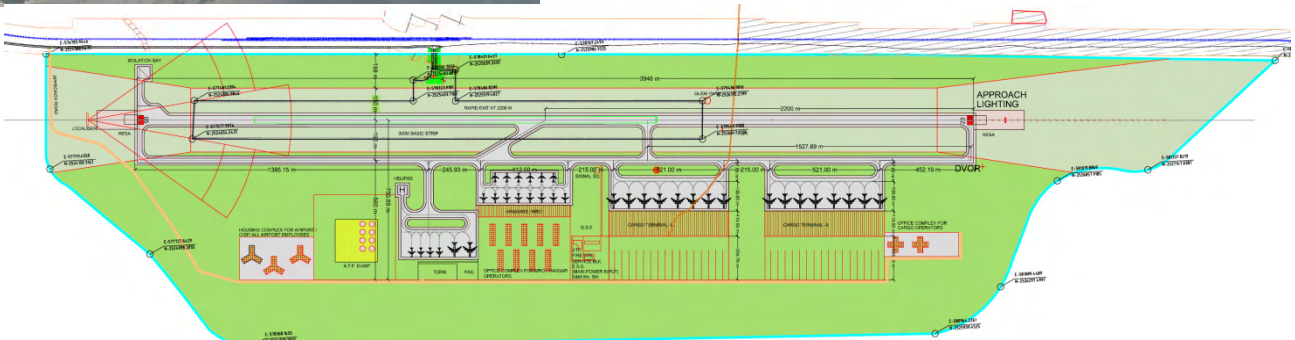


# PRE-FEASIBILITY REPORT

## ENVIRONMENTAL CLEARANCE FOR DEVELOPMENT OF COMMERCIAL AIRPORT AT MUNDRA, KUTCH DISTRICT, GUJARAT



**PROJECT PROPONENT  
MUNDRA INTERNATIONAL  
AIRPORT PRIVATE LIMITED**



**ENVIRONMENT CONSULTANT  
GRENCINDIA CONSULTING  
PRIVATE LIMITED**



**NABET/EIA/RA014/041**

# PRE-FEASIBILITY REPORT

FOR DEVELOPMENT OF COMMERCIAL AIRPORT AT MUNDRA, KUTCH DISTRICT,  
GUJARAT

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**PROJECT PROPONENT**

**Mundra International Airport Pvt. Ltd. (MIAPL)**

**ENVIRONMENT CONSULTANT**

**Greencindia Consulting Private Limited (GCPL)**

# PRE-FEASIBILITY REPORT

FOR DEVELOPMENT OF COMMERCIAL AIRPORT AT MUNDRA, KUTCH DISTRICT,  
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PROJECT PROPONENT

Mundra International Airport Pvt. Ltd. (MIAPL)

ENVIRONMENT CONSULTANT

Greencindia Consulting Private Limited (GCPL)

Chapter 1

# **INTRODUCTION**

# 1. INTRODUCTION

## 1.1 BACKGROUND

Mundra taluka of Kutch, in the Gujarat state, is located 66 km from Bhuj and 350 km from Ahmedabad – the commercial capital of Gujarat. Adani Ports and Special Economic Zone Limited (APSEZ) comprises of an all-weather port as well as port linked multi product Special Economic Zone (SEZ) at Mundra. The ultimate capacity of 225 million tons of bulk, liquid or containerized cargo is projected from APSEZ. The special economic zone is planned for 18000 ha area out of which presently 8481 ha area is notified. The functioning of the port and the SEZ in close proximity of each other provides all that is necessary for establishing a commercial airport to support the movement of cargo and passengers from the region.

Presently Mundra has road connectivity to the National and State highways. Access by rail is available through Broad gauge railway network. Air connectivity into the region is limited only through Bhuj which provides a connection from Mumbai twice a day.

APSEZ has established an airstrip within the SEZ area. The 1,898 m long and 30 m wide runway with a 400 m<sup>2</sup> terminal facility was granted DGCA permission on 24<sup>th</sup> June, 2007 to conduct aircraft operations under VFR conditions for 'private use'. Mundra airport is licensed to Mundra International Airport Pvt. Ltd. (MIAPL), a subsidiary of APSEZ. Presently only private / Non-Commercial flights are operating at Mundra Airstrip.

APSEZ's proposal for expansion of the existing airstrip into a full-fledged category E airport serving B-747:400 category aircraft will be catalytic for the growth of trade and even tourism into the west/north-west belt of Gujarat. APSEZ provides an unlimited scope for the growth of trade and commercial activities. The plans are to upgrade to a level of an International Air Cargo Hub with night landing facility. The airport has potential to develop commercial modern state-of-the-art international airport capable of serving requirements of cargo hub centre, MRO facilities, passenger/baggage handling facility, fuel refilling, aprons, hangars etc. for various kind of aircrafts.

## 1.2 PROJECT PROPONENT

APSEZ has incorporated MIAPL on 7<sup>th</sup> August 2009, which is a 100% subsidiary of APSEZ. Currently, MIAPL manages the development, maintenance and operation of airstrip at Mundra. AAI provides Air Traffic Management (ATM) services at Mundra airstrip to ensure safety of aircraft operations.

## 1.3 TYPE OF PROJECT

The proposed project is the development of an international airport spread over an area of 627 Ha is to be constructed for air side, Land Side & approach road. The proposed project falls in Category 7(a) of

the Schedule vide EIA notification 2006 amended to date involving preparation of Environment Impact Assessment study and Environment Management Plan. However general condition is not applicable to this project. This project is independent and does not link with other project/s which attracts directly or indirectly any provisions of schedule of EIA notification 2006 amended to date.

#### **1.4 AIRPORT SECTOR PROFILE**

The Airports Authority of India (AAI) manages a total of 126 Airports, which include 12 International Airports, 08 Customs Airports, 81 Domestic Airports and 25 Civil Enclaves at Defence Airfields. AAI also provides Air Traffic Management Services (ATMS) over entire Indian Air Space and adjoining oceanic areas with ground installations at all Airports and 25 other locations to ensure safety of Aircraft operations.

The Airports Authority of India (AAI) is currently responsible for 126 airports of which 46 manage at least 100,000 annual passengers.

The first category covers airports operated through joint-ventures with private airport operators and currently includes the two largest airports in the country (Delhi and Mumbai), as well as Cochin, Bangalore and Hyderabad.

The four largest Indian airports (Mumbai, Delhi, Chennai, and Bangalore) each handle more than 10 million annual passengers and accounted for more than 60% of national passenger traffic. India has come through a period characterized by a major expansion of the air transportation industry and proposed to develop 67 domestic airports across country.

Most growth has taken place since 2003/04, averaging 24.4% per year, with particularly high growth in domestic traffic.

#### **1.5 AIR CONNECTIVITY PATTERN**

In India, with its geographical spread interspersed with deserts, seas, forests and hilly terrain, regional and remote area air connectivity can play a crucial role in this context. Establishing or relying on railway / road networks for connecting such parts of the country may not be time effective or even viable (technically /financially).

Also, while railway and road networks may be viable connectivity options to other parts of the country (not impacted by issues of terrain, security, etc.), air connectivity provides a key advantage in terms of time saving.

The routes connecting Tier-2 towns / cities to Tier-3 towns / Cities-1, only constitute about 7% of the air transport market in India in terms of seat deployment. While routes can be configured in numerous ways in terms of combination of frequencies, timing of the flights and aircraft sizes, a number of these routes are likely to witness traffic that can be better serviced using small aircraft such that the aircraft could be optimally utilized over the day as well as achieve viable PLF.

## **1.6 NEED OF THE PROJECT**

### **1.6.1 Traffic Analyses**

The first and foremost parameters for planning of an airport is to establish air traffic demand and forecast the growth of traffic to determine the type, adequacy and sizing of facilities to be provided. This would ensure that oversized facilities are not created which then would become a financial liability on the investments.

Traffic forecasts for any infrastructure development, especially a Greenfield airport carries a certain amount of uncertainty. The present day Government policies have encouraged the growth of aviation industry and therefore movement of cargo by air. This healthy growth is likely to continue in the coming years.

### **1.6.2 Air Traffic in Gujarat- Passenger**

Of the existing 10 airports in Gujarat, 2 are not functioning and at 2, operations are carried out from civil enclaves at defense airfields. Ahmedabad handles 75% of the state's passenger traffic and almost the entire cargo traffic.

### **1.6.3 Traffic Forecast for Mundra- Passenger**

The total tourist traffic into Gujarat is estimated at 9.0 million passengers annually of which 7% are assumed to be from outside the country and the rest from within and outside the state. It is assumed that 25% of the foreigners and 5 % of the domestic visitors would use air services into the Kutch region which when distributed equally between Bhuj and Mundra should have delivered 78,750 international and 2,09,250 domestic passengers to Mundra in 2019-2020. The growth rate of 5% upto 2017-2018 and 6% thereafter adopted by AAI in their forecasts for Bhuj is followed for Mundra also.

In addition, there would be business and expatriate traffic into Mundra by virtue of the establishment of the SEZ. The large number of Gujarat's population, settled in America, Europe and Africa, have their roots in Kutch and would also constitute direct travel into Mundra, once airport facilities with direct links are available.

### **1.6.4 Air Traffic in Gujarat - Cargo**

The development of the SEZ would generate high volumes of traffic, after the various industrial Parks are set up. Substantial amount of Cargo is expected to be exported overseas as well as within the country. Import of goods to provide raw material for conversion into finished goods is likely to be in the region of 10 % of total cargo. Cargo exports and imports through the airport would not only be generated from the APSEZ but would also be through several similar facilities in the region.

### 1.6.5 Traffic Forecasts for Mundra- Cargo

There are no international passengers or cargo originating out of Bhuj. The restricted availability of connections necessitates the several travelers to USA, UK and Africa to travel to Mumbai and Delhi. Within the next ten years, requirement of direct links to these regions would encourage airlines to introduce flights into Mundra.

The basic reason for development of Mundra airport in the SEZ is to provide convenient facilities for the business houses to export goods within the shortest possible time and within convenient distance.

Often lack of proper infrastructure discourages users from utilizing such facilities resulting in shifting of alliances to other outlets, even if inconvenient. Such situation which may result in withdrawals should not be allowed to precipitate.

Considering the possibilities, the evaluation of traffic as briefed above, is considered reasonable to take forward the expansion which is proposed to be commissioned in 2017-2018 to cater for the requirements of 2019-2020 evaluated as 4,40,000 passengers and 11,00,000 tons of cargo. During peak, 218 numbers of departures / arrivals is envisaged daily.

## 1.7 EMPLOYMENT OPPORTUNITIES

The facility is expected to generate direct employment opportunities for 725 persons and indirect employment for 7,250 persons during the operation phase. During construction phase, employment opportunities for 1,200 persons would be generated.

## 1.8 STRUCTURE OF THE REPORT

The purpose of this report is to establish techno-economic feasibility for the proposed project at Mundra. The report is divided into seven chapters excluding this chapter, the details of which are summarized below:

**Chapter 2: Project Description-** This chapter discusses the details of the project like location, project salient features, project magnitude, summary of proposed infrastructure and various other requirements like water, power, construction materials etc.

**Chapter 3: Site Analysis-** This chapter discusses the site profile, landform, and existing land use and drainage pattern. The land details, climate and meteorological parameters are also described in various sections of the chapter. The traffic forecast is also mentioned in this chapter.

**Chapter 4: Planning Considerations-** This Chapter presents layout drawing and design considerations for construction of new runway with all allied facilities like terminal, Building, Apron, Apron Shoulder, Taxi Track, Runway Shoulder, boundary wall, perimeter roads etc.

**Chapter 5: Proposed Infrastructure-** This chapter discusses the Concept Plan for aviation support facilities and utilities also provides for the redevelopment & re-planning of existing air strip.

**Chapter 6: Rehabilitation and Resettlement (R&R) Plan-** There is no R&R due to the proposed project as there are no settlements in the proposed project area.

**Chapter 7: Project Schedule & Cost Estimates-** This Chapter describes the total investment and cost regarding the project.

**Chapter 8: Analysis of Proposal (Financial & social benefits to the locals) -** This chapter summarizes the CSR activities undertaken by APSEZ.



Figure 1-1: Airports in Gujarat

Chapter 2

# **PROJECT DESCRIPTION**

## 2. PROJECT DESCRIPTION

### 2.1 INTRODUCTION

Mundra International Airport Private Limited (MIAPL) has proposed an expansion of existing airstrip to develop full fledged commercial airport at Mundra

### 2.2 LOCATION & LINKAGE

The proposed airport is located at a distance of approximately 60 km from Bhuj in North West Direction. Details of location of the proposed airport are given in Table 2.1.

**Table 2-1: Project Description**

Description	Details		
Project Site	Baroi, Goarsama, Shekhadia, Luni in Mundra Taluka		
Location	Kutch District, Gujarat		
Coordinates	<b>Points</b>	<b>Latitude</b>	<b>Longitude</b>
	A	22°49'37.7" N	69°44'53.8" E
	B	22°51'25.3" N	69°47'40.9" E
	C	22°51'00.4" N	69°47'34.0" E
	D	22°50'21.2" N	69°47'20.7" E
	E	22°49'19.2" N	69°45'49.2" E
	F	22°49'21.9" N	69°45'26.8" E
	G	22°49'23.7" N	69°45'05.2" E
Villages & Plot No.	Baroi	244, 207, 238,	
	Goarsama	52, 53, 24/1,2; 25/1,2,3; 26, 34/1; 34/6; 34/7, 34/8; 34/9; 34/10; 23/1,2; 27, 52	
	Shekhadia	81/2; 120	
	Luni	468/4; 468/5	
Total Area in hectares	627 Ha		
Access Road	National Highway-8A	3 km	NW
District Headquarter	Bhuj	60 km	NW
Nearest Town	Bhuj	50 km	NW
Nearest Railway Station	Gandhidham Railway Junction	50 km	NE
Nearest Domestic Airport	Bhuj	70 km	NW
Nearest International Airport	Sardar Vallbhbhai Patel International Airport, Ahmedabad.	360 km	E

Source: Primary Survey, Greencindia Consulting Private Limited, NCR, Ghaziabad;

On the northern side between the airport boundary and APSEZ's private railway line a width of approximately 200m is available through which a 2 lane approach road to the airport is available. On the south there is a large stretch of open barren land between the airport boundary and the coast line of Gulf of Kutch. APSEZ will develop East port under the Waterfront Development Project (WFDP) as

approved by MoEF&CC in the southern direction of the boundary of the proposed project. The eastern and western end, along which the runway is aligned, has clear approaches. There does not appear to be any problem in availability of land for up gradation of the airport to a category 4E airport.

### 2.3 DETAILS OF ALTERNATIVE SITES

As the proposed project is for expansion of existing airstrip to develop commercial airport for operations of wide bodied aircraft with augmentation of required facilities. The development of full fledged airport was also visualized as part of master plan for SEZ at Mundra. Hence, no alternative sites were examined.

### 2.4 PROJECT MAGNITUDE

APSEZ proposes to upgrade the existing airstrip in Mundra into a full-fledged airport serving B-747:400 category aircrafts.

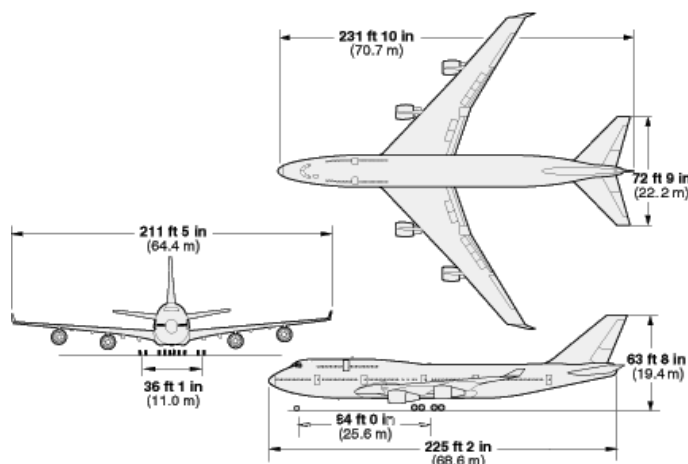
The 747-400 is the latest, longest ranging and best-selling model of the 747 family. Boeing launched the 747-400 in October 1985 and the first development aircraft first flew on April 29, 1988.

The 747-400 is developed from Boeing 747-300 but it is a significantly improved aircraft. Changes include a new, two crew digital flight deck with six large CRT displays, an increased span wing with winglets (*the -400 was the first airliner to introduce winglets*), new engines, re-contoured wing/fuselage fairing, a new interior, lower basic but increased max takeoff weights, and greater range.

**Dimension:** The dimension specifications include Wing span of 64.44m (211ft 5in), length 70.67 m (231ft 10in), height 19.41m (63ft 8in) and wing area 541.2 m<sup>2</sup> (5825sq ft).

#### Capacity:

- 747-400 – Flight crew of two. Typical three class seating for 416 (23 first, 78 business and 315 economy class pax). Cargo hold 170.5 m<sup>3</sup> (6025cuft) or 151 m<sup>3</sup> (5332cuft).
- 747-400 Domestic - Two class seating for 568 (24 first and 544 economies).
- 747-400 Combo - Typical arrangement for six or seven pallets and 266 three class passengers.
- 747-400ER - Same as -400, but cargo hold 158.6 m<sup>3</sup> (5599cuft) or 137 m<sup>3</sup> (4837cuft).
- 747-400F - 30 pallets on the main deck and 32 LD1 containers in the lower hold.



Boeing 747:400 Dimension

#### PROJECT PROPONENT

Mundra International Airport Pvt. Ltd. (MIAPL)

#### ENVIRONMENT CONSULTANT

Greencindia Consulting Private Limited (GCPL)

**2.5 PEAK TRAFFIC DETAILS & TRAFFIC PROJECTION**

The peak traffic details are given in Table 2.2.

**Table 2-2: Peak Traffic Details**

	Peak traffic details					
	International		Domestic		Total	
	Passenger	Cargo	Passenger	Cargo	Passenger	Cargo
	(Numbers)	(Tonnes)	(Numbers)	(Tonnes)	(Numbers)	(Tonnes)
Forecasted Annual Traffic	1,20,845	8,96,534	3,21,105	2,38,319	4,41,950	11,34,854
Design Traffic	1,20,000	8,69,000	3,20,000	2,31,000	4,40,000	11,00,000
Average Daily Traffic	329		877		1205	
Peak day Traffic	460		1227		1688	
Total peak Hour Traffic	276		160		436	
Peak Arrivals/ Departures	138		80		218	

**Existing project features**

Presently, the airport has the following infrastructure:

- Runway – Orientation is 05-23
- Size – 1,898 m x 30 m
- Surface – Flexible
- Apron – 185 m x 90 m
- Taxi – 1 no
- Turning pad – both end
- Terminal – One number (corporate use)

**2.6 DESCRIPTION OF PROPOSED PROJECT**

The proposed project is the expansion / development of Mundra airport that involves development of the following features:

- a. Expansion of runway
- b. Construction and development of
  - Over-run
  - Taxiways
  - Apron international
  - Apron domestic

- Isolation bay
  - Runway strip
  - Drainage
  - Navigation/communication aids
  - Visual aids
  - Fire and rescue services
  - ATC equipment
  - MET, equipment
- c. Civil works include
- Pavements
  - Passenger Terminal Building
  - Technical block cum control tower
  - Fire station
  - Cargo terminals
  - MRO
  - Fuel Farm
- d. Miscellaneous works include
- Water storage
  - Sewage treatment plant
  - Substation for housing of DG sets
  - Security gates
  - CCR room
  - Horticulture and gardening
  - Residential quarters
- e. Electrical & Mechanical Works include
- High intensity Runway Lighting System
  - Apron flood lights
  - Conveyor belts
  - Signage in passenger terminal building
  - Cabling

The above mentioned works are given in detail in Chapter 4.

Various buildings that will be constructed along with their coverage area is given in Table 2.3.

**Table 2-3: List of buildings with coverage area**

Sr. No.	Building name	Coverage area (sq.mt)	Construction area (sq.mt)
1	Passenger terminal building	7,500	7,500
2	Cargo terminal building	1,10,000	1,10,000
3	ATC tower & technical block	500	3,200

**PROJECT PROPONENT**

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Sr. No.	Building name	Coverage area (sq.mt)	Construction area (sq.mt)
4	Fire Station	900	1,500
5	Electrical Substation	500	1,000
6	Administration block	500	1,000
7	GSE storage	1,000	1,000

\*The above list may vary during detail design stage.

## 2.7 CONSTRUCTION MATERIAL

The basic raw materials quantity envisaged for construction is mentioned in Table no. 2.4.

**Table 2-4: Construction material (Estimated)**

Sl. No	Description	Quantity
1	Earth / Murrum	5,59,000 cum
2	Gravels	6,17,000 cum
3	Aggregates	2,93,00 cum
4	Bitumen	1,62,00 MT
5	Reinforcement steel	13,500 tons
6	Structural steel	14,100 tons

## 2.8 POWER REQUIREMENT

Power required for the entire airport would be 6500 KW which will be provided by Mundra Utility division. A dedicated 66KV / 132KV overhead transmission line would be constructed to provide the necessary power supply.

## 2.9 WATER REQUIREMENT

The total water requirement for the entire airport will be provided by APSEZ utility division. The quantity is given under table no. 2.5.

**Table 2-5: Water requirements of the project**

Sr. no	Purpose	Construction phase (KLD)	Operation phase (KLD)
1	Industrial	400	15
2	Fire		1500 KL

## 2.10 WASTE WATER GENERATION AND MANAGEMENT

The wastewater generation (Table 2.6) mainly consists of sanitary waste, sewage from airport terminal, flight kitchen, effluent from the workshop etc. The sewage and sanitary waste from the buildings and airport terminal will be treated in Sewage Treatment Plant (STP) of capacity 100 KLD comprising primary, secondary and tertiary treatment facilities. The treated wastewater from the STP will be used for horticulture purposes. It is estimated that about 80 KLD of wastewater will be generated from the proposed airport. The entire wastewater that is generated from the airport will be recycled and reused for non-potable purposes.

Table 2-6: Wastewater generation and reuse

Sr. no	Purpose	Construction phase (KLD)	Operation phase (KLD)
1	Industrial		15
2	Domestic	40	80

Standards of drinking water are given in Table 2.7.

Table 2-7: Standards for Drinking Water as per CPCB

Characteristics	Unit	Designated use class of inland waters				
		A	B	C	D	E
Dissolved Oxygen, minimum	Mg/l	6	5	4	4	-
pH	-	6.5-8.5	6.5-8.5	6.0-9.0	6.5-8.5	6.0-8.5
BOD (5days at 20°C)	Mg/l	2	3	3	-	-
Total Coliform organisms, max	MPN/100 ml	50	500	5000	-	-
Colour	Hazen	10	300	300	-	-
Chlorides (as CL), max	Mg/l	250	-	600	-	600
Sodium Absorption ratio, max	-	-	-	-	-	600
Boron (as B)	Mg/l	-	-	-	-	2
Sulphate(as So <sub>4</sub> )	Mg/l	400	-	400	-	1000
Nitrates (as No <sub>3</sub> ), max	Mg/l	20	-	50	-	-
Free ammonia (as NH <sub>3</sub> )	Mg/l	-	-	-	1.2	-
Conductivity at 25°C, max	Microhm/cm	-	-	-	1000	2250
Arsenic (as As), max	Mg/l	0.05	0.2	0.2	-	-
Iron (as Fe)	Mg/l	0.3	-	50	-	-
Fluorides (as F)	Mg/l	1.5	1.5	1.5	-	-
Lead (as Pb), max	Mg/l	0.1	-	0.1	-	-
Copper (as Cu)	Mg/l	1.5	-	1.5	-	-
Zinc (as Zn), max	Mg/l	1.5	-	1.5	-	-
Manganese (as Mn)	Mg/l	0.5	-	-	-	-
Total Dissolved Solids	Mg/l	500	-	1500	-	2100
Total hardness (as CaCO <sub>3</sub> )	Mg/l	300	-	-	-	-
Magnesium (as Mg)	Mg/l	100	-	-	-	-
Chlorides (as Cl)	Mg/l	250	600	-	-	600
Cyanides(as CN)	Mg/l	0.5	0.5	0.5	-	-

Source: IS: 10500:1991, Bureau of India Standards, New Delhi

Notes: A= Drinking Water Source without conventional treatment but after disinfection; B= Outdoor bathing (Organised); C= Drinking water source after conventional treatment and disinfection; D= Propagation of Wild life and Fisheries; E= Irrigation, Industrial Cooling, Controlled Waste disposal Source: Central Pollution Control Board, Government of India, New Delhi

### Water Use Reduction

To estimate the reduction in water use achieved by the building by following the mitigation measures, use following steps: (i) Step 1: Estimate total water demand based on the occupancy and type of building; (ii) Step 2: List various efficient fixtures and other measures and (iii) Step 3: Calculate demand reduction as compared to the BIS per capita water consumption.

**Domestic Use for 24 hours**

Under normal conditions, water consumption per person for flushing is 45 liters (9 liter/flush with 5 numbers of uses). With efficient fixture (3 and 6 liter/flush), water use is 21 liter (3 liter /flush with 3 uses and 6 liter /flush with 2 uses). Water use per person for washing with normal fixture with a flow rate of 20 liters per minute is 40 liter (assuming use for 2 minutes), while with efficient fixture (flow rate of 7.5 lpm) is 15 liters.

**Water Conservation in Landscaping**

Landscape forms an important part of the building environment. This is constituted by combination of vegetation, and paving. The vegetation includes lawns, shrubs, herbs and trees. In general, the water demand for lawns and shrubs are higher as compared to trees, which does not require or require less water after establishment. In addition, native species also require less water.

**2.11 MEASURES FOR REDUCING WATER DEMAND FOR LANDSCAPE:**

The water consumption for the gardening depends on the type of plant species and the plant factors. As the plant factor for native species and trees is the minimum, one of the options to reduce the water demand for gardening is to include more native species and low water consuming species. Other options include use of efficient fixtures for watering, following certain best practices to minimize losses and optimize consumption.

**2.11.1 Efficient irrigation Equipment:**

- **Drip irrigation:** To save water, drip irrigation is an efficient technique as it prevents loss of water due to evaporation, run-off and percolation. Further, it has a better control and facilitates uniform water distribution. However, this system cannot be used for lawns and ground covers but for non –native turf and other non-xerophytes plants.
- **Sprinkler irrigation:** Sprinkler irrigation system requires a network of pipes and pumping system to maintain sufficient pressure for uniform distribution. It is best suited for areas with sandy soils which have high infiltration rates. To prevent water logging, the system should be designed in such a way that infiltration rate exceeds the application rate. Sprinklers which can produce fine sprays are more efficient as compared to those that produce large water droplets. The efficiencies of irrigation systems differ widely. Further, to improve the efficiency certain measures can be followed, which includes use of a pressure regulator for pressures greater than 30 psi which will significantly reduce the loss during watering.

**2.12 SOLID WASTE MANAGEMENT**

Solid waste generated from the proposed airport mainly comprises of food waste and garbage waste. Further, small quantities of sludge from STP, medical waste and other waste will be generated. Collection and handling of domestic solid waste would be done in line with the provisions of the Indian

standards. The waste generated from the airport complex amounts to 600 kg/day which will be collected, segregated and disposed to the integrated solid waste management of the SEZ at Mundra.

Chapter 3

# **SITE ANALYSIS**

## 3. SITE ANALYSIS

### 3.1 INTRODUCTION

Site analysis is a pre-design research activity which focuses on existing and potential conditions on and around the project site. It is an inventory of the site factors and forces, and how they coexist and interact. The purpose of the analysis is to provide thorough information about the site assets and liabilities prior to starting the design process. The typical site analysis includes the site location and size, neighborhood context, zoning, legal aspects, geology, physiographic (natural and man-made features), hydrology, soils, vegetation, wildlife, climate, culture, pedestrian and vehicular circulation, access, utilities, historic factors, density, sensory stimuli, and any other factor deemed appropriate for the particular site. This chapter discusses the site profile, landform, and existing land use and drainage pattern. The land details, climate and Metrological parameters are also described in various sections of this chapter.

### 3.2 LOCATION & CONNECTIVITY

Mundra Port, located in the Kutch district of Gujarat state is the largest among all ports of APSEZ and acts as a gateway for north-western India. Gandhidham railway station is the nearest passenger rail head about 50 Km away. Mandvi airstrip (about 30 Km), Kandla airstrip (about 45 Km) and Bhuj airport (about 70 Km) are the airstrips/airports in the vicinity. Mandvi and Kandla airstrips are non-operational at this stage.

#### LAND FORM, LAND USE & LAND OWNERSHIP

The total land required for developing the airport is about 627 hectares, of which-

- Land owned by APSEZ- 175 ha
- Abandoned salt works- 226 ha Forest land- 226 ha

Approximately 91 ha of area fall under CRZ. However, no development is proposed in this area.

### 3.3 TOPOGRAPHY

The topography of the proposed expansion facilities is flat. Presently, proposed site for building works consists of short trees in approximately 214 ha area which will be redesigned as per the expansion plan.

### 3.4 PROPOSED LAND USE PATTERN

The site proposed for airport development will be converted into 'public use' category which is 'private use' category. A residential complex for the essential operational and other staff is also proposed within the airport boundary.

### 3.5 EXISTING INFRASTRUCTURE

Presently, the airport has the following infrastructure:

- Runway – Orientation is 05-23
- Size – 1,898 m x 30 m
- Surface – Flexible
- Apron – 185 m x 90 m
- Taxi – 1 no
- Turning pad – both end
- Terminal – One number (corporate use)

### 3.6 SOCIAL INFRASTRUCTURE AVAILABLE

The existing social infrastructure in Mundra which is located at about 8 km from the site is:

- Hospital with ambulance;
- Banks;
- Post office;
- Bus station;
- Fire station;
- Secondary school;
- Police station;
- Shopping complex;
- Sports infrastructure;
- Community halls;
- Primary health care centres.

### 3.7 GEOLOGY & SOIL

Kutch district consists of Jurassic succession which mainly consists of ammonitic beds over and underlain by plant beds. The basement of this succession is of Achaean contains mainly metamorphic and igneous domain.

### 3.8 LOCAL GEOLOGY & GROUND WATER CONDITION

Geology controls the occurrence of groundwater in this area. The area is underlain by Quaternary sediments consisting of a succession of clay, silty clay, sand and sand mixed with gravel. The geological set up of the area clearly indicates that groundwater occurs both under unconfined and

confined conditions. The deeper zone have greater yield compared to shallower aquifer due to their higher hydraulic conductivity. The shallow aquifers in Mundra area contain saline water.

### 3.9 METEOROLOGY & CLIMATOLOGY

The data obtained from the Meteorological Department of India for Kutch observatory has been utilized.

#### Climatic Condition (30-years IMD Data)

Total mean annual rainfall for the period 1970-2000 of the district is 276.4 mm. Summary of 30 years average data is presented in the Table 3.1 below:

**Table 3-1: Climate data on IMD for Kutch (1971–2000)**

Sl. No.	Parameters	Description of the Season					
1	Rainfall in mm	Total Annual Rainfall is 276.4 mm					
		Winter (Dec to Feb)	<b>Months</b>	<b>Total rainfall (in mm)</b>			
			December	0.2			
			January	2.0			
			February	0.6			
			<b>Total</b>	<b>2.8</b>			
		Summer (Mar to May)	March	1.2			
			April	0.2			
			May	2.6			
			<b>Total</b>	<b>4.0</b>			
		Monsoon (June to Sept)	June	34.7			
			July	104.6			
			August	74.4			
			September	43.5			
			<b>Total</b>	<b>257.2</b>			
		Post-Monsoon (Oct to Dec)	October	8.1			
November	4.3						
December	0.2						
<b>Total</b>	<b>12.6</b>						
2	Temperature (Mean Daily Temp. in °C)	<b>Months</b>	<b>Max</b>	<b>Min</b>	<b>Avg</b>		
		Winter (Dec to Feb)	Dec	28.8	9.6	19.2	
			Jan	27.4	8.4	17.9	
			Feb	30.1	11.4	20.8	
			<b>Average</b>	<b>28.7</b>	<b>9.8</b>	<b>19.3</b>	
		Summer (Mar to May)	Mar	35.4	17.0	26.2	
			Apr	39.2	21.9	30.6	
			May	39.7	25.2	32.5	
			<b>Average</b>	<b>38.1</b>	<b>21.4</b>	<b>29.8</b>	
		Monsoon (June to Sept)	June	37.9	27.2	32.6	
Jul	34.3		26.4	30.4			

			Aug	33.0	25.3	29.2		
			Sep	34.9	23.9	29.4		
			<b>Average</b>	<b>35.0</b>	<b>25.7</b>	<b>30.4</b>		
		Post-Monsoon (Oct to Dec)	Oct	36.8	20.7	28.8		
			Nov	32.9	14.7	23.8		
			Dec	28.8	9.6	19.2		
			<b>Average</b>	<b>32.8</b>	<b>15.0</b>	<b>23.9</b>		
3	Relative Humidity in per cent	Winter (Dec to Feb)	<b>Month</b>	<b>08.30 hrs</b>	<b>17:30 hrs</b>			
			Dec	71	31			
			Jan	74	30			
			Feb	70	26			
			<b>Average</b>	<b>71.7</b>	<b>29</b>			
		Summer (Mar to May)	Mar	67	26			
			Apr	66	26			
			May	70	36			
			<b>Average</b>	<b>67.7</b>	<b>29.3</b>			
		Monsoon (June to Sept)	Jun	73	50			
			July	80	63			
			Aug	82	64			
			Sep	80	52			
			<b>Average</b>	<b>78.8</b>	<b>57.3</b>			
		Post-Monsoon (Oct to Dec)	Oct	71	33			
			Nov	69	30			
			December	71	31			
			<b>Average</b>	<b>70.3</b>	<b>31.3</b>			
		4	Wind-speed	Winter (Dec to Feb)	<b>Month</b>	<b>Speed (kmph)</b>		
					Dec	5.8		
Jan	6.1							
Feb	6.9							
<b>Average</b>	<b>6.2</b>							
Summer (Mar to May)	Mar			8.0				
	Apr			11.0				
	May			15.6				
	<b>Average</b>			<b>11.5</b>				
Monsoon (June to Sept)	Jun			17.2				
	July			16.7				
	Aug			14.6				
	Sep			10.8				
	<b>Average</b>			<b>14.8</b>				
Post-Monsoon (Oct to Dec)	Oct			6.5				
	Nov			5.6				
	Dec			5.8				
	<b>Average</b>	<b>6.0</b>						

Source: Climatological Table 1971 – 2000, Indian Meteorological Department, Govt. of India, New Delhi

Chapter 4

**PLANNING**

**CONSIDERATION**

# 4. PLANNING CONSIDERATION

## 4.1 INTRODUCTION

The purpose of this chapter is to present the Planning Concepts for Mundra Airport, in terms of both their vision and reasoning. Therefore, several basic assumptions have been established, which are intended to direct the future planning of the Airport. These assumptions are supported by the aviation activity forecasts and include a commitment for continued airport operation, which supports local and regional needs.

Airport planning and design primarily depends upon availability of land, its topography, orientation, accessibility, etc. Traffic is the other major factor that decides the size of runway, terminal building and other related infrastructure required for the proposed airport. The site and traffic studies have been discussed in the preceding chapters. Based on the site and traffic studies the planning and conceptual design of the proposed airport is discussed in this chapter.

## 4.2 PLANNING CONCEPT

Because all airport functions relate to and revolve around the basic runway/ taxiway layout, airside planning recommendations must first be carefully examined and evaluated. It is essential that the initial development of the Airport be commensurate with the anticipated needs and requirements of the airport users; however, the long-term expansion capabilities of the facility must also be considered and planned for to ensure the future success of the project. The main objective of the proposed project is to ensure design requirement to cater to the cargo as well as passenger demand.

The airport is not only for Gujarat interstate transportation but also national and international transportation and also carriage transport. Aerodrome code of Mundra airport is 4E. Aerodrome Reference Code is defined by the characteristics of the aircraft intended to use the airport. The parameters to categorize the Aerodrome reference code by ICAO are mentioned in Table 4.1

**Table 4-1: Categories of Aerodrome based on Aeroplane Reference Field Length**

Code Number	Aero plane reference field length
1	Less than 800m
2	800m up to 1200m but not including 1200m
3	1200m up to 1800m but not including 1800m
4	Over 1800m

Source: ICAO

**Table 4-2: Categories of Aerodrome based on Wing Span & Outer Main Gear Wheel Span**

Code Letter	Wing span	Outer main gear wheel span
A	Up to and not including 15m	Up to and not including 4.5m
B	15m up to and not including 24m	4.5m up to and not including 6m
C	24m up to and not including 36m	6m up to and not including 9m
D	36m up to and not including 52m	9m up to and not including 14m
E	52m up to and not including 65m	9m up to and not including 14m
F	65m up to and not including 80m	14m up to and not including 16m

Source: ICAO

#### 4.2.1 RUNWAY ORIENTATION

The most suitable orientation of the runway for Mundra airport is 05-23, NW-SE direction. The data on intensity and prevailing wind directions for Mundra, noted from climatological tables by Meteorological Department of India for nearest observatory at Kutch have been analyzed.

#### 4.2.2 RUNWAY LENGTH:

MIAPL proposes one runway with the following dimensions:

**Table 4-3: Dimension of various parameters of Proposed Airport**

Name	Dimension
Length	3946m
Width	60m
Basic Strip	150m on either side of runway centre line
Runway End Safety Area( RESA)	2nos.x240mx90m
Runway overrun	2nos.x60mx60m

#### 4.2.3 RUNWAY GEOMETRY

The runway is planned for Code 4E. The proposed width of the runway is 60 m and length of 3946 m. The orientation of the runway for Mundra airport is 05-23, NW-SE direction. The permissible values of slopes as per ICAO are given in Table 4.4 below:

**Table 4-4: Permissible values of slopes as per ICAO**

Name	Slope	Permissible
Runway	Longitudinal	1.25% (Max.) with Max. slope of 0.8% in the last quarters on both ends and overall slope not to exceed 1.00%
	Transverse	1.50% (Max.) 1.00% (Min.)
Runway Strip	Longitudinal	1.50% (Max.)
	Transverse	2.50% (Max.)
Taxiway	Longitudinal	1.50% (Max.)
	Transverse	1.50% (Max.)
Taxiway Strip	Transverse	2.50% (Max. Downward) 0.50% (Max. Upward)

Name	Slope	Permissible
Apron	Longitudinal	1.00% (Max.)
	Transverse	1.00% (Max.)

**4.2.4 TAXIWAY**

The taxiway system is planned with the flexibility for future demand. Space for a parallel taxiway along the length of the runways is provided. The initial phase will only have an apron taxiway and two perpendicular exit taxiways connecting the apron. Details of dimension of taxiway are given in Table 4.5.

**Table 4-5: Dimension of taxiways**

Parameter	Measurement
Length	5290m
Width	23m+21m

**4.2.5 APRON**

Two type of Apron of the Mundra airport is proposed.

International Apron: Dimension of International apron is 459 m x 140 m

Domestic Apron: Dimension of Domestic apron is 181 m x 130 m

**4.2.6 ISOLATION BAY**

Isolation Bay is constructed with the dimension of 80 m x 80 m.

**4.2.7 PAVEMENT**

Aprons and aircraft stands shall be constructed as rigid pavement. Concrete pavements are necessary on aprons since fuel spillage during re-fueling is likely to occur. Flexible pavements are not able to withstand fuel spillage or high temperatures of summer in combination with static loads from aircraft without being damaged.

Taxiways can be constructed both as rigid and flexible pavements. Both pavement types have advantages and disadvantages but none of the disadvantages are of such a character that one type is preferred over other. It should therefore be left to the detailed design to find the most economically beneficial pavement type.

**4.2.8 PARKING SPACE**

Parking for 150 cars & 5 Buses, VIP car park (20 cars), AAI and Airlines staff car / scooter parking area at 100 m away from any building as per BCAS norms.

**4.2.9 CIVIL WORKS*****Pavements***

- Extension of existing runway 05/23 of length 1,898 m x 30 m to make the total dimensions of 3,946

m x 60 m for operation of B747-400 type of aircraft. The centre line of the runway remains the same and expansion of runway width is proposed equally on both sides. The extension of the runway length is proposed at both ends.

- New aprons for cargo, MRO and passenger terminals are proposed. A defined and dedicated isolation bay is also planned.
- New taxiways linking to isolation bay, passenger terminal, MRO apron and cargo apron. A parallel taxiway is also proposed.
- Provision of Runway End Safety Area of dimensions, Length 240m x Width 90m for both the Runway 05 and 23.
- Levelling, Grading and Development of Runway Basic strip (150m on either side of runway centre line). The soil of Runway strip should be flush with the edges of pavements and appropriate slope to facilitate draining of rain water into drainage system beyond the basic strips.
- Levelling of ground beyond Runway Strip up to Boundary Wall.
- Levelling & grading of Taxiway strip for taxiway & apron taxi lanes.
- Provision of Isolation Bay of dimensions 80 m x 80 m along with link taxi track of 23 m width & shoulders of width 10.5 m, at a distance of 220m from the centre line of Runway and construction of cooling Pit.
- Construction of drainage system for the runways, beyond Runway strip.
- Construction of Signal Square Area, provision of Turn Pads, landing 'T', and windsock etc.
- Removal or reduction in height of identified manmade obstacles including trees, HT/LT power lines, water / gas pipelines and diversion of road, if passing through development area and approach funnel area
- Construction of building for housing DVOR/DME.

#### ***Passenger Terminal Building***

- Construction of new passengers terminal building of total area 7,500 Sq. m and features of Low Cost Terminal Building with modular design for handling 150 arriving and 150 departing passengers at a time with a scope for future expansion. The building shall be provided with essential amenities for passengers, airlines such as check-in counters, conveyor belt for departing baggage, one number of oval shape conveyor belt in the arrival baggage collection area with provision/space for future installation of additional conveyor with minimum spacing of 11 m, space for storage of baggage trolleys (300 nos.), toilet facilities for passengers including those for physically challenged persons, adequate number of signage's, Fire Fighting/ alarm system, Drinking Water

Coolers/Purifiers, adequate lighting inside & kerb side of the terminal building, provision of Renewable Energy System etc.

- Covered Kerb Area on city side with three lanes each for arriving and departing passengers, covered baggage make-up and break-up area on air side.
- Car park for 150 cars & 5 Buses, VIP car park (20 cars), AAI and Airlines staff car / scooter parking area at 100m away from any building as per BCAS norms

### ***Construction of new technical block cum control tower***

- Construction of new Control Tower cum Technical Block.
- Construction of Control Tower as per NOC for height clearance with minimum height of 25m AGL.
- Provision of control tower table and other equipment, furniture, fixtures as per requirement of ATM, CNS & Met etc.

### ***Construction of fire station***

Construction of Fire Station Cat. VIII, to house 4 fire tenders and 2 ambulances.

### ***Construction of Cargo terminals***

Construction of two cargo terminals in stages.

### ***Construction of MRO***

Construction of MRO hangars and facilities.

### ***Construction of Fuel Farm***

Construction of ATF storage tanks and facilities. The fuel depot will be of 3,000KL capacity. The fuel will be received from refineries in Jamnagar and nearby areas, through tankers. Applicable statutory regulations as per Petroleum rules 2002 and OISD RULES: 117 & 118 shall be followed for the proposed facility. Initially the refueling to the aircrafts would be through refueller, but at a later stage, the refueling is proposed to be through hydrants.

### ***Miscellaneous civil works***

- Provision of water storage and water supply, pump house for overhead water tanks and sump etc. for terminal building and residential colony, preferably by pressurizing system and rain water harvesting system
- Construction of sewerage treatment plant with facility for future expansion.
- Construction of regular boundary wall of height as per BCAS norms around periphery and crash gates at either end of runway direction to provide for outside access to RFF vehicles in case of emergency. Provision of watch towers as per requirements.

- Construction of sub-station for housing DG sets, stepping down main power supply, transformers etc., storage facility for diesel, equipment, spare parts etc.
- Provision of gates to segregate air side and city side area with security guard posts at the entry gate and additional security posts inside the operational area at appropriate location in consultation with ATM and Security Dates.
- Construction of approach road from fire station to runway and apron through shortest distance and runway end to boundary of airport in the approach path of runway, of sufficient strength to withstand twice the weight of the heaviest CFT or 60 tons, whichever is greater.
- Construction of CCR room at appropriate location as per Master Plan.
- Procurement of furniture, chairs and baggage trolleys.
- Provision of culvert (pipe / box) at appropriate location in the operational / non-operational area for crossing of electrical, communication cables, draining of storm water from runways, apron, terminal building and car park area. The strength of culverts must be designed for highest category aircraft of Code 'E' to facilitate long term usage without need for dismantling & reconstruction.
- Horticulture and gardening works on city and airside.
- Construction of residential quarters, transit accommodation for AAI & CISF staff. Presently the area identification and utilities demand is planned for and identified within the airport premises. Looking to the nearby residential development works, a decision may be taken to have this facility outside the airport premises.
- The soil investigation carried out by M/s Geotech, in August 2005, reveals that a CBR of 15% is available for pavement design works.

#### 4.2.10 ELECTRICAL AND MECHANICAL WORKS

- High intensity Runway Lighting System (HIRL) comprising runway edge lights, runway end lights, threshold lights, simple approach lights at RWY05, CAT-I approach lights at RWY23, PAPI at both ends on Runway05/23, lighted landing 'T', lighted windsock, aerodrome rotating beacon, taxiway edge lights, apron edge lights and apron flood lights, Mandatory and informative signage etc. Internal and external electrification for all buildings and consideration of Energy Efficient solutions including renewable energy like Solar Power.
- Procurement and Installation of standby DG sets of adequate capacity, to provide essential 50% power supply to terminal building and 100% to control tower and equipment room and fire station and 100% for airfield lightings. 300 litres/hour is the estimated consumption of diesel.
- Unitary AC/Packaged ACs etc. of adequate capacity for Terminal Building, Technical Block &

Control Tower, centralized Fire Control System and Building Management System for Terminal Building.

- Provision of Apron Flood Lights at appropriate locations without infringing apron safety lines/clearance area for safety of aircraft operating on the apron with power-in/power-out parking stands.
- Lighting on car park, approach road, around terminal building area, Perimeter road and Watch Towers.
- Procurement, installation and commissioning of conveyor belts behind the check-in counters and baggage collection area.
- Procurement, installation of additional split air-conditioners for reserved lounge, and Equipment Room, Control Tower, DVOR building etc.
- Installation of signage in the passenger Terminal Building.
- Necessary electricity supply to DVOR building and other operational buildings.
- Substation equipment, cabling, augmentation of power supply including deposits to State Electricity authorities / Mundra Utilities etc.
- Substation equipment, cabling, augmentation of power supply including deposits to State Electricity authorities / Mundra Utilities etc.

#### **4.2.11 C.N.S WORKS**

- Provision of DVOR / DME, VHF and other associated communication and navigation aids including calibration and commissioning of DVOR/ DME, at the location indicated in the Master Plan.

#### **4.2.12 IT AND AIRPORTS SYSTEM**

- Public address system and car calling system.
- Surveillance Close circuit TV system (SCCTV) and provision of adequate number of close circuit TV monitors, Security Surveillance System with monitoring facilities in the Terminal Manager Room, Security Control Room, APD Office etc.
- Provision of Flight Information Display System (FIDS) with adequate number of plasma TV's in departure, arrival and security hold area for passenger facilitation/ entertainment
- Provision of adequate no. of X-ray machines for scanning hand/checked-in baggage, including provision of required number of ETDs, DFMDs & HHMDs, as per BCAS norms.
- Computer cable data networking.
- Provision of adequate no. of VHF FM Sets (Walkie Talkie, Base Stations & Mobile Stations).

- Provision of Telephone Exchange / digital EPABX system for Terminal Building including telephone/ intercom instruments, wiring etc

### **4.3 SUPPORT AMENITIES**

The following facilities will be available in the proposed airport

- Baggage handling system
- Passenger boarding bridges
- Flight information and displays
- Sewage treatment facility
- Firefighting system
- Security equipments
- Bookshop
- Restaurant

Chapter 5

**PROPOSED**

**INFRASTRUCTURE**

# 5. PROPOSED INFRASTRUCTURE

## 5.1 THE PLAN

The Concept Plan for the proposed airport defines the ultimate scope of the proposal and the development of facilities in accordance with the requirements of traffic. Earlier discussion on Traffic Analysis and Project Sizing are used as the basis for planning of the various components.

It is the overall objective of this effort to produce a balanced airside and landside complex to serve forecast aviation demands. However, before defining and evaluating specific alternatives, airport development objectives need to be outlined. The primary goal of the Master Plan is to define a development concept which allows for the airport to be marketed, developed, and safely operated for the betterment of the region and its users. With this in mind, the following development objectives have been defined for this planning effort:

- Maintain an attractive, efficient, and safe aviation facility in accordance with government, state, and local regulations.
- Develop facilities to efficiently serve general aviation users and encourage increased use of the airport, including business and corporate activity.
- Provide sufficient airside and landside capacity, efficiency, and safety through additional facility improvements which will meet the long term planning horizon level of demand for the airport and region.
- Identify any future land acquisition needs.
- Ensure that any recommended future development is environmentally compatible.
- Enhance local economic development through maximizing the use of available property.
- Identify opportunities for approved non-aeronautical use of certain areas on the airport to further diversify airport facility revenue generating potentials.

The proposed project involves construction and development of a number of facilities which are outlined in Table 5.1.

**Table 5-1: Proposed Infrastructure**

Component/ Facility	Key Specification	Proposed Size/ Standards	AREA (m <sup>2</sup> )	Area (Ha)	Remarks
Runway	Orientation	5-23			Based on existing Runway

Component/ Facility	Key Specification	Proposed Size/ Standards	AREA (m <sup>2</sup> )	Area (Ha)	Remarks
	Length	3946 m	236760 m <sup>2</sup>	23.676 Ha	Calculated
	Width	60m including shoulders			Mandatory
	L-Slope	0.75%			Assumed
	X-Slope	1.00%			Assumed
Overrun	Length	60m at either end.	3600 m <sup>2</sup>	0.36 Ha	Mandatory
	Width	60m including Shoulders			Mandatory
Taxiways	Length	5290m	2,30,000 m <sup>2</sup>	23 Ha	Calculated
	Width	23m + 21m Shoulders			Mandatory
	Location and Type	Full length parallel to R/W			Designed
		1 Rapid Exit			
		2 End Exits			
2 Taxiways to Apron					
		1 Taxiway to Isolation Bay			
Apron International	Length	459 m	50000 m <sup>2</sup>	5 Ha	Power in push out Configuration
	Width	120 m			
Apron Domestic	Length	181 m	23,530 m <sup>2</sup>	2 Ha	Power in push out Configuration
	Width	130 m			
Isolated Bay	Length	80.0 m with Shoulder	6400 m <sup>2</sup>	0.64 Ha	
	Width	80.0 m with Shoulder			
Runway Strip	Length	4066 m	1219800 m <sup>2</sup>	121.98 Ha	
	Width	300 m			
	X-Slope	2.50%			
Drainage	Open Drain	Concrete/ Lined			Parallel along basic strip
Nav/ Comm Aids	Non Visual aids communication Facilities	DVOR/ DME			
		ILS- CAT II			
		VHF DF			
		VHF-RT (Air to ground)			
		AMSS linked to AFTN			
		ATS DS circuits			
		Voice Logging System			
		VCCS			
PABX Telephones					
Visual Aids	Category I	Simple Approach Lights PAPI			R/W 05
		Approach Lights			R/W 23

# PRE-FEASIBILITY REPORT

FOR DEVELOPMENT OF COMMERCIAL AIRPORT AT MUNDRA, KUTCH DISTRICT,  
GUJARAT

5-3

Component/ Facility	Key Specification	Proposed Size/ Standards	AREA (m <sup>2</sup> )	Area (Ha)	Remarks
		Runway Centreline Lights			
		Threshold Lights			
		Touch down lights			
		PAPI			
		Runway End Lights			
		Lighted Landing 'T'			
		Lighted wind Sock			
		Aerodrome Beacon			
		Obstruction Lights			
		Apron Flood lights			
		Apron / Taxiway edge lights			
Fire and Rescue Services	Category 8	Crash fire tenders (CFT) 4 Nos.			
		Ambulance 2 Nos			
ATC Equipment		Controllers Consoles			
		Flight data Display System			
		Control System			
		VHF-RT remotely operated Facility			
		Remote Control Unit of airfield lightning			
		Standby battery operated VHF-RT			
		Signalling Lamps			
		Communication Network			
		Wind Direction and speed Indicator			
		Clock			
		Nav. Aids Monitoring panel Notam Displays			
MET, Equipment	Forecasting Station	Barometer			
		Barograph			
		Anemometer			
		Rain Gauge			
		Sunshine Recorder			
		Stevenson Screen			
		Thermo Hygrograph			
		Ballooning Station			
		Met Communication			
		Station Linked with AMSS			

Source: Technical Report, MIAPL, February 2016

**PROJECT PROPONENT**

Mundra International Airport Pvt. Ltd. (MIAPL)

**ENVIRONMENT CONSULTANT**

Greencindia Consulting Private Limited (GCPL)

Chapter 6

**REHABILITATION &  
RESETTLEMENT PLAN**

## **6. REHABILITATION & RESETTLEMENT PLAN**

Area required for the expansion of airport consists of land owned by APSEZ, abandoned salt works, forest land and CRZ land (no development is proposed) where no habitation is present. Hence, no Resettlement and Rehabilitation is envisaged for the proposed expansion of airport.

Chapter 7

**PROJECT SCHEDULE &  
COST ESTIMATE**

# 7. PROJECT SCHEDULE & COST ESTIMATES

Preliminary estimated cost of work for Development of Mundra Airport is worked out as INR 1,400 Crores. Construction time will be around 24 months.

## 7.1 BREAKUP OF TOTAL PROJECT COST

A brief breakup of the capital expenditure (excluding any land cost) is mentioned below

**Table 7-1 Showing Breakup of the Project Cost**

Sl. No.	ITEM	Amount (Rs.) in Cr
<b>1.0</b>	<b>AIRFIELD PAVEMENTS</b>	
1.1	Runways/ Parallel Taxiway/ Rapid exits & Link Taxiways	185.90
1.2	Runway/ Taxiways/ Apron Shoulders and overruns	41.81
1.3	Apron- Passenger	17.90
1.4	Apron- Cargo	7.32
1.5	Isolation Bay	4.00
1.6	Drainage	3.00
	<b>SUBTOTAL</b>	<b>259.94</b>
<b>2.0</b>	<b>AIRFIELD LIGHTING</b>	
2.1	Runway lights including Approach lights, edge lights, Threshold lights, PAPI, Taxiway lights	22.00
2.2	Apron Lighting	1.68
	<b>SUBTOTAL</b>	<b>23.68</b>
<b>3.0</b>	<b>CNS ATM Equipment for CAT-II Airport</b>	
3.1	Navigational aids-DVOR/DME, NDB, ILS CAT-II	10.00
3.2	Radar (ASR)	25.00
3.3	Communication Equipment	8.00
3.4	Meteorological Equipment	4.00
3.5	Approach Control Centre	10.00
	<b>SUBTOTAL</b>	<b>57.00</b>
<b>4.0</b>	<b>PASSENGER TERMINAL BUILDING</b>	
4.1	Civil works including facilities/instrumentation	75.00
	<b>SUBTOTAL</b>	<b>75.00</b>
<b>5.0</b>	<b>CARGO TERMINAL BUILDING</b>	

Sl. No.	ITEM	Amount (Rs.) in Cr
5.1	Civil works including facilities/instrumentation	770.00
	<b>SUBTOTAL</b>	<b>770.00</b>
<b>6.0</b>	<b>ATC TOWER AND TECHNICAL BLOCK</b>	
6.1	Civil works	8.00
	<b>SUBTOTAL</b>	<b>8.00</b>
<b>7.0</b>	<b>FIRE STATION</b>	
7.1	Civil works	3.75
7.2	Equipment (4 Nos. Crash Fire Tenders and other support vehicles)	12.00
	<b>SUBTOTAL</b>	<b>15.75</b>
<b>8.0</b>	<b>ELECTRICAL SUB STATION</b>	
8.1	Civil works	2.50
8.2	Generators	3.00
8.3	Power supply and Grid station	14.50
	<b>SUBTOTAL</b>	<b>20.00</b>
<b>9.0</b>	<b>ADMINISTRATIVE BLOCK</b>	<b>2.00</b>
<b>10.0</b>	<b>A/C PLANT ROOM</b>	<b>4.00</b>
<b>11.0</b>	<b>GSE STORAGE</b>	<b>1.00</b>
<b>12.0</b>	<b>WATER TREATMENT</b>	<b>4.00</b>
<b>13.0</b>	<b>SEWAGE DISPOSAL</b>	<b>6.00</b>
<b>14.0</b>	<b>INCINERATOR</b>	<b>0.50</b>
<b>15.0</b>	<b>CAR PARKING</b>	<b>6</b>
<b>16.0</b>	<b>APPROACH ROAD, PERIMETRE ROAD AND INTERNAL ROAD</b>	<b>2.8</b>
<b>17.0</b>	<b>SITE DEVELOPMENT</b>	
17.1	Earthwork	10.00
17.2	Drainage	5.00
17.3	Landscaping, Agriculture, Environmental Improvement	2.00
17.4	Provision of water Lines	4.00
	<b>SUBTOTAL</b>	<b>21.00</b>
<b>18.0</b>	<b>FENCING, BOUNDARY WALL RETAINING WALL</b>	<b>8.957</b>
<b>19.0</b>	<b>BULK SERVICES</b>	<b>20.00</b>
	<b>TOTAL</b>	<b>1305.62</b>
	<b>7% CONTINGENCIES</b>	<b>94.00</b>
	<b>TOTAL INVESTMENTS</b>	<b>1,400.00</b>

Chapter 8

**ANALYSIS OF  
PROPOSAL (FINANCIAL  
& SOCIAL BENEFITS TO  
THE LOCALS)**

## **8. ANALYSIS OF PROPOSAL (FINANCIAL & SOCIAL BENEFITS TO THE LOCALS)**

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

Adani Foundation has already done extensive work in this region considering the above thematic areas. However, need based assessment will be a continual action during the entire construction as well as operation phases of the proposed project. On the basis of the outcomes of the assessment, support for the above mentioned core areas will be provided to the locals.