારા પ્રાથમિક શિવસમાં ચાલતા ઉત્યાન પ્રોજેક્ટ અંતર્ગત પણ વિવિધ દિવસોનો અનોખી રીતે ઉજવલી કરવામાં આવે છે. આ વખતે ઉત્યાન શાળાઓમાં 'ઈકો 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 કારા અને પ્રકૃતિ માટે થીમ અંતર્ગત આયોજન કરવામાં આવ્ય 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 આપલે છીએ અને તે હશે તો જ આપણે રહીશું તેથી રસ જાગે અને શાળાનું વાતાવરણ





विश्व मेलेटिया दिवस उपवसीओ मुंहरा घोर्ड

વાહકજન્ય રોગો અંગે સમજ આપી સંપૂર્ણ સારવાર પર ભાર મુકાયો

તાલુકા દીબી. સુપરવાઈઝર મેથજભાઈ મોધમે આ તબકકં દીબી અગે વિસ્તૃત મહિતી આપી હતી, જ્યારે જગદીમભાઇ ભાસે ગવા આવતા લેબરની સંપુત્રે આગેલ પ્રે અન્યાર્થ આપવામાં આવે છે અન્ય અગ્યા આપવામાં આવે છે જેવા કારણે મહદઅંદ રોગાને કેલ્લાનો અટકાવી શકા રાગોન કલાતા અટકાવા શાકા છે ને વાલ કરીને કંપની વતી સૌનાં આવ્યાર બાન્યો હતો. સંચાલન મનહારભાઈ ચાવહ્ય કર્યું હતું. હાર્યક્રમ અલ્લાગી

ગામ કરવા રધા વેશેરિયા ચાટે નવીનામા ગાવા ડાયા ગીમારી જેવે આપવા ચરીએ થીમ આગંગ કેનામાં છે ગામવાની સાહિયો તાપ આપવા પંચાય થી છે. આપવા ટેટાકિયો તાપ આપવા પંચાય આપવા કે ગામ ગામ કેન્દ્રો થી દેખાં વિભિયમ વિભય પાટે આપું જગાવ દર વર્ષ ૨૫ અદિવા વિભય સંવર્ષિયા દરસ્ય દિવસ ઉજવણીએ જનરલ આપવા ગુરૂ દર્શા હવુ છે. આપવા ગુરૂ દર્શા વાલુમાં હવુ આપવા ગુરૂ દર્શાલ્યું છે. આપવા ગુરૂ દર્શાલયા ગુરૂ છે. આપવા ગુરૂ છે. આપવા ગુરૂ દર્શાલયા ગુરૂ છે. આપવા ગુરૂ છે. આપવા ગુરૂ દર્શાલયા ગુરૂ છે. આપવા ગુરૂ છે મંહરિયા સુપરવાઈઝર જવેશભાઈ ભાનુશાલીએ સંપૂર્ણસારવાર પર ભાર મુક્લો હતો. જ્યારે તાલુકા સંપરકાઈઝર તાલુકા

કલ્પતર પ્રોજેક્ટ હેઠળ ૫૦ લાખ વૃક્ષોનું વાવેતર કરવાનું લક્ષ્ય બોરાણામાં મુન્દ્રાની બ્રહ્માકુમારીઝ સંસ્થા દારા ૧૧૦૦ રોપાંઓનું વાવેતર કલ્પતર પોજેક્ટ હેઠળ ઓછામાં ઓછા

। મુન્દ્રા । (સંદેશ બ્યુરો) મુન્દ્રા પ્રજાપિતા બ્રહ્માકમારી ઈશ્વરીય ૫૦ લાખ વૃક્ષો વાવવાનો લક્ષ્યાંક નક્કી

વિશ્વવિદ્યાલય તેમજ અદાણી લઉન્ડેશનના સંયક્ત ઉપક્રમે અદાલી 🐋 ફાઉન્ડેશનના ચેરમેન ડૉ. પીતિબેન 🎜 અદાણીના પ૮મા જન્મદિવસ નિમિત્તે 🏂 બોરાણા ગામે વિસ્તરી માતાજી મંદિરના પરિસરમાં વ્રક્ષારોપણ કાર્યક્રમનું આયોજન કરવામાં આવ્યું હતું. જેમાં મુન્દ્રા સેવા કેન્દ્રના ૫૦ જેટલા ભાઈ -બહેનોએ પરમાત્માની મધર સ્મૃતિમાં ૧૧૦૦ જેટલા અલગ અલગ પ્રકારના

રોપાંઓનું વાવેતર કર્ય હતું. બ્રહ્માકમારીઝ વિશ્વ વિદ્યાલય દારા



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

તેની રક્ષા કરવી એ આપણી જવાબદારી છે. તે મલ્ય બાળપણમાંથી જ વિકશે તે ખુબ જ અગત્યનું છે. શું રાખડી બાંધીને કોઇની રક્ષા ખરેખર થઈ શકે ખરી ? એ પ્રશ્નનો જવાબ આ રીતે રક્ષાબંધન ઉજવાય તો આપો આપ જ મળી જાય તેમ છે. ઉત્યાન પ્રોજેક્ટ અંતર્ગત બાળકોને વિવિધ ઉજવણી દ્વારા તહેવારો વિશે જાણવામાં ઉત્સાહ જાગે, શાળામાં આવી ઉજવણી થાય તો શિક્ષભમાં

સુરત તા.૯ : સુરત વિલ્લાના આદિવાસી બનુલ એવા

રેતથી ઉજવણી કરવામાં આવી

હતી. ઉત્થાન સહાયકોના

જાય છે. બાળકનાં આવી

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માર્ગદર્શાનમાં ભાળકોએ 'ઇકો

ફેન્ડલી' રાખડીઓ બનાવવામાં

આવી હતી. બાળકો પોતે સંપૂર્ણ

રીતે તેમાં જોડાય અને તે પોતે રાખડી

બનાવે તો તેનું મહત્વ ખુબ જ વધી

વિચારશીલતા, સર્જનાત્મકતા અને

સંવેદનશીલતા જેવા જરૂરી ગુજો

પ્રવૃતિઓમાં જોડાવાથી તેમની

ધમધમતું અને બાળકને ગમતું બને તે

તુરત આ વ્યવસ્થા ઊભી કરવા માટે શંસ્થાને સહયોગ માળ્યો છે. હવે આ વિશ્વાર્થિનીઓ આ ચોમાસે રેહવાની ચિતા કર્યા વગર આવ્યાસ કરી શકશે.



તોસ્ટેલનું લોકાર્પણ થયું હતું. અદાસી કાઉનોમન્ રજરાએઆ ગરીલ અદિવાસી કન્યાઓની વ્યવ સમજને

PRESS NOTE

અદાણી ફાઉન્ડેશને નેત્રંગ તાલુકાના અંતરિયાળ વિસ્તારમાં પુસ્તકાલયની સ્થાપના કરી

ધબકાર પ્રતિનિધિ, વાગરા, તા. ૦૯ ગ્રામીણ વિસ્તારમાં સ્પર્ધાત્મક પરીક્ષાઓની તૈયારી કરતાં યુવાનોને ઘર આંગણે સુવિધા મળે એ આશયથી અદાણી ફાઉન્ડેશન, દહેજ દ્વરા ભરૂચના અંતરિયાળ થવા ગામમાં સંપૂર્ણ સુવિધાયુક્ત લાઇબ્રેરીની સ્થાપના કરી હતી. જેનું ઉદઘાટન હજીરા અને દહેજ અદાશી પોર્ટના સીઇઓ અનિલ



કિશોર સિંહના હસ્તે સ્થાનિક બનાવવાનું નક્કી કરાયુ હતો.આજના લોકાર્પણ કાર્યક્રમ આગેવાનોની હાજરીમાં કર્યું હતુ.ગામગ્રઓનું યુવાધન સ્પર્ધાત્મક દરમિયાન અદાણી ફાઇન્ડેશન,દહેજ હતુ.નેત્રંગ તાલુકાના થવા અને પરીક્ષા ની તૈયારી સુપ્રેરે કરી શકે એ દ્વારા પુસ્તકાલયમાં વધુ પુસ્તકોની સાથે આસપાસના ગામોના ૧૦૦થી વધુ માટે સંદર્ભ સાહિત્ય સાથે ની સમયાંતરે વિષય નિષ્ણાંત વક્તા અને વિદ્યાર્થીઓ સ્પર્ધાત્મક પરીક્ષમાં ભાગં પુસ્તકાલયમાં ગુજરાતી,હિન્દી અને સલાહકારોની શિબિરનું પણ આયોજન લેતા હોય છે.પરંતુ આર્થિક સ્થિતિ અને અંગ્રેજી ના પુસ્તકો ઉપલબ્ધ કરાવાયા કરવામાં આવશે ની જાહેરાત કરવામાં વાંચન સામગ્રીની સુવિધાના અભાવે છે.જેમાં અભ્યાસક્રમ ના પુસ્તકો ઉપરાંત આવી હતી અદાલી ફાઉન્ડેશનો ઉદેશ્ય પરીક્ષાઓમાં ઉત્તમ પ્રદર્શન કરી શક્તા જનરલ નોલેજ મહાન વ્યક્તિઓના પરીક્ષાઓ પાસ કરનારા વિદ્યાર્થીઓને ન હતા.જેબાબત ને ધ્યાને લઇ અદાલી જીવનચરિત્ર, નવલ કથાઓ અને મદદરૂપ થવાની સાથે સામાજિક સ્તર ક્રાઝ્ન્પ્રેશન દ્વારા સુવિધા સજ્જ લાયબ્રેરી અખબારો નો સમાવે શ કરાયો ઊંચુલાવવાનો છે.

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Annexure – 3



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Annexure – 4



"Half Yearly Environmental Monitoring Reports"



M/S. ADANI PORTS & SPECIAL ECONOMIC ZONE LTD.

PLOT NO. 169/P, AT - NAVINAL ISLAND, TAL. - MUNDRA, DIST. - KUTCH - 370421.

Monitoring Period: April – 2022 to September - 2022

Submitted By



UniStar Environment & Research Labs Pvt. Ltd.

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





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ISO 45001:2018 Certified Company

MARINE WATER MONITORING SUMMARY REPORT

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

SR.	TEST	UNIT	APRIL	-2022	MAY	-2022	JUNE	-2022	JULY	-2022	AUGUS	ST-2022	SEPTEME	BER-2022	TEST METHOD
NO.	PARAMETERS		SURFACE	BOTTOM	SURFACE	BOTTOM									
1.	рН		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	mg/L	124	116	128	114	128	114	132	122	140	124	154	132	
	Suspended														Ed.,2017,2540- D
4	BOD	ma/l	2.4	BDI	26	BDI	2 5	BDI	26	BDI	20	BDI	26	PDI	IS 2025/Dart
	(3 Days @	iiig/ L	2.4	DDL	2.0	DDL	2.5	DDL	2.0	DDL	2.0	DDL	2.0	DDL	44)1993Δmd 01
	27°C)														44,15557.114.01
5.	Dissolved	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 23 rd
	Oxygen	-													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	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 23 rd 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 23 rd
- 10			0.07			0.46		0.46							Ed.,2017,4500NO ₂ B
10.	Ammonical	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 23 rd Ed.,
	Nitrogen as														2017,4500- NH3 B
11.	Phosphates as	umol/L	BDL	BDL	BDL	BDL	APHA 23 rd								
	PO ₄	p													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	μg/L	N.D.	N.D.	N.D.	N.D.	APHA 23 rd								
	Hydrocarbon														ED,2017,5520 F
14.	Total Dissolved	mg/L	36428	36962	36128	36788	35922	36464	35864	36124	35810	35984	35846	36012	APHA 23 rd Ed.,2017,
15	Solids		12.02	8.02	15.0	11.0	10.0	11.0	24.05	16.02	11.00	7.00	16.1	12.07	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 23 ¹⁰ E0.,2017,
															5220-В



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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-2	22	Jul-2	2	Aug-2	2	Sep-	22	TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
Α								Phytoplank	ton						
1.	Chlorophyll	mg/m ³	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 10³/L	123	75	105	89	96	98	106	58	98	69	71	69	APHA (23rd Ed. 2017)10200 F
4	Name of Group		Navicula	Pinnulari a	Navicula	Pinnulari a	Biddulphi a	Coscinodi scus	Pinnulari a	Navicula	Pinnulari a	Odentell a	Ceratium	Nitzschia	APHA (23rd Ed. 2017)10200 F
	Number and name of		Fragillari a	Navicula	Fragillari a	Surirella	Fragillari a	Thalassio nema	Surirella	Fragillari a	Surirella	Rhizosole nia	Diploneis	Pinnulari a	
	group species		Thalassio	Odentell	Skeleton	Odentell	Odentell	Rhizosole	Odentell	Thalassio	Odentell	Coscinodi	Odentell	Odontell	
	of each group		thrix	а	ета	а	а	nia	а	thrix	а	scus	а	a	
			Grammat	Grammat	Grammat	Grammat	Grammat	Dinophys	Grammat	Grammat	Grammat	Grammat	Grammat	Dinophys	
			ophora	ophora	ophora	ophora	ophora	is	ophora	ophora	ophora	ophora	ophora	is	
			Surirella	Melosira	Odentell a	Melosira	Melosira	Skeleton ema	Melosira	Surirella	Melosira	Thallassi osira	Melosira	Surirella	

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



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Laboratory u	nder the	EPA-1986	(12.01	.2020 to17.03.2023)

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

SR.	TEST	UNIT	Apr-2	22	May-22	2	Jun-2	2	Jul-2	2	Aug-	22	Sep	-22	
NO.	PARAMET ERS		SURFACE	воттом	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	TEST METHOD
С								Microbiolog	ical						
1	Total Bacterial Count	CFU/ml	201		14	12	21	14	12	28	1	00	23	34	APHA 23 rd Ed.2017,9215-C
2	Total Coliform	/100ml	3	35	3	30		8	4	0	2	7	4	4	APHA 23 rd Ed.2017,9222-B
3	Ecoli	/100ml	1	L 2	2	4	1	.8	2	0	1	.4	2	0	IS :15185:2016
4	Enterococ cus	/100ml		8	1	2	(6	1	4		8	14	4	IS:15186:2002
5	Salmonell a	/100ml	Abs	sent	Abs	Absent		ent	Abs	ent	Abs	sent	Abs	ent	IS:15187:2016
6	Shigella	/100ml	Abs	sent	Abs	ent	Abs	ent	Abs	ent	Abs	sent	Abs	ent	APHA 23 rd Ed.2017,9260-E
7	Vibrio	/100ml	Abs	sent	Abs	Absent		ent	Abs	ent	Abs	sent	Abs	ent	IS: 5887 (Part V):1976

Perel

Mr. Nilesh Patel Sr. Chemist



Mr. Nitin Tandel Technical Manager



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

SR.	TEST	UNIT	APRIL-2022	MAY-2022	JUNE-2022	JULY-2022	AUGUST-2022	SEPTEMBER-2022	TEST METHOD
NO.	PARAMETERS		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					Heav	y 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.	TEST	UNIT	APRIL-2022	MAY-2022	JUNE-2022	JULY-2022	AUGUST-2022	SEPTEMBER-2022	TEST METHOD
NO.	PARAMETERS		SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
D					Benth	ic Organisms			
1	Macrobenthos		Gastropods	Decapods Larvae	Gastropods	Turbellarians	Amphipods	Amphipods	APHA (23rd Ed. 2017)10500
			Isopods	Isopods	Isopods	Isopods	Decapod Larvae	Decapod Larvae	C
			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/m ²	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.	TEST	UNIT	APRIL	-2022	MAY	-2022	JUNE	-2022	JULY-	2022	AUGUS	ST-2022	SEPTEM	BER-2022	TEST METHOD
NO.	PARAMETERS		SURFACE	BOTTOM	SURFACE	BOTTOM									
1.	рН		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 23 rd 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 23 rd 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	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 23 rd 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 23 rd Ed.,2017,4500NO₂ 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 23 rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO ₄	μmol/L	BDL	BDL	BDL	BDL	APHA 23 rd 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 23 rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	μg/L	N.D.	N.D.	N.D.	N.D.	APHA 23 rd ED,2017,5520 F								
14.	Total Dissolved Solids	mg/L	36426	36832	36342	36744	36124	36580	36210	36742	36150	36544	36110	36540	APHA 23 rd 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 23 rd 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.	TEST	UNIT	Apr	-22	May	y-22	Jun	-22	Jul	-22	Aug	g-22	Sep	-22	TEST METHOD
NO.	PARAMETE		SURFAC	BOTTO	SURFAC	BOTTO	SURFAC	BOTTO	SURFAC	BOTTO	SURFAC	BOTTO	SURFAC	BOTTO	
	RS		E	М	E	м	E	М	E	м	E	м	E	М	
Α								Phyto	plankton						
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.	Phaeophyti n	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		Ceratiu	Coscinod	Pinnulari	Nitzschi	Cyclotell	Pleurosi	Nitzschi	Ceratiu	Melosira	Gramma	Thalassi	Odentell	APHA (23rd Ed.
	Group		m	iscus	а	а	а	gma	а	m		tophora	othrix	а	2017)10200 F
	Number		Diplonei	Diplotell	Pleurosi	Pinnulari	Pinnulari	Cyclotell	Pinnulari	Diplonei	Pinnular	Rhizosol	Surirella	Rhizosol	
	and name		S	а	gma	а	a	a	а	S	ia	enia		enia	
	of group		Odentell	Odontell	Odentell	Odontell	Skeleton	Biddulph	Odontell	Odentell	Skeleton	Nitzschi	Navicula	Coscinod	
	species of		а	а	а	а	ета	ia	а	а	ета	а		iscus	
	each group		Gramma	Dinophy	Gramma	Dinophy	Thallassi	Skeleton	Dinophy	Gramma	Rhizosol	Thallassi	Thallassi	Gramma	
			tophora	sis	tophora	sis	osira	ета	sis	tophora	enia	osira	osira	tophora	
			Melosira	Surirella	Melosira	Surirella	Thalassi	Thallassi	Surirella	Melosira	Pleurosi	Pleurosi	Skeleton	Thallassi	
							onema	osira			gma	gma	ета	osira	

В					Zooj	plankton			
1	Abudance(Population)	noX103 / 100 m3	50	41	38	40	42	36	APHA (23rd Ed. 2017)10200 G
2	Name of		Copepods nauplii	Copepods nauplii	Crustacean	Crustacean Larvae	Copepods nauplii	Crustacean Larvae	
	Group Number		Crustacean Larvae	Crustacean Larvae	Oikoplura	Egg(Fish and Shrimps)	Oikoplura	Egg(Fish and Shrimps)	
	and name		Oikoplura	Oikoplura	Crustacean Larvae	Copepods	Crustacean Larvae	Copepods	
	of group		Bivalve Larvae	Bivalve Larvae	Oikoplura	Crustacean	Oikoplura	Crustacean	
	species of each group		Oikoplura	Oikoplura	Bivalve Larvae	Bivalve Larvae	Bivalve Larvae	Bivalve Larvae	
3	Total Biomass	ml/100 m ³	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.	TEST	UNIT	APRIL-20	22	MAY-2022	JU	NE-2022	JULY-20	22	AUGUST-2022	SEPTE	MBER-2022	TEST METHOD
NO.	PARAMETERS		SURFACE	BOTTOM	I SURFACE I	воттом	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
С							Microbiologi	cal					
1	Total Bacterial	CFU/ml											APHA 23 rd
	Count		152		168		150	136		184		184	Ed.2017,9215-
													С
2	Total Coliform	/100ml											APHA 23 rd
			41		36		47	52		40		40	Ed.2017,9222-
													В
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	t 🛛	Absent	1	Absent	Absen	t	Absent		Absent	IS:15187:2016
6	Shigella	/100ml	Abcom		Absort		heant	Ahaan		Abcout		Abcont	APHA 23 rd
			Absen		Absent	,	absent	Absen	L	Absent		Absent	Ed.2017,9260-E
7	Vibrio	/100ml	Abcont		Abcont		hcont	Abcon		Abcont		Abcont	IS: 5887 (Part
			Absent		Ausent		ADSEIIL	Absen	L	Absent		ADSEIIL	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.	TEST	UNIT	APRIL-2022	MAY-2022	JUNE-2022	JULY-2022	AUGUST-2022	SEPTEMBER-2022	TEST METHOD
NO.	PARAMETERS		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 I	Vietals			
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.	TEST	UNIT	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	TEST METHOD
NO.	PARAMETERS		SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
D						Benthic Organisms	5		
1	Macrobenthos		Sipunculids	Sipunculids	Sipunculids	Foraminiferan	Amphipods	Gastropods	APHA (23rd Ed.
			Decapods Larvae	Decapods Larvae	Decapods Larvae	Decapods Larvae	Isopods	Isopods	2017)10500 C
			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/m ²	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.	TEST	UNIT	APRIL	-2022	MAY	-2022	JUNE	-2022	JULY	-2022	AUGUS	T-2022	SEPTEME	BER-2022	
NO.	PARAMETERS		SURFACE	BOTTOM	TEST WETHOD										
1.	рН		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 23 rd 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 23 rd 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	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 23 rd 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 23 rd Ed.,2017,4500NO ₂ B
10.	Ammonical Nitrogen as NH₃	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 23 rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO₄	µmol/L	BDL	BDL	APHA 23 rd 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 23 rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	μg/L	N.D.	N.D.	APHA 23 rd ED,2017,5520 F										
14.	Total Dissolved Solids	mg/L	36344	36854	35984	36768	36002	36648	36118	36748	35986	36422	36080	36640	APHA 23 rd 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 23 rd 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.	TEST	UNIT	Apr	-22	May	y-22	Jun	-22	Jul	-22	Aug	g- 22	Sep	-22	TEST METHOD
NO.	PARAMETE RS		SURFACE	BOTTOM	SURFACE	воттом	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	воттом	
Α									Phytopl	ankton					
1.	Chlorophyll	mg/m ³	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.	Phaeophyti n	mg/m ³	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		Pinnulari	Fragillari	Fragillari	Odentell	Odentell	Skeleton	Odentell	Pinnulari	Cyclotell	Coscinod	Cyclotell	Dinophys	APHA (23rd Ed.
	Group		а	а	а	а	а	ema	а	а	а	iscus	а	is	2017)10200 F
	Number		Thalassio	Rhizosol	Thalassio	Rhizosole	Cyclotell	Diplotell	Rhizosol	Thalassio	Pinnulari	Diploneis	Pinnulari	Pinnulari	
	and name		nema	enia	nema	nia	а	а	enia	nema	а		а	а	
	of group		Navicula	Pinnulari	Navicula	Coscinodi	Pinnulari	Odontell	Coscinod	Navicula	Skeleton	Rhizosol	Skeleton	Thalassio	
	species of			а		scus	а	а	iscus		ета	enia	ета	thrix	
	each group		Thallassi	Gramma	Thallassi	Gramma	Biddulph	Dinophys	Gramma	Thallassi	Thallassi	Dinophys	Thallassi	Gramma	
			osira	tophora	osira	tophora	ia	is	tophora	osira	osira	is	osira	tophora	
			Skeleton	Thallassi	Skeleton	Thallassi	Thallassi	Surirella	Thallassi	Skeleton	Thalassio	Thalassio	Thalassio	Ceratium	
			ета	osira	ета	osira	osira		osira	ета	nema	nema	nema		

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



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

SR.	TEST	UNIT	Apr	-22	May-	22	Jun-22	2	Jul-22		ļ	Aug-22	Sej	p-22	TEST METHOD
NO.	PARAMETERS		SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	I SURFACE	BOTT	ГОМ	SURFACE	BOTTOM		
С									Microbiological						
1	Total Bacterial	CFU/ml	19	8	200)	190		200			245	2	45	APHA 23 rd
	Count														Ed.2017,9215-C
2	Total Coliform	/100ml	3	9	28		40		36			42	4	12	APHA 23 rd
															Ed.2017,9222-B
3	E.coli	/100ml	22	2	11		27		21			20	2	20	IS :15185:2016
4	Enterococcus	/100ml	1!	5	18		15		20			14	1	L4	IS:15186:2002
5	Salmonella	/100ml	Abs	ent	Abse	nt	Absen	t	Absent		F	Absent	Ab	sent	IS:15187:2016
6	Shigella	/100ml	Abs	ent	Abse	nt	Absen	t	Absent		A	Absent	Ab	sent	APHA 23 rd
															Ed.2017,9260-E
7	Vibrio	/100ml	Abs	ent	Abse	nt	Absen	t	Absent		F	Absent	Ab	sent	IS: 5887 (Part
															V):1976

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Mr. Nitin Tandel Technical Manager



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

SR.	TEST	UNIT	APRIL-2022	MAY-2022	JUNE-2022	JULY-2022	AUGUST-2022	SEPTEMBER-2022	TEST METHOD
NO.	PARAMETERS		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 I	Vietals			-
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	lron 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.	TEST	UNIT	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	TEST METHOD
NO.	PARAMETERS		SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
D					Benthic Or	ganisms			
1	Macrobenthos		Isopods	Gastropods	Isopods	Sipunculids	Polychates	Sipunculids	APHA (23rd Ed.
			Polychates	Polychates	Polychates	Polychates	Gastropods	Decapods Larvae	2017)10500 C
			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/m ²	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.	TEST	UNIT	APRIL	-2022	MAY	-2022	JUNE	-2022	JULY	-2022	AUGUS	T-2022	SEPTEM	BER-2022	
NO.	PARAMETERS		SURFACE	BOTTOM											
1.	рН		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	٥C	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 23 rd 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 23 rd 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	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 23 rd 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 23 rd Ed.,2017,4500NO₂B
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 23 rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO ₄	µmol/L	BDL	BDL	APHA 23 rd 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 23 rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	μg/L	N.D.	N.D.	APHA 23 rd ED,2017,5520 F										
14.	Total Dissolved Solids	mg/L	36524	37042	36204	36944	36312	36864	36422	36894	36128	36750	35988	36520	APHA 23 rd 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 23 rd 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.	TEST	UNIT	Арі	r-22	Ma	y-22	Jun	-22	Jul	-22	Aug	g- 22	Sep	-22	TEST METHOD
NO.	PARAMETE RS		SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	воттом	SURFACE	воттом	
Α								Phytopl	ankton						
1.	Chlorophyll	mg/m ³	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.	Phaeophyti n	mg/m ³	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		Melosira	Diploneis	Melosira	Gramma tophora	Diploneis	Cyclotell a	Gramma tophora	Melosira	Gramma tophora	Rhizosole nia	Coscinod iscus	Ceratium	APHA (23rd Ed. 2017)10200 F
	Number		Pinnulari	Rhizosole	Pinnulari	Rhizosole	Rhizosol	Fragillari	Rhizosol	Pinnulari	Rhizosol	Pinnulari	Diploneis	Pinnulari	
	and name		а	nia	а	nia	enia	а	enia	a	enia	a		a	
	of group		Skeleton	Nitzschia	Skeleton	Nitzschia	Nitzschia	Diniphysi	Nitzschia	Skeleton	Nitzschia	Thalassio	Rhizosol	Odontell	
	species of		ета		ета			s		ema		thrix	enia	а	
	each group		Rhizosol	Thalassio	Nitzschia	Thallassi	Cyclotell	Thallassi	Thallassi	Rhizosole	Thallassi	Gramma	Dinophys	Thalassio	
			enia	thrix		osira	а	osira	osira	nia	osira	tophora	is	thrix	
			Pleurosig	Pleurosig	Pleurosig	Pleurosig	Pleurosig	Skeleton	Pleurosig	Pleurosig	Pleurosig	Ceratium	Thalassio	Thallassi	
			ma	та	та	та	та	ета	та	та	та		пета	osira	

В						Zooplankton			
1	Abudance(noX103	45	38	41	40	31	40	APHA (23rd Ed.
	Population	/ 100							2017)10200 G
)	m3							
2	Name of		Egg(Fish and	Egg(Fish and	Egg(Fish and	Copepods nauplii	Copepods nauplii	Pinnularia	
	Group		Shrimps)	Shrimps)	Shrimps)				
	Number		Oikoplura	Oikoplura	Oikoplura	Crustacean Larvae	Crustacean Larvae	Surirella	
	and name		Copepods nauplii	Copepods nauplii	Copepods nauplii	Oikoplura	Oikoplura	Odentella	
	of group		Crustacean	Crustacean	Crustacean	Bivalve Larvae	Bivalve Larvae	Grammatophora	
	species of		Bivalve Larvae	Bivalve Larvae	Bivalve Larvae	Oikoplura	Oikoplura	Melosira	
	each group					•	-		
3	Total	ml/100	17.24	16.35	13.98	14.74	16.48	16.54	
	Biomass	m ³							



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

SR.	TEST	UNIT	Apr-2	22	May-22		Jun-22		Jul-2	2		Aug-22	Se	p-22	TEST METHOD
NO.	PARAMETERS		SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTO	OM SURF.	ACE B	оттом	SURFACE	BOTTOM		
С									Microbiologi	cal					
1	Total Bacterial Count	CFU/ml	150)	188		128		148			200	2	204	APHA 23 rd Ed.2017,9215-C
2	Total Coliform	/100ml	30		42		24		28			41		35	APHA 23 rd 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	Abse	nt	Absent		Absent		Absei	nt		Absent	At	sent	IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absei	nt		Absent	Ab	osent	APHA 23 rd Ed.2017,9260-E
7	Vibrio	/100ml	Abse	nt	Absent		Absent		Absei	nt		Absent	Ab	sent	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.	TEST	UNIT	APRIL-2022	MAY-2022	JUNE-2022	JULY-2022	AUGUST-2022	SEPTEMBER-2022	TEST METHOD
NO.	PARAMETERS		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	Vietals			
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	lron 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.	TEST	UNIT	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	TEST METHOD
NO.	PARAMETERS		SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
D					Benth	ic Organisms			
1	Macrobenthos		Amphipods	Amphipods	Amphipods	Amphipods	Amphipods	Isopods	APHA (23rd Ed.
			Decapod Larvae	Decapod Larvae	Sipunculids	Sipunculids	Sipunculids	Polychates	2017)10500 C
			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/m ²	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.	TEST	UNIT	APRIL	-2022	MAY	-2022	JUNE	-2022	JULY	-2022	AUGUS	ST-2022	SEPTEM	BER-2022	TEST METHOD
NO.	PARAMETERS		SURFACE	BOTTOM	SURFACE	BOTTOM									
1.	рН		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 23 rd 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 23 rd 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	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 23 rd 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 23 rd Ed.,2017,4500NO ₂ B
10.	Ammonical Nitrogen as NH₃	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 23 rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO ₄	µmol/L	BDL	BDL	BDL	BDL	APHA 23 rd 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 23 rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	μg/L	N.D.	N.D.	N.D.	N.D.	APHA 23 rd ED,2017,5520 F								
14.	Total Dissolved Solids	mg/L	36710	36944	36528	37002	36244	36948	36008	36644	35866	36542	35920	36610	APHA 23 rd 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 23 rd 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.	TEST	UNIT	Apr	-22	May	/-22	Jun	-22	Jul	-22	Aug	g- 22	Sep	-22	TEST METHOD
NO.	PARAMETE RS		SURFACE	воттом	SURFACE	воттом	SURFACE	воттом	SURFACE	воттом	SURFACE	воттом	SURFACE	воттом	
Α									Phytopl	ankton					
1.	Chlorophyll	mg/m ³	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.	Phaeophyti n	mg/m ³	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		Cyclotell a	Pinnulari a	Rhizosol enia	Thalassio thrix	Pinnulari a	Ceratium	Thalassio thrix	Cyclotell a	Rhizosol enia	Diploneis	Fragillari a	Surirella	APHA (23rd Ed. 2017)10200 F
	Number and name		Pinnulari a	Surirella	Biddulph ia	Surirella	Biddulph ia	Melosira	Surirella	Pinnulari a	Biddulph ia	Rhizosole nia	Thalassio nema	Thalassio thrix	
	of group species of		Skeleton ema	Navicula	Skeleton ema	Navicula	Navicula	Nitzschia	Navicula	Skeleton ema	Skeleton ema	Nitzschia	Navicula	Navicula	
	each group		Thallassi	Thallassi	Thallassi	Thallassi	Thallassi	Dinophys	Thallassi	Thallassi	Thallassi	Thalassio	Thallassi	Skeleton	
			osira	osira	osira	osira	osira	is	osira	osira	osira	thrix	osira	ета	
			Thalassio	Skeleton	Thalassio	Skeleton	Skeleton	Pleurosig	Skeleton	Thalassio	Thalassio	Pleurosig	Skeleton	Thallassi	
			nema	ета	nema	ета	ета	та	ета	nema	nema	ma	ета	osira	

В						Zooplankton			
1	Abudance(noX103	29	32	32	51	47	51	APHA (23rd Ed.
	Population	/ 100							2017)10200 G
)	m3							
2	Name of		Crustacean Larvae	Crustacean Larvae	Egg(Fish and	Egg(Fish and	Copepods	Nitzschia	
	Group				Shrimps)	Shrimps)			
	Number		Decapoda	Egg(Fish and	Copepods	Copepods	Oikoplura	Pinnularia	
	and name			Shrimps)					
	of group		Copepods	Copepods	Crustacean Larvae	Crustacean Larvae	Crustacean Larvae	Odontella	
	species of		Crustacean	Crustacean	Oikoplura	Oikoplura	Crustacean	Dinophysis	
	each group		Bivalve Larvae	Surirella					
3	Total	ml/100	15.74	14.78	16.78	15.48	17.86	18.23	
	Biomass	m ³							



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

SR.	TEST	UNIT	Apr-2	22	May-22		Jun-22		Jul-22		Aug-22	Se	p-22	TEST METHOD
NO.	PARAMETERS		SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTON	VI SURFACE	BOTTOM	SURFACE	BOTTOM		
С								Μ	licrobiological					
1	Total Bacterial	CFU/ml	142	2	170		200		209		176		158	APHA 23 rd
	Count													Ed.2017,9215-C
2	Total Coliform	/100ml	50		44		39		42		39		23	APHA 23 rd
														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	Abse	nt	Absent		Absent		Absent		Absent	Al	osent	IS:15187:2016
6	Shigella	/100ml	Abse	nt	Absent		Absent		Absent		Absent	Al	osent	APHA 23 rd
														Ed.2017,9260-E
7	Vibrio	/100ml	Abse	nt	Absent		Absent		Absent		Absent	Al	osent	IS: 5887 (Part
														V):1976

Perel

Mr. Nilesh Patel Sr. Chemist



Mr. Nitin Tandel Technical Manager



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

SR.	TEST	UNIT	APRIL-2022	MAY-2022	JUNE-2022	JULY-2022	AUGUST-2022	SEPTEMBER-2022	TEST METHOD
NO.	PARAMETERS		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 I	Vietals			
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	lron 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.	TEST	UNIT	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	TEST METHOD
NO.	PARAMETERS		SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
D						Benthic Organisms	5		
1	Macrobenthos		Decapod Larvae	Decapod Larvae	Polychates	Polychates	Polychates	Amphipods	APHA (23rd Ed.
			Gastropods	Gastropods	Gastropods	Gastropods	Gastropods	Decapod Larvae	2017)10500 C
			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/m ²	250	278	284	384	325	306	

Perel

Mr. Nilesh Patel Sr. Chemist



Mr. Nitin Tandel Technical Manager



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

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

SR.	TEST	UNIT	APRIL	-2022	MAY	-2022	JUNE	-2022	JULY	-2022	AUGUS	ST-2022	SEPTEM	BER-2022	
NO.	PARAMETERS		SURFACE	BOTTOM	SURFACE	BOTTOM									
1.	рН		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	۰C	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	mg/L	122	114	132	112	132	112	122	108	128	114	136	112	APHA 23 rd
	Suspended Solids														Ed.,2017,2540- D
4.	BOD	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
	(3 Days @ 27°C)														44/1555Ama.01
5.	Dissolved	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 23 rd
	Oxygen														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	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 23 ^{ra} 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 23 rd
															Ed.,2017,4500NO ₂ B
10.	Ammonical	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.,
	Nitrogen as														2017,4500- NH3 B
11.	Phosphates as	µmol/L	BDL	BDL	BDL	BDL	APHA 23 rd								
	PO₄	•													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 23 rd Ed.,
															2017,4500 NH3 - B
13.	Petroleum	µg/L	N.D.	N.D.	N.D.	N.D.	APHA 23 rd								
	Hydrocarbon														ED,2017,5520 F
14.	Total Dissolved	mg/L	36128	36620	36442	36714	36244	36824	36102	36558	35956	36444	36020	36580	APHA 23 rd Ed.,2017,
	Solids		46.00		40.0		47.0			40.00	45.00				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 23 rd Ed.,2017,
															2220-B



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

SR.	TEST	UNIT	Apr	-22	May	<i>-</i> 22	Jun	-22	Jul	-22	Aug	g-22	Sep	-22	TEST METHOD
NO.	PARAMETE RS		SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	воттом	
Α									Phytopl	ankton					
1.	Chlorophyll	mg/m ³	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.	Phaeophyti n	mg/m ³	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		Gramma tophora	Coscinodi scus	Thallassi osira	Navicula	Coscinod iscus	Navicula	Navicula	Gramma tophora	Thallassi osira	Gramma tophora	Thallassi osira	Gramma tophora	APHA (23rd Ed. 2017)10200 F
	and name		Rhizosol enia	Diploneis	Melosira	Skeleton ema	Diploneis	Cyclotell a	Skeleton ema	Rhizosole nia	Melosira	Rhizosole nia	Melosira	Rhizosole nia	
	of group species of		Nitzschia	Rhizosole nia	Nitzschia	Rhizosole nia	Rhizosol enia	Pinnulari a	Rhizosol enia	Nitzschia	Nitzschia	Nitzschia	Nitzschia	Nitzschia	
	each group		Thalassio nema	Dinophys is	Rhizosol enia	Dinophys is	Dinophys is	Skeleton ema	Dinophys is	Thalassio nema	Rhizosol enia	Thalassio nema	Rhizosol enia	Thallassi osira	
			Pleurosig	Thalassio	Pleurosig	Thalassio	Thalassio	Thallassi	Thalassio	Pleurosig	Pleurosig	Pleurosig	Pleurosig	Pleurosig	
			та	пета	та	nema	пета	osira	пета	та	та	та	та	та	

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



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

SR.	TEST	UNIT	Apr-	22	May-22	2	Jun-22		Jul-22		Aug-22	Se	ep-22	TEST METHOD
NO.	PARAIVIETERS		SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTO	OM SURFACE	BOTTO	VI SURFACE	BOTTOM		
С									Microbiological					
1	Total Bacterial	CFU/ml	178	B	198		196		180		202		200	APHA 23 rd
	Count													Ed.2017,9215-C
2	Total Coliform	/100ml	39		32		47		36		32		30	APHA 23 rd
														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	Abse	ent	Absent		Absent		Absent		Absent	A	osent	IS:15187:2016
6	Shigella	/100ml	Abse	nt	Absent		Absent		Absent		Absent	Al	osent	APHA 23 rd
														Ed.2017,9260-E
7	Vibrio	/100ml	Abse	nt	Absent		Absent		Absent		Absent	Al	osent	IS: 5887 (Part
														V):1976

Perel

Mr. Nilesh Patel Sr. Chemist



Mr. Nitin Tandel Technical Manager



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

SR.	TEST	UNIT	APRIL	-2022	MAY	-2022	JUNE	-2022	JULY	-2022	AUGUS	ST-2022	SEPTEM	BER-2022	TECT METHOD
NO.	PARAMETERS		SURFACE	BOTTOM	SURFACE	BOTTOM	TEST WETHOD								
1.	рН		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 23 rd 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 23 rd 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	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 23 rd 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 23 rd Ed.,2017,4500NO ₂ B
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 23 rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO ₄	µmol/L	BDL	BDL	BDL	BDL	APHA 23 rd 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 23 rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	μg/L	N.D.	N.D.	N.D.	N.D.	APHA 23 rd ED,2017,5520 F								
14.	Total Dissolved Solids	mg/L	36284	36622	36846	37124	36564	37056	36124	36786	36020	36594	36110	36630	APHA 23 rd 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 23 rd 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.	TEST	UNIT	Apr	-22	Мау	-22	Jun	-22	Jul	-22	Aug	;-22	Sep	-22	TEST METHOD
NO.	PARAMETE RS		SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
Α									Phytopl	ankton					
1.	Chlorophyll	mg/m ³	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.	Phaeophyti n	mg/m ³	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		Skeleton	Rhizosole	Odentell	Dinophys	Rhizosol	Surirella	Dinophys	Skeleton	Dinophys	Skeleton	Gramma	Pinnulari	APHA (23rd Ed.
	Group		ета	nia	а	is	enia		is	ета	is	ета	tophora	а	2017)10200 F
	Number		Gramma	Pinnulari	Gramma	Pinnulari	Fragillari	Rhizosole	Pinnulari	Gramma	Pinnulari	Gramma	Rhizosol	Thalassio	
	and name		tophora	а	tophora	a	a	nia	a	tophora	a	tophora	enia	nema	
	of group		Nitzschia	Thalassio	Nitzschia	Thalassio	Thalassio	Nitzschia	Thalassio	Nitzschia	Thalassio	Nitzschia	Nitzschia	Navicula	
	species of			thrix		thrix	thrix		thrix		thrix				
	each group		Thalassio	Gramma	Thalassio	Gramma	Gramma	Thalassio	Gramma	Thalassio	Gramma	Thalassio	Thalassio	Thallassi	
			thrix	tophora	thrix	tophora	tophora	пета	tophora	thrix	tophora	thrix	пета	osira	
			Pleurosig	Ceratium	Pleurosig	Ceratium	Ceratium	Pleurosig	Ceratium	Pleurosig	Ceratium	Pleurosig	Pleurosig	Skeleton	
			ma		ma			та		та		та	ma	ema	

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



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ISO 45001:2018 Certified Company

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

SR.	TEST	UNIT	Apr-2	22	May-22		Jun-22		Jul-22		Aug-22	Se	ep-22	TEST METHOD
NO.	PARAMETERS		SURFACE	воттом	SURFACE	воттом	SURFACE	BOTTO	OM SURFACE	BOTTOM	SURFACE	BOTTOM		
С									Microbiological					
1	Total Bacterial Count	CFU/ml	200)	202		214		208		216		264	APHA 23 rd Ed.2017,9215-C
2	Total Coliform	/100ml	32		37		29		28		30		47	APHA 23 rd 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	Abse	nt	Absent		Absent		Absent		Absent	A	osent	IS:15187:2016
6	Shigella	/100ml	Abse	nt	Absent		Absent		Absent		Absent	At	osent	APHA 23 rd Ed.2017,9260-E
7	Vibrio	/100ml	Abse	nt	Absent		Absent		Absent		Absent	At	osent	IS: 5887 (Part V):1976

Revel

Mr. Nilesh Patel Sr. Chemist



Mr. Nitin Tandel Technical Manager



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

SR.	TEST	UNIT	APRIL-2022	MAY-2022	JUNE-2022	JULY-2022	AUGUST-2022	SEPTEMBER-2022	TEST METHOD
NO.	PARAMETERS		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.	TEST	UNIT	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	TEST METHOD
NO.	PARAMETERS		SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
D						Benthic Organisms	5		
1	Macrobenthos		Amphipods	Gastropods	Gastropods	Sipunculids	Sipunculids	Sipunculids	APHA (23rd Ed.
			Sipunculids	Isopods	Isopods	Isopods	Isopods	Decapods Larvae	2017)10500 C
			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/m ²	326	330	330	385	340	325	

Puter

Mr. Nilesh Patel Sr. Chemist



Mr. Nitin Tandel Technical Manager



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

SR.	TEST	UNIT	APRIL	-2022	MAY	-2022	JUNE	-2022	JULY	-2022	AUGUS	ST-2022	SEPTEME	BER-2022	
NO.	PARAMETERS		SURFACE	BOTTOM	SURFACE	BOTTOM	TEST WIETHOD								
1.	рН		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 23 rd 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 23 rd 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	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 23 rd 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 23 rd Ed.,2017,4500NO ₂ B
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 23 rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO ₄	µmol/L	BDL	BDL	BDL	BDL	APHA 23 rd 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 23 rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	μg/L	N.D.	N.D.	N.D.	N.D.	APHA 23 rd ED,2017,5520 F								
14.	Total Dissolved Solids	mg/L	36112	36624	36628	37250	36524	37146	36262	36860	36124	36762	36140	36640	APHA 23 rd 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 23 rd 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.	TEST	UNIT	Apr	-22	May	y-22	Jun	-22	Jul	-22	Aug	g- 22	Sep	-22	TEST METHOD
NO.	PARAMETE RS		SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
Α									Phytopl	ankton					
1.	Chlorophyll	mg/m ³	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.	Phaeophyti n	mg/m ³	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		Ceratium	Melosira	Thalassio thrix	Ceratium	Melosira	Cyclotell a	Ceratium	Ceratium	Diploneis	Ceratium	Diploneis	Pinnulari a	APHA (23rd Ed. 2017)10200 F
	Number and name		Melosira	Cyclotell a	Melosira	Pinnulari a	Pinnulari a	Fragillari a	Pinnulari a	Melosira	Rhizosol enia	Pinnulari a	Rhizosol enia	Surirella	
	of group		Odentell	Odontell	Odentell	Odontell	Skeleton	Navicula	Odontell	Odentell	Nitzschia	Odontell	Nitzschia	Odentell	
	species of		а	а	а	а	ета		а	а		а		a	
	each group		Dinophys	Skeleton	Dinophys	Thalassio	Thallassi	Thallassi	Thalassio	Dinophys	Cyclotell	Thalassio	Cyclotell	Gramma	
			is	ета	is	thrix	osira	osira	thrix	is	а	thrix	a	tophora	
			Pleurosig	Thallassi	Pleurosig	Thallassi	Thalassio	Skeleton	Thallassi	Pleurosig	Pleurosig	Thallassi	Pleurosig	Melosira	
			ma	osira	ma	osira	пета	ета	osira	ma	та	osira	ma		

В					Zoopla	nkton			
1	Abudance(noX103	32	44	50	43	36	44	APHA (23rd Ed.
	Population	/ 100							2017)10200 G
)	m3							
2	Name of		Oikoplura	Oikoplura	Egg(Fish and	Decapoda	Crustacean Larvae	Grammatophora	
	Group				Shrimps)				
	Number		Copepods nauplii	Copepods nauplii	Oikoplura	Copepods	Decapoda	Rhizosolenia	
	and name		Crustacean Larvae	Crustacean Larvae	Copepods nauplii	Crustacean Larvae	Copepods	Nitzschia	
	of group		Crustacean	Crustacean	Crustacean	Crustacean	Crustacean	Thalassionema	
	species of		Bivalve Larvae	Bivalve Larvae	Bivalve Larvae	Oikoplura	Bivalve Larvae	Pleurosigma	
	each group							-	
3	Total	ml/100	15.36	14.96	17.58	16.85	17.86	15.26	
	Biomass	m ³							



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

SR.	TEST	UNIT	Apr-3	22	May-22		Jun-22		J	ul-22		Aug-22	Se	ep-22	TEST METHOD
NO.	PARAMETERS		SURFACE	BOTTOM	SURFACE	BOTTOM	1 SURFACE	BOTT	гом s	URFACE	BOTTOM	SURFACE	BOTTOM		
С									Microbic	ological					
1	Total Bacterial	CFU/ml	214	1	200		190			190		184		202	APHA 23 rd
	Count														Ed.2017,9215-C
2	Total Coliform	/100ml	40		30		35			35		33		36	APHA 23 rd
															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	Abse	nt	Absent		Absent		Α	bsent		Absent	A	bsent	IS:15187:2016
6	Shigella	/100ml	Abse	nt	Absent		Absent		Α	bsent		Absent	A	bsent	APHA 23 rd
															Ed.2017,9260-E
7	Vibrio	/100ml	Abse	nt	Absent		Absent		A	bsent		Absent	Al	bsent	IS: 5887 (Part V):1976

Perel

Mr. Nilesh Patel Sr. Chemist



Mr. Nitin Tandel Technical Manager



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

SR.	TEST	UNIT	APRIL	-2022	MAY	-2022	JUNE	-2022	JULY	-2022	AUGUS	ST-2022	SEPTEM	BER-2022	
NO.	PARAMETERS		SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1.	рН		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	mg/L	118	112	126	108	126	108	106	78	120	104	114	98	APHA 23 rd
	Suspended														Ed.,2017,2540- D
	Solids														
4.	BOD	mg/L	3.2	BDL	2.9	BDL	3.1	BDL	2.9	BDL	2.8	BDL)	2.7	BDL	IS 3025(Part
	(3 Days @														44)1993Amd.01
-	27°C)		5.07	F 77	6.42	6.00	6.42	F 02	6.07	6.47	6.47	6.07	6.45	6.05	A DULA DOI'D
5.	Dissolved	mg/L	5.97	5.//	6.12	6.02	6.12	5.92	6.27	6.17	6.17	6.07	6.15	6.05	
6	Cxygen	nnt	25.27	25.96	25.22	25.74	25.20	25.02	25.21	3E 70	2E 10	25.69	25.06	25.76	Ed.,2017,4500-0, B
0.	Samity	ppr	55.27	55.00	55.55	55.74	55.20	55.65	35.21	55.76	55.19	55.00	55.00	55.70	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 23 rd 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	
10	A		2.54	2.40	2.44	2.20	2.40	2.24	2.02	0.75	2.62	2.22	2.62	2.20	Ed.,2017,4500NO ₂ B
10.	Ammonical	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 23 ¹⁰ Ed.,
	Nitrogen as														2017,4500- NH5 B
11.	Phosphates as	µmol/L	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	APHA 23 rd
	PO₄														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 23 rd Ed.,
															2017,4500 NH3 - B
13.	Petroleum	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 23 rd
	Hydrocarbon														ED,2017,5520 F
14.	Total Dissolved	mg/L	36638	36912	36942	37624	36842	37122	36520	37160	36442	36988	36520	36840	APHA 23 rd Ed.,2017,
	Solids														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 23 rd Ed.,2017,
															5220-B



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

SR.	TEST	UNIT	Арі	-22	May	y-22	Jun	-22	Jul	-22	Aug	g- 22	Sep	-22	TEST METHOD
NO.	PARAMETE RS		SURFACE	воттом	SURFACE	воттом	SURFACE	воттом	SURFACE	воттом	SURFACE	воттом	SURFACE	воттом	
Α									Phytop	ankton					
1.	Chlorophyll	mg/m ³	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.	Phaeophyti n	mg/m ³	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		Biddulph ia	Gramma tophora	Pleurosig ma	Surirella	Gramma tophora	Coscinodi scus	Surirella	Biddulph ia	Pinnulari a	Surirella	Thallassi osira	Nitzschia	APHA (23rd Ed. 2017)10200 F
	Number and name		Fragillari a	Dinophys is	Dinophys is	Thalassio thrix	Dinophys is	Diploneis	Thalassio thrix	Fragillari a	Biddulph ia	Thalassio thrix	Melosira	Pinnulari a	·
	of group species of		Odentell a	Navicula	Odentell a	Navicula	Navicula	Nitzschia	Navicula	Odentell a	Navicula	Navicula	Nitzschia	Odontell a	
	each group		Gramma	Fragillari	Gramma	Skeleton	Fragillari	Dinophys	Skeleton	Gramma	Thallassi	Skeleton	Rhizosol	Dinophys	
			tophora	а	tophora	ета	а	is	ета	tophora	osira	ета	enia	is	
			Melosira	Thallassi	Melosira	Thallassi	Biddulph	Thalassio	Thallassi	Melosira	Skeleton	Thallassi	Pleurosig	Surirella	
				osira		osira	ia	пета	osira		ета	osira	та		

В						Zoopla	nkton				
1	Abudance(noX103	35	51	48	5)	45		50	APHA (23rd Ed.
	Population	/ 100									2017)10200 G
)	m3			Decapoda Decapoda						
2	Name of		Decapoda	Decapoda	Decapoda	Deca	ooda	Crustacean		Coscinodiscus	
	Group		Copepods	Copepods	Oikoplura	Oiko	olura	Oikoplura		Diploneis	
	Number		Crustacean Larvae	Crustacean Larvae	Crustacean Larv	vae Crustace	n Larvae	Crustacean Larv	vae	Rhizosolenia	
	and name		Crustacean	Crustacean	Bivalve Larva	e Bivalve	Larvae	Oikoplura		Dinophysis	
	of group species of each group		Oikoplura	Oikoplura	Oikoplura	Oikoplura	Bi	valve Larvae		Thalassionema	
3	Total Biomass	ml/100 m ³	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.	TEST	UNIT	Apr-3	22	May-22		Jun-22		Jul-22		Aug-22	Se	ep-22	TEST METHOD
NO.	PARAMETERS		SURFACE	BOTTOM	SURFACE	BOTTON	A SURFACE	BOTTO	OM SURFACE	BOTTOM	SURFACE	BOTTOM		
С									Microbiological					
1	Total Bacterial Count	CFU/ml	110	0	142		230		222		212		196	APHA 23 rd Ed.2017,9215-C
2	Total Coliform	/100ml	24		31		40		41		46		52	APHA 23 rd 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	Abse	ent	Absent		Absent		Absent		Absent	At	osent	IS:15187:2016
6	Shigella	/100ml	Abse	ent	Absent		Absent		Absent		Absent	At	osent	APHA 23 rd Ed.2017,9260-E
7	Vibrio	/100ml	110	D	142		230		222		212	:	196	IS: 5887 (Part V):1976

Perel

Mr. Nilesh Patel Sr. Chemist



Mr. Nitin Tandel Technical Manager



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RESULTS OF ETP OUTLET WATER

			LIQUID TERMINAL							
SR.NO.	TEST PARAMETERS	UNIT	APRIL-2022	MAY-2022	JUNE-2022	JULY-2022	AUGUST-2022	SEPTEMBER- 2022	GPCB Limit	TEST METHOD
			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 23 rd Ed.,2017,4500- H ⁺ B
3.	Temperature	°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 23 rd Ed.,2017,2540 –D
5.	Total Dissolved Solids	mg/L	1462	1486	1494	1502	1510	1524	2100	APHA 23 rd 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 °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 23 rd Ed.,2017,3111-B



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						GPCB Limit	TEST METHOD			
SR.NO.	TEST PARAMETERS	UNIT	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 23 rd 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 23 rd Ed.,2017,3111-B
17.	Fluoride as F	mg/L	1.03	0.84	0.86	1.03	0.94	0.82	2	APHA 23 rd 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 23 rd 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

Perel

Mr. Nilesh Patel Sr. Chemist



Mr. Nitin Tandel Technical Manager



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	Results of Ambient Air Quality Monitoring										
Nam	e of Location	CT3 RMU-2									
	Date of			Pa	rameter with Res	ults					
Sr. No.	Monitoring	ΡΜ ₁₀ μg/m ³	ΡΜ _{2.5} μg/m ³	SO₂ µg/m³	NO₂ µg/m³	CO mg/m ³	HC µg/m³	Benzene µg/m ³			
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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Nam	e of Location	CT3 RMU-2						
	Date of			Pa	rameter with Res	ults		
Sr. No.	Monitoring	ΡΜ ₁₀ μg/m ³	ΡΜ _{2.5} μg/m ³	SO₂ µg/m³	NO₂ μg/m³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
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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Nam	e of Location	CT3 RMU-2						
	Date of			Ра	rameter with Res	ults		
Sr. No.	Monitoring	ΡΜ ₁₀ μg/m ³	ΡΜ _{2.5} μg/m ³	SO₂ µg/m³	NO₂ μg/m³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
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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Nam	e of Location	CT3 RMU-2										
	Date of			Ра	rameter with Res	ults						
Sr. No.	Monitoring	ΡΜ ₁₀ μg/m ³	ΡΜ _{2.5} μg/m ³	SO₂ µg/m³	NO₂ μg/m³	CO mg/m ³	HC µg/m ³	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				
Permissi N	ible Value as per NAAQMS	100.0	60.0	80.0	80.0	2.0		5.0				
Те	st 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)



Jaivik S. Tandel (Manager - Operations)



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	Results of Ambient Air Quality Monitoring											
Nam	e of Location	Near Fire Station	า									
	Date of			Pai	rameter with Resu	ults						
Sr. No.	Monitoring	ΡΜ ₁₀ μg/m ³	ΡΜ _{2.5} μg/m ³	SO₂ µg/m³	NO₂ µg/m³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³				
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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Nam	e of Location	Near Fire Station	n					
	Date of			Ра	rameter with Res	sults		
Sr. No.	Monitoring	ΡΜ ₁₀ μg/m ³	ΡΜ _{2.5} μg/m ³	SO₂ µg/m³	NO₂ μg/m³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
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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Nam	e of Location	Near Fire Station										
	Date of			Pa	rameter with Res	ults						
Sr. No.	Monitoring	ΡΜ ₁₀ μg/m ³	ΡΜ _{2.5} μg/m ³	SO₂ µg/m³	NO₂ μg/m³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³				
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				



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	Name	of Location	Near Fire Station									
		Data of			Ра	rameter with Res	ults					
Sr. N	No.	Monitoring	ΡΜ ₁₀ μg/m ³	ΡΜ _{2.5} μg/m ³	SO₂ µg/m³	NO₂ μg/m³	CO mg/m ³	HC µg/m³	Benzene µg/m ³			
4	48.	15-09-2022	76.28	38.72	29.71	35.63	1.17	2.95	NOT DETECTED			
2	49.	19-09-2022	81.27	33.62	32.47	38.31	1.1	6.73	NOT DETECTED			
Ę	50.	22-09-2022	75.88	27.91	34.83	40.27	1.00	4.36	NOT DETECTED			
Ę	51.	26-09-2022	78.94	34.39	31.18	37.49	1.25	5.98	NOT DETECTED			
Ę	52.	29-09-2022	84.94	35.74	36.49	43.65	1.15	4.19	NOT DETECTED			
Pe	rmissik N	ble Value as per AAQMS	100.0	60.0	80.0	80.0	2.0		5.0			
	Tes	t 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)



Jaivik S. Tandel (Manager - Operations)



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	Results of Ambient Air Quality Monitoring										
Nam	e of Location	ADANI PORT – T	UG Berth 600 KL l	Pupm House							
	Date of			Pa	rameter with Res	ults					
Sr. No.	Monitoring	ΡΜ ₁₀ μg/m ³	ΡΜ _{2.5} μg/m ³	SO₂ µg/m³	NO₂ µg/m³	CO mg/m ³	HC µg/m³	Benzene µg/m ³			
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			



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ISO 45001:2018 Certified Company

Nam	e of Location	ADANI PORT – TUG Berth 600 KL Pupm House								
	Date of		_	Pa	rameter with Res	ults				
Sr. No.	Monitoring	ΡΜ ₁₀ μg/m ³	PM _{2.5} μg/m ³	SO₂ μg/m³	NO₂ μg/m³	CO mg/m ³	HC µg/m³	Benzene µg/m ³		
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		



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ISO 45001:2018 Certified Company

Nam	Name of Location ADANI PORT – TUG Berth 600 KL Pupm House							
	Date of			Pa	rameter with Res	ults		
Sr. No.	Monitoring	ΡΜ ₁₀ μg/m ³	ΡΜ _{2.5} μg/m ³	SO₂ µg/m³	NO₂ μg/m³	CO mg/m ³	HC µg/m³	Benzene µg/m ³
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											
	Data of		Parameter with Results								
Sr. No.	Monitoring	ΡΜ ₁₀ μg/m ³	ΡΜ _{2.5} μg/m ³	SO₂ µg/m³	NO₂ μg/m³	CO mg/m ³	HC µg/m³	Benzene µg/m ³			
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			
Permiss I	ible Value as per NAAQMS	100.0	60.0	80.0	80.0	2.0		5.0			
Те	est 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)



Jaivik S. Tandel (Manager - Operations)



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	Results of Ambient Air Quality Monitoring										
Name	e of Location	PUB / Adani Ho	use								
	Date of	Parameter with Results									
Sr. No.	Monitoring	ΡΜ ₁₀ μg/m ³	ΡΜ _{2.5} μg/m ³	SO₂ µg/m³	NO₂ μg/m³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³			
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			



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Nam	e of Location	PUB / Adani House								
	Date of			Pa	rameter with Res	ults				
Sr. No.	Monitoring	ΡΜ ₁₀ μg/m ³	ΡΜ _{2.5} μg/m ³	SO₂ μg/m³	NO₂ µg/m³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³		
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								
	Date of			Ра	rameter with Res	ults		
Sr. No.	Monitoring	ΡΜ ₁₀ μg/m ³	ΡΜ _{2.5} μg/m ³	SO₂ µg/m³	NO₂ μg/m³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³
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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Nam	e of Location	PUB / Adani House								
	Date of	Parameter with Results								
Sr. No.	Monitoring	ΡΜ ₁₀ μg/m ³	ΡΜ _{2.5} μg/m ³	SO₂ µg/m³	NO₂ μg/m³	CO mg/m ³	HC µg/m ³	Benzene µg/m ³		
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		
Permiss I	ible 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)



Jaivik S. Tandel (Manager - Operations)



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	Results of Noise Level Monitoring										
L	ocation Name	Name CT3 RMU-2									
Sr No	Sampling Date and		1	Noise Level Leq. d	IB(A) - Day Time	1	1				
51.100.	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 di	3 (A)						



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L	ocation Name	CT3 RMU-2					
Sr. No.	Sampling Date and			Noise Level Leq. d	3(A) – Night Time		
Sr. NO.	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 dI	В (А)		

Test Method

IS: 9989 : 1981

Nikunj D. Patel (Chemist)



Jaivik S. Tandel (Manager - Operations)



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	Results of Noise Level Monitoring										
L	ocation Name	Near Fire Station									
Sr No	Sampling Date and			Noise Level Leq. c	lB(A) - Day Time	1	1				
51.140.	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 dl	В (А)						



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Laboratory un	der the	EPA-1986	(12.01.	2020 to17.03.20	23)

QCI-NABET Accredited EIA Consultant Organization GPCB Recognized Environmental Auditor (Schedule-II)

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L	ocation Name	Near Fire Station					
Sr No	Sampling Date and			Noise Level Leq. d	B(A) - Night Time		
51. NO.	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 di	В (А)		

Test Method

IS: 9989 : 1981

Nikunj D. Patel (Chemist)



Jaivik S. Tandel (Manager - Operations)



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)

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Results of Noise Level Monitoring								
L	ocation Name	ADANI PORT – TUG Berth 600 KL Pump House						
Sr. No.	Sampling Date and	Noise Level Leq. dB(A) - Day Time						
	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)						



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Location Name		ADANI PORT – TUG Berth 600 KL Pump House						
Sr. No.	Sampling Date and	Noise Level Leq. dB(A) - Night Time						
	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

Nikunj D. Patel (Chemist)



Jaivik S. Tandel (Manager - Operations)



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Results of Noise Level Monitoring								
Location Name		PUB/Adani House						
Sr. No.	Sampling Date and	d Noise Level Leq. dB(A) - Day Time						
	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)						



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Location Name		PUB/Adani House						
Sr. No.	Sampling Date and	Noise Level Leq. dB(A) - Night Time						
	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



Nikunj D. Patel (Chemist)



Jaivik S. Tandel (Manager - Operations)


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	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 NOx	ppm	17.89	19.87	17.89	19.76	50	IS 11255 (Part - 7)		

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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 NOx	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)	



Nikunj D. Patel (Chemist)



Jaivik S. Tandel (Manager - Operations)



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	Results of Stack Monitoring								
Sr.	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	Method of Test	
INO.				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 NOx	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.	Parameter Unit		D.G. Set- KVA) 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	Method of Test
140.				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	

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Sr.	Parameter Un		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	Method of Test
NO.			Sep-22 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 NOx	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

Nikunj D. Patel (Chemist)



Jaivik S. Tandel (Manager - Operations)



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RESULTS OF BORE HOLE WATER

	TEST DADAMETEDS	LINUT	Pump House-1	Pump House-2	Pump House-3	TECT METHOD
SK.NO.	TEST PARAMETERS	UNIT	16-05-2022	16-05-2022	16-05-2022	
1.	рН @ 25 ° С		8.48	8.12	8.16	IS 3025(Part 11)1983
2.	Salinity	ppt	4.94	5.08	5.16	APHA 23 rd 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 23 rd 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 23 rd 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	

Perel

Mr. Nilesh Patel Sr. Chemist



Mr. Nitin Tandel Technical Manager



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RESULTS OF BORE HOLE WATER

	TEST DARAMETERS	LINUT	Pump House-1	Pump House-2	Pump House-3	Near Unloading bays	Near ETP	TEST METHOD
SR.NO.	TEST PARAIVIETERS	UNIT	04-08-2022	04-08-2022	04-08-2022	04-08-2022	04-08-2022	TEST METHOD
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 23 rd 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 23 rd 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 23 rd 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	

Perel

Mr. Nilesh Patel Sr. Chemist



Mr. Nitin Tandel Technical Manager



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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 (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				



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	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								



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	MARINE WATER		
Sr. No.	Test Parameter	Unit	MDL
1	рН		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							



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

	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								

Annexure – 5



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

Cost of Environmental Protection Measures

Annexure – 6

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

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

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No.: Sigr		M (74) C**	*		~

Registered Office: Adani Corporate House, Shantigram, Nr. Vaishno Devi Circle, S.G. Highway, Khodiyar, Ahmedabad – 382421, Gujarat, India **182**



20th July, 2022

-1C

Sub: Cumulative Impact Assessment report for Waterfront, and Pointed NorthBack NorthBa

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".

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Thanking You, Yours Faithfully, For, Adani Ports and SEZ Limited

4

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.

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

Tel +91 2838 25 5000 Fax +91 2838 25 51110 info@adani.com www.adani.com

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

Annexure – 7



Compliance Report of CIA Study Environment Management Plan

S. No.	Identified environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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 Chan	ge			-		
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 accommodatin g 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 environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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 environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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
			etc. peak daily rainfall of 440 mm/hr. Hence flooding of water in the neighboring areas is not envisaged. As per the directions given in the environment al clearance issued for the proposed Multi- Product SEZ and CRZ clearance for Desalination,	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	APSEZ, District Administratio n* and Irrigation department	As and When Required	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. 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.
			sea water intake, outfall facility and pipeline project, the master plan of the project was	through the APSEZ area			



S. No.	Identified environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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. 3	Due to conservatio n and protection of mangroves in the designated conservatio n area, it has been predicted that the current mangrove footprint area would	Positive Impact with ecologi cal benefits	designed and being implemented without disturbing the natural flow of rainwater in all the seasonal streams. 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	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
	marginally increase in next 15		2800 ha at various locations				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



S. No.	Identified environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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
	years due to natural growth. This will enhance the overall biodiversity in the local coastal eco- system.		across the coast of Gujarat state in consultation with various organizations				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. Sr Recommenda tions • APSEZ entrusted NCSCM, Chennai to carry out Monitoring in and around APSEZ and shoreline changes in Bocha island. • As a part of this study,



S. No.	Identified environmenta I and social impacts for the fully developed scenario (vear 2030)	Type of Impact & Magnitud e1	Environment management plans adopted or being adopted by APSEZ as per permits, clearapcos	Additional Risk Mitigation Measures/ESMP	Responsible agency	Timeframe for implementation	Compliance
	(year 2000)		applicable regulations and guidelines etc.				
							 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 environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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	Com	bliance		
							3.	Tidal observation in creeks in and around APSEZ Removal of Algal and Prosopis growth from mangrove areas	•	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. 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



S. No.	Identified environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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



S. No.	Identified environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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	
								 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



S. No.	Identified environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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
							 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 is in progress which will be resulted in 20 Hector.
1. 4	Developmen t 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.



S. No.	Identified environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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
	changes in hydro- dynamic		change prediction for a fully	three years			approved waterfront development plan, a historical shoreline change assessment has been undertaken using the satellite imagery for a period of 2008 to
	characterist ics along		developed APSEZ				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
	the shoreline. Shoreline of		facility has been studied. The				2018. AMBUR Methodology was used to study the historical analysis
	any area also can be		study reveals that the				APSEZ project boundary has been considered for assessing the historical shoreline change
	by storm surges and		accretion in the study				scenario. The baseline shoreline change assessment depicts the influence of both natural causes and also possible changes in the shore due to various
	other natural		area at the end of 15th				development activities in the study area during the designated period. For the purpose of this study,
	processes.		within the designated				Shoreline and that of the right side as East Side Shoreline for ease of recognition.
			criteria of ± 0.5 m/year. which				The maximum accretion and erosion rate of the west side shoreline over a period of 10 years during the year
			that the				m/yr respectively.
			development activities of APSEZ would				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.
			pose insignificant				APSEZ has already awarded work to the agency namely



S. No.	Identified environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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
			impact on				M/s. Gujarat Institute of Desert Ecology, Bhuj for
			the Mundra shoreline.				Mundra region vide P.O. No. 4802013270 dated
							30.03.2022. The cost of said study is INR 17.39 Lacs.
2	Penional Traffi	c Mananama	ot Plan				The said study is under process.
2.	The	l evel-1	As per the	Additional road	APSE7	As and When	Presently, ~ 51.7 % of the total SEZ is developed. Based
1	projected	20001	master plan	as per master	/ 022	Required	on technical studies,
	traffic data		of APSEZ,	plan will be built			
	as per the		eight artillery	in future based			Existing road/rail/conveyer infrastructure facilities are
	EIA Report		roads will be	on the overall			adequate to evacuate the existing cargo. Further,
	of Multi-		connected to	progress of the			APSEZ's cargo evacuation through rail / conveyer /
	Product		either state	project.			the usage of road
	Special		highway or	Currently about			
	Economic		national	25% of cargo			Additional road facilities will be built as per master plan
	Zone, the		nignway for	transported by			considering future development.
	vehicular		the noods	Rail and the			
	traffic from		from APSEZ.	same will be			The facilities for transportation of cargo other than
	the port and		None of	enhanced to 40%			road will be enhanced considering future development,
	SEZ		these roads	when the facility			which will reduce the traffic volumes on the regional
	operations		are passing	is fully developed			road Network.
	(including		through	in future. This			
	supporting		settlements,	will further			
	facilities		thereby	reduce the			
	and colony)		avoiding	traffic volumes			
	could be in		traffic	on the regional			
	the order of			road			
	10,200 and		in the	network.			
	10,400		respective				



S. Identified S. environmen No. I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines	Additional Risk Mitigation Measures/ESMP	Responsible agency	Timeframe for implementation	Compliance
vehicles pr day respectivel There cou be possible increase traffic congestion on villag highway intersectio s and roa accidents.	er y Id a in Is e- n ad	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				



S. No.	Identified environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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 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.



S. No.	Identified environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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
							 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 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.



S. No.	Identified environmenta I and social impacts for the fully developed scenario	Type of Impact & Magnitud e1	Environment management plans adopted or being adopted by APSEZ as per permits,	Additional Risk Mitigation Measures/ESMP	Responsible agency	Timeframe for implementation	Compliance
	(year 2030)		clearances, applicable regulations and guidelines etc.				
							lane segregation, Channelizing the traffic, at Junctions and indicating Caution for the road users.
3	Water resource	s Manageme	ent and sewage tr	eatment & disposal P	lan		
3.	For a fully	No-	APSEZ is	As per the master	APSE	As and When	Currently there are two fresh water sources available
1	developed	Impact	meeting the	plan and	Z	Required	with APSEZ.
	APSEZ		CURRENT	permissions			Desaination Plant – 47 MLD
	Tacility,		demand	EC ADSE7 will be			capacity)
	demand will		through	develoning			
	be in the		Narmada	progressively			Current water demand for APSEZ along with SEZ
	order of		water supply	4,50,000 m3/day			industries including Adani Power Plant is an avg. of
	4,30,000		scheme and	(450 MLD) of			23.18 MLD.
	m3/day		47 MLD	desalination			
	(430 MLD).		captive	plants to meet			So presently, these sources are adequate to fulfill the
	APSEZ WIII		desalination	the future			current freshwater requirement of entire APSEZ
	majority of						including member units.
	the water		water	regional water			The desalination plant of additional capacities will be
	from the		allocation	resources due to			installed on modular basis considering future
	captive		from	these			requirement of APSEZ.
	desalination		concerned	developmental			
	plants,		authorities	projects will be			
	wnicn Will		was obtained	ress			
	developed			signinicalit.			
	in		renewed				
	progressive		from time to				
	manner.		time as per				
			the				



S. No.	Identified environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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
			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						Our water conservation work is as below.
demand of the local communitie s 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						 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 developmen t, 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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			etc.	· · ·			
	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 man	agement Pla	<u> </u> N				
4. 1	Although all the regulated activities in the study area will be	Level-2	APSEZ and other thermal power plants have obtained	All existing and new industrial establishments will obtain requisite consents from	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
	adopting promulgate d emission norms, total air emission		valid consent to operate and have been operating	GPCB and adhere to the stipulated emission norms regulations and guidelines issued			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.



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	mass discharge from the study area would increase.		the facilities as per the emission norms stipulated in respective consent orders. APSEZ and other two power plants are	by authorities from time to time.			Adani power and air qual Directive an power plant of The AAQM s Mar'22) are a Locations: 16 villages) Frequency: T	plant ha ity monil d submil of CGPL i summary is below. 5 Nos. (A wice in a	es instal coring in ting the s outside for last PSEZ – 7 week	led cont istrumer e report e APSEZ : six mo 13 + APL	inuous e its as pe s also. area. onths (A 3 incl	emission er CPCB Another pr'22 to uding 4
			monitoring the ambient				Paramete	Unit	Max	Min	Averag e	Perm. Limit ^{\$}
			air quality on				PM10	µg/m³	89.76	15.23	71.79	100
			intervals as				PM _{2.5}	µg/m³	53.62	5.67	30.97	60
			per GPCB/CPCB				SO ₂	µg/m³	41.48	4.1	22.17	80
			guidelines				NO ₂	µg/m³	48.52	0.21	27.8	80
			and the data is analyzed and				Values	recorded	^s as confirms	per NAA to the sti	Q standar pulated si	ds, 2009 andards.
			presented to GPCB on monthly basis. Both				Approx. INR environment 2022-23 (till quality monit	t 6.37 L al monit Sep'22), coring for	akhs is oring a which a overall	spent ctivities Iso inclu APSEZ, I	by APS during Jdes amb Nundra.	SEZ for the FY pient air
			the thermal power plants located				Other indust requisite per	ries locat missions	ed withi: from th	n the SE e comp	Z have c etent aut	btained horities:



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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 Administratio n 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 cleaning of outside of the SEZ units. 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 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 concentrati on in the background air. This could pose some health impacts such as asthma and COPD etc.	Health Impact	APSEZ has been implementin g 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



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	among the local communitie s.		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,				Adequate a FGDs, Bag provisions a plant. The stack of (Apr'22 to N Total Nos. o Frequency: 1 Parameter PM SO ₂ NO _x Values Approx. INF environment 2022-23 (ti monitoring f All other inc provide ade measures for respective p is being ins SPCB officia	ir pollu Filters, re imple monitor lar'22) a f Stack Monthly Unit Unit Unit Mg/ Nm ³ Ppm s recorde R 6.37 tal mon ill Sep for over dustries quate s pr prop ermissi pected ils on re	tion con etc. and emented ing sum are as be s: 23 Nos y / Half Y GPCB Limit 150 100 50 ed confirm Lakhs nitoring '22), wh all APSE: a located stack he er dispenons gran and ens	mary fo low. (early Min 15.67 6.1 17.85 is spen activitie ich also Z, Mundr within S ight and rsion of ted by th ured by sis.	asures I ate stac the therm r last sit 27.45 16.78 29.67 tipulated t by A s during o includ a. SEZ are a pollution pollutan e board. APSEZ a	ike ESPs, k heights nal power x months Avrg. 19.6 8.05 22.7 standards. PSEZ for p the FY les stack adhere to on control ts as per The same as well as
			covering of				As mention	ed abo	ve, pres	ently, Al	PSEZ ha	s formed



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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 Administratio n*	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



 In the study area have installed electrostatic precipitators on the boilers and are meeting the emission in the mission in the emission is per the emission is per the emission in the emission is per the emission is per the emission in the emission is per the emission is per CPCB guidelines and EC conditions, the relative air pollution impacts due to release of emissions from two power plants is insignificant. Shins are the emission is per the emission is provided with the emission is per CPCB is provided with the emission is provided wi	S. No.	Identified environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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
		Ships are		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



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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 internationa I 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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	(year 2030)		applicable regulations and guidelines etc.				
	with NOX						
	emissions						
	less than						
	14.4						
	gram/Kwhr						
	or engine.						
	stack						
	heights of						
	the marine						
	diesel						
	engine, ship						
	emissions						
	often gets						
	dispersed in						
	the local						
	environmen						
	fumination						
	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.



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	are envisaged		operations at the	required to			 D.G. S Mainte 	ets having	g Acousti		Jres.	hae and
	from port		waterfront	monitoring at	APSEZ	Continual	equipr	nent's on	regular f	requency	/.	
	operations,		development	their facilities to		Process						
	Industrial		, the noise	demonstrate the			Noise monitoring is being carried out by NABL					
5	and nower	l evel-1	from the port	the Noise level			accredited and MoEF&CC authorized agency namely					
1	plants in the	Leven	cargo	standards.			Vapi as per permission granted and reports are being					
	study area.		handling will	Continuous noise			submitted to the concerned authorities on regular					
	Any		be minimal.	recording units			basis.					
	increase in		An adequate	can be installed								
	noise levels		greenbelt is	by APSEZ at			The noise	monitori	ng sumn	nary for	last six	months
	beyond		being	facility boundary			(Apr'22 to)	Mar'22) a	re as belo	W.		
	three		developed by	to address the								
	from the		APSEZ CO				Locations: 13 Nos.					
	background		reduce any	ever required. To			Frequency	Unce in	a month I	(24 nouri T	y)	1.00
	levels would		residual	assess the			Noise	Unit	Leq Max	Leq Min	Leq Avr.	Perm.
	perceived as		to noise	compliance and			Devi					Limit ^s
	noise		emissions	also to address			Day Time	dB(A)	70.8	53.65	64.48	75
	(USEPA)7.		facility.	grievances			Night Time	dB(A)	67.8	50.98	59.4	70
			Periodic noise level	related to noise issues due to			^{\$} as per GPCB standards					
			monitoring programs were adopted by APSEZ.	operation of APSEZ facilities.			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.					



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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 (Terr	estrial and Marin	e)			ľ
6. 1	In general, release of untreated wastewater from industrial facilities would pose threat to water quality of streams, estuaries and marine water bodios	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	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 page of the second	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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			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	Storm water runoff from the facility during the first rain shall be sampled and			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.
			yards is collected in	analyzed for the presence of	APSEZ	Continual	Presently Marine monitoring is being carried out once in a month by NABL and MoEF&CC accredited agency



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			sedimentatio	heavy metals or			namely N	Vs. Uni	star Ei	nviron	ment a	nd Re	esearc	h Labs
			n ponds	other criteria			Pvt. Ltd.,	Vapi fo	r APS	SEZ &	APL b	oth.	The a	nalysis
			(dump pond)	pollutants to			reports o	of the s	same	are b	eing s	submi	tted I	to the
			to remove	adopt corrective			concerne	d author	ities o	n regu	lar pas	sis.		
			any residual	and preventive										с.,
			OUSC	actions to			The mari	ne water) sum	mary t	ror last
			for further	marine water				15 (Api 22	2 10 ///	di 22)	is as p	er ber	000.	
			disposal into	nuality.			Locations	s: 14 Nos	(APS	F7 – 9) + API	- 5)		
			sea	All red and			Frequency: Once in a Month / Half Yearly							
				hazard category industry within APSEZ shall			TEST PARA METE RS	T A Cumulative Cumulative Cumula Surface Botto			umulat Bottor	ive n		
				adopt spill					Mi	Ma	Aver	Mi	Ma	Aver
				prevention and					n	×	age	n	x	age
				and no effluents			рН		8.0 4	8.3 1	8.17	7.9 2	8.2	8.12
				shall be discharged into storm water-			BOD	mg/L	2.4	6.0 2	3.47	3.9	5.1	4.3
				drains.			TSS	mg/L	94	181	146. 74	78	17 8	138. 97
							DO	mg/L	5.5	6.2 7	5.95	5.1	6.1 7	5.56
							Salinit y	ppt	35	36. 8	35.5 3	35. 68	37. 3	36.3 5
							TDS	mg/L	35 81 0	36 94 2	362 46	35 98 4	37 62 4	367 51
							Tempe rature	oC	30. 1	33	32.5	31. 5	31. 6	31.5



S. No.	Identified environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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
							environmental monitoring activities during the FY 2022-23 (till Sep'22), which also includes noise monitoring for overall APSEZ, Mundra.
			Detailed marine hydrodynami c 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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			comprehensi ve environment al 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 q	uality and sa	linity ingress				
7.	While Mundra block is enjoying safe ground water status as on date (based on the data published by CGWB).	Level-2	APSEZ is not utilizing ground water for any type of use. APSEZ is meeting the current water demand through	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.



S.	Identified environmenta	Type of Impact &	Environment management	Additional Risk Mitigation	Responsible agency	Timeframe for implementation	Compliance
NO.	i and social	Magnicuo	plans adopted	Measures/ESMP			
	the fully	ei	adopted by				
	developed		APSEZ as per				
	scenario		permits.				
	(year 2030)		clearances,				
			applicable				
			regulations				
			and guidelines				
			etc.				
	induced		water supply				
	economic		scheme and				
	and		47 MLD				
	population		captive				
	growth, use		desalination				
	of ground		plant at site.				
	water						
	resources						
	by the local						
	people						
	mignt						
	Increase in						
	negion. This						
	ingine inoroaco tho						
	chloride						
	around						
	water in						
	future.						
7.	Due to	Level-2	Ground	The Govt. of			APSEZ will co-operate and comply with the directions
2	induced		water is not	Gujarat,	District		from concerned regulatory authorities.
	growth in		drawn by	Narmada, Water	Administratio	Long Term	
	the region,		APSEZ for its	Resources, Water	N*	-	APSEZ does not draw any ground water for the fresh
	pressure on		operations.	Supply & Kalpsar			water requirement.
	the		Natural	Dept.,(WRD)12			
	available		streams	has been			However, Adani Foundation – CSR arm of Adani Group
	ground		(seasonal	implementing			has carried out rainwater harvesting activities in the



S. No.	Identified environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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
	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.



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				W/hile the			Narmada Water Resources, Water Supply & Kalp Dept., (WRD)1 has been implementing various salir ingress prevention projects. Under Sardar Saro canal project, Govt. of Gujarat has proposed implement about 8200 Km stretch of water canal a the project is at various stages of implementati Under this project about 112,000 ha of land in ab 180 villages will be benefitted with irrigation nee This will significantly reduce the pressure on ground water resources in the region.					
				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	All Concerned Stakeholders, District Administratio n and CGWB*	Continual Process	Image: A state of the second state of the regulatory authorities on regular basis. The summary of APSEZ ground water que monitoring for last six months (Apr'22 to Sep'22) at below. Nos. of Location: 09 Parameters Unit Min Max Ave of the second state of					



S. No.	Identified environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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				
				ground water conservation			Hydrocarbon	mg/L	Not Detecte	Not Detect	Not Detect
				action			L Dh		0	ed	eo
				committee can			Lead as PD	mg/L	0.02	0.08	0.05
				be formed under the guidance of			Arsenic as As	mg/L	L:0.01)	DL:0.01	DL:0.01
				state ground			Nickel as Ni	mg/L	0.06	0.33	0.12
				water board and district			Total Chromium as Cr	mg/L	0.06	0.06	0.06
				Administration.			Cadmium as Cd	mg/L	0.01	0.12	0.06
							Mercury as Hg	mg/L	BDL(MD L:0.001)	BDL(M DL:0.0 01)	BDL(M DL:0.0 01)
							Zinc as Zn	mg/L	0.12	0.29	0.18
							Copper as Cu	mg/L	BDL(MD L:0.05)	BDL(M DL:0.0 5)	BDL(M DL:0.0 5)
							Iron as Fe	mg/L	0.12	1.12	0.67
							Insecticides/Pes ticides	µg/L	Absent	Absent	Absent
							Depth of Water Level from Ground Level	mete r	1.9	2.3	2.1
								1	RUI	– Below Det	ection Limit
									MDL – N	Ainimum Det	ection Limit
							Approx. INR 6.3	57 Laki	ns is spe	nt by Al	PSEZ for
									iy activiti		
							monitoring for ov	erall AP	which als SEZ, Mund	so includ ra.	es noise
							The freshwater re SEZ is being satisf	quireme ied thro	ent of all th ough APSE	ne industr Z. All the i	ies within ndustries



S. No.	Identified environmenta I and social impacts for the fully	Type of Impact & Magnitud e1	Environment management plans adopted or being adopted by	Additional Risk Mitigation Measures/ESMP	Responsible agency	Timeframe for implementation	Compliance
	developed scenario (year 2030)		APSEZ as per permits, clearances, applicable regulations and guidelines etc.				
							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 Manage	ment	1	Γ	T		
	Solid waste		APSEZ has	APSEZ will			Presently APSEZ has implemented Zero waste
	will be		been	continue to			Initiatives as per 5R (Reduce, Reuse, Recycle, Recover
	generated		adopting	adopt Zero			& Reprocess) principles of Waste management. At
Q	industrial	Lovol-2		and wastes will		Continual	facility for 6.0 TPD capacities A well-established
1	activities of	Level-2	and the	be segregated at	AFJLZ	Process	system for segregation of dry & wet waste is in place.
•	APSEZ and		entire waste	source and		1100000	All wet waste (Organic waste) is being segregated &
	other		generated	disposed to			utilized for compost manufacturing and/or biogas
	permitted		from existing	various recycling			generation for cooking purpose. The compost is further
	facilities in		operations is	vendors, co-			used by in house horticulture team for greenbelt
	the study		segregated	processing in			development. Whereas dry recyclable waste is being
	area		and disposed	cement plants.			sorted in various categories. Presently manual sorting
	Mundra		vendors				waste Segrenated recyclable materials such as Pager
	town. These		thereby	reduce the waste			Plastic, Cardboard, PET Bottles, Glass etc. are then sent
	wastes		APSEZ has	to landfill			to respective recycling units, whereas remaining non-
	would		achieved	significantly, but			recyclable waste is bailed and sent to cement plants
	contain		zero landfill	also to recycle			for Co-processing as RDF (Refused Derived Fuel). The



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	recyclable		status as on	the materials			same practice will be continued in future also. APSEZ
	material,		date.	there by avoiding			has also been recognized for Zero Waste to Landfill
	n debris			impacts			certification from reputed organization.
	organic						APSEZ, Mundra is certified for Zero Waste to Landfill
	waste, inert						management system (ZWTL MS 2020) by
	material and						TUVRheinland India Pvt. Ltd. (valid up to 31.05.2024).
	e-waste etc.						Details of the same were submitted as part of
	absence of						And'21 to Seo'21
	any						
	organized						APSEZ will continue proper solid waste management in
	source						his operational area.
	segregation						
	programs						
	recycling						
	strategies						
	and						
	infrastructu						
	re facilities,						
	these will						
	environmen						
	t and would						
	pose long						
	term health						
	impacts.			The suiterin			4
			APSEZ has	ine existing			



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8.2	Considering an average solid waste generation of 0.25 Kg/person/d ay, 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 aspe	ects (terresti	ial 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.



S. Identified S. environmenta No. I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines	Additional Risk Mitigation Measures/ESMP	Responsible agency	Timeframe for implementation	Compliance
developmen tal activities. This might have certain level of changes in the biodiversity in the study area.		etc. 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 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 conservatio n 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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	t would pose certain ecological risk.		more than 2800 ha at various locations across the coast of Gujarat state in consultation with various organization s The Adani Foundation introduced 'Mangrove Nursery Developmen t and Plantation' scheme in the area as an alternative income generating activity for the people of the region.				betw Anal there the c grow As a man unde Sr N o. 1.	veen 2011 and 20 ysis of data betr e was an increase conversion of scat yth of mangroves a part of GCZMA grove conservater ertaken following Recommenda tions Mangrove mapping and monitoring in and around APSEZ	 19. Ween categories indicated that e in dense mangroves along with tered into sparse, that shows the in a progressive direction. recommendations and NCSCM ion action plan, APSEZ has activities. Compliance 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



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							2.	Tidal observation in creeks in and around APSEZ	•	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. APSEZ carried out the tidal observations at locations similar to 2017 in Kotdi, Baradimata, Navinal, Bocha and Khari



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							3.	Removal of Algal and Prosopis growth from mangrove areas Awareness of mangroves importance in	•	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. 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. Adani Foundation – CSR Arm of Adani group has done awareness camps/activities created in the community



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							 surrounding communities 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


Identified S. environmen No. I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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					
						Bandar, Luni	i Banda	r and B	avadi Banc	lar.	akbabiad
						IOCL & 1250 creek area b	00 No 9 APSE	s. of ne Z.	ew sapling	s were	planted in
9.3 Outfall fro the therm power plants desalinatio and CET would pos certain lev of impact o the marin environme t.	n P e e n e	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	All approved marine outfalls shall be monitored for salinity, temperature and other designated parameters as per consent to establish issued by GPCB. Existing marine enviro nmental monitoring program shall be continued.	APSEZ and Concerne d Industry	Continual Process	Presently ma Adani power reports are authorities of APSEZ is ca month at S MoEF&CC a Environment analysis repor concerned a Adani power 5 locations (by NABL and Unistar Envi analysis repor concerned a of marine wa The compari and current Parameter Temp. Salinity	r ving r plant r	2. ponitorin at the r y subn ar basis out Ma ions in ed age Researc he sam ies on r s also d ions at 2CC accont & Re he sam ies on ality is s marine ring dal CIA 30.2 418	ig is being marine out nitted to s. arine mon n deep se ncy name h Labs Pv e are being egular bas oing marin outfall lock credited ag esearch La e are being regular bas shown abo water res ta are as b Max Present 30	carried fall loca the itoring a by f ly M/s. t. Ltd., submil is. e water ation) ir gency na submil sis. The ve. ults be elow.	out by the ations and concerned once in a NABL and Unistar Vapi. The tted to the tted to the e summary tween CIA Min Present 29 35.2



S. No.	Identified environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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
			respective power plants in the study area have been monitoring the marine water quality status on monthly basis for the stipulated environment al 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 dedicatenurs ery 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.



S. No.	Identified environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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
10	deciduous shrubs. Due to scanty rains in the area, the overall natural green- cover/vegetat ion in the area is very small. Socio-		undertaken a plantation with about 9.6 Lakh fully grown trees.				
	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 infrastructure s 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



S. No.	Identified environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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
			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.



S. No.	Identified environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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
							 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-III (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



S. No.	Identified environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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
							 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



S. Identified S. environmenta No. I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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
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 contribute and Reproductive age women



S. Identified S. environment No. I and social impacts for the fully developed scenario (year 2030)	Type of Environme a Impact & manageme Magnitud plans adop e1 or being adopted by APSEZ as p permits, clearances applicable regulations and guideli etc.	nt Additional Risk nt Mitigation ted Measures/ESMP er	Responsible agency	Timeframe for implementation	Compliance
					 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



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							 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 oil child
10.	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 environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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 O9 villages of Mundra, O3 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.



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							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



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	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 Ko capacity



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							 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 Kaushalya Vardhan Yojana Machhimar Sadhan Sahay Yojana Machhimar Shudhh Jal Yojana Machhimar Akshay kiran Yojana Machhimar Ajivika Uparjan Yojana Machhimar Ajivika Uparjan Yojana Machhimar Ajivika Uparjan Yojana



S. No.	Identified environmenta I and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitud e1	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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mental ISO 9001:2015 (e-11) Certified Company

ISO 45001:2018 Certified Company

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)	Date of Report	26/07/2022
	PLOT NO: - NAVINAL ISLAND, Village - MUNDRA,	Customer's Ref	As Per W O
	Tal. – Bhuj, DIST KUTCH - 370421.	customer s ken	
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 23 rd Ed.,2017,2540 –D	mg/L	92
4.	рН @ 25 ° С	APHA 23 rd Ed.,2017,4500-H ⁺ B		6.97
5.	Temperature	Environnis 3025(Part 9)1984 ch Labs	Pvt. Ltd. 🥯	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 °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 23 rd Ed.,2017,3114-C	mg/L	BDL(MDL:0.01)
12.	Mercury (as Hg)	APHA 23 rd 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 23 rd 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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mental ISO 9001:2015 (e-11) Certified Company

ISO 45001:2018 Certified Company

TEST REPORT	TEST	REPORT
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Report No.	URC /22/07/Water/APL-0001		
Name & Address of Customer	M/S. ADANI PORTS & SPECIAL ECONOMIC ZONE LTD. (WFDP-West Port)	Date of Report	26/07/2022
	PLOT NO: - NAVINAL ISLAND, Village - MUNDRA,	Customer's Ref	As Per W O
	Tal. – Bhuj, DIST KUTCH - 370421.	customer s ken	
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 23 rd 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 23 rd Ed.,2017,4500-P, D	Pvt. Ltd. mg/	0.5
24.	Sulphide as S	APHA 23 rd 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 23 rd 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 23 rd Ed.,2017,4500 NO3-B	mg/L	0.7
Remar	ks: BDL= Below Detection Limit, M	DL = Minimum Detection Limit		
Opinio	n & Interpretation (If required):			

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

Checked By

he C

(Nilesh C. Patel) (Sr. Chemist) Page 2 of 2

Authorized By

(Nitin B. Tandel) (Technical Manager) UERL/CHM/F–2/05



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mental ISO 9001:2015 e-11) Certified Company

ISO 45001:2018 Certified Company

Report No.	URC /22/07/Water/APL-0002		
Name & Address of Customer	M/S. ADANI PORTS & SPECIAL ECONOMIC ZONE LTD. (WFDP-West Port)	Date of Report	26/07/2022
	PLOT NO: - NAVINAL ISLAND, Village - MUNDRA,	Customer's Ref.	As Per W.O.
	Tal. – Bhuj, DIST KUTCH - 370421.		
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 23 rd Ed.,2017,2540 –D	mg/L	74
4.	рН @ 25 ° С	APHA 23 rd Ed.,2017,4500-H ⁺ B		7.12
5.	Temperature	Environn IS 3025 (Part 9) 1984 ch Labs	Pvt. Ltd. 🥯	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 °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 23 rd Ed.,2017,3114-C	mg/L	BDL(MDL:0.01)
12.	Mercury (as Hg)	APHA 23 rd 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 23 rd 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)

Page 1 of 2

UERL/CHM/F-2/05



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ISO 45001:2018 Certified Company

Report No.	URC /22/07/Water/APL-0002		
Name & Address of Customer	M/S. ADANI PORTS & SPECIAL ECONOMIC ZONE LTD. (WFDP-West Port)	Date of Report	26/07/2022
	PLOT NO: - NAVINAL ISLAND, Village - MUNDRA,	Customer's Ref	As Per W O
	Tal. – Bhuj, DIST KUTCH - 370421.	customer s kei.	AST CI 11.0.
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 23 rd 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)	EnvirAPHA 23rd Ed.,2017,4500-P, D	Pvt. Ltd.	0.64
24.	Sulphide as S	APHA 23 rd 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 23 rd 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 23 rd Ed.,2017,4500 NO3-B	mg/L	0.5
Remar	ks: BDL= Below Detection Limit, MI	DL = Minimum Detection Limit		
Opinio	n & Interpretation (If required):			

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

Checked By

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(Nilesh C. Patel) (Sr. Chemist) Page 2 of 2

Authorized By

(Nitin B. Tandel) (Technical Manager) UERL/CHM/F–2/05



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ISO 45001:2018 Certified Company

Report No.	URC /22/07/Water/APL-0003		
Name & Address of Customer	M/S. ADANI PORTS & SPECIAL ECONOMIC ZONE LTD. (WFDP-West Port)	Date of Report	26/07/2022
	PLOT NO: - NAVINAL ISLAND, Village - MUNDRA,	Customer's Ref.	As Per W.O.
	Tal. – Bhuj, DIST KUTCH - 370421.		
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 23 rd Ed.,2017,2540 –D	mg/L	56
34.	рН @ 25 ° С	APHA 23 rd Ed.,2017,4500-H ⁺ B		7.24
35.	Temperature	Environnes 3025(Part 9)1984 ch Labs	Pvt. Ltd. 🗯	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 °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 23 rd Ed.,2017,3114-C	mg/L	BDL(MDL:0.01)
42.	Mercury (as Hg)	APHA 23 rd 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 23 rd 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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UERL/CHM/F-2/05



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mental ISO 9001:2015

ISO 45001:2018 Certified Company

Report No.	URC /22/07/Water/APL-0003		
Name & Address of Customer	M/S. ADANI PORTS & SPECIAL ECONOMIC ZONE LTD. (WFDP-West Port)	Date of Report	26/07/2022
	PLOT NO: - NAVINAL ISLAND, Village - MUNDRA,	Customer's Ref	As Per W O
	Tal. – Bhuj, DIST KUTCH - 370421.	customer s ken	A51 C1 10.0.
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 23 rd 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	Pvt. Ltd. mg/	0.69
54.	Sulphide as S	APHA 23 rd 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 23 rd 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 23 rd Ed.,2017,4500 NO3-B	mg/L	0.6
Remar	ks: BDL= Below Detection Limit, MI	DL = Minimum Detection Limit		
Opinio	n & Interpretation (If required):			

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

Checked By

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(Nilesh C. Patel) (Sr. Chemist) Page 2 of 2

Authorized By

(Nitin B. Tandel) (Technical Manager) UERL/CHM/F–2/05

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 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 cleanup 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		Compli ed Yes/ No	Remarks
RISK ASS	ESSMENT			· ·
1	Whether the facility produces/ hand imports/ stores any type of petroleur	les/ uses/ m 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 spi occur in the worst-case scenario is o	ll that can considered	Yes	25000 T Chap2, refer Para 2.5.3-page No: 21 & Chapter-4 Part-B report
5	Whether relative measure of the pro consequences of various oil spills in case scenario are taken into accour	bability and cluding worst nt	Yes	Chapter2 refer para 2.5.3 Page No. 23 & Chapter-4 Part-B report
6	Whether all types of spills possible are considered including Grounding Fire, Explosion, Rupture of hoses	in the facility , Collision,	Yes	Chapter2 refer para 2.1.1 Page No. 17 & Chapter-4 Part-B report
7	Please specify the list of oils conside assessment	ered for risk	Crude, HSD & Fuel Oil	Chapter2 refer para 2.8 Page No. 24 & Chapter-4 Part-B report
8	Whether the vulnerable areas are exconsidering maximum loss scenario condition	stimated by and weather	Yes	Chapter2 refer para 2.12 Page No. 31
9	Whether impacts on the vulnerable made after considering the Marine p areas, population, fishermen, saltpa mangroves, corals and other resour that area	areas are protected ns, ces within	Yes	Chapter2 refer para 2.12- & 2.13-Page No. 31,32 & Chapter-3 Part-C report
10	Whether measures for reduction of risks are included by reducing the control through spill mitigation measures	identified high onsequences	Yes	Chapter7 refer fig.7.1 Page No. 66
11	Whether steps have been considerer risks to the exposed population by in safe, distances by acquiring propert facility, if possible	ed to reduce ncreasing y around the	Yes	Chapter 7 refer fig 7.1 Page No. 66
12	Whether risk levels are established month after considering the probabi and current and consequences of e	for each lity with tide ach such spill	NA	
13	Whether prevention and mitigation r included in the plan	neasures are	Yes	Chapter8 refer para 8.1 Page No 84
14	Whether the spill may affect the sho (length of the shoreline with coordin	ates)	Yes	Part-B report, chapter 5-OS modelling tables (Jan, July, Oct) page nos. 58-66
15	Whether time taken the oil spill to re	ach ashore	Yes	Part-B report, chapter 5-OS
ada	Adani Ports and Special Economic Zone Ltd, Mundra	Conetnts		Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3 263



		1	non lor po
	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	Yes	Part-C report, chapter 3,
	out		refer para 3.1-page no. 5
17	Does the sensitivity mapping clearly identify the	Yes	Part-C report chapter 3, refer
	vulnerable areas along with MPAs, corals,	235	para 3.1-page no. 5
	fishermen community, saltpans, mangroves and		
	other socio- economic elements in the area		
18	Do the sensitivity maps indicate area to be	Yes	Part-C report Annexure-1
	protected on priority	1	refer fig A.1.8-page no. 37
19	Does the map indicate boom deployment	Yes	Part-C report Annexure-1
	locations		refer fig A.1.1(a), (b)-page
	105 2011		no. 35
20	Whether any Marine. Protected Area will be	Yes	Part-C report chapter 3, refer
	affected		para 3.15-page no. 17
21	Whether total number of fishermen likely to be	No	
	affected is mentioned in the plan		
22	Whether any saltpan in the area is going to	No	
	be affected		
23	Whether any mangroves in the area will be	No	12 1 1
	affected by a spill		1 1 1 1 1 1 1
Prepared	ness		
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	Yes	Chapter4 refer para 4.1
	storage capacity		Page No. 43
27	Whether location of the oil spill response	Ves	Chapter/ refer para / 1
21	equipment is mentioned in the plan	103	Page No. 43
29	Whether suitable vessels available for deploying	Voc	Chapter4 refer para 4.4
20	the beem elymmer etc.	103	Dago No. 44
20	Whether OSD held with facility	Vee	Fage No. 44
29		res	5000 LUS – Page No. 50
30	whether the OSD held with the facility is	Yes	
	approved for use in Indian waters		
31	Whether the facility has MoU with other	Yes	Oil companies, HMEL
	operators for tier-1 preparedness		Operators
32	Whether the list of oil spill response	Yes	Chapter 9 refer para 9.1
	equipment available with each agency in MoU		page no. 89
	is deliberated		
33	Whether the facility has any MoU with private	Yes	Chapter 9 refer para 9.4
	OSRO		page no. 91
34	Whether the procedure for evoking the mutual aid	Yes	
	is clearly described in the plan		
25		Vee	Chapter 10 refer pars 10.0.0
30	Whether additional manpower is available	res	
			page no. 106
36	Whether list of approved recyclers is mentioned in	Yes	Chapter 10 refer para 10.2.1
	the plan		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	Yes	Part-D report, chapter 2.
	identified in the plan		refer para 2.2-page no. 13
39	Whether relevant authorities and stakeholders	Yes	Part-D report chapter 3
	were consulted for NEBA and during the areas for		
	priority protection		
40	Whether District administration has been	Yes	Part-D report
	appraised of the risk impact of oil spills?		
Action Pla	an		
41	Whether the plan outlines procedure for reporting	Yes	Chapter 2, refer para 2.6-
	of oil spills to Coast Guard		page no. 22
42	Whether the oil spill response action is clearly	Yes	Chapter 3, refer para 3.1-
	mentioned		page no. 36
43	Whether the action plan includes all duties to be	Yes	Chapter 3, refer para 3.1
	attended in connection with an oil spill	-	page no. 36
14	Whether the action plan includes key personnel	Yes	Chapter 5-page no. 54
	by their names and designation viz. COO. ICO		
45	Whether alternate coverage is planned to take	Yes	
	care of the absence of a particular person lin		
	cases where action plan is developed basis		
	names]		1 35 11
46	Whether the plan includes assignment of all key	Yes	Chapter 10 page no. 93
	coordinators viz. the Communication Controller.		
	Safety Coordinator, Emergency management		1 1 8 12/11
	team Administration and Communication		1 6 6 6 7
	Coordinator and Safety Coordinator		24 - 24 11 /
17	Whether contact directory containing numbers of	Yes	Chapter10 Page No. 93
	key response and management personnel is	100	
	intimated in the plan		
48	Whether approved recyclers are identified for	Yes	Chapter10 Page No. 104
	processing recovered oil and oily debris		
49	Whether the shoreline likely to be affected is	Yes	
	identified		
50	Whether final report on the incident is submitted to	NA	
	CGHQ as per NOS-DCP 2015		
51	Whether the spill incident and its consequences	NO	
-	are informed to fishermen and other NGOs	_	
	for environment protection through media		
Training a	ind Exercises		
52	Whether mock fire I emergency response drills	Yes	Chapter 5 refer para 5 2
	are specified in the plan		page no. 54
53	Whether the mock drills cover all types of	Yes	Chapter 5 refer para 5 2
	probable oil spills		page no. 54
54	Whether the plan mentions list of trained	Yes	Chapter 5 refer para 5 3
	manpower		page no. 55
55	Whether records for periodic mock drills are	Yes	Quaterly
	maintained in a well defined format		
		1	
56	Whether the plan to undated according to the	Yee	

Risk assessment study and preparation of contingency plan for marine oil spills at Adani Ports & Special Economic Zone Ltd, Mundra



What is the frequency of updatron / review of	Ves	
contingency plan?	103	As an when required
Periodicity of joint exercise with mutual aid partners	Yes	
Frequency of mock-drills for practice	Yes	Twice in a year Chapter 12 Page no.131
Whether the records for periodic mock drills are maintained in a well defined format	Yes	Chapter 5
Frequency of updation / review of contingency plan	Yes	As an when required
declare that the all information appended above and	true and c	orrect to my knowledge or belief
VERIFIED	001100	rator / motana.on managor
(District Commander ICG) or his representative		
10 MAN 4	1	Regional Commander ICG)or his representative
	contingency plan? Periodicity of joint exercise with mutual aid partners Frequency of mock-drills for practice Whether the records for periodic mock drills are maintained in a well defined format Frequency of updation / review of contingency plan declare that the all information appended above and the Chieless Content of the second se	contingency plan? Periodicity of joint exercise with mutual aid partners Frequency of mock-drills for practice Yes Whether the records for periodic mock drills are maintained in a well defined format Yes Frequency of updation / review of contingency yes Yes declare that the all information appended above and true and content Chief Conse VERIFIED

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

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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

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

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 Preand 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.

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

Adani Ports and Special Economic Zone Ltd, Mundra	Conetnts	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003- 268
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Risk assessment study and preparation of contingency plan for marine oil spills at Adani Ports & Special Economic Zone Ltd, Mundra



- 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.





*Rev.No: 03 Dt: 30th July 2022 Doc No: ENVR 2022-003-***2370**

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ABBREVIATIONS

ADIOS	Automated Data Inquiry for Oil S	pills	
CC	Communications Coordinator		
CCA	Central Coordinating Authority	10000	a marting and a second s
CGHQ	Coast Guard Head Quarters		and the second sec
CIC	Chief Incident Controller	and the	1 21
CISF	Central Industry Security Force		
CMG	Crisis Management Group		A STA
CMT	Crisis Management Team		
COC	Communication and Operations	Center	
CTTL	Chemical Terminal Trombay Ltd.		
DCA	District Coordinating Authority		
DCC	District Contingency Committee	1000	VI I N I N I
DHQ	Coast Guard District Head Quart	ers	
DNV	Det Norske Veritas	10 10 10	
ECC	Emergency Control Center		
EG	Environment Group		
ESI	Environmental Sensitivity Index		10/10
HFO	Heavy Fuel Oil		10 A.R. 19
НМ	Harbour Master		No Billed
IAP	Incident Action Plan	1.14	1 5 500
IC	Incident Controller		- 1 8 83AV
IDRN	Indian Disaster Resource Netwo	rk	and and and
IM	Incident Manager		
IMD	India Meteorological Department		
IMO	International Maritime Organizati	on	
IMT	Incident Management Team		1
IOCL	Indian Oil Corporation Ltd.		
IPIECA	International Petroleum Industry	Environmental Conse	ervation Association
JD	Jawahar Dweep	ar n	
LAG	Local Action Group	OIN	
LCA	Local Combat Agency		
LO	Logistics Officer		
LST	Local Action Group Support Tear	m	
MARPOL	International Convention for the I	Prevention of Pollution	n from ships 1973 as modified
73/78	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 Analy	sis	
NFPA	National Fire Protection Associat	ion	
NOS-DCP	National Oil Spill Disaster Contin	gency Plan	
NRT	National Response Team		
OPRC	International Convention on Oil F	Pollution Preparednes	s, Response and Co-
Convention	operation 1990		
	On screen Coordinator		
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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





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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



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,

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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
Α	SPMs				
1	SPM-HMEL (S1)	29.50	700 tons	Crude	69° 37' 23.19" E,
2			10000 tons	Crude	22° 40' 59.06" N
3		2.00	25000 tons	Crude	1000
4			10000 m ³ /h	Crude	
	125-20 5 3	S. C.	for 1 min		
5	SPM-IOCL (S2)	28.45	700 tons	Crude	69° 39' 14.05" E,
6	and the second se		10000 tons	Crude	22° 40' 47.21" N
7			25000 tons	Crude	
8			10000 m ³ /h	Crude	
			for 1 min		17 - A - A - A - A - A - A - A - A - A -
В	VLCC Jetty				•
9	Spill Location (S15)		700 tons	Crude	69° 40.78' E,
10			10000 tons	Crude	22° 43.6' N
11		15.71	25000 tons	Crude	
12	100 million (1997)		10000 m³/h	Crude	156 14
			for 1 min		103 101
С	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
Е					
	west basin (berths)		1	1	1
15	100 tons (due to Berthing incident/ collision) at the West Basin berths (FO)		100 tons	FO	69°34'13.99'' E, 22°45'15.54" N
	Spill point: S5	14.61			
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

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	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 	14.48	20 Tons 100 Tons	HSD FO	69°34'22.75'' E, 22°45'5.33" N
	Spill point: S6		700.1	50	
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		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	13.76	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)	1. 1			
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: o 20 Tons of HSD oil	17	20 Tons 100 Tons	HSD FO	69°41'33.62'' E, 22°44'6.49" N
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	 due to Tug Impact 100 Tons of FO due to Tug Impact Spill point: S10 				
Н	ММРТ		1		1
	At the existing MPT1 berth: : Spill Point S11			1	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	Reg	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	20.80	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
1	MICT / AMCT Berths:				·
	At the existing MICT / AMCT Berths: : Spill point S12		S S		69°42'56.30'' E, 22°44'36.69" N
32	100 tons (due to Berthing incident/ collision) at the (FO) - Spill point S12	15 12	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.	ITEM	Minimum No. of operators/ workmen	Quantity /
(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	imom V	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

4aWeir 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.NA2 Nos.4bDrum/ 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.NA2 Nos.4cVacuum type oil skimmer 30 m³/hr capacity oil recovery pump coupled to a diesel engine complete with all accessories etc. complete as per specifications.NA2 Nos5aBio Remediation (L)NA2000 L				
4bDrum/ 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.NA2 Nos.4cVacuum type oil skimmer 30 m³/hr capacity oil recovery pump coupled to a diesel engine complete with all accessories etc. complete as per specifications.NA2 Nos.5aBio Remediation (L)NA2000 L	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.
4cVacuum type oil skimmer 30 m³/hr capacity oil recovery pump coupled to a diesel engine complete with all accessories etc. complete as per specifications.NA2 Nos5aBio Remediation (L)NA2000 L	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.
5aBio Remediation (L)NA2000 L	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 NA 3 KL type-3 combined, approved by the 3 KL	5b	Oil Spill Dispersant, concentrate type-3 combined, approved by the	NA	3 KL

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			- Mart
	Indian Coast Guard		
6	Flex Barge of about 10 KLtrs. along	NA	2 Nos
	with its accessories.		
7a	Absorbent (oil only) 80 L Kit for quick	NA	2 Nos
	oil spill response		
7b	Sorbent pads 20-inch x 20 inch (nos)	NA	2000 Nos
7c	Sorbent Boom size min 5inch dia,	NA	500 Nos
	min length 5 feet		
8	Protective Equipment (PPE) kit for oil	NA	15 Nos
	spill response.		
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	A	$\left(\right)$
2	Capt. Aditya Gaur (HOD- Marine Services Adani, Kattupalli Port)	OSCT India 01-04 Mar 2022	n.Sh	24
3	Capt. Ajit Mahapatra (HOD- Marine services, Adani Dhamra Port)	OSCT India 01-04 Mar 2022		10

(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		l	ssued on	Vaild till
Marine Serivces			Serivces			
1	Mr.Ramdas Pawale	IC	G		10-Aug-18	9-Aug-23
2	Mr Leelu Singh	ICG 10-Aug-18		9-Aug-23		
3	Mr Amod Pandey	IC	G		10-Aug-18 9-Aug	
20	Adani Ports and Special Economic Zone Ltd, Mundra		Executive		Rev.No: 03 I Doc No: EN	Dt: 30 th July 2022 VR 2022-003-R3
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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

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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

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	current)		
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 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.	3 Nos	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.	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
0	VOC Portable Monitor	4 Nos	0





LIST OF DESCRIPCES AVAILADE & ADANI DODTS and SET LIMITED MUNDDA						
LIJI	OF RESOU		ale for Oil Spill	Containment		A
		Tugs Availar	ble for Oli Spill	Containment		
Name of Tug	Туре	ВНР	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	2200 X 2	3000 ltr	2000 ltr	1200	55
	(DSV)	1		199		
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	401 X 2			-	10
	screw	1 5 6				

Additional equipment and location

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
15	- Q	Managing the team and Supervision of
1 1 513	6-172	data inputting the model
1280		Analyzing the output data
		Report preparation
		Data interpretation & Simulation runs
Ms. Smitha	Team Members	Prepare the tools for report preparation
Dr Rashmi		Preparing the input data for model
		Simulation runs
		Digitizing the satellite Maps
		Graphical outputs preparation
	100	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.



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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.







2514000 -	Terminal-1
<u>\$9</u> -22'4FN	Container Terminal-2 Container Terminal-3 Container Terminal-4 Bodts
2513500 - S15 - S11	New Bund Container Terminal–3 Exten S Port
589500 570000 570500 571000 571500 572500 572500 573000 573500 574000 Existing(m)	Turning Gircle
Fig.1.3 Zoomed portion showing marine facilities of South Basin selected	and spill locations

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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

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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

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- 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 Cooperation, 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:



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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:

$d \leq 50 \text{ mm}$	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	of pipe			
The probability of hose fai	ilures 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 1.7×10^{-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 = $2\pi rLv$
- 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.

Time in hours after rupture	Spill Size		
1	1900		
3	3400		
6	5300		
12	9000		
24	13500		
36	14100		

Table 2.1 Pipeline spill volume (m3)

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

	<7 Tones	7-700 Tones	>700 Tones	TOTAL
OPERATIONS	- A 60 -			
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: Number of oil spills occurred during 1974 to 2010 and their causes and
the spill quantity

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

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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**)

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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.



- 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

Chemical and	Fuel Oil	Crude Oil	HSD
Physical Properties			
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 m²/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

Table.2.3 Type of oils selected for oil spill modelling studies

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	Major process accountin	< 5 days	
	gaseous state. Lighter	loss of oil. At 15°C gaso	line will	
	factions are lost first.	evaporate completely ov	/er a 2-	
		day period, 80% of diese	el fuel	
		and 40% of light crude, 2	20% of	
		heavy crude and about \$	5- 10%	
		of Bunker C fuel.		
Emulsification	Small water droplets	Will increase the amoun	t of	Onset may be
	get mixed into liquid oil.	pollutant to be recovered	d by a	delayed but
	Water content will	factor of 2 - 4.	emulsification	
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Process	Description	Importance	Time Frame
	reach 50-80%.		process will start rapidly.
Natural	Breakup of an oil slick	Removes oil from water surface	< 5 days
Dispersion	into small droplets		
Dissolution	Mixing of soluble oil	Water soluble components are	< 5 days
	components into water	most toxic	
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.</p>
- ➢ 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:

Appearance	Thickness
Silver Sheen	0.0001mm
Rainbow sheen	0.003 mm
Light brown/ Black slick	0.1 mm
Dark brown/ Black slick	> 1 mm

Table.2.5: Appearance and Thickness of Slick

To determine an approximate quantity of spilled oil in the event of a spill, the following formula is used:

 $V = L \times W \times T / 100$

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:

Comp.	Spill Location	WD (m)	Spill Qty	Туре	Spill Location
Runs				of oil	Co-ordinates
Α	SPMs				-
1	SPM-HMEL (S1)	29.50	700 tons	Crude	69° 37' 23.19" E,
2			10000 tons	Crude	22° 40' 59.06" N
3			25000 tons	Crude	
4			10000 m ³ /h	Crude	and the
			for 60 sec		A / 1
5	SPM-IOCL (S2)	28.45	700 tons	Crude	69° 39' 14.05" E,
6			10000 tons	Crude	22° 40' 47.21" N
7	Contraction (Don		25000 tons	Crude	1. 191
8			10000 m ³ /h	Crude	
			for 1 min	8 . AL	
В	VLCC Jetty				
9	Spill Location (S15)		700 tons	Crude	69° 40.78' E,
10			10000 tons	Crude	22° 43.6' N
11		15.71	25000 tons	Crude	
12			10000 m3/hr	Crude	
			for 1 min	2	
С	Pipeline				
13	Crude oil spill of 2611 tons at		12500 m3/hr	Crude	69° 39' 43.35" E,
	the pumping rate of 12500	C	for 3hr		22° 42' 36.39" N
	m3/hr for 60 sec (2611 Tons	TO			
	of crude for 36 hrs) along the	01.00			
	pipeline corridor at a select	21.20			
	(midway) point of subsea				
	pipeline in the pipeline routes.				
	Spill point: (S3)				
D	Tanker Route				
14	Instantaneous crude oil spill				
	of 25000t along the tanker		25000 tons	Crude	69°32'11.38'' E,
	route at select location	22.54			22°36'1.13" N
	Spill point: S4				
E	West Basin (berths)				

Table.2.6 Details of Oil Spill Scenarios





15	100 tons (due to Berthing incident/ collision) at the West Basin berths (FO) Spill point: S5			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	14.0	61	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	14.4	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	17.0	08	700 tons	FO	69°33'40.66'' E, 22°43'36.31" N
F	LNG berth			1	1	
21	100 tons (due to Berthing incident/ collision) at the LNG berth (FO) Spill point: S8			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	13.	76	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
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	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: o 20 Tons of HSD oil due to Tug Impact		20 Tons 100 Tons	HSD FO	69°41'33.62'' E, 22°44'6.49" N
	 100 Tons of FO due to Tug Impact 	17	2		
RZ	Spill point: S10				11
Н	Mundra Port				
	At the existing MPT1 berth: : Spill Point S11		~~~~		69°42'20.45" E, 22°43'32.17" N
29	100 tons (due to Berthing incident/ collision) at the berth (FO)	701	100 Tons	FO	69°42'20.45'' E, 22°43'32.17" N
	Spill point: S11				A. 1
30	50 Tons (due to Berthing incident/ collision (diesel oil tanks)) at the berth (HSD) – Spill point: S11	20.80	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	<u>~</u>	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	for	00	10	69°42'56.30'' E, 22°44'36.69" N
32	100 tons (due to Berthing incident/ collision) at the (FO) - Spill point S12	15.12	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.

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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





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	133 19
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
	Shoreline Cleanup Equipment's		
1	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.

LIST OF RESOURCES AVAILABLE-ADANI PORTS and SEZ LIMITED, MUNDRA						
		Tugs Availat	ole for Oil Spill	Containment		
Name of Tug	Туре	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						
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Additional equipment and location





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, MU	NDRA
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	2no
collector LSC-3C/2300(01C02-P536). Oil transfer pump OT A 50 with oil	2sets
transfer hose set	
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 Itr capacity	1no
Portable pumps	2no
Two -way hydraulic maneuvering panel	2no
Oil containment boom	2000 mtr
-length 2000 meters, height-1500 mm, draft-900mm, free board-600mm	
Current buster room	2no
-fasflo-75 (for response in fast current)	
Skimmer	4no
-KOMARA 15 duplex skimmer system with floating IMP 6 PUMP	
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	2no
inter tidal zones	
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: <u>amose@amosc.com.au</u> Web: <u>http://www.aip.com.au</u>
- 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 : <u>giefost@club-internet.fr</u>

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: <u>osrl@osrl.co.uk</u> Web: <u>http://www.oilsillresponse.com</u>

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: <u>mail@pcs.gr.ip</u> Web : <u>http://www.pcs.gr.ip</u>

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.





Risk assessment study and preparation of contingency plan for marine oil spills at Adani Ports in Mundra

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

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 	

Table.4.1: Major functions of Crises Management Team

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



Risk assessment study and preparation of contingency plan for marine oil spills at Adani Ports in Mundra



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:



Risk assessment study and preparation of contingency plan for marine oil spills at Adani Ports in Mundra

- i. Chief Operating Officer APSEZL Mundra
- ii. Incident Control Officer (HOS - Marine / Duty Port Captain)
- iii. Site Emergency Coordinator (Senior Pilot and Radio Officer)
- Fire Coordinator (HOS Fire / HOS Safety) iv.
- HOS Security / Duty Security officer ٧.
- Medical Superintendent vi.
- vii. Marine Pollution Coordinator – Manager (Marine /Pollution Control)
- viii. Traffic Coordinator - Duty Port Captain
- Communications Officer (Duty Port Captain / Duty Radio Officer) ix.
- Chief Emergency Controller (Head -HSE) х.
- Civil Coordinator (HOS Environment Cell / HOS Estate) xi.
- xii. Marine Engineering Coordinator (HOS – SPM / Diving Team in-Charge)
- xiii. HOD – Corporate Affairs
- HOS-Legal & HOD Estate xiv.

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.



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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 sirencontinuous 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

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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

b.

- a. Knowledge of Contingency Plan and Procedures
 - 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	Landline- Adani Ports and SEZ	02838-255739
Control)	Limited, Mundra	
	VHF – Adani Ports and SEZ	VHF Channel -77 & 16
	Limited, Mundra	
COC (MMPT Marine Control)	Landline No	02838-255739
	Mobile	98252 28673
	VHF	VHF Channel -77 & 16
Harbour Master / CIC	Landline – Adani Ports and	02838-277727
	SEZ Limited, Mundra	
	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, who in 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 V	√essel)	
Incident Number (Sq number	/ dd /mm/ yyyy)	
1.DETAILS		
Time of recording	(24 hr format)	Date
Day		
Person / Organization repo	orting incident	
Name	Designation	
Contact number		
2. INCIDENT		
Name of VESSEL	Location	
Position (if not alongside) La	atitude	
La	ongitude	
Sounding	Same	
Incident details		
Time (Of	incident, 24 hrs format) Date	
Cause of spill		
Type of oil		
Estimated quantity	of spill	
Details of damage t	o vessel / installation	
3. COMMENTS		
1. Recorded by Nam	P	





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(a	is per)
N. C	1	2.0°
 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

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- 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.









Table.10.1 Contact Details of Spill Information Center

SI 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	





Place Name	Address of Centre	Contact Details	
Bhuj (Kutch)	District Collector Office Near Circuit House, Mandvi Road, Nr. Mota Bandh, Bhuj (Kachchh) Guiarat – 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	
Khambhalia	District Collector Office 1st Floor, Lalpur Bypass Road, Dharampur, Khambhalia, Gujarat - 361305	 91 2833 232805 +91 2833 232102 <u>collector-devbdwarka@gujarat.gov.in</u> 	

Table.10.3 Contact Details of Gujarat Fisheries Development Council

SI 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	No.	Phone: (079) Fax : (079) 2161) 2323 2152) 2323 2156, 2322 2784, 2323
	Gujarat Pollution Control Board Paryavaran Bhavan, Sector-10A, Gandhinagar-382010.	gpcbchairma chairman-gpo Member Sec	n@gmail.com, cb@gujarat.gov.in retary:
Morbi	Regional Center RR4F+6P7, Scientific Vadi, Sardar Nagar, Morbi, Gujarat 363641	Tel : <u>02822 22</u>	8 001
Jamnagar	Regional Center Sardar Patel Commercial Complex, Rameshwar Nagar regional centre Kasturba Gandhi Vikas Gruh Marg, Bedi Bandar Road Jamnagar- 361 008	Telephone Fax: Email:	(0288) 2752366 (0288) 2753540 <u>ro-gpcb-jamn@gujarat.gov.in</u>
Bhuj	Regional Centre Katira Commerical Complex-1, Nr.Manglam 4 Rasta,Sanskar Nagar, Nr.I.Tax Ofic,Bhuj 370001	Telephone: Fax: Email:	(02832) 250620 - ro-gpcb-kutw@gujarat.gov.i



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10.1.2 Coastal Charts, Currents, Tidal Information Prevailing Winds



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

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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.

Direction Sector	Return Period	Inshore	Hs	T2
(°N)	(years)	Direction (°N)	(m)	(sec)
	1	222	1.2	5.0
210	5	222	1.4	5.3
	20	221	1.6	5.8
	100	221	1.8	6.1
	1	226	1.5	5.4
240	5	226	1.7	5.8
	20	225	1.8	6.1
	100	225	2.0	6.5
	1	239	1.4	5.5
270	5	236	1.7	6.3
	20	236	1.8	6.7
	100	235	2.0	7.4
10	1	240	0.8	5.2
300	5	240	0.9	5.6
	20	239	1.0	6.2
	100	238	1.2	6.7

Design Waves at Mundra

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.



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

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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)

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.

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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



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	Natura I recovery	Comments	
Rocks, Boulders and Artificial structures	V	NA	V	t TO	Poor access may prevents pumping /skimming. Expos ed/ remote shorelines best left to natural recovery	
Cobbles, Pebbles and shingle	V	Х	V	+	Exposed / remote Shorelines best left to natural I 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 washi ng/Sand	Dispersa nts	Natural organic sorbents	Batch recover y	Natur al recov ery	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	Х	+	+	+	+	If load bearing character good, consider pus hi ng oi led material to surf zone to enhance	





Sand	V	x	+	NA	+	+	Soli d oi l can be recovered using beach cleaning machines. Enhance natural recovery by ploughing/harrowing
Mud flats marshes and mangrove s	+	x	x	+	NA	V	Operations should preferably be carried out on the water from small, shallow-drought vessel s.

V: Vi a bl e + = Possibly useful X = Not recommended NA: Not Appi ca bl e

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 _{(m} 3)
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
10	Super sacks	0.5 to 2.5
0	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 Fuel s	Refining		
Oil debris	Incineration	Open burning	Landfill
Oily PPE	Incineration	Landfil	

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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:

SI. 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, 15 th 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	2no
	LSC-3C/2300(01C02-P536). Oil transfer pump OT A 50 with oil transfer hose set	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



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12	Portable pumps	2no
13	Two -way hydraulic maneuvering panel	2no
14	Oil containment boom	2000 mtr
	-length 2000 meters, height-1500 mm, draft-900mm, free board-600mm	
15	Current buster room	2no
	-fasflo-75 (for response in fast current)	
16	Skimmer	4no
	-KOMARA 15 duplex skimmer system with floating IMP 6 PUMP	
4.7	12.5T flexible floating storage tank (PUA).	3no
1/		
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	A COL

1. Adani Ports SEZ Limited, Mundra:

DESIGNATION	APPOINTED MEMBER
Chief Incident Controller (CIC)	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 • <u>collector-jam@gujarat.gov.in</u>
Khambhalia	District Collector Office 1st Floor, Lalpur Bypass Road, Dharampur, Khambhalia, Gujarat - 361305	 91 2833 232805 +91 2833 232102 <u>collector-devbdwarka@gujarat.gov.in</u>

Contact Details of Gujarat Fisheries Development Council

SI 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	

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State Pollution Control Board – Regional Offices

	Address of Centre	Contact Details
Gandhi nagar		Phone: (079) 2323 2152 Fax : (079) 2323 2156, 2322 2784, 2323 2161
	Gujarat Pollution Control Board Paryavaran Bhavan, Sector-10A, Gandhinagar-382010.	gpcbchairman@gmail.com, chairman-gpcb@gujarat.gov.in Member Secretary :
Morbi	Regional Center RR4F+6P7, Scientific Vadi, Sardar Nagar, Morbi, Gujarat 363641	Tel : <u>02822 228 001</u>
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



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	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 /	Telephone Nos.		
0.110.	designation	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		1
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 FOIFO 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



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7. OPERATION PLANNING

The response operations planning will follow the initial response actions. The procedures to be adopted have been discussed below:



 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

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Risk assessment study and preparation of contingency plan for marine oil spills at Adani Ports & Special Economic Zone Ltd, Mundra



- 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

 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



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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:
 - 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.

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- 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:

S.		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;

Table 7.1: Technique for Oil Spill Sampling





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 (m³)
 - 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.

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- 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
- 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

- 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

- The purpose of shoreline clean-up should be to produce a net environmental benefit. Cleanup 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.

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- 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.
- 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.
 - s

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

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	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.



 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.

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- 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: <u>amose@amosc.com.au</u> Web: <u>http://www.aip.com.au</u>





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: <u>osrl@osrl.co.uk</u> Web: <u>http://www.oilsillresponse.com</u>

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: <u>mail@pcs.gr.ip</u> Web : <u>http://www.pcs.gr.ip</u>

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"

Preparing Operations Accounting and Financing Reports 8.6

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.

Preparing Releases for Public and Press Conferences 8.7

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



- 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 socioeconomically 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.









Table.10.1 Contact Details of Spill Information Center

SI 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,	Phone: +91 2832 250650
	Nr. Mota Bandh,	Fax: +91 2832 250430
	Bhuj (Kachchh)	Email: collector-kut@gujarat.gov.in
	Gujarat – 370001	
Jamnagar	District Collector Office, Jilla Seva Sadan,	Collector, Jamnagar
	Sharu Section Road, Jamnagar - 361002	 +91 288 2555869
		 +91 288 2555899
1		collector-iam@quiarat.gov.in
	Valanda Maria	
- /8	District Collector Office	91 2833 232805
11/	1st Floor, Lalpur Bypass Road, Dharampur,	+91 2833 232102
	Khambhalia,	collector-devbdwarka@gujarat.gov.in
Khambhalia	Gujarat - 361305	

Table.10.3 Contact Details of Gujarat Fisheries Development Council

SI 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	C	Contact Details
Gandhi nagar	No.	Phone: (079) 2 Fax : (079) 2 2161	2323 2152 2323 2156, 2322 2784, 2323
4	Gujarat Pollution Control Board Paryavaran Bhavan, Sector-10A, Gandhinagar-382010.	gpcbchairman@ chairman-gpcb Member Secre	<u>⊅gmail.com,</u> @gujarat.gov.in ⊪tary:
Morbi	Regional Center RR4F+6P7, Scientific Vadi, Sardar Nagar, Morbi, Gujarat 363641	Tel : <u>02822 228 (</u>	001
Jamnagar	Regional Center Sardar Patel Commercial Complex, Rameshwar Nagar regional centre Kasturba Gandhi Vikas Gruh Marg, Bedi Bandar Road Jamnagar- 361 008	Telephone Fax: Email:	(0288) 2752366 (0288) 2753540 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: Fax: Email:	(02832) 250620 - ro-gpcb-kutw@gujarat.gov.i



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10.1.2 Coastal Charts, Currents, Tidal Information Prevailing Winds



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.

Direction Sector (°N)	Return Period (years)	Inshore Direction (°N)	Hs (m)	T2 (sec)
	1	222	1.2	5.0
210	5	222	1.4	5.3
	20	221	1.6	5.8
	100	221	1.8	6.1
	1	226	1.5	5.4
240	5	226	1.7	5.8
	20	225	1.8	6.1
	100	225	2.0	6.5
	1	239	1.4	5.5
270	5	236	1.7	6.3
	20	236	1.8	6.7
	100	235	2.0	7.4
10	1	240	0.8	5.2
300	5	240	0.9	5.6
	20	239	1.0	6.2
-	100	238	1.2	6.7

Design Waves at Mundra

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.



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

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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)

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



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

			PRI	MAY CLEANUP	
	Pumping / skimming	Mechanical removal	Manual removal	Natura I recovery	Comments
Rocks, Boulders and Artificial structures	V	NA	V	+	Poor access may prevents pumping /skimming. Expos ed/ remote shorelines best left to natural recovery
Cobbles, Pebbles and shingle	V	Х	V	+	Exposed / remote Shorelines best left to natural I recovery
Sand	V	+	V	+ 0	Heavy equipment only applicable on firm beaches
Mud flats marshes and	+	X	+	V	Operation preferably carried out on the water from small, shallow drought vessels.

	FINAL CLEANUP								
	Low pressure flushing	High Pressure washi ng/Sand	Dispersa nts	Natural organic sorbents	Batch recover y	Natur al recov ery	Comments		
Rocks, Boulders and Artificial structures	NA	V	1+1	У+К	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 pus hi ng oi led material to surf zone to enhance		



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Sand	V	x	+	NA	+	+	Soli d oi l ca n be recovered using beach cleaning machines. Enhance natural recovery by ploughing/harrowing
Mud flats marshes and mangrove s	+	x	X	+	NA	V	Operations should preferably be carried out on the water from small, shallow-drought vessel s.

V: Vi a bl e + = Possibly useful X = Not recommended NA : Not Appi ca bl e

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 _{(m} 3)	
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	
- 10	Super sacks	0.5 to 2.5	
	Barrels or drums	~0.2	
1	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 Fuel s	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	8 1 8
Hazardous wastes	Social handling storage treatment		

Table 10.6: Approved Waste Handling Contractors:

SI. 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, 15 th F ^{Ioor} 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	2no
	LSC-3C/2300(01C02-P536). Oil transfer pump OT A 50 with oil transfer hose set	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	2000 mtr
	-length 2000 meters, height-1500 mm, draft-900mm, free board-600mm	
15	Current buster room	2no
	-fasflo-75 (for response in fast current)	
16	Skimmer	4no
	-KOMARA 15 duplex skimmer system with floating IMP 6 PUMP	
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	A-MA

1. Adani Ports SEZ Limited, Mundra:

DESIGNATION	APPOINTED MEMBER
Chief Incident Controller (CIC)	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
Khambhalia	District Collector Office 1st Floor, Lalpur Bypass Road, Dharampur, Khambhalia, Gujarat - 361305	 91 2833 232805 +91 2833 232102 <u>collector-devbdwarka@gujarat.gov.in</u>

Contact Details of Gujarat Fisheries Development Council

SI 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

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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



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	1	1	1
	Govt. of Gujarat		079-23252156(Fax)
13	Gujarat Pollution Control	Environmental Engineer	079-232 22756
	Board		079-232 22784 (Fax)

List of Important Telephone Numbers of Adani Group Personnel

S No	Description / contact person /	Telephon	one Nos.		
0.110.	designation	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		14
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



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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 cleanup 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 are Gujarat 3. Net environment benefit analysis studies plan for Adani Hazira Port, Hazira, Surat	eas of Hazira, and response		
15	Oil spill response plan development for Cairn CB/Os onshore and offshore facility, Gulf of Khambhat , Gu	S-2 Suvali Jjarat	2015	Cairn Energy Pvt. Ltd., Suvali
16	1. Oil spill risk assessment, net environment benefit and response plan for Reliance Industries Limited S Surat.2. Mapping of marine sensitive areas in the co Hazira, Gujarat. 3. Net environment benefit analysis response plan for Reliance Industries Limited SPM	t analysis studies SPM at Hazira, bastal areas of s studies and at Hazira, Surat	2015	Reliance Industries Ltd., Hazira
17	1. Oil spill risk analysis and modelling studies for ES Terminal Ltd at Hazira in Gulf of Khambhat, Gujarat marine sensitive areaa in the coastal areas of Hazir environment benefit analysis studies and response Bulk Terminal Limited, Hazira	SSAR Bulk 2. Mapping of a, Gujarat 3. Net plan for ESSAR	2015	ESSAR Bulk Terminal Limited, Hazira.
18	Oil spill risk assessment study and contingency plar Mukta Oil Fields of BGEPIL, West Coast of India	nning for Panna-	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 Ra East Coast of India	vva Oil Field,	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 plar	nning for Krishna	2013	Oil and Natural Gas
9	Adani Ports and Special Economic Zone Ltd, Mundra	References	,	Rev.No: 3 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3 Page No: 115



	- 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



Risk assessment study and preparation of contingency plan for marine oil spills at Adani Ports in Mundra



43	Oil spill risk assessment due to crude oil leak from th 30" oil trunk pipeline from Mumbai High to Uran	he ruptures in the	2012	Oil and Natural Gas Corporation (ONGC), Mumbai
44	Oil spill risk assessment due to oil spill in the offshor Mumbai Port	Oil spill risk assessment due to oil spill in the offshore waters off Mumbai Port		CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai
45	Numerical modelling studies for oil spill risk assessm response plan for RIL Jamnagar marine facilities	nent and	2012	Reliance Industries Ltd.
46	Risk assessment study of marine oil spills for existin extension of jetties & SPMs of Vadinar Oil Terminal pathfinder inlet, Gulf of Kutch, Jamnagar	ng & proposed Limited at	2011	Vadinar Oil Terminal Limited (VOTL), Jamnagar
47	Oil spill risk assessment study for IOCL at Vadinar C Kutch, Jamnagar	Coast, Gulf of	2011	CSIR-National Institute of Oceanography (NIO), Regional Center, Mumbai & Indian Oil Corporation Limited
48	Risk assessment study of marine oil spills for KPT S Product Jetty, Vadinar, Gulf of Kutch	PMs and	2011	CSIR-National Institute of Oceanography (NIO), Goa & Kandla Port Trust, Vadinar
49	Comprehensive risk analysis study of existing SPM in Gulf of Kutch at Vadinar, Gujarat	facilities of IOCL	2011	Indian Oil Corporation Limited, Pipelines Division, Noida
50	Oil spill risk analysis and contingency plan for Multi (Adani Hazira Port Private Limited, Hazira, Surat	Cargo Port by	2011	Adani Hazira Port Pvt. Ltd., Surat
51	Oil spill risk analysis and contingency plan for ESSA Limited, Hazira	R Bulk Terminal	2010	ESSAR Bulk Terminal Limited, Hazira.
52	Oil spill assessment studies for the oil spill occurred Panna Oil Field	at SPM in the	2009	BG Exploration and Production India Limited, Mumbai
53	Oil spill risk assessment study for the extension of p facilities of Vadinar Oil Terminal Limited product jetti coast of Kutch Jamnagar.	roposed marine ies at Vadinar	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 Gulf of Kutch	of Cairn Energy,	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 contai	iner berths at	2008	CSIR-National Institute of
9	Adani Ports and Special Economic Zone Ltd, Mundra	References	1	Rev.No: 3 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3 Page No: 117



	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 &
			B No. 02 D4 20th L.L. 2022





			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



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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 : <u>www.environsoftware.com</u>) 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		
Rank		
SHORE / INSIDE HARBOUR		
Date		
Shift		
Area		
Longitude		
NM Sounding		
Incident Severity (tick one)		
Minor / Major / Tier I / Tier II / Tier III		
Brief details of incident and action taken		
Direction Sea State		
Direction		
nperature Fog / Mist		
dity Cloud cover		





OPERATION DATA

Type of Boom / Booms deployed	Total LengthIn Depth
Power Pack Running hrs	Skimmer Running hrs
Oil Recovered from water Liters /	Tons Oil transferred ashoreLitres/Tons
Oil / Sludge cleared from shoreKg	Sorbents pads useNos.
O.S.D usedLiters	Saw Dust usedKg
LOGISTICS AND MANPOWER	
Name and type of the vessel / boats available for	or assistance
Name and type of the vehicles available for ass	istance
Manpower utilized	
Fireman Security Services men	Others
FORM COMPLETED BY	6 18 M
Name	
Rank / Designation	
Signature	
Time Date	
On completion, this form is to be handed over hand over this form to ECR Team Leader. In at Team Leader directly	r to OSC, who in turn after his comments would osence of any OSC it may be handed over to ECR





(To / From)	
	1001
	YXA
	N X





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							
	1	Date and time					
	2	Position					
Part I (POLAR WARN)	3	Incident					
	4	Overflow					
	5	Acknowledge					
ALAR4	1						
	2	Position					
Design of the second se	3						
	4	Characteristic of Pollution					
	6	Source and Course of pollution					
	3						
	1	Current or tide					
Part ii (POLINE)	0	See state and visibility					
	10						
	10	Forecast					
	12	Identify of observer and ships on scene					
	12	Action taken					
	14	Photograph or samples					
	15	Name of other agencies informed					
	1	Date and time					
	2	Baguast for assistance					
	3						
	3	Cost					
901	4	Pre-arrangements for the delivery					
	5	Assistance to where and how					
	6	Other agencies requested					
Falt III (FOLFAC)	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	tion :			
Summary of Incident Response Resou	rce Utiliz	ation :		
Number of Aircraft:	No.	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:	10			
Total amount of oil spilled:		Tonnes		
Total amount of oil recovered:		Tonnes		
Outstanding amount of spilled oil:	No.	Tonnes		
Mass balance:		Tonnes		
Estimated natural weathering:		Tonnes		
Mechanically agitated		Tonnes		
Chemically dispersed		Tonnes		
Skimmer recovered		Tonnes		
Sorbent recovered		Tonnes		
Manually recovered	h_{1}	Tonnes		
Bioremediated::	I.	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)

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	Mumbai		
11	Gujarat Maritime Board	Vice Chairman & CEO	079-23238346 / 23238363
		Chief Nautical Officer	079-23234716
12	Ministry of Environment	Director (Environment)	079-23252154 / 23251062
	Govt. of Gujarat		079-23252156 (Fax)
13	Gujarat Pollution Control	Environmental Engineer	079-232 22756
	Board	100 0 C 20 0	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

Age	Agencies for Supplying Shore Cleanup Equipment and Safety Gears				
Agency	Addres	Contact Number			
M/s Envirocare Systems	4-B, Apeejay surrendra House, 4 th Floor, 24, Baroda Street, Mumbai – 400009 Email: <u>envirocaresystems1@gmail.com</u> Web: <u>www.envirocaresystems.net</u>	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: <u>sales@hitechelastomers.com</u>	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: <u>shipping@sadhav.com,</u> <u>osv@sadhav.com</u> Web: <u>www.sadhav.com</u>	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
Khambhalia	District Collector Office 1st Floor, Lalpur Bypass Road, Dharampur, Khambhalia, Gujarat - 361305	 91 2833 232805 +91 2833 232102 <u>collector-devbdwarka@gujarat.gov.in</u>

2. FISHERIES

SI 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		
adar	Adani Ports and Special Economic Zone Ltd, Mundra	A	ppendix	Rev.No: 03 Dt: 30 th July 2022 Doc No: ENVR 2022-003-R3 Page No:131	4



3. STATE POLLUTION CONTROL BOARD – REGIONAL OFFICES			
	Address of Centre	Contact Details	
Gandhinagar		Phone: (079) 2323 2152 Fax : (079) 2323 2156, 2322 2784, 2323 2161	
	Gujarat Pollution Control Board Paryavaran Bhavan, Sector-10A, Gandhinagar-382010.	<u>gpcbchairman@gmail.com,</u> <u>chairman-gpcb@gujarat.gov.in</u> Member Secretary:	
Morbi	Regional Center RR4F+6P7, Scientific Vadi, Sardar Nagar, Morbi, Gujarat 363641	Tel : <u>02822 228 001</u>	
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.ir	
Bhuj	Regional Centre Katira Commerical Complex-1, Nr.Manglam 4 Rasta,Sanskar Nagar, Nr.I.Tax Ofic,Bhuj 370001	Telephone: (02832) 250620 Fax: - <u>Email: ro-gpcb-kutw@gujarat.gov.in</u>	







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 / RE	PO	RTER	Server -		1000	
Full Name:		Organization Company:				
Contact Telephone No,:		Contact E-mail:				
INCIDENT DETAILS					1000	
Operator / organization / company responsible for incident:						
Date of Incident:)	Time of incident:			
Installation / facility:	Fi>	Fixed/Mobile(delete as applicable)		24	Field Name:	
Latitude:	Lo	ongitude:			Quad & Block no:	
Oil release / Chemical release o	r pe	rmitted discharg	e Notification (tic	k bel	ow and complete column	
details as applicable).						
Oil release		Chemical rele	ase Notification	Pe	rmitted discharge Notification	
Max Released (tones):	1	Quantity Rele	ased (kgs):	Ma	x oil discharged (tones):	
Min released (tones):		Chemical Nar	ne:	Mir	Min oil discharged (tones):	
Type of oil:		Chemical Use	9:	Тур	be of oil:	
Tier of response (1,2 or 3):%Oil i		%Oil if OBM of	OBM or base oil:		Oil conc. In discharge:	
(as per Oil pollution emergency W		Warning Label:		Discharge rate M3 / hr		
Plan)						
Appearance:	A	Appearance:		Ар	pearance:	
Approx. release area on sea	A	Approx. release	area on sea		Approx. release area on sea	
surface (m2 or km2): surface (m2 or k		m2): surface (m2 or km2):		face (m2 or km2):		
Is release ongoing? YES/NO (if YES notification must be updated & reported each 24 hr period unless						
otherwise directed by Indian Coa	ast C	Guard)				
Release since last report (tones)):		Total R	Relea	se 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):			

ada



APPENDIX-11: APPLICATION FOR SEEKING COASTGUARD APPROVAL

FOR OSD APPLICATION

Fax To:			Tele No:	
IDENTITY OF OBSERVER / RE	PORTER	No.	See and a second se	
Full Name:	1 and the second	Organization	Company:	
Contact Telephone No	1.0 m	Contact E-ma	il:	
DETAILS OF SPILLS	~020	612	2234	
Quantity Particu	lars of oil	Date of incident	Time of Incident	
LOCATION				
Latitude:	Longitude:		Depth of Water	
LOCATION		2.00		
Landmark				
Oil Type:			YXA	
QUANTITIES OF OIL SPILLED	AND SOURCE:		DY X I	
DESCRIPTION OF SLICKS	Dal			
Dimensions Color				
OTHER METHODS OF RESPO	NSE BEING APP	LIED OR CONS	IDERED	
WEATHES CONDITIONS			A ABOY	
Wind Speed (Knots):		Wind Direction (0-360)		
Beaufort scale (1-12):		Wave Height (Meters):		
SENSITIVE AREAS IN PROXIM	IITY AND TYPE		X	
PARTICULARS OF OSD			and the	
Name of OSD Held with	Quantity held with	th	Whether the OSD approved	
~()	On h	ar U	for use in Indian waters-	
	1. IX			
Toxicity (LC50 value for 96	Efficiency		Solubility	
hours)				





APPENDIX – 12 : PRESS RELEASE FORMAT

INITIAL PRESS STATEMENT FORM - POLLUTION INCIDENT

Public Statement Number 1.

An oil spill occurred at <u>.....hours of date in the facilities of Adani port</u>, West coast of India.

The location of the incident is <u>......in the offshore of Adani facilities</u>.

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 farlitres/ 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			Cor ed ` No	npli Yes/	Remarks
RISK ASSE	ESSMENT				
1	Whether the facility produces/ hand imports/ stores any type of petroleu	les/ uses/ m 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 sp occur in the worst-case scenario is	ill that can considered	Yes		25000 T Chap2, refer Para 2.5.3-page No: 21 & Chapter-4 Part-B report
5	Whether relative measure of the pro- consequences of various oil spills in case scenario are taken into accourt	bability and Including worst Int	Yes	d	Chapter2 refer para 2.5.3 Page No. 23 & Chapter-4 Part-B report
6	Whether all types of spills possible are considered including Grounding Fire, Explosion, Rupture of hoses	in the facility , Collision,	Yes	2	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			de, D & I Oil	Chapter2 refer para 2.8 Page No. 24 & Chapter-4 Part-B report
8	Whether the vulnerable areas are e considering maximum loss scenaric condition	stimated by and weather	Yes	1	Chapter2 refer para 2.12 Page No. 31
9	Whether impacts on the vulnerable made after considering the Marine p areas, population, fishermen, saltpa mangroves, corals and other resour that area	areas are protected ans, rces within	Yes	<i>''</i>	Chapter2 refer para 2.12- & 2.13-Page No. 31,32 & Chapter-3 Part-C report
10	Whether measures for reduction of risks are included by reducing the c through spill mitigation measures	identified high onsequences	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 month after considering the probabi and current and consequences of e	for each lity with tide ach such spill	NA		
13	Whether prevention and mitigation i included in the plan	measures are	Yes		Chapter8 refer para 8.1 Page No 84
14	Whether the spill may affect the sho	oreline.	Yes		Part-B report, chapter 5-OS
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	(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	Yes	Part-C report Annexure-1
	protected on priority		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	LAN .
22	Whether any saltpan in the area is going to be affected	No	16
23	Whether any mangroves in the area will be affected by a spill	No	1 Part
Prepared	less		
24	Whether any containment equipment is available	Yes	Chapter4, refer para 4.2 Page No. 43
			1 age 110. 40
25	Whether any recovery equipment is available	Yes	Chapter4 refer para 4.2 Page No. 43
25 26	Whether any recovery equipment is available Whether the facility is having any temporary storage capacity	Yes Yes	Chapter4 refer para 4.2 Page No. 43 Chapter4 refer para 4.1 Page No. 43
25 26 27	Whether any recovery equipment is available Whether the facility is having any temporary storage capacity Whether location of the oil spill response equipment is mentioned in the plan	Yes Yes Yes	Chapter4 refer para 4.2 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.1 Page No. 43
25 26 27 28	Whether any recovery equipment is available Whether the facility is having any temporary storage capacity Whether location of the oil spill response equipment is mentioned in the plan Whether suitable vessels available for deploying the boom, skimmer etc	Yes Yes Yes Yes	Chapter4 refer para 4.2 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.4 Page No. 44
25 26 27 28 29	Whether any recovery equipment is availableWhether the facility is having any temporary storage capacityWhether location of the oil spill response equipment is mentioned in the planWhether suitable vessels available for deploying the boom, skimmer etcWhether OSD held with facility	Yes Yes Yes Yes Yes	Chapter4 refer para 4.2 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.4 Page No. 44 5000 Ltrs – Page No: 50
25 26 27 28 29 30	Whether any recovery equipment is availableWhether the facility is having any temporary storage capacityWhether location of the oil spill response equipment is mentioned in the planWhether suitable vessels available for deploying the boom, skimmer etcWhether OSD held with facilityWhether the OSD held with the facility is	Yes Yes Yes Yes Yes Yes	Chapter4 refer para 4.2 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.4 Page No. 44 5000 Ltrs – Page No: 50
25 26 27 28 29 30	Whether any recovery equipment is available Whether the facility is having any temporary storage capacity Whether location of the oil spill response equipment is mentioned in the plan Whether suitable vessels available for deploying the boom, skimmer etc Whether OSD held with facility Whether the OSD held with the facility is approved for use in Indian waters	Yes Yes Yes Yes Yes	Chapter4 refer para 4.2 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.4 Page No. 44 5000 Ltrs – Page No: 50
25 26 27 28 29 30 31	Whether any recovery equipment is availableWhether the facility is having any temporary storage capacityWhether location of the oil spill response equipment is mentioned in the planWhether suitable vessels available for deploying the boom, skimmer etcWhether OSD held with facilityWhether the OSD held with the facility is approved for use in Indian watersWhether the facility has MoU with other operators for tigr-1 preparedness	Yes Yes Yes Yes Yes Yes	Chapter4 refer para 4.2 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.4 Page No. 44 5000 Ltrs – Page No: 50
25 26 27 28 29 30 31 32	Whether any recovery equipment is availableWhether the facility is having any temporary storage capacityWhether location of the oil spill response equipment is mentioned in the planWhether suitable vessels available for deploying the boom, skimmer etcWhether OSD held with facilityWhether the OSD held with the facility is approved for use in Indian watersWhether the facility has MoU with other operators for tier-1 preparednessWhether the list of oil spill response	Yes Yes Yes Yes Yes Yes Yes	Chapter4 refer para 4.2 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.4 Page No. 44 5000 Ltrs – Page No: 50 Oil companies, HMEL Operators Chapter 9 refer para 9.1
25 26 27 28 29 30 31 32	Whether any recovery equipment is availableWhether any recovery equipment is availableWhether the facility is having any temporary storage capacityWhether location of the oil spill response equipment is mentioned in the planWhether suitable vessels available for deploying the boom, skimmer etcWhether OSD held with facilityWhether the OSD held with facilityWhether the facility has MoU with other operators for tier-1 preparednessWhether the list of oil spill response equipment available with each agency in MoU is deliberated	Yes Yes Yes Yes Yes Yes Yes	Chapter4 refer para 4.2 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.4 Page No. 44 5000 Ltrs – Page No: 50 Oil companies, HMEL Operators Chapter 9 refer para 9.1 page no. 89
25 26 27 28 29 30 31 32 33	Whether any recovery equipment is availableWhether the facility is having any temporary storage capacityWhether location of the oil spill response equipment is mentioned in the planWhether suitable vessels available for deploying the boom, skimmer etcWhether OSD held with facilityWhether the OSD held with facilityWhether the facility has MoU with other operators for tier-1 preparednessWhether the list of oil spill response equipment available with each agency in MoU is deliberatedWhether the facility has any MoU with private OSRO	Yes Yes Yes Yes Yes Yes Yes Yes	Chapter4 refer para 4.2 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.4 Page No. 43 Chapter4 refer para 4.4 Page No. 44 5000 Ltrs – Page No: 50 Oil companies, HMEL Operators Chapter 9 refer para 9.1 page no. 89 Chapter 9 refer para 9.4 page no. 91
25 26 27 28 29 30 31 32 33 34	Whether any recovery equipment is availableWhether any recovery equipment is availableWhether the facility is having any temporary storage capacityWhether location of the oil spill response equipment is mentioned in the planWhether suitable vessels available for deploying the boom, skimmer etcWhether OSD held with facilityWhether the OSD held with facilityWhether the facility has MoU with other operators for tier-1 preparednessWhether the list of oil spill response equipment available with each agency in MoU is deliberatedWhether the facility has any MoU with private OSROWhether the procedure for evoking the mutual aid is clearly described in the plan	Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	Chapter4 refer para 4.2 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.1 Page No. 43 Chapter4 refer para 4.4 Page No. 44 5000 Ltrs – Page No: 50 Oil companies, HMEL Operators Chapter 9 refer para 9.1 page no. 89 Chapter 9 refer para 9.4 page no. 91

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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 Pla	an		
41	Whether the plan outlines procedure for reporting of oil spills to Coast Guard	Yes	Chapter 2, refer para 2.6-
42	Whether the oil spill response action is clearly mentioned	Yes	Chapter 3, refer para 3.1-
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 a	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

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			-110	
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 c	orrect to my knowledge or belief	
Date	VERIFIED		valor / mstallation manager	
Date		(District Commander ICG) or his representative		
Date	Vest 10	No.	Regional Commander ICG)or his representative	
	0 32	12		


Risk assessment study and preparation of contingency plan for marine oil spills at Adani Ports & Special Economic Zone Ltd, Mundra



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 Adami 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
3а	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	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
Зс	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

adani

Risk assessment study and preparation of contingency plan for marine oil spills at Adani Ports & Special Economic Zone Ltd, Mundra



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.	3 Nos	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.	5 Nos	2 Nos.
	specifications.		AA .
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
	90	on for por	

Additional equipment and location

LIST OF RESOURCES AVAILABLE-ADANI PORTS and SEZ LIMITED, MUNDRA						
		Tugs Availal	ole for Oil Spill	Containment		
Name of Tug	Туре	BHP	OSD	AFFF	Capacity	BP
					(cum/Hr)	
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	2200 X 2	3000 ltr	2000 Itr	1200	55
	(DSV)					
Dolphin No. 14	ASD	3000 X 2	3000 ltr	2000 Itr	1200	70
Dolphin No. 15	ASD	3000 X 2	3000 ltr	2000 Itr	1200	70
Dolphin No. 16	ASD	3000 X 2	3000 ltr	2000 Itr	1200	70

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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	401 X 2		-	-	10
	screw			and the second se		

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 – 9



FAX/EMAIL

FROM	INDIAN COAST GUARD STATION VADINAR	TELE FAX: 02833-256333	
TO		EMAIL: cgs-var@indiancoastguard.nic.in	
10	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	EMAIL: mithilesh.k.singh@ril.com	
	INDUSTRIES LTD, JAMNAGAR		
	THE CHIEF OPERATIONS OFFICER, VOTL	EMAIL: alok.kumar@nayaraenergy.com	
	(NAYARA ENERGY LTD), VADINAR		
	THE CHIEF EXECUTIVE OFFICER, ESBTL,	EMAIL: umakant.singh1@essarport.co.in	
	SALAYA		
	THE MARINE HEAD, ADANI PORT & SEZ,	EMAIL: yogesh.nandaniya@adani.com	
	MUNDRA PORT		
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,

dhamp (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

– CG 152 came close for inspection and threw Saw dust in water.



– CG 152 completed the inspection and appreciated the quick and professional response from Dol-11.

: CG 152 advised all participants to hold position and keep the equipment deployed. Meanwhile CG 152 continued to inspect the deployment by all participants.

: Coastguard Dornier aircraft and chopper took the aerial rounds.

: OSC CG 152 appreciated all participants and advised all craft to call off the drill, pick up the deployed equipment and return to base.

: All deployed equipment recovered and secured. Dol-11 and victor commenced passage to Mundra.

1405: Dol-11 arrived Tug berth, Mundra.



Team Adani

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: All deployed equipment recovered and secured. Dol-11 and victor commenced passage to Mundra.

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Team Adani