

PRE-FEASIBILITY REPORT
ON
EXPANSION OF WATER FRONT
DEVELOPMENT PLAN
OF
MUNDRA PORT
BY
ADANI PORTS & SPECIAL ECONOMIC
ZONE LIMITED (APSEZ)

March 2019



Pre-Feasibility Report for Expansion of Waterfront Development Plan of Mundra Port

CLIENT	Adani Port & Special Economic Zone Limited (APSEZ)		
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1 Introduction

1.1 Background

Adani Port & Special Economic Zone Ltd (hereinafter referred to as “APSEZ”), India’s largest private port and special economic zone, was incorporated as Gujarat Adani Port Limited (“GAPL”) in 1998 to develop a private port at Mundra, on the west coast of India. The Government of Gujarat (“GoG”) and Gujarat Maritime Board (“GMB”) granted GAPL a concession to develop a deep water port in Mundra. APSEZ is intending to develop, construct, operate, and maintain the multi-cargo terminals and related infrastructure at the water front area of Mundra. APSEZ has prepared Master plan of Water Front Development Plan (WFDP) in 2009 and same has been approved by MoEF&CC. The validity of EC & CRZ clearance for the development of WFDP has expired and critical development activities pertaining to WFDP are yet to be completed. In order to undertake the remaining developments and also to optimize the Waterfront development plan for handling additional cargo based on the forecasted cargo inflow, APSEZ has proposed for an expansion of the existing WFDP. The proposed project expansion will occur within the boundary limits as defined in the master plan for the Waterfront development area. The proposed expansion is aimed at maximum utilization of available area and development of facilities/infrastructure by changing cargo configuration and optimization of layout .

1.2 Need for the Project

The Indian Economy has been on a growth trajectory since the process of liberalization started in the year 1991. Various sectors and new models of development have been adopted to address the basic infrastructure needed to match the growing GDP of the country. Among many sectors of infrastructure, Sea Port infrastructure are grossly inadequate for the nation to meet the growing challenges which in turn successfully integrate Indian Trade with the Global economy in terms of productivity, efficiency, state-of-art technology and surpass global developments in the Shipping sector.

Realizing this need, the Government of India has given adequate thrust to Sea Port infrastructure by setting targets to create a port capacity of around 3200 MT to handle the expected traffic of about 2500 MT by 2020.

As a result of the country’s economic growth and the resulting increase in trade, Indian ports have witnessed an increase in traffic. To cater the needs, attention has to be paid to the development of coastal shipping, development of value added services at the ports.

1.3 Existing Infrastructure

Mundra Port is located on the West Coast of India in Gulf of Kutch about 50 km west of

Kandla in District Bhuj of Gujarat state.

Figure 1-1: Location of Mundra Port in Kutch region



For the development of the Mundra port and SEZ, various environmental clearances have been taken from the Ministry of Environment and Forest as listed below:

Table 1-1 Chronology of the existing EC

S. No	Letter Number	Dated	Description/Details of clearance
1	J-16011/13/95-IA.III	25 th August 1995	Environmental Clearance for handling facility of General Cargo/LPG/Chemicals and their storage terminal at Navinal Island, Mundra Taluka of Kutch District, Gujarat.
2	J-16011/40/99-IA-III	20 th September 2000	Environmental Clearance for the proposed port expansion project including dry/break bulk cargo container terminal, railway link and related ancillary and back-up facilities at Mundra Port, District Kachchh in Gujarat by M/S Gujarat Adani Port Limited.
3	J-16011/30/2003-IA.III	21 st July 2004	Environmental Clearance for the proposed Single Point Mooring (SPM), Crude Oil Terminal (COT) and connecting pipes at Mundra Port, District Kachchh by M/S Gujarat Adani Port Ltd (GAPL)

S. No	Letter Number	Dated	Description/Details of clearance
4	J1-84/2006-IA.III	5 th February 2007	Environmental Clearance for proposed development of multipurpose berth (Terminal 2) at Mundra Port, Mundra District.
5	10-47/2008-IA.III	12 th January 2009	Coastal Regulation Zone and Environmental Clearance for proposed waterfront development project at Mundra District Kachchh, Gujarat of M/S Mundra Port and SEZ Limited
6	10-47/2008-IA.III	19 th January 2009	Addendum- Inclusion of south port and west port in the clearance accorded on 12 th January 2009
7	SEIAA/GUJ/EC/8(b)/44/2010	20 th February 2010	Environment Clearance for proposed project township and area development project at Survey No.141 (Part), Mundra village, Kutch district by M/s. Adani Mundra SEZ Infrastructure Pvt. Ltd in category 8(b) of schedule annexed with EIA Notification dated 14/9/2006.
8	SEIAA/GUJ/EC/7(h)/43/2010	20 th February 2010	Environment Clearance for establishment of Common Treatment Plant (CETP) of 17 MLD Capacity at Survey No.141 (Part), Mundra village, Kutch district by M/s. MPSEZ Utilities Pvt Ltd in category 7(h) of schedule annexed with EIA Notification dated 14/9/2006.
9	10-138/2008-IA.III	15 th July, 2014	EC for proposed Multi-Product SEZ and CRZ clearance for Desalination, sea water intake, outfall facility and pipeline, at Mundra by M/s Adani Port and SEZ Ltd.
10	10-47/2008-IA.III	7 th October 2015	Waterfront Development at Mundra in District Kachchh (Gujarat) by M/S Adani Port & SEZ Limited- Extension of validity of Clearance dated 12.01.2009.

As per the EC letter dated 7th October 2015, the extension of validity of clearance for WFDP has been granted up to 11th January 2019.

Mundra port is the largest port in the country and currently handling ~ 140 MMTPA cargos (predicted for FY 2018-19). As on date 7870 m long berths are developed which are handling Multipurpose cargo such as steel coils, steel pipes, steel slabs, agri products, fertilizers, other dry bulk cargo, project cargo, soya, liquid/gas/cryogenic cargo etc. In addition to these, other supporting infrastructures have been developed such as areas for

parking, CFS, godowns and other related utilities and amenities. The layout of the earlier approved WFDP master plan is attached as **Annexure-A**.

1.4 Proposed Expansion

APSEZ has earlier prepared Master plan of Water Front Development and same has been approved by MoEF&CC vide letter no. 10-47/2008-IA-III on 12th Jan 2009 and named as Water Front Development Plan (WFDP). Extension of validity was done further by MoEF&CC EC order dated 17th October 2015, wherein EC validity was increased upto 11th January 2019. Since all the activities in-line to existing Environment & CRZ Clearance were not completed, it is utmost importance to restore the current Environment & CRZ Clearance. Further, based on the growth of business and cargo ramp up, the need of development of the remaining components with minor modification as per the business needs and other technical suitability in the approved Water front development plan is required. Hence proposal for Environment & CRZ clearance for the optimization of Water front development plan has been prepared. All the activities proposed as part of the current expansion will be within the boundary of WFDP

Figure 1-2: Location of Existing and Proposed port on satellite image



Average dredge depth at berths will be from -17.5 m CD to -21.0 m CD. The layout map showing revised Water Front Development Plan is enclosed as **Annexure – B**.

The proposed expansion plan will comprise of the multi-purpose cargo and Liquid/Gas/cryogenic cargo handling quay development and associated facilities are given in the table below:

Table 1-2 Summary of the Overall development of the WFDP

S. No	Description	Approved Earlier to WFDP	Approved as per WFDP	Already developed	Proposed Expansion	Remarks
1	Total Area (ha)	5170				The proposed expansion of WFDP will utilise entire area for Multipurpose cargo handling. Area outside the CRZ, will also be used for industrial development with separate permissions, if applicable
2	Cargo Capacity (MMTPA)	225		140	385	There will be optimization of layout and Multipurpose berth operation concept will be adopted, which will increase the cargo handling capacity.
3	Quay Length (m)	22000		7870	14470	The increase in quay length is envisaged due to optimization of layout for Multi-purpose cargo handling
5	Dredging (MCuM)	-	210	123	350	Due to optimization of layout within the existing approved water front area additional dredging quantity is envisaged
6	Effluent Treatment Plant (KLD)	265	-	265	1000	Based on the future requirement, ~1000 KLD is proposed to be developed on Modular basis.
7	Sewage Treatment Plant (KLD)	-	50000	55	50000	Based on the future requirement 50 MLD will be developed in Modular basis
8	Desalination Plant (MLD)		300	47	400	Based on the future requirement additional units will be developed in Modular basis

Associated infrastructure Facilities

Necessary cross country pipelines within the WFDP will be developed progressively as per the requirements of the project. Necessary utility corridors such as pipelines, internal roads, railway lines, transmission lines etc will be developed wherever necessary within the WFDP. Other utilities such as Sewage Treatment Plant (STP), Effluent Treatment Plant (ETP), and desalination plant will be developed in phased manner as per the requirement.

1.5 Regulatory Requirements

Proposed project will fall under the expansion/modernization category-7(e) Ports and Harbours of the EIA notification 2006 and also attract CRZ Notification, amended till date. Project will be developed in various phases based on the cargo ramp up. The proposed project consists of development of quay for handling multipurpose cargo and multipurpose storage areas, construction and extension of breakwater, dredging and reclamation works, Desalination plant and other necessary utilities well within the defined boundary of WFDP Master Plan. The proposed development requires prior EC &CRZ clearance from MoEF&CC.

1.6 Structure of PFR

Chapter 1 gives an introduction about the project proponent, overview of the existing and proposed infrastructure and the regulatory requirements as applicable.

Chapter 2 describes the environmental attributes in the Mundra region of the proposed project site.

Chapter 3 gives the description in detail of the existing and the proposed project and its features, employment potential and the traffic forecast.

Chapter 4 explains the existing as well as the proposed Environmental Management Plan.

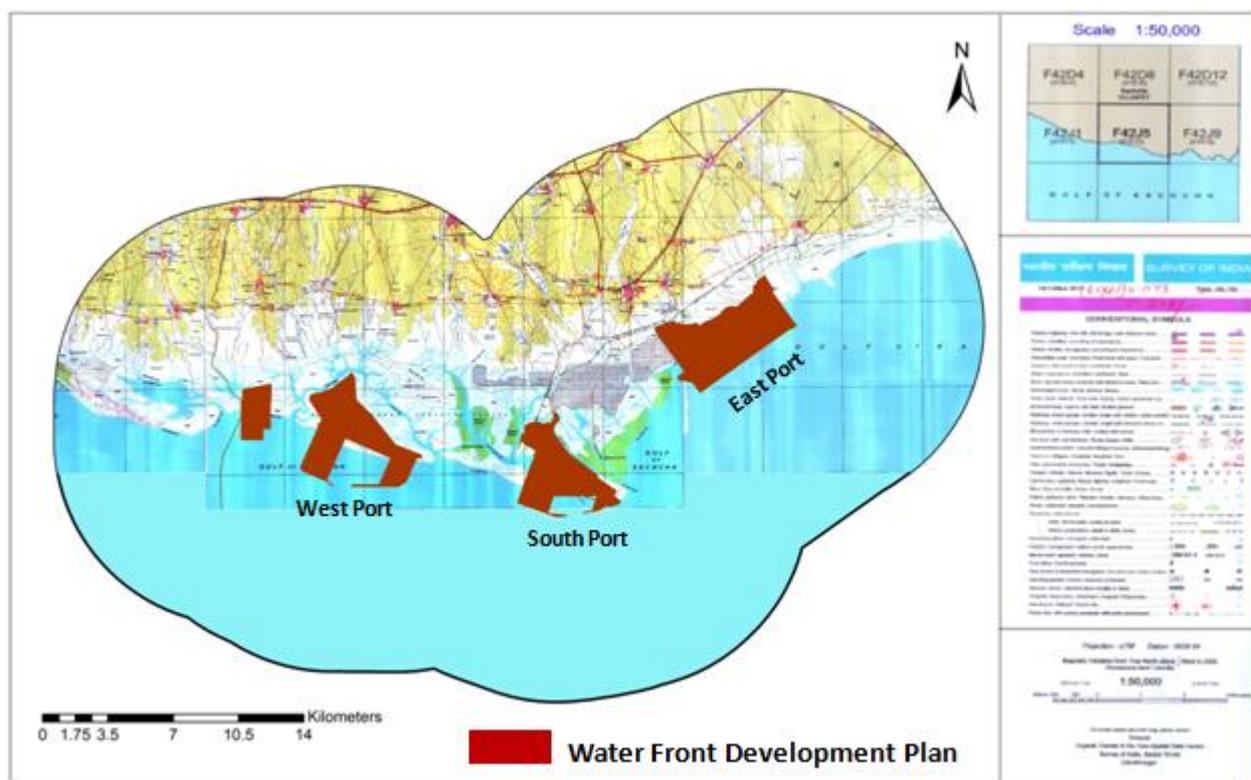
Chapter 5 describes the project schedule and the total cost for the proposed development.

2 Environmental Attributes

2.1 Project Site Location

Mundra Port 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 location of the project site along with the 10 km radius of the study area is represented in **Figure 2-1**.

Figure 2-1 Study area superimposed on Sol Toposheet (Open Series Map)



(Source : Survey of India (Sol) Toposheet (OSM) No: F42J5 (41F5), F42J9-10 (41F9-10), F42J13 (41F13))

2.2 Air Environment

2.2.1 Regional Meteorology

The study area is moderated strongly by Arabian Sea. As per IMD classification the year may broadly be divided into four seasons viz.,

Summer	March to May
Monsoon	June to September
Post monsoon	October to November
Winter	December to February

Long term meteorological data from the Climatological Normals published by Indian Meteorological Department (IMD) was referred (1971-2000). The nearest IMD observatory

for the project site is located at New Kandla which is at an aerial distance of around 60 km from the project site. New Kandla is considered as the representative station for the study as it closely represents the study area.

2.2.2 Ambient Temperature

The 30 years average data published by IMD from the nearby IMD-Observatory "New Kandla" has been represented in **Table 2-1**.

Table 2-1 IMD - Recorded Temperature at New Kandla

Month	MEAN*				EXTREMES	
	Daily Max °C	Daily Min °C	Highest in the Month °C	Lowest in the Month °C	Highest °C	Lowest °C
January	25.3	14.1	29.2	10.6	35.2	4.4
February	27.6	16.2	32.6	12.4	38.8	7.7
March	31.7	20.1	36.8	16.0	42.6	12.8
April	34.5	23.7	39.3	20.5	42.7	14.4
May	35.1	26.4	39.8	23.6	45.5	19.8
June	34.9	27.9	38.4	25.3	47.1	22.0
July	32.6	27.1	35.6	24.6	38.1	22.2
August	31.6	26.2	34.2	23.9	37.6	20.8
September	32.9	25.6	36.3	23.7	40.4	20.3
October	34.3	24.3	37.6	21.1	40.7	15.0
November	31.0	20.1	34.8	16.2	37.6	10.6
December	26.6	15.7	30.3	11.9	33.8	7.2
Annual Mean or High/Low	31.5	22.3	39.8 (5)	10.6 (1)	47.1 (6)	4.4 (1)

Source: * IMD - Climatological Normals 1971 - 2000.

It has been observed from **Table 2-1** that the annual mean maximum and minimum temperature in the region is about 31.5°C and 22.3°C respectively. The highest and lowest temperature in the year has been recorded in the month of May (39.8 °C) and January (10.6 °C) respectively.

2.2.3 Rainfall

The rainfall in the area is primarily received by the South-west monsoon which occurs for a period of around 16 days with a total amount of around 355 mm rainfall against the annual rainfall of around 397 mm occurring for a period of around 18 days. **Table 2-2** shows the Annual rainfall data recorded at New Kandla.

Table 2-2 IMD - Recorded Rainfall at New Kandla

Month	Total Rainfall in mm	No. of Rainy days	Heaviest fall in 24 Hours	
			Rainfall in mm	Date and Year
January	0.8	0.1	12.0	2 - 1965
February	2.1	0.2	24.0	15 - 1999

Month	Total Rainfall in mm	No. of Rainy days	Heaviest fall in 24 Hours	
			Rainfall in mm	Date and Year
March	0.9	0.1	31.0	24 - 1967
April	0.0	0.0	7.0	15 - 1983
May	3.7	0.2	22.4	20 - 1999
June	67.6	2.4	208.8	20 - 1996
July	152.4	5.7	224.0	11 - 1981
August	95.8	5.0	185.9	4 - 1956
September	39.2	2.0	101.2	14 - 1975
October	24.4	0.8	146.2	23 - 1975
November	10.2	0.6	87.6	18 - 1979
December	0.3	0.0	16.0	16 - 1967
Annual Mean or High/Low	397.3	18.1	224 (7)	11 - 1981

It has been inferred that July is the wettest month in a year as it receives rainfall of around 152.4 mm in 5.7 days.

2.2.4 Relative Humidity

As per the long term IMD data the relative humidity was comparatively higher during monsoon season which was about 78% to 83% in the morning and 60% to 69% in the evening. During the rest of the year the relative humidity was around 60% to 76% in the morning and 36% to 56% in the evening. The highest relative humidity of 83% occurs in the month of August during morning hours. The lowest relative humidity of 36% occurs in the month of February during evening hours.

2.2.5 Wind Speed

The wind data from the IMD Observatory New Kandla for the 30 years average has been represented in **Table 2-3** and the seasonal windrose plots are provided in **Figure 2-2**.

Table 2-3 Long term annual wind data from IMD

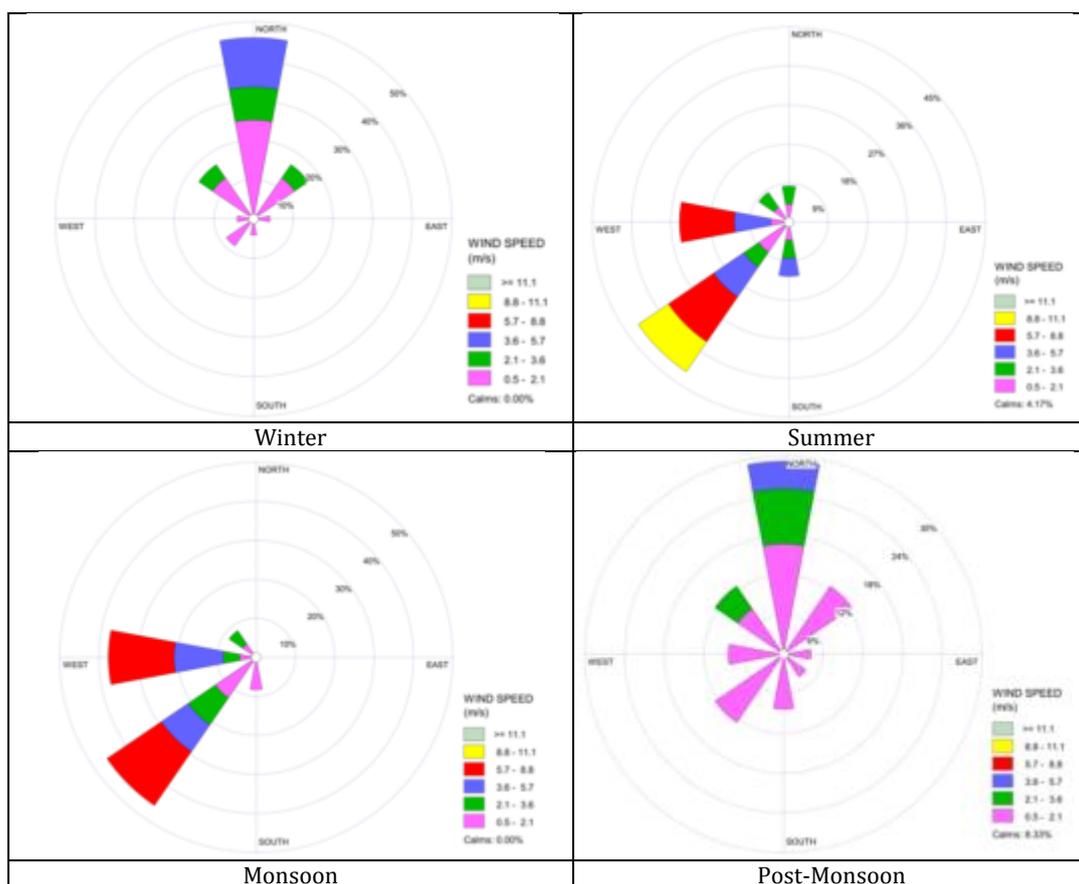
Month	No. of Days with Wind Speed (Km.p.h.)				Percentage No. of Days Wind From								
	62 or more	20-61	1-19	0	N	NE	E	SE	S	SW	W	NW	Calm
January	0	1	28	2	43	11	1	1	1	2	5	28	8
	0	5	24	2	39	17	2	3	9	10	4	10	6
February	0	1	24	3	34	10	2	1	2	6	11	24	10
	0	6	21	1	27	13	2	3	16	22	7	5	5
March	0	1	27	3	23	5	1	1	3	15	22	21	9
	0	13	17	1	12	6	1	3	22	40	9	4	3
April	0	4	25	1	8	2	0	0	4	30	38	13	5
	0	22	8	0	3	1	0	0	23	52	18	2	1
May	0	13	17	1	2	0	0	0	6	45	40	5	2
	0	29	2	0	0	0	0	0	17	60	22	1	0
June	0	12	18	0	2	1	1	3	10	40	38	4	1
	0	25	5	0	0	0	0	2	13	56	28	1	0
July	0	13	17	1	1	0	1	1	6	42	43	4	2
	0	27	4	0	1	0	0	1	10	56	31	1	0

Month	No. of Days with Wind Speed (Km.p.h.)				Percentage No. of Days Wind From								
	62 or more	20-61	1-19	0	N	NE	E	SE	S	SW	W	NW	Calm
August	0	9	21	1	1	0	0	1	5	39	46	6	2
	0	26	5	0	0	0	0	0	11	57	31	1	0
September	0	3	25	2	4	1	1	1	3	24	45	15	6
	0	20	10	0	3	1	0	1	17	53	23	1	1
October	0	1	26	4	25	7	2	3	1	7	17	23	15
	0	6	23	2	17	7	4	4	18	29	10	4	7
November	0	1	27	2	42	15	3	2	1	1	4	23	9
	0	2	25	3	32	19	5	7	8	8	4	6	11
December	0	1	27	3	47	16	2	1	0	4	3	23	8
	0	3	25	3	42	21	4	3	5	4	2	7	11
Annual	0	58	285	22	19	6	1	1	4	3	26	16	6
	0	191	161	13	15	7	2	2	14	2	16	3	4

Source: IMD-Climatological Normals 1971 - 2000.

Two rows in a month represent data recorded at 0830 hours and 1730 hours

Figure 2-2 Seasonal Wind Rose for New Kandla (IMD-Observatory)



2.3 Topographic Features

The proposed development of west port and south port is on reclaimed land and has an average level of (+) 6.0 m CD to (+) 7.0 m CD. The proposed east port area is on land which is required to be reclaimed in future, the average level at the proposed reclamation site is (+) 2.0 m CD to (-) 2.0 m CD.

2.4 Soil Classification

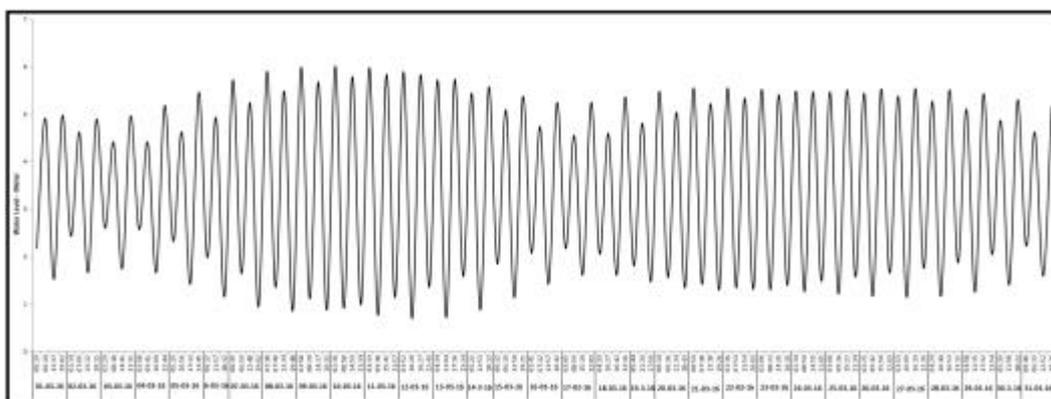
Detailed Geo-technical investigation has been carried out in the Offshore & inter tidal zone, with sufficiently accurate information, both general and specific, about the sub-soil profile and relevant soil and rock parameters at site on the basis of which the foundations for various structures and equipment have been designed rationally.

2.5 Marine Environment

2.5.1 Tide

Tides are the rise and fall of the sea that are caused by the gravitational pull between the earth, sun and the moon. Due to the conical formation of the Gulf, Gulf of Kutch experiences high tidal variations. The tidal pattern in the Gulf of Kutch is dominated by semi-diurnal as the tidal constituent M_2 & S_2 gets amplified high compare to the diurnal constituent K_1 & O_1 . **Figure 2-3** shows the tidal variation at Mundra port during March 2016. It has been inferred from the figure that the tidal variation is about 1.81m to 5.22m.

Figure 2-3 Tidal plot of Mundra port during March 2016 (Water Level)



2.5.2 Current

The maximum surface currents are moderate (0.7-1.2 m/s) near the study area and it increases to 2.0-2.5 m/s in the centre portion of the Gulf¹. The spring currents are 60-65% stronger than the neap currents. The bottom currents are also periodic with a velocity of 60-70% of the surface currents. The maximum current speed recorded during the study in 2007² was 0.8 m/s. The maximum current speed varies between 0.5 to 1.2 m/s. The

¹ NIO Study 2009- “Marine Environmental Impact Assessment for Discharge Channel of 4000 MW Ultra Mega Power Project Near Mundra, Gulf of Kutchh”

² NIO study 2007-“Rapid Marine Environmental Impact Assessment for Ultra Mega Power Project Near Mundra”

maximum current speed is 1.65 m/s at central channel of Gulf of Kutch near Okha during peak flood. The maximum current speed is about 1.6 m/s at central channel of Gulf of Kutch near Okha during peak ebb. The currents during neap tide are in the range of 0.3 to 1.2 m/s³.

2.5.3 Coastal Stability

The shoreline map prepared by Institute for Ocean Management (IOM), Anna University, Chennai, for Gujarat reveals that the coast line on the west of Mundra port is ranging between medium erosion to stable coast. The stretch of APSEZ area falls under low erosion to high accretion coast. The coast line on east of Mundra port is ranging between medium erosion and stable coast.

Figure 2-4 shows the shoreline change map for the coastline for west of Mundra port.

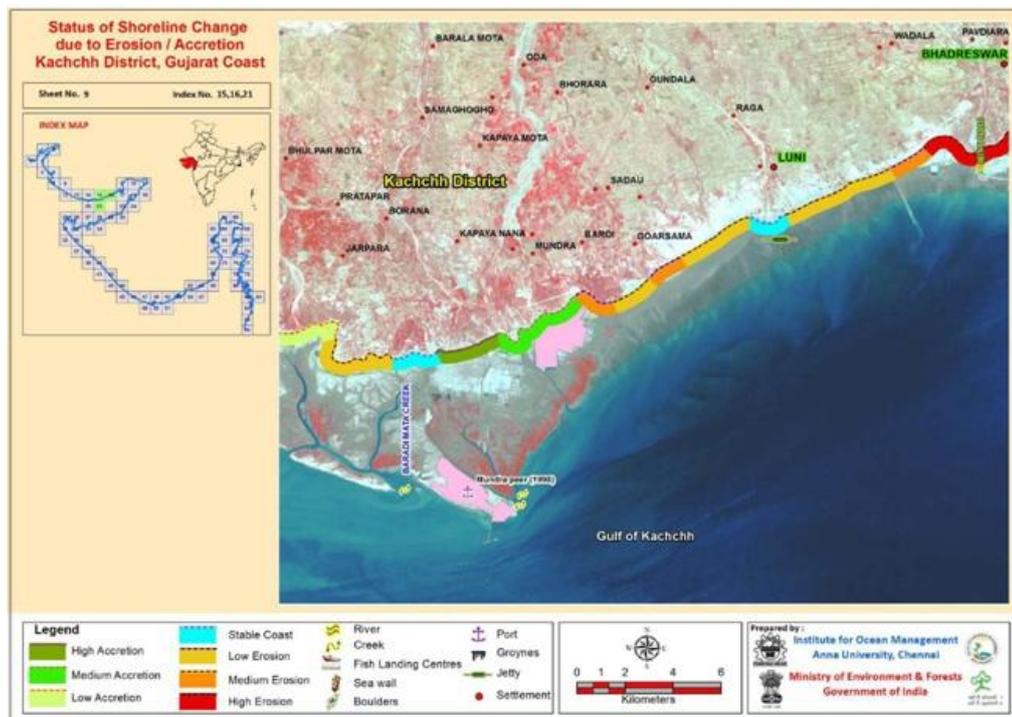
Figure 2-5 shows the shoreline change map for the coastline for east of Mundra port.

³ Aditya Environmental Services Pvt Ltd, 2012- "*Rapid Environmental Impact Assessment for Multi-Product Special Economic Zone at Mundra*"

Figure 2-4 Shoreline Map for West of Mundra port



Figure 2-5 Shoreline Map for East of Mundra port



3 Project Description

3.1 Details of existing infrastructure

3.1.1 Port and Other Facilities:

As a part of approved water front development plan and earlier approvals prior to WFDP, APSEZ has developed multi-purpose terminals including container , liquid & Cryogenic Gas, Godowns, steel yard, Coal Storage yard, Storage areas for Dry cargo, Bulk cargo, Break bulk cargo etc., near South and West Port area. LPG project construction is under completion phase. At western side of the west port intake channel has been constructed to meet the intake water requirement of the power plant. Two Single Buoy Mooring (SBM) has been developed prior to WFDP in the off-shore of Mundra for handling liquid cargo, based on their specific permissions.

The port has state of art connectivity with rail, road, pipeline and airways for smooth evacuation of the cargo.

No development has been initiated at East Port. The photographs of the existing facilities are presented in **Figure 3-1**.

Figure 3-1 Existing Facilities at APSEZ

	
<p>Coal Berth at West Port</p>	<p>Liquid Terminal</p>
	
<p>Container Terminal at South Port</p>	<p>Single Buoy Mooring (SBM)</p>

3.1.2 Road Connectivity

APSEZ is having a very good network of Roads including Main Arterial Roads, Sub-arterial Roads and Internal Roads interconnecting the various areas of port terminal and SEZ areas. In order to ensure smooth flow of traffic anywhere within the APSEZ, port has constructed well managed 4 Lane and 6 Lane roads in the port and SEZ based on the traffic generating potential of various terminals. All major and important junctions are provided with suitably designed Grade Separators & Flyover.

3.1.3 Rail Connectivity

The port is well connected by railway to its hinterland and it was the first port in India connected by double stack container rail facility. Mundra has shortest connectivity to Northern Hinterland.

APSEZ has constructed a Mundra Port to Adipur railway line which is non-government railway line with serving station as Adipur on Indian Railways Gandhidam – Bhuj railway line. Adipur – Mundra Port Railway siding is being operated with 4 crossing stations viz., Devaliya, Vasaithrith Road, Bhadreswar Road and Mundra Airport road station for increasing section capacity.

R & D yard is focal point which connects port rail lines to outside rail line. Mundra Port has several railway sidings and diesel locomotives. Railway lines can handle double stack container rakes. The main commodities which are transported through railway are coal, containers, soya, fertilizers and liquid cargo.

Figure 3-2: Satellite image of Existing Development at Mundra Port



3.2 Proposed Expansion of WFDP

For the expansion of WFDP plan, it is important to utilize the maximum marine development potential. Therefore, based on the future Cargo projections and business requirement of the hinterland, it is proposed to develop the port with the flexibility to handle various cargos. Type of berth and type of cargo is a commercial and business requirement. Hence, expansion plan will be developed with those flexibilities to accommodate berths and storage facilities as multi-purpose. The expansion plan will consist of berths at various locations, material handling area, cargo storage area, operational and utility area, internal connectivity, drainage, greenbelt and various utilities, amenities and bunkering facilities.

Along with berths, backup facilities and independent port craft facilities, waste reception facilities, conveyor systems, drainage, water supply, electrical works, internal roads, railway works and other utilities, amenities and bunkering will be developed to accommodate all multipurpose cargo such as Liquid, Bulk, Break Bulk, Project Cargo, General Cargo, Dry Cargo, Container, Ro – Ro & Automobiles and any other non-hazardous cargo and Liquid /Gas/ Cryogenic cargo (Upto -162 degree Celsius, Pressurized Gases).

Area outside the CRZ, will also be used for industrial development with separate permissions, if applicable

The cumulative configuration of the waterfront development facility includes the following:

- Proposed expansion is for the development of 14470m quay length berth. However existing approved & developed quay length berth of 7870 m is also proposed to be used as multipurpose or liquid/gas/cryogenic, as per business needs.
- Proposed expansion is to increase the cargo capacity by 385MMTPA in addition to the earlier approved and handled 140 MMTPA cargo. Existing approved and handled cargo is also being proposed to be handled in form of multipurpose or liquid/gas/cryogenic, as per business needs

The cargo mix that has been revised as per the proposed development is represented in the **Table 3-1.**

Table 3-1 Cargo Mix for Revised Master Plan development

S. No.	Cargo Type	Cargo Mix
1.	Multipurpose (Including Liquid)	<p>Coal / Iron ore / limestone / Mines & Minerals & other dry bulk/Fertilizers and raw materials for manufacture of fertilizer / food grains / sugar / clinker / cement / Project cargo / timber & wood / machines/ Iron steel products / Break Bulk etc./Container, Ro – Ro & Automobiles and any other non-hazardous cargo</p> <p>All Class A, B, C petroleum products, excluded petroleum products Including Petrochemical products, Hazardous, Toxic and Non Hazardous chemicals/Liquids and other Liquid cargos</p> <p>Tentative list of hazardous liquid cargo but not limited to are as follows:</p> <p>Ethylene, Propylene (Propene), Butadiene, Pentane, Ethyl Mercaptan Motor Spirit, Propylene Oxide, Hexane, Naphtha, Acetone, Methyl Chloride / Chloro Methane, Cyclohexane, Benzene, Ethyl Acetate, Acrylonitrile Acetonitrile, Methyl Methacrylate, Methacrylonitrile, Methanol (Methyl Alcohol),Isopropyl Alcohol, Ethyl Alcohol (Ethanol), Ethylene di chloride, Methyl Isobutyl Ketone, Ethyl Benzene, N-Butyl Acetate, Isobutyl Alcohol (Iso Butanol), N-Butyl Alcohol (N-Butanol), Epichlorohydrine, Styrene, O-Xylene, High Speed Diesel, Cumene, Crude Oil, Aviation Fuel, Kerosene, Acetic Acid, Acetic Anhydride, Non-edible/Mentha Oil Low Sulphur Heavy Stock/ Furnace oil, Carbon Black Feedstock (CBFS), Aniline, Methyl Ethyl Ketone Peroxide, Ethyl Hexanol-2, Vinyl Chloride, Phenol, Naphthalene, Ethylene Glycol, Mono Ethylene Glycol, Toluene 2.4 -di isocyanate, Diphenyl Methane Di-Isocyanate, Edible oil/Palm Oil, Paraffin, Bitumen, Sulphur, Lube oil, Asphalt, Coal, CNG, NG, Ammonia (NH3), Diammonium Phosphate, Muriate of Potash (MOP), Soda Ash</p>

S. No.	Cargo Type	Cargo Mix
		(Sodium Carbonate), Urea, Limestone, Caustic Soda, Sulphuric acid, Phosphoric acid, Piperine/ Piperdine, Chloroform, Hydrochloric Acid (HCL), Ethylene diamine (EDA), CMDI etc.
2.	Gas/Cryogenics /Liquid	LNG, Propane, Butane, LPG, CNG, NG and All Class A, B, C petroleum products, excluded petroleum products Including Petrochemical products, Hazardous, Toxic and Non Hazardous chemicals/Liquids and other Liquid cargos.

The proposed project development consists of the following components:

1. Area

APSEZ has developed Port and SEZ in Mundra. SEZ has been proposed over area of 8481 ha of notified area. Ports were developed through reclamation by using dredged material as part of WFDP. It was also proposed to use dredged material for level rising of SEZ developable areas as well rising of embankment for utility corridor.

SEZ was proposed to facilitate industrial development in which APSEZ being a developer has to provide common infrastructure utilities and amenities. Separate environment clearance has been obtained under SEZ category.

2. Development of South Port

The South Port consists of facilities, which are developed prior to WFDP (developed near South Port) and also as part of WFDP. Presently, Quay length of 6360m has been developed as against approved 8575 m quay length in total. As a part of expansion, 4025 m quay length berth is proposed as a part of South Port, all the berths (present and proposed) will be developed to the concept of Multipurpose or Liquid/Gas/ Cryogenic cargo handling. Presently, 107.68 MMTPA cargo is being handled at South Port. As a part of expansion, 169.32 MMTPA (Multipurpose cargo – 159.32 MMTPA, Liquid/Gas/Cryogenic – 10 MMTPA cargo) is being proposed. The envisaged dredging at South Port as per the current proposal accounts to 20 MCM.

LNG project approved as a part of WFDP was transferred to GSPC LNG Ltd (GLL) and GLL has obtained separate Environment & CRZ Clearance for setting up of LNG terminal for 10 MMTPA capacity vide MoEF&CC EC no - F.No.10-2/ 2009-IA.III dtd 6th March 2014.

3. Development of West Port

The West Port has already developed Quay length of 1510 m as part of approved 6125 m quay length in WFDP. As a part of expansion, 4865 m quay length berth is proposed as a

part of West Port. . All the berths will be developed to the concept of Multipurpose or Liquid/Gas/ Cryogenic cargo handling. Presently, 32.32 MMTPA cargo is being handled at West Port. As a part of expansion, 119.68 MMTPA (Multipurpose cargo – 104.68 MMTPA, Liquid/Gas/Cryogenic – 15 MMTPA cargo) is being proposed.. The envisaged dredging at West Port as per the current proposal is 100 MCM.

4. Development of East Port

No development has been taken place in the East Port; hence it has been proposed to develop 5580 m quay length which is approved earlier. All the berths will be developed to the concept of Multipurpose or Liquid/Gas/ Cryogenic cargo handling. The ultimate cargo handling capacity of the east port is 96 MMTPA of Multipurpose cargos. The envisaged dredging at East Port as per the current proposal accounts to 230 MCM.

5. Desalination Plant

The existing water supply for port operation and drinking purpose is met from existing Water treatment plant located at Mundra. Considering the proposed revised waterfront development plan of the port, future total water demand will be met by desalination plant. The treated water from desalination plant will be distributed for port infrastructure and potable purpose through water supply distribution system. As on date, 47 MLD of the approved 300 MLD desalination plant has been developed. So the remaining capacity of 253 MLD as well as an additional 147 MLD desalination plant is proposed to be developed as part of the WFDP. Desalination plant will be developed on modular basis.

6. Construction of Breakwater

- Extension of the existing eastern and western breakwater for 500m to prepare a round head in the south port which has been approved earlier as per the accorded EC of WFDP.
- The west port has the breakwater on one side (west) and the eastern side breakwater will be developed for a length of 5000m which is as per the master plan approved by earlier EC.

7. Backup Yard development

The backup yard in the south, east and west ports will be developed.

8. Shipyards

The shipyards that have been approved as per the earlier ECs will be developed in phased manner.

9. STP & ETP

As part of WFDP clearance about 50 MLD STP is approved, out of which 55KLD is already developed. Development of 50 MLD is proposed as part of the current proposal in modular phases as per requirement. About 265 KLD of ETP is developed and in operation prior to WFDP. In addition to this about 1000 KLD of ETP is proposed, which will be developed on modular basis in the operational area. The treated water from STP will be 100% utilized within the facility for green belt and dust suppression systems, whereas the treated effluent from ETP (both existing and proposed) will be utilized as much as possible within the facility for green belt, dust suppression. The excess water from ETP will be disposed in to the offshore at suitable location after meeting discharge standards.

10. Facilities for Copper Smelter Plant

The port will facilitate import and export of various cargoes and commodities required for various industries within the SEZ / industries areas. For eg: Copper smelter plant has been proposed at west port area near existing Adani Power plant. The Proposed project includes Copper Smelter, Sulphuric Acid Plant, Copper Refinery, Continuous Cast Copper, Wire Rod Plant, Precious metal recover plant, Phosphoric Acid Plant, Aluminum Fluoride Plant etc.

This facility is required to handle following cargos from the west port.

- Sulphuric Acid (> 98% Conc) : 1 MMTPA
- Phosphoric Acid (> 48% P₂O₅) : 0.5 MMTPA
- Copper concentrate – 3.5 MMTPA
- Rock Phosphate – 2.0 MMTPA

3.2.1 Utilities & Other Infrastructure

Water Source

The water requirement of the existing facility is met by the desalination plant and Narmada canal which is located at about 10 km to 15 km distance from Mundra Port. The water requirement of the proposed expansion project will also be met through the proposed desalination plant and Narmada canal water. Water demand during construction phase will be approximately 2.0 MLD and will be met through the bowsers (tankers) and existing water supply system. About 300 MLD capacity was already approved as a part of earlier WFDP clearance, out of which 47 KLD is developed and operational. So the remaining capacity of 253 MLD as well as an additional 147 MLD desalination plant is proposed to be developed as part of the WFDP

The maximum water withdrawal from intake will be in the range of 1500 MLD for desalination plant of 400 MLD. The reject outfall quantity from desalination plant will be approximate 1100 MLD, which will be disposed at marine disposal location, identified through modelling studies.

Power Source

The electric power requirement during construction phase will be in the range of 8000 to 9000 kWh/day and it will be sourced from the existing power source provided by Gujarat Electricity Board (GEB). Electricity requirement during operation phase will be in the range of 19,00,000 to 20,000,000 kWh/day. It will also be sourced from GEB. During operation phase, power back up in form of DG sets will be available to the tune of 40 MVA to 50 MVA. Diesel consumption for the same will be to the tune of 400 Lit/hr.

Raw Materials required

Being a logistic industry port does not use the raw material for its operation and there is no manufacturing of these raw materials in port. Port is just providing services for handling, storage and evacuation of the import/export cargo. However the construction of the port and supporting facilities would require following as basic raw material for the proposed development plan.

- Coarse aggregate – 375 Lac MT
- Fine aggregate (Sand) – 250 Lac MT
- Stone – 200 Lac MT (Breakwaters will be developed either through rocks/slag or any other suitable materials which will also be explored for using in combination while carrying out detailed engineering)

However, Basic raw material for construction is available in near vicinity of Port. Ready mix concrete will be made out of the basic raw material on site itself. Batching plants of respective size and capacity as per requirement will be installed at the site.

Connectivity

Mundra Port has good connectivity with rail, road, pipeline, waterways as well as air. For cargo evacuation from the port chiefly rail and road facilities are mainly used. Presently there is no traffic for air cargo movement at Mundra Port. However, to handle the cargo from the future growth the enhancement and additional of the existing system is required to be developed.

Road Connectivity

APSEZ is having a very good network of Roads including Main Arterial Roads, Sub-arterial Roads and Internal Roads inter-connecting the various areas of SEZ. In order to ensure smooth flow of traffic anywhere within the APSEZ, port has already augmented his road capacity inside the port and SEZ. All major and important junctions are provided with suitably designed Grade Separators & Flyover.

Internal road connectivity

Inside the port and SEZ, Mundra port is having state of art road network. The SEZ entry gate is connected with port main gate by 8 lane road (4 lanes each for in and out). The various terminal of port is connected by main spine road by 2 lanes and 4 lanes as per the traffic generating from the various terminals. The total internal length of roads inside the port is around 20 km. Total length of approach road from Mundra to Port is 10 Km.

Internal and external port road has been planned in such a way so that they can accommodate heavy port traffic seamlessly. During the road construction special care has been taken to protect road from heavy load vehicular movement damage, various sub layers have been applied during construction of road.

External road connectivity

The external road connectivity to port is important in order to faster the evacuation of cargo from port to hinterland and vice-versa. The Mundra port is well connected to other part of country, but there if further scope to increase capacity of port to connecting port.

The new development is going on with respect to port infrastructure augmentation some of them area as follows. The following State Highways / District Roads / Village Roads connecting APSEZ with the NH-8A (Extn.) shall be upgraded and widened in a phased wise manner looking to the increase in traffic intensity:

- SH-6 connecting Mokha to Vadala
- SH-6 connecting Gundala to Motakan dagra viaNavinal.
- Road connecting Gundala to Luni
- SH-48 connecting Pragpar (on NH-8A Extn.) to Mirza corner (near Mundra town)
- New alignment from Pragpar (on NH-8A Extn.) to APSEZ (connecting to Mundra Port approach Road)
- Road connecting Desalpar to Navinal

In addition to the above, any other roads interconnecting the above NH / SH / DR / Village Roads will also be upgraded, if required.

Rail Connectivity

The port is well connected by railway to its hinterland and it was the first port in India connected by double stacker container rail facility. Mundra has shortest connectivity to Northern Hinterland.

However, the distance from JNPT–Mumbai–Vasai–Vadodara–Kota–Mathura–Delhi is 1500 km and distance of Mundra-Adipur-Gandhidham-Bhildi-Palanpur-Jaipur-Delhi is 1058 km. Hence Mundra has advantage over JNPT of about 422 km.

Rail facilities:

R & D yard is focal point which connects port rail lines to outside rail line. Mundra Port has 7 railway sidings and with sufficient diesel locomotives. Railway lines can handle double stack container rakes. The total rail line within the APSEZ (R&D yard to Port) is around 20 Km. The container terminal is directly connected by rail facility where as for other cargo, racks are loaded around storage areas. The main commodities which are transported through railway are coal, containers, soya, fertilizers and liquid cargo.

APSEZ currently has an operational private railway line of 57 Km, length connecting Adipur to Mundra Port and looking to development of new Port & Berths in future there is a plan to develop additional Railway lines in a phased wise manner connecting Adipur to Mundra Port.

Following are the other Rail connectivity along with the Sidings wherever required, which are proposed to be developed at APSEZ:

- Rail connectivity to South Port & Sidings
- Expansion of R&D Yard at Mundra

The Railway network shall, wherever required take care of the provisions of Double Stack Containers & Dedicated Freight Corridor (DFC) requirements. The Signalling & telecommunication systems of these Rail Networks shall also be upgraded in a phased wise manner considering the latest technology updation, which would in turn increase the overall capacity of Rail network and also provide sufficient safety measures.

Alternative Site Analysis

The proposed development is the expansion of the existing waterfront development facility. Hence alternative site cannot be suggested. Also, the proposed development is within the notified port limits and hence, land acquisition is not envisaged.

3.3 Traffic Forecast

Based on the in-house assessed traffic figures, the target commodities (Coal, Steel Product, Liquid and Cryogenic Gas, Iron Ore, Project Cargo, other dry bulk and break bulk cargo, Containers etc.) from the hinterland has been summarized as per table given below.

Table 3-2 Phase wise Traffic Forecast (30 years) in MMTPA

Sr. No.	Type of Cargo	FY20	FY25	FY30	FY35	FY40	FY45	FY50
1	Coal	56.0	60.0	60.0	62.0	65.0	67.0	70.0
2	Iron Ore	0.0	5.0	10.0	12.0	15.0	16.0	17.0
3	Multi-Purpose	30.0	45.0	60.0	75.0	90.0	105.0	120.0
4	Liquid	20.0	35.0	50.0	65.0	70.0	85.0	98.0
5	LNG	10.0	10.0	15.0	15.0	20.0	25.0	30.0
6	LPG	5.0	5.0	5.0	10.0	10.0	10.0	10.0
7	Container	122.4	138.4	154.4	170.4	186.4	202.4	218.4
7a	Container MTEU	8.74	9.89	11.03	12.17	13.31	14.46	15.60
Total		243.4	298.4	354.4	409.4	456.4	510.4	563.4

3.4 Employment generation

During construction phase, approximately 200 workers will be employed. During operation phase, approximate direct and indirect employment generation is as per the table given below.

Table 3-3 Direct and Indirect Employment Generation

	Units	Numbers
Direct Employment	No.	1200
Indirect Employment	No.	3600
Total	No.	4800

4 Environmental Management Plan (EMP)

The existing WFDP has best management practices and well established environmental Management plan for the protection of physicochemical parameters such as air quality, water quality, soil and noise levels, natural streams and marine water quality, groundwater quality. Apart from these, Solid and hazardous waste management plan, Socioeconomic Management Plan Hazardous Chemical Handling Management and Onsite and Off-site Management plan, Disaster Management Plan and Oil Spill Contingency Plan are being practiced by the existing WFDP facility and the same will be continued in the future also. However, in addition to the above, for the proposed development, the management plans of various environmental parameters are mentioned below:

4.1 Dust Suppression System

An effective air quality emission control program is in place in the existing facility which will be continued in the future also. In addition to the existing dust suppression control measures, necessary measures will be taken for the proposed development as well. Dust suppression equipment will be provided for efficient control of dust pollution on environment during storage and handling of Coal cargo at berth and stockyard of water front area. An efficient dust suppression system will contain dust particles before it is airborne.

A common system consisting of suitable pump, storage tank, nozzles for dust suppression at discharge / feeding points of belt conveyors have been proposed at each transfer tower for efficient dust control system. In addition to above suitable spray system shall also be provided at ship unloader, stockyards & wagon loading station. Dust control is envisaged at following locations.

- Ship unloader discharging in to hoppers
- Stockyards
- Discharge and feeding points of conveyors
- Rapid loading system
- Sprinklers / nozzles will be provided to control dust emission at various points or areas.

Table 4-1 Air Quality Management Measures at APSEZ

	
<p>Coal Unloading at West Port-Mechanised Handling</p>	<p>Continuous AAQ Monitoring Station at APSEZ</p>

4.2 Wastewater Management

4.2.1 Storm Water Management and Treatment

Effective stormwater management is in operation in the existing facility. However additional stormwater management measures are proposed for the current proposal. The water used for dust suppression at west port area in the conveyor transfer points and the stockyards will get absorbed to the extent of the property of the material and remaining water will be collected through proper drainage. During rainy season the rain water over vast stockyard area will also to be collected. For this purpose the stockyard ground level will be provided with a slope in each of each stockyard from the center to the sides. For collecting water draining out of the stockyards RCC toe drains will be constructed along the length of the each row and interconnected to finally lead it to a settlement pond. Settling ponds will be constructed out of concrete. Lime will be added in the settling pond to neutralize the heavy metal, if any in the runoff from the stockyard. The settled materials will be retrieved and sent back to respective cargo stockyard. The supernatant water will be reused for dust suppression.

The storm water runoff from container terminal and liquid terminal at south port area will be discharged in to the sea through hume pipes with suitable outfall arrangement below the jetty. For all the storm water drains, drain parallel to road will also get connected to the main drainage system and discharged in to the sea.

4.2.2 Sewage and Effluent Treatment

The sewage generated in the existing facility is treated in the 55KLD STP. At present, 100% of treated sewage is being utilized for green belt development and dust suppression system.

As part of the current expansion about 50MLD STP is proposed to be developed in the modular basis. The treated water will be utilized for green belt and dust suppression system.

The effluent generated from the existing facility is treated in 256 KLD ETP. At present, 100% of the treated waste water from the existing ETP is utilized for the green belt development and dust suppression system. As part of the current expansion, about 1000 KLD of ETP is proposed to be developed in the modular basis. The treated effluent from ETP (both existing and proposed) will be utilized as much as possible within the facility for green belt, dust suppression. The excess water from ETP will be disposed in to the offshore at suitable location after meeting discharge standards

4.3 Fire-Fighting Facilities

4.3.1 Dry Bulk Berths and Stockyards

The existing firefighting system at the port will be capable of both controlling and extinguishing fires. However, it is proposed to install Fire Hydrant System, which will be designed to give adequate fire protection for the facility based on Indian Standard or equivalent and conform to the provisions of the Tariff Advisory Committee's fire protection manual.

Fire hydrant system is proposed at the following areas, which are classified as ordinary hazard areas.

- Proposed bulk import / Export berths
- Bulk import and bulk export stockyards
- All galleries of bulk import and bulk export conveyors

The fire hydrant system will be designed to ensure that adequate quantity of water is available at all times, at all areas of the facility where a potential fire hazard exists Each hydrant connection will be provided with suitable length of hoses and nozzles to permit effective operation.

The hydrant service will consist of ring mains to cover the facility, with its pump, located in a common pump house. Adequate arrangement with jockey pumps, pressure switches, etc. will be provided to maintain the required pressure in the hydrant system. The operation of pumps provided for the system will be automatic.

4.3.2 Container Terminal

The firefighting system will be designed to give suitable fire protection for the containerized cargo and container handling facilities in the terminal and shall conform to the provision of Tariff Advisory Committee's fire protection manual. The firefighting system shall be a combination of water hydrants, fire alarm system and fire extinguishers.

The fire hydrant system will be sea water based and designed to ensure that an adequate quantity of water is available at all times, at all areas of the facility where a potential fire hazard exists. There will be provision for connecting the system to the potable water supply in order that the system can be flushed and rested on potable water after a fire-fighting event.

The fire-fighting system will consist of an underground ring main with spur lines to cover the facilities in the yard. Hydrants will be provided at sufficient spacing. Each hydrant connection will be provided with a suitable length of hose and nozzle to permit effective operation. The main firefighting pumps will be provided in the pump house located at the western end of the berth.

4.3.3 Liquid Jetty and Tank Farm Area

Jetty:

The liquid jetty will be provided with fixed fire-fighting facilities according to the requirements of OISD Guidelines. Sea water will be used for firefighting facilities. The facilities will include a pump house on trestle, tower mounted water/foam monitors as well as hydrants and water curtains. The proposed firefighting facility for the jetty broadly consists of following.

- A sea water pump house with a control room on top along the approach trestle at adequate safety distance from the loading platform / manifold.
- Two tower mounted foam/water monitors
- Monitors of stand pipe type at Jetty service platform
- Water curtain system at jetty service platform and on the two breasting dolphins.
- Fire hydrants on the jetty service platform, breasting and mooring dolphins and on the pile line trestle.
- Leak detection/ Alarm system.

On the fire hydrant line standard double headed hydrants are proposed for installation one on each of the breasting and mooring dolphins and two nos. on the service platform. In addition it is proposed to provide similar fire hydrants on the pipe line track from the pump room to the jetty at a required spacing.

At any given point of time the fire hydrant pipe line will be capable of supplying water enough for feeding, hydrants and the water curtains located on the service platform, breasting and mooring dolphins.

For the jetty and pipeline trestle it is proposed to have fire gas detector and an air sampling type detector. A sampling type detector consists of piping or tubing distribution from the detector unit to the areas to be protected. An air pump draws air from the protected area back to the detector through the air sampling ports and piping. At the detector the air is analyzed for the fire products.

It is also proposed to have an alarm system which comes into operation automatically through the fire gas detector and the sampling type detector. This can also be manually operated for conveying fire alert message.

4.3.4 LNG / LPG Terminal

A centralized spill, fire and combustible gas alarm and control system provides input to an information management system. Automatic detection devices, manual alarms and audible and visual signaling devices are generally strategically located throughout the terminal. Automatic detection devices include flame, fire and heat, smoke, low temperature and combustible gas detectors. Emergency shutdown system (ESD) incorporates in the design of the terminal and provides the operators with the capability of remotely shutting down the entire or selective portions of the terminal. The unloading arms are generally equipped with Powered Emergency Release Couplers (PERCs). The PERC maintains containment integrity and prevents damage to the unloading arms in the event of an emergency.

Firefighting facilities are provided in the LNG / LPG terminal which operates through centralized alarm & control system. Following firefighting facilities are provided for the LNG / LPG terminal including jetty:

- Fire water storage facility
- Fire water pumps (Motor & Engine driven)
- Motor driven jockey pumps
- Fire water distribution network
- Fire hydrant & hoses
- Fixed deluge spraying system
- Monitors
- Water curtains wherever required
- Clean agent system
- Mobile & Portable firefighting equipment

- Appropriate Building protection
- Fire Tender

Depending on the business requirements, LNG will also be handled through FSRU mode and LPG will also be handled through FSO mode in addition to land based terminal as part of Revised Master Plan development.

4.4 Drainage and Sewage System

Proper drainage facility is provided in the existing WFDP facility. In addition to this, an adequate drainage system will be provided at the site with separate collection streams to segregate the storm run-off from roads, open areas, material storage areas, vehicle wash water and other wastewater streams. Wastewater treatment facilities such as Sewage Treatment Plant (STP), Effluent Treatment Plant (ETP) have been developed. The treated sewage will be used for irrigating greenbelt development.

Considering the proposed revised waterfront development plan of the port, future total drainage and sewage system demand will be met by further construction of new STPs and ETPs.

4.5 Industrial waste management and Solid waste management

At present, APSEZ has a well-defined solid waste management practices in the existing facility. APSEZ has developed a vision for Zero Waste under the Zero Waste Initiatives, by adopting 5R principles of waste management (Reduce -Reuse-Recycle-Recover-Reprocess) to avoid the disposal of waste back to the environment.

For the proposed development, Municipal wastes in the form of canteen wastes, domestic wastes, papers, etc. will be generated. Disposal of municipal solid waste will be carried out as per prevailing norms. Municipal solid waste from canteen and administrative areas during expansion Plan development is estimated at about 1 to 1.2 TPD, of which 60% will be biodegradable and 40% non-biodegradable.

Used oil, spent oil, Wastes/Residue containing oil, Oil soaked rags, Cotton waste, discarded containers, barrels & Used Battery and Sludge from ETP will be collected and disposed to SPCB/CPCB approved vendors. Hazardous wastes, if any will be handled as per Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. Hazardous wastes will be disposed through approved GPCB vendor.

4.6 Corporate Social Responsibility

The Adani Foundation is the Corporate Social Responsibility arm of Adani Group, an integrated infrastructure conglomerate that is committed to inclusive growth and

sustainable development in not only the communities it operates in, but also in contributing towards nation building.

The focus of the activities are mainly on three major dimensions of human development which include expansion of sustainable livelihood opportunities, improving the status of health and education and broadening the range of choices by creating rural infrastructure. The aim is to walk with the communities, help people look ahead, make the right choices and secure a bright and beautiful future, together.

The Foundation conceptualizes its purpose by consolidating the activities under four broad working areas that are as follows:

- Education
- Community Health
- Sustainable Livelihood Development
- Rural Infrastructure Development

Need based assessment will be a continual action during the entire construction as well as operation phases of the revised master plan and based on the outcomes of the assessment, support for the above mentioned four core areas will be provided to the locals.

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) will be continued in future as well with allocation of appropriate budget.

- a. APSEZ has also undertaken various activities towards Swachh Bharat Abhiyan of GoI under the *Swachchagrah* initiative. Activities such as construction of toilets (more than 2400 nos.) at fishermen settlements and in the villages around APSEZ as well as cleaning of areas around fishermen settlements and common areas of villages like roads / streets are being undertaken on regular basis. Appropriate budget allocation for the same is also done.
- b. Started in June 2012, Adani Vidya Mandir, Bhadreswar provides free education (including nutritious lunch and snacks every day) to children from the fisherfolk communities as well as economically backward families. About 400 students are getting benefited every year. In addition to education, the Foundation also focuses on the overall health of the students by holding co-curricular activities and sports related events.
- c. Established in 2001, the Adani Public School, Mundra, provides high quality education to the children of employees and children from local community. It has strength of over 1,500 students and offers both science and commerce

streams at the senior secondary level, and coaching for competitive examinations.

- d. The Adani Foundation runs rural clinics and Mobile Health Care Units (MHCUs) catering to over 29 villages and 6 fisherfolk settlements near Mundra. As part of the medical camps, medical officers conduct awareness sessions on preventive healthcare at schools and colleges. Besides this, patients from socio-economically backward backgrounds and differently-abled people are given medical support at no or low cost.
- e. To promote awareness for preventive healthcare, healthy living and healthcare seeking behaviour amongst senior citizens, Health cards are issued to senior citizens which provide hassle-free healthcare services at no or low cost.

The CSR activities carried out by Adani Foundation is presented in Table below:

Table 4-2 CSR Activities by Adani Foundation

	
<p>Primary School by Adani Foundation</p>	<p>Adani Vidya Mandir</p>
	
<p>Educational facility to Fishermen Community</p>	<p>Public Toilets by Adani Foundation</p>

<p>Medical camps organised</p>	<p>Mobile healthcare facility</p>
<p>Vidya Sahay Yojana- Scholarship Support</p>	<p>Primary Healthcare Centre</p>

4.7 Greenbelt development

The proposed project of development will create the marine facility for operation of coal, liquid, container and other break bulk cargo. However, the provision for green belt as well as green area has been kept. The detailed plan for greenbelt development will be finalized during detailed planning of the storage area.

Existing 450 Ha of green belt has been developed. However, in future additional 100 Ha of green belt will be developed.

5 Project Schedule & Cost

5.1 Project Schedule

The schedule is prepared taking into account all the items of the project, the various activities involved and the duration of each activity. The complete port construction is expected to take about 60 months from the date of start of construction.

5.2 Cost Estimation

The capital cost estimates have been prepared for the proposed master plan development of the project. The basis of the costing is as follows:

- The cost estimates of civil works have been prepared on the basis of current rates for various items of work prevailing in the region and also on the past costs for similar works elsewhere.
- The costs of equipment and machinery are based on budgetary quotations with the manufacturers and also in-house data. The costs include all taxes and duties.
- All costs towards overheads, labour, tools, materials, insurance, financing costs, etc., are covered in the rates for individual items.
- The costs towards plant and machinery include manufacture, supply, installation and commissioning of the respective items.
- Provision towards contingencies, engineering and establishment has been included separately.

Total capital cost for the proposed development is estimated to be approximate Rs. 56157 Cr. (Plus or minus 15 %). The cost estimates of various heads are worked out based on current rates and it is summarized in below table.

Table 5-1 Capital Cost for proposed Development

Sr. No	Particulars	Amount (Rs. in Cr.)
1	Dredging and reclamation work	4375
2	Breakwater Construction	225
3	Berth Construction Works	3141
4	Approach Road and RoB	937
5	Development of backup yards	4532
6	Development of Liquid Terminal	15275
7	Buildings and gate complex	1895

Sr. No	Particulars	Amount (Rs. in Cr.)
8	Utility Works (Water Supply, Drainage, Utility Crossing and Sewerage Works)	437
9	Railway Works	516
10	Port Craft	657
11	Equipment in Yard and Jetty	8786
13	Electrical Works	2609
14	IT & Automation and misc. Works	391
Total Cost		43777
Contingency, Consultancy Charges, Study and Investigation, GST, etc.		13817
Grand Total		57594

The following assumptions are made about this table:

- The numbers represented here are indicative.
- The cost estimates include design, procurement, supply, mobilisation, installation, commissioning, contingency etc. as well as owner's costs. The total project cost will be the sum of the base cost and the soft cost elements such as financing cost, initial development cost etc.
- No land cost / Lease rental cost for land has been considered
- Above cost is excluding Land Charges, IDC charges
- Cost for Development of LNG and other cryogenic Terminals have been excluded
- Above cost is for MoEF&CC purpose only not for any other submission.