
4 Selection of Location

4.1 INDUSTRIAL ESTATES: PROPER SITING & PLANNED DEVELOPMENT

Industries also are potential contributors to the degradation of the environment. Siting of an industry always involves a certain risk. As the degree of pollution potential of the industry increases, the risk involved in siting it also increases. Unplanned and uncontrolled industrial development leads to incompatible land use patterns thereby increasing the risks on the receiving environment. Production and handling of polluting and hazardous substances is associated with substantial risks in cases of failure of pollution control equipment or disasters and very often even in cases of normal operation. The protection of the environment can be achieved by proper planning and management of various spatial entities viz. water resources, land, settlements, forests etc. in the most effective manner.

The Environmental problems encountered in the Industrial Estates are mainly due to:

- Improper siting.
- Lack of proper pollution control abatement infrastructure.
- Absence of control of surrounding land uses.
- Lack of awareness among Industries about cleaner production.

4.2 SITING METHODOLOGY

Often, the site selection is not based on environmental considerations such as land use compatibility and the capacity of the receiving environment. In certain cases, the industrial demand is also not well estimated. As a result, proper layout, infrastructure planning and development become difficult. Also, it becomes difficult to plan common facilities for pollution abatement. The industrial demand of the area has to be assessed before selecting a site for an industrial estate. This will help in identifying the type of industries coming up in the area and regulating industrial siting in an estate, grouping them based on compatibility and planning cost-effective pollution abatement infrastructure.

The degree of the impacts from the industrial estates is dependent on the type of pollution generated from the industries in the estate and sensitivity of the surrounding land uses. For example, in the Bhopal case, if the land use compatibility, protection of the land, air, water, settlements and flora and fauna and capacity of the environment had been considered and if the industrial site were surrounded by a lesser sensitive land use, the impact would have been reduced.

Therefore the need for a methodical approach for siting and management of industrial estates can hardly be over-emphasized.

a. Selection Criteria

The Industries Department or the Industrial Development/Investment Corporations are the agencies who generally select the sites for the industrial estates in the States.

The main criteria for selecting the sites are:

- Optimal geographical location where there are good transport and communication facilities.
- Good water supply and electricity.
- Development of Backward and rural areas irrespective of its suitability.
- Areas where the auxiliary or ancillary industries are nearby.

b. Siting Guidelines

The following environmental guidelines laid down by the Ministry of Environment and Forest should be followed for industries having potential for pollution to ensure optimum use of natural and man-made resources in sustainable manner with minimal depletion and degradation of environment.

In siting industries, care should be taken to mitigate the adverse impact of the industries on the immediate neighborhood as well as distant places. Some of the natural life sustaining systems and some specific land uses are more sensitive to industrial impact because of the nature and extent of fragility. With a view to protect such areas, industrial sites shall maintain the following distance from the listed areas:

- Ecologically and/ or otherwise sensitive areas: At least 25 km., depending on the geo-climatic conditions.
- Flood plain of the riverine system: At least 1/2 Km., from the flood plain or modified flood plain affected by dam in the upstream or by flood control systems.
- Transport / Communication System: At least 1/2 Km., from highways and railways.
- Major settlement (3,00,000 population): Distance from settlements is difficult to maintain because of urban sprawl. At the time of siting of the industry if notified limit of any major settlement is within 50 Km., the spatial direction of growth of the settlement for at least a decade must be assessed. And the industry is then sited at 25 Km. from the projected growth boundary of the settlement.

c. Ecologically and /or otherwise sensitive areas

These include:

(i) Religious and Historic Places; (ii) Archaeological monuments; (iii) Areas of scenic beauty; (iv) Hill resorts; (v) Health resorts; (vi) Estuaries rich in mangroves, breeding grounds of specific species; (vii) Gulf areas; (viii) Biosphere Reserves; (ix) National Parks and Sanctuaries; (x) Natural lakes, swamps; (xi) Seismic zones; (xii) Tribal settlements; (xiii) Area of scientific and geological interest; (xiv) Defense installations; specially those of security importance and sensitive to pollution; (xv) Border areas (International).

d. Industrial Estate Planning

The overall objective of Industrial Estate Planning is to identify sites for industrial estates and plan industrial development in compatibility with surrounding land uses in a sustainable manner.

The specific objectives include:

- Identification of a search area where suitable sites for developing industrial estates for polluting industries might be found.
- Detailing environmental sensitivity of the search area and its surroundings.
- Assessing the siting potential of the search areas by identifying suitable sites for industrial estates (so called "candidate sites").
- Identification of types of industries that can be allowed in these estates after assessing the pollution risks from those industries and the environmental impact risks by predicting the amount and spatial extent of adverse impacts.
- Recommending necessary effluent treatment and waste disposal facilities and other abatement infrastructures needs to be commonly used by all industries of the estate.
- Providing buffer zones around the estates.
- Recommending land use controls around the estates for controlling and minimizing adverse environmental impacts and
- Identifying the social impacts of developing an industrial estate at an identified site and recommending mitigate or compensatory measures, if needed.

In addition to the Siting Guidelines laid down by the **Ministry of Environment and Forests (MOEF)** as mentioned above there are other deterministic parameters for site identification for the Chemical Industrial Estates and the Kutch Region in particular for further study. Based on these parameters, the Coastal Talukas of Kutch were explored for the location suitability and thus seven sites were identified. A land potentiality study of these seven sites was carried out to shortlist three locations. Land suitability and SWOT analysis were done for these three sites and the final site selected.

e. **Deterministic Parameters**

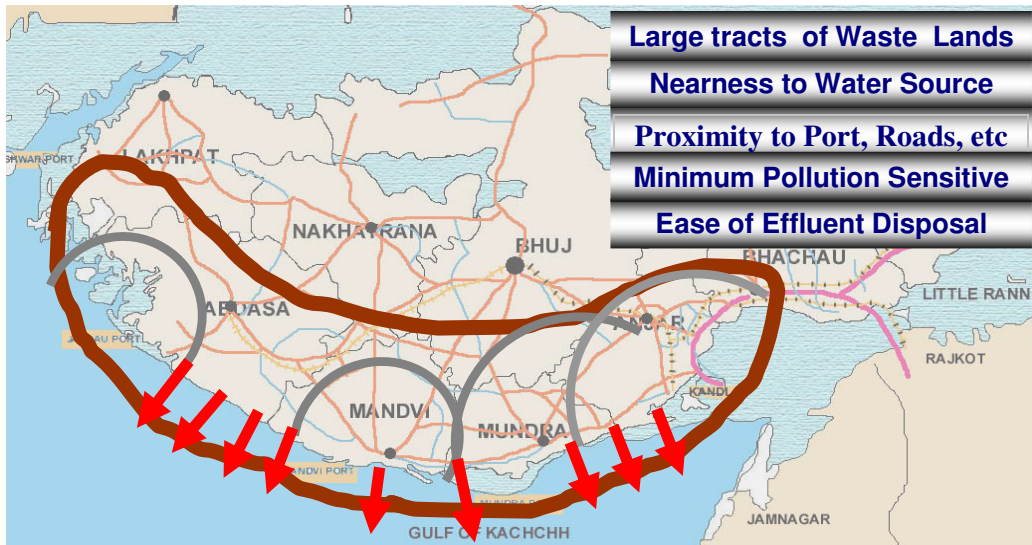
Focus areas for site identification

It has been realized from the experience in the many chemical industries in Gujarat that an efficient effluent disposal system is highly essential and a very critical parameter of the high pollutant Chemical estates. This would suggest nearness to coastline for easy deep-sea discharge of treated effluent. Chemical industries are highly water intensive and availability of large amount of water for industrial use is also one of the most important factors. Since Kutch is a water scarce region, therefore to explore the possibility of using seawater for desalination, a coastal area would be desirable.

For setting up a Chemical Industrial Estate of a medium/large scale, the minimum size of land required will be of a tune of 1000 Ha for the optimum utilisation of infrastructure and viability. Also considering the need to set up the all the basic infrastructure of the Industrial Estate at place in 18 months under the wake of the limited time frame specified under the notification of the Excise Exemption by the government, (31st July 2002 as the last date of commissioning of production of an industrial unit), it is of paramount importance that ready availability of government lands are considered for location and site identification. Therefore, considering the estimated demand vis a vis the future growth prospects, an identification of the sites having large tracts of waste lands (both Govt. and private) upto 500 Ha was of prime importance.

These sites need to have good accessibility in terms of nearness to ports, roads, railways etc since most of the raw materials will have to be brought in and the product will have to

be marketed outside Kutch. Various regions of Kutch exhibiting specific characteristics like fishery rich areas, coastal mangroves, and marine sanctuaries etc demanded that the estate region should be minimum pollution sensitive.



For site identification the region which would be explored further would be covering part of the Talukas of Bhachau, Anjar, Gandhidham, Mundra, Mandvi and Abdasa. Thus the deterministic parameters for identification of site keeping in view the specific requirements of the chemical estate are Nearness to Water Source, Easiness of Effluent Disposal, presence of large quantity of waste lands, Proximity to Port, Roads etc and minimum pollution sensitive region.

4.3 IDENTIFYING POTENTIAL LOCATIONS

a. Approach and Methodology

Villages with predominantly waste lands and less fertile lands were identified based on the District census, land use, village maps discussions with Collectors, Mamlatdars of the six Talukas, Talatis etc.

The Western region was omitted as there are sensitive mangrove forests and the southwestern regions as the border of the coastal villages are mostly occupied for defense purposes. Seven sites were identified based on various inputs, siting guidelines and a comprehensive field visits to these site. A Comparative Site Potentiality analysis was carried out to arrive at the candidate site.

The sites identified were

- | | | |
|----|------------------------------|---------------------|
| 1) | Moti Chirai | : Bhachau Taluka |
| 2) | Mithi Rohar | : Gandhidham Taluka |
| 3) | Kidana and Bharapar | : Gandhidham Taluka |
| 4) | Goersama and Luni | : Mundra Taluka |
| 5) | Gundiwali and Tragadi | : Mandvi Taluka |
| 6) | Bada and Panchatiya | : Mandvi Taluka |

b. Land Potentiality Analysis

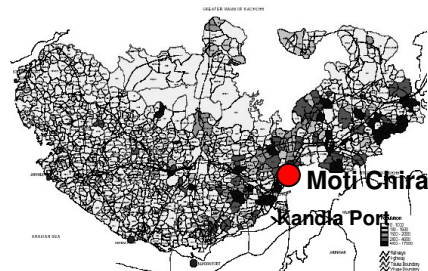
As part of the site selection/ elimination process, potentiality analyses of the seven sites was carried out.

SITE: 1

Village: **MOTI CHIRAI**

Taluka: **BHACHAU**

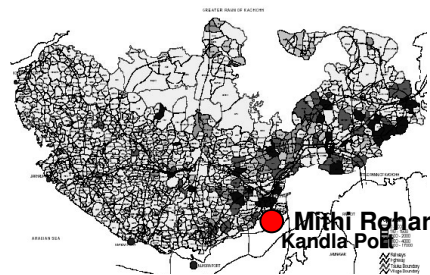
Moti Chirai site is located at 2 km from the Highway. The land is relatively flat, has proposed Narmada Canal passing through. The Govt. land is less and is spread in pockets with predominantly surrounded by private land. The fault line also passes through the site making it earthquake prone.



TRANSPORT INFRASTRUCTURE			
1	Road	From Highway: 2 km	
2	Ports	From Kandla Port: 30 km	
3	Railways	Nearest Station- Bhachau; Railway line through the village	
LAND			
4	Land Area	Around 1000 ha	
5	Land Use	Waste land 350 ha	Gauchar 100 ha
6	Land Holding	Government Around 450ha	Private Around 550 ha
7	Land Price	2- 4 lakhs near highway- to interiors Rs.75,000/-	
8	Topography	Relatively leveled Site	
9	Flood Proneness	Not prone	
10	Land Acquisition/ Transfer	Predominantly private land and the no. of private plots is around 225; hence land acquisition will be time consuming	
11	Pipelines if any	Kandla Bhatinda pipeline running through the site	
12	Flora/ Fauna	Mostly barren with clumps of <i>Babul</i> (Acacia-wild thorny bush) found all over the site	
13	Religious Structure	Few religious structures/ installations	
ENVIRONMENTAL & RESOURCE CONSIDERATIONS			
14	Nearness to Sea/ Creek	From end of site Around 25 km	Year Round Availability Yes
15	Underground Water Availability	Depth for boring 200- 300 ft	Quality of Water Highly Saline
16	Distance to Settlement	5 km	
17	Environmental Sensitivity	Proposed Narmada Canal cutting through site Forest area abutting the site.	
OTHER PHYSICAL INFRASTRUCTURE			
18	Water Supply	From Supadiya village	
19	Power	66 kV substation located nearby	
20	Drainage network	-	
21	Nearest Industrial Estate/ Industry	Salt industries nearby, also proposed Growth Centre for industry(GGDC)- comes in the Chemical zone	

SITE: 2Village: **MITHI ROHAR**Taluka: **ANJAR/ GANDHIDHAM**

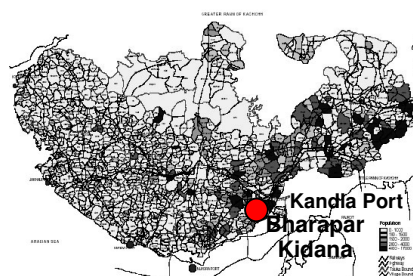
Mithi Rohar site is located at 12 km from Gandhidham on the eastern side. The site is relatively flat and has good proportion of Government WasteLand and KPT land put together. Hence time required for acquisition could be less. On the seaward side (creek side) of the site, for about 4 km there are salt pans.



TRANSPORT INFRASTRUCTURE				
1	Road	From National Highway (NH8A) : 5 km		
2	Ports	From Kandla Port: 15 km		
3	Railways	Nearest Station- Gandhidham; Railway line abutting Site		
LAND				
4	Land Area	Around 600 (upto 1000) ha		
5	Land Use	Waste land	Gauchar	Private Field
		70%	15%	15%
6	Land Holding	Govt.	KPT	Private
		350ha	100 ha	150 ha
7	Land Price	2 to 3 lakhs		
8	Topography	Almost flat, natural slope towards sea		
9	Flood Proneness	Never flooded; High tide brings in water to part of salt pans		
10	Land Acquisition/ Transfer	KPT transfer of land to Centre and then Centre to State, further to GIDC might take time. Process already initiated.		
11	Pipelines if any	Kandla- Bhatinda Pipeline running through the site.		
12	Flora/ Fauna	Babul trees/ shrubs as water scarce		
13	Religious	Couple of Dargahs/Cemetery in the North Western corner		
ENVIRONMENTAL & RESOURCE CONSIDERATIONS				
14	Nearness to Sea/ Creek	From end of site	Year Round Availability	
		10 km	Yes	
15	Underground Water Availability	Depth for boring	Quality of Water	Use of bore
		35ft – 200 ft	Highly Saline	Few bores nearby for salt pan use.
16	Distance to Settlements	The Mithi Rohar Gamtal is 3 km away. Gandhidham town is 12 km away.		
17	Envt. Sensitivity	Presence of Mangroves in the Creeks . Highly complex creek system of the Kandla.		
OTHER PHYSICAL INFRASTRUCTURE				
18	Water Supply	Drinking water from Tapar Dam for the village.		
19	Power	66 kV - Gandhidham		
20	Drainage network	-		
21	Nearest Industrial Estate/ Industry	Kandla FTZ at around 15 km Independent Salt industries nearby (within 5 km)		

SITE: 3

Village: **BHARAPAR, KIDANA**
Taluka: **GANDHIDHAM/ ANJAR**

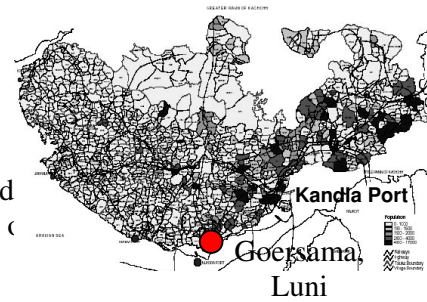


The site is located abutting the Free Trade Zone on the Kidana side (E side) and close to the Gandhidham town. The site spreads parallel to the coast towards Tuna village side. The site has excellent infrastructure-physical, social and industrial in the nearby vicinity. Also on the South-Western side is the old Tuna Port which is proposed to be developed by KPT.

TRANSPORT INFRASTRUCTURE				
1	Road	From Highway: 3 km from the NH-8A		
2	Ports	From Kandla Port: 5 km		
3	Railways	Nearest Station- Gandhidham (10 km)		
LAND				
4	Land Area	Around 700 (upto1000) ha		
5	Land Use	Waste land	Gauchar	Private Field
		300 ha		400 ha
6	Land Holding	Government	KPT/Others	Private
		40%	(5%)	50%
7	Land Price	2.25 lakh (near Kidana/FTZ) -40,000 thousand (Bharapar village) per acre.		
8	Topography	Relatively flat, gentle slope towards sea. Pockets of dugout Land of 2/3 m depth near the FTZ area.		
9	Flood Proneness	Not prone		
10	Land Acquisition/ Transfer	Almost Equal distribution of Govt. and Pvt. Land Land acquisition will be little bit time consuming.		
11	Pipelines if any	Jamnagar-Loni pipeline running though the site		
12	Flora/ Fauna	Mostly barren with pockets of agriculture done on sewage water of Gandhidham.		
13	Religious Struct./ Graveyards if any	2/3 religious installations		
ENVIRONMENTAL & RESOURCE CONSIDERATIONS				
14	Nearness to Sea/ Creek	From end of site	Year Round Availability	
		5 km	Yes	
15	Underground Water Availability	Depth for boring	Quality of Water	Occurrence
		25ft- 200 ft	Saline	Few Bores nearby
16	Distance to Settlements	2-4 km		
17	Envt.Sensitivity	-		
OTHER PHYSICAL INFRASTRUCTURE				
18	Water Supply	Pipeline from Nagalpur village in Anjar; for FTZ Tapar dam (Supadiya village)		
19	Power	Kandla FTZ- 220 kV		
20	Drainage network	FTZ has, can be linked up		
21	Nearest Industrial Estate/ Industry	Kandla FTZ abutting the site at Kidana end; Wind Farm (GEDC); FCI godown, Friends salt etc near by		

SITE: 4Village: **GOERSAMA, LUNI**Taluka: **MUNDRA**

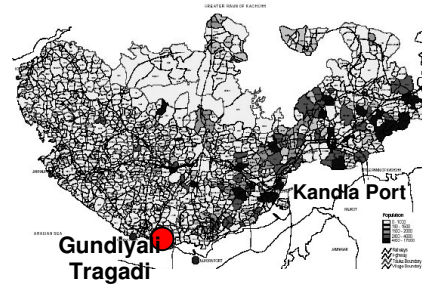
The site is near the Mundra Port. As there are new industries and the Mundra port, the site could be good in terms of industries.



TRANSPORT INFRASTRUCTURE				
1	Road	From Highway: 4 km		
2	Ports	From Mundra Port: 10 km		
3	Railways	Nearest Station- Gandhidham (60kms); prop. Mundra line		
LAND				
4	Land Area	Around 900 ha (to 1200)		
5	Land Use	Waste land	Gauchar	Private Field
		400 ha	100 ha	400 ha
6	Land Holding	Government	KPT	Private
		60%		40%
7	Land Price	1 L- 2.5 L per acre.		
8	Topography	Almost level site		
9	Flood Proneness	Not prone		
10	Land Acquisition/ Transfer	Scattered govt. land, lot of private acquisition required		
11	Pipelines if any	-		
12	Flora/ Fauna	Relatively barren		
13	Religious Struct./ Graveyards if any	-		
ENVIRONMENTAL & RESOURCE CONSIDERATIONS				
14	Nearness to Sea/ Creek	From end of site	Year Round Availability	
		6 km	Yes	
15	Underground Water Availability	Depth for boring	Quality of Water	Occurrence
		200 ft	Saline	Few Bores nearby
16	Distance to Settlement	4 km		
17	Envt. Sensitivity	-		
OTHER PHYSICAL INFRASTRUCTURE				
18	Water Supply			
19	Power	66 kV		
20	Drainage network	-		
21	Nearest Industrial Estate/ Industry	Lot of relatively new industrial development because of Adani Port.		

SITE: 5Village: **GUNDIYALI, TRAGADI**Taluka: **MANDVI**

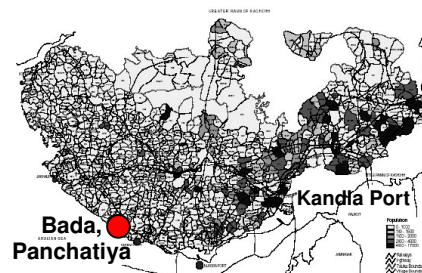
The site is on the eastern side of Mandvi. The site has relatively flat and vast expanses of Government wastelands. There is a proposal to establish a GMDC alumina plant here.



TRANSPORT INFRASTRUCTURE			
1	Road	From Highway: 4 km	
2	Ports	From Mundra Port: 15 km	
3	Railways	Nearest Station- Gandhidham (60kms); prop. Mundra line	
LAND			
4	Land Area	Around 1000 ha	
5	Land Use	Waste land	Gauchar
		600 ha	100 ha
6	Land Holding	Government	KPT
		70%	30%
7	Land Price	20-25 K per acre.	
8	Topography	Almost level site.	
9	Flood Proneness	Not prone	
10	Land Acquisition/ Transfer	Mostly govt. land	
11	Pipelines if any	-	
12	Flora/ Fauna	Relatively Barren.	
13	Religious Structure	-	
ENVIRONMENTAL & RESOURCE CONSIDERATIONS			
14	Nearness to Sea/ Creek	From end of site	Year Round Availability
		6 km	Yes
15	Underground Water Availability	Depth for boring	Quality of Water
		200 ft	Saline
16	Distance to Settlement	4 km	
17	Envt. Sensitivity	-	
OTHER PHYSICAL INFRASTRUCTURE			
18	Water Supply		
19	Power	66 kV	
20	Drainage network	-	
21	Nearest Industrial Estate/ Industry	Very little industrial development nearby; proposed Alumina Plant nearby	

SITE : 6Village: **BADA, PANCHATIYA**Taluka: **MANDVI**

This site is on the Western side of Mandvi. The site (combining the coastal villages of Bada and Panchatiya) has a relatively close proximity to the sea/creek and has vast expanse of Government wasteland that is mostly barren.



TRANSPORT INFRASTRUCTURE			
1	Road	From Main Road: 7 km	
2	Ports	Kandla Port :120 km; Mundra Port : 55 km; Mandvi Port-10km	
3	Railways	Nearest Station- Bhuj (65 km)	
LAND			
4	Land Area	Around 800 ha	
5	Land Use	Waste land	Gauchar
		600 ha	100 ha
6	Land Holding	Government	KPT
		70%	30%
7	Land Price	10 K– 20 K per acre.	
8	Topography	Slightly Undulating, slope towards sea.	
9	Flood Proneness	Not prone	
10	Land Acquisition/ Transfer	Mostly govt. land	
11	Pipelines if any	-	
12	Flora/ Fauna	Barren with isolated vegetation(strip of Babul forest near the coast)	
13	Religious Structure	-	
ENVIRONMENTAL & RESOURCE CONSIDERATIONS			
14	Nearness to Sea/ Creek	From end of site	Year Round Availability
		4 km	Yes
15	Underground Water Availability	Depth for boring	Quality of Water
		200 ft	Saline
16	Distance to Settlement	3 km	
17	Envt. Sensitivity	Reserved Forest between the site and the coast; Agricultural lands nearby	
OTHER PHYSICAL INFRASTRUCTURE			
18	Water Supply	From local Ponds	
19	Power	66 KV	
20	Drainage network	-	
21	Nearest Industrial Estate/ Industry	Very little industrial development nearby	

4.4 SHORT LISTING OF LOCATIONS

For short-listing of sites for further detailed analysis, a matrix-based elimination process was adopted. Critical parameters were identified for each site and weightages were assigned to each parameter depending upon its criticality. A scale of 1 to 5 is used for weightages. The weightage increases as number increases from 1 to 5. The weightage 1 indicates that the parameter is least important. Weightage 5 indicates the parameter is most important and can not be neglected.

For each parameter, in addition to weightage, a rating scale is developed from 0 to 3. The benefit to the site increases as the rating of the parameter increases. For instance, for Ports parameter the rating scale is developed as followed:

0-15 km	3	15-30 km	2	30-50 km	1	> 50 km	0
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The above rating scale indicates that as the distance from port increases, the transportation advantage to the site decreases. The '0' rating indicates the transport advantage becomes negligible beyond 50 km compared to the distances between the sites.

For each parameter, weightages and ratings are assigned. The weightage is multiplied with the parameter rating to get parameter score. All the parameter scores are summed up to get total score for each site. The weightages and rating alongwith site scores are presented below:

	Weightage	Parameter	Rating Scale	Mithi Rohar		Moti Chirai		Kidana Bharapar		Bada, Panchatiya		Goersama, Luni		Gundiya, Tragadi		Nr.Sanghi	
				Rating	Parameter Score	Rating	Parameter Score	Rating	Parameter Score	Rating	Parameter Score	Rating	Parameter Score	Rating	Parameter Score	Rating	Parameter Score
		TRANSPORT															
1	4	Ports		3	12	2	8	3	12	1	4	2	8	2	8	0	0
		0-15 km	3														
		15-30 km	2														
		30-50 km	1														
		> 50 km	0														
2	2	Road		2	4	3	6	3	6	2	4	3	6	3	6	2	4
		0-5 km	3														
		5-10 km	2														
		10-20 km	1														
		>20 km	0														

3	3	Railways		2	6	3	9	3	9	0	0	2	6	0	0	0	0
		< 15 km	3														
		15-30 km	2														
		30-50 km	1														
		> 50 km	0														
		LAND															
4	5	Land Holding		3	15	1	5	2	10	2	10	2	10	2	10	1	5
		> 80 % govt. land	4														
		70- 80 %	3														
		60- 70 %	2														
		40-60 %	1														
		<40% g.l	0														
5	3	Land Use		2	6	1	3	2	6	2	6	1	3	2	6	1	3
		>80 % waste land	3														
		60- 80% W.L	2														
		40-60 % W.L	1														
		<40% W.L	0														
6	2	Land Price per acre		1	2	1	2	2	4	3	6	1	2	3	6	3	9
		< 25 K	3														
		25K - 1 L	2														
		1-2.5L	1														
		> 2.5 L	0														
7	1	Topography		2	2	2	2	2	2	1	1	2	2	2	2	2	2
		Almost level	2														
		Undulating	1														
		Highly Und.	0														
8	1	Flood Proneness		2	2	2	2	2	2	2	2	2	2	2	2	2	2
		Not Prone	2														
		At high tide	1														
		Flood Prone	0														
9	2	Exp.time for acquisition		2	4	0	0	1	2	2	4	0	0	2	4	1	2
		<3 months	2														
		3-9 m	1														
		> 9 months	0														
10	2	Flora/ Fauna		2	4	2	4	2	4	1	2	2	4	1	2	1	2
		Rel. barren	2														
		Medium	1														
		Rich	0														
11	1	Religious Str/Graveyard		0	0	1	1	1	1	1	1	1	1	1	1	1	1
		No	2														
		At corners	1														
		Scattered	0														
		RESOURCE / ENVT.															
12	5	Distance to Sea/ Creek		2	10	0	0	3	15	3	15	3	15	3	15	1	5
		0-10 km	3														

parameters were the point of disposal of the treated effluents and the point of intake of seawater for desalination.

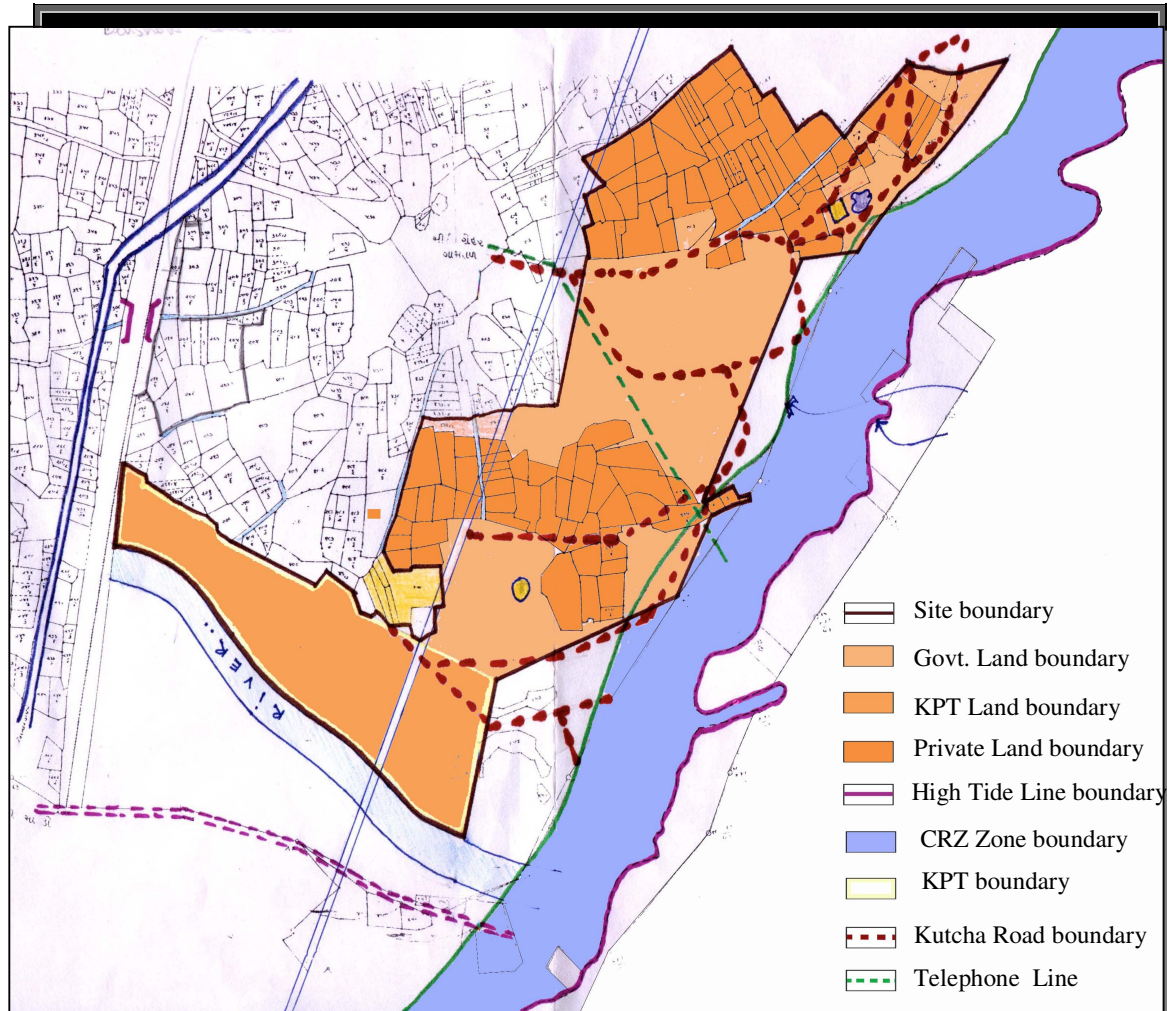
◆ **Infrastructure Parameters**

A detailed assessment of accessibility and power linkages was studied at all three locations. As part of accessibility, the approach to the site from the existing main roads (NH/SH/MDR) and the approximate distances and quality of the approach roads were studied. For power, the existing substations, and high-tension lines near the sites were studied for its capacity, upgradation possibility, etc.

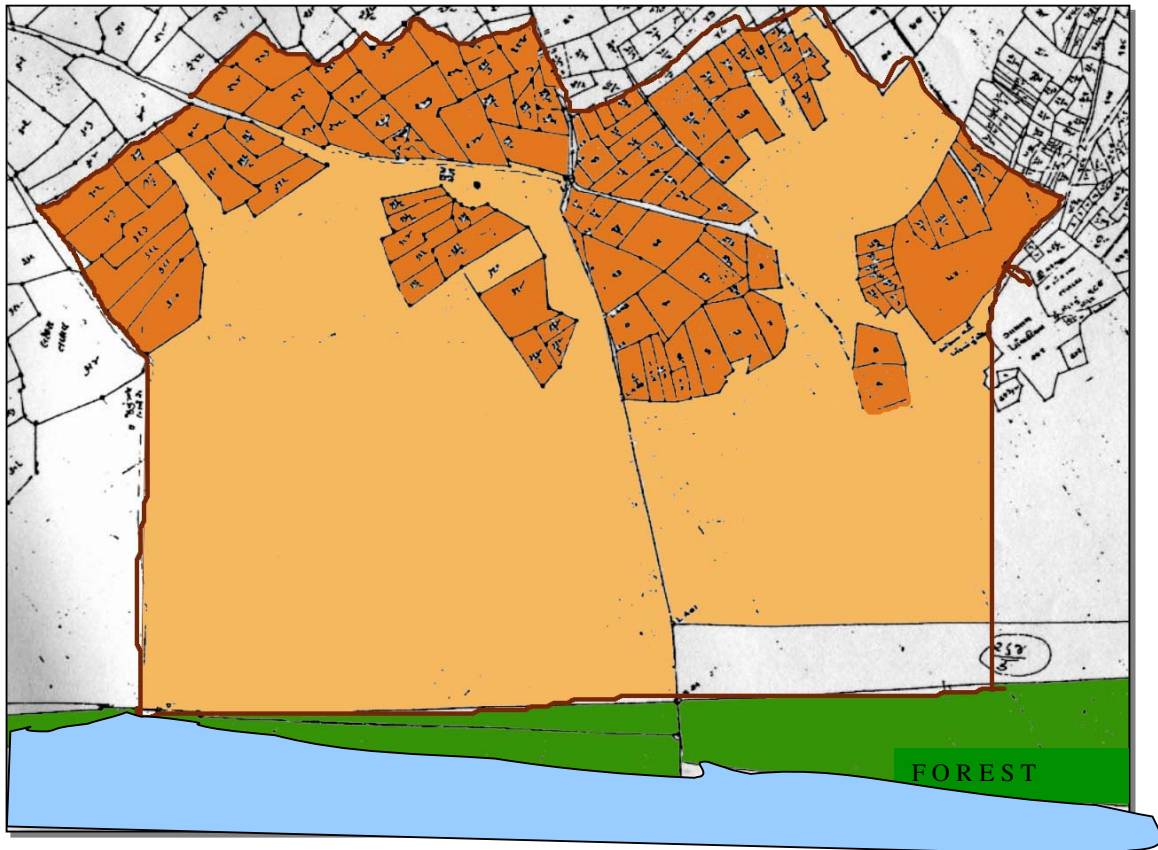
◆ **Land Parameters**






In addition to the land parameters analyzed earlier, the land holdings were studied in detail. Also the no of years for which the land has not been cultivated, the type of cropping and the number of crops per year for the various land options were studied. These factors determine the acquisition time and the cost of acquisitions.

MITHI ROHAR SITE



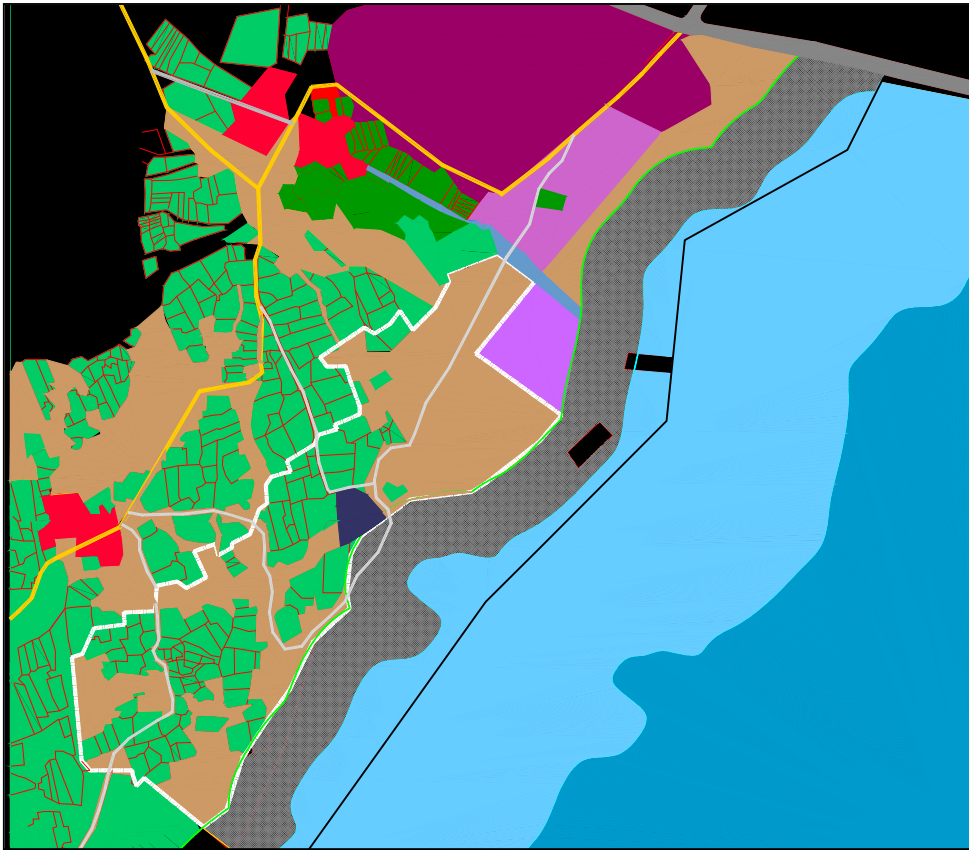
Large parcel of Government waste land (around 60%) is available. In addition to the Govt land, KPT is transferring part of its land to Govt. for industrial purposes. The site has good accessibility from the Highway (NH-8A). The site is relatively flat and hence the cost of site development would be less. The Kandla- Patinda pipeline abuts the site. The site does not have much land under the CRZ regulation zone. The Sea/creek is far off from the site boundary. Effluent disposal into the nearby creek will pose serious problems as deep sea is far away for discharge and the creek is environmentally sensitive.

BADA, PANCHATIYA SITE

-  Site Boundary
-  Govt. Land
-  Private Land
-  Forest land
-  Creek/Sea

Very large tracts of Government waste land is available and hence land acquisition process will be faster. The land cost is relatively low. The site is relatively flat and the cost for site development will be less. The site abuts the coastal line and hence the nearness to sea for deep sea discharge is an advantage. The region around lacks in physical and social infrastructure facilities. Also the nearby landuse is agricultural.

KIDANA, BHARAPAR SITE



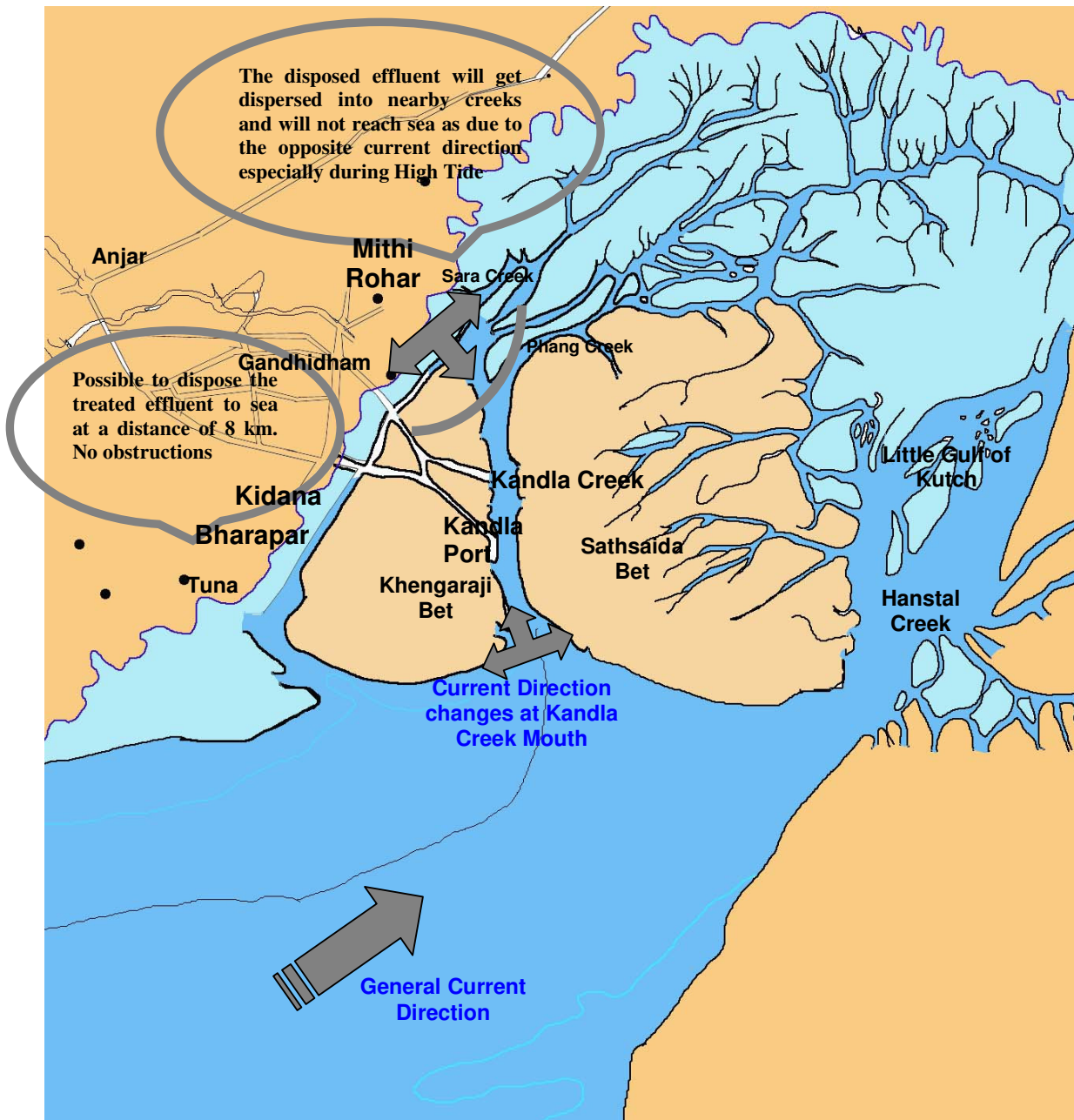
- Govt. Land
- Private Land
- KPT Land
- KFTZ Land
- Disputed Land
- Gamtal
- CRZ -500m strip
- Site boundary
- Salt pans
- Creek/deep sea

Relatively big parcel of Government waste land (around 45%) is available. The site abuts the Kandla Free Trade Zone and has good industrial, physical and social infrastructure nearby. The site has good accessibility (around 3 kms) from the Highway (NH-8A). The site is relatively flat and hence the cost of site development would be less. The Kandla-Luni- Jamnagar pipeline cuts across the site. A considerable portion of govt. land on the seaward side of the site comes under the CRZ regulation zone. The Sea/creek is near the site boundary and effluent disposal into the sea does not have major obstructions.

◆ Environment and Resource Parameters

To assess the environmental parameters, detailed discussions were held with concerned KPT officials, KFTZ authorities, Gujarat Pollution Control Board and Gujarat Department of Forests and Environment. Data and maps related to CRZ, Kandla Creek system, ecologically sensitive areas (mangroves, forest, etc.), economic activities (salt making, agriculture, and fisheries) were collected.

The **Kandla Creek system** is studied in depth for its sensitiveness to discharge treated effluents in it.



The General Current Direction in the Gulf of Kutch is from west to east. The current changes its direction towards north at the mouth of the Kandla Creek and enters into the creek. Because of this, if effluent is discharged at the inner end of the Kandla Creek from the proposed Mithi Rohar Site, the effluents instead of taking the route to the sea, will pollute the intricate network of sub-creeks and the rich mangrove system on the eastern side.

- The creek water is also used by the salt pans which is one of the major economic activities in this area. If the treated effluents are discharged into the creek, the pollutants may also enter the salt pans.
- The kandla creek maintains natural draught due to circulation of water in small sub-creeks. If any large quantities of effluent disposal in the creek may result in imbalance in the creek.
- Kandla creek water is muddy, which requires treatment before using for desalination.

Thus, environmental parameters of deep-sea discharge of treated effluent and water source point for desalination, becomes critical parameters for site selection for a chemical industrial estate.

4.6 SWOT ANALYSIS

The following are the important parameters, which form the bases for selection of site:

- Distance to sea (for effluent disposal and source for desalination water)
- Environmental sensitivity
- Nearness to port, Nearness to railways etc.
- Landholdings
- Landuse
- Industrial estate/ industry nearby
- Availability of social infrastructure

SWOT ANALYSIS:

MITHI ROHAR SITE	KIDANA, BHARAPAR SITE	BADA, PANCHATIYA SITE
STRENGTHS:		
<ul style="list-style-type: none"> • Good accessibility from the Highway (NH-8A) • Large parcel of Government waste land available • KPT also ready to transfer large quantity of land • Good Quality social infrastructure facilities available nearby. • Relatively flat site, less cost for site development • Land acquisition process will be less time consuming, as there are less private lands. 	<ul style="list-style-type: none"> • Relatively large chunks of Government waste land available • Kandla Free Trade Zone (KFTZ) abuts the proposed site • Kandla port relatively close by. • Good accessibility from the NH-8A. Alternate access to site also available • Relatively flat site, less cost for site development • Distance of sea/creek is less from the site; hence effluent disposal will be easy and cost effective. • Existing infrastructure facilities can be augmented for initial setting up phase. • Good quality social infrastructure available in close vicinity(Gandhidham town) 	<ul style="list-style-type: none"> • Very large tracts of Government waste land available • Land acquisition process will be faster. • Land cost is relatively lower. • Relatively flat site, less cost for site development • Distance of sea/creek is less from the site; hence effluent disposal will be easy and cost effective.

MITHI ROHAR SITE	KIDANA, BHARAPAR SITE	BADA, PANCHATIYA SITE
WEAKNESSES:		
<ul style="list-style-type: none"> Sea/creek is far off from the site boundary Effluent disposal into the nearby creek/sea will not be possible as the creek is environmentally sensitive (presence of rich mangroves) and will face objections from KPT, GPCB and GDPE. Alternate disposal points will be cost ineffective and will require number of clearances from various authorities/statutory bodies. Required quality of seawater not possible for desalination plant as the creek water is of muddy nature. 	<ul style="list-style-type: none"> Quite a large tract of private land needs to be acquired. This will be a time consuming process. Need to upgrade the accessibility facilities to the site. Large amount of Govt. wasteland goes off in the CRZ regulation. Land acquisition cost will be relatively higher. 	<ul style="list-style-type: none"> Presence of a strip of forestland near the coast side for which the approvals will be time consuming. Access from the highway is quite far off. Railway head is far off. Nearest railway station is Bhuj Large amount of Govt. wasteland goes off in the CRZ regulation. Good quality social infrastructure facilities are not available in close proximity. Presence of highly fertile agricultural lands in the region.
OPPORTUNITIES:		
<ul style="list-style-type: none"> Presence of number of growing individual industries in the proximity. Good site for engineering and other type of less water intensive industries. The proposed estate here can also be declared as special zone in line with the existing FTZ. 	<ul style="list-style-type: none"> The proposed estate on this site can also be declared as special zone in line with the existing FTZ. Immense potential for export based industries/units. 	<ul style="list-style-type: none"> Proximity to sea/creek and availability of large tracts of Govt. land will help in faster setting up of industrial estate. Setting of industrial estate would lead to regional development of Mandvi Taluk, which otherwise is undeveloped
THREATS:		
<ul style="list-style-type: none"> Proximity of earthquake fault line. 	<ul style="list-style-type: none"> Possible impact of strong cyclone will have relatively greater damage. 	<ul style="list-style-type: none"> Possible opposition from Environmental bodies against the chemical estate in the agricultural belt The site is close to defense establishments, which may subject to attacks in war times The site is close to virgin sea beaches which are marketed as tourist destination

4.7 CONCLUSION

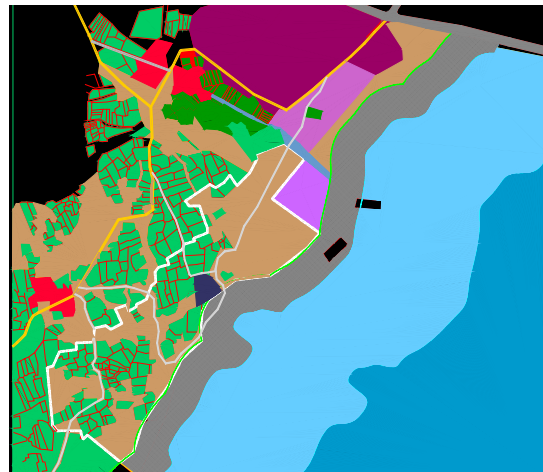
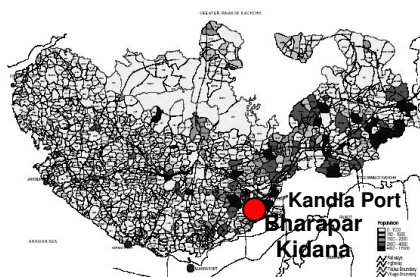
Out of the three locations analysed for site selection, the **site at Bada-panchatiya near Mandvi is rejected** due to disadvantages in the following parameters:

- Distance to Port.
- Distance to Railways.
- Environmental sensitivity with Agricultural Lands nearby.
- No industrial estate/industry or proper physical infrastructure nearby.
- Non-availability of social infrastructure.

The site at Mithi Rohar is rejected due to severe disadvantage of the two critical parameters, distance to sea for effluent disposal and source of water for desalination, and environmental sensitivity due to Kandla creek system.

From the detailed Land Suitability and SWOT analysis and taking into consideration the possible environmental impacts in each site, the site at **Kidana- Bharapar** near KFTZ is selected due to the advantages in the following parameters:

- Nearer to port
- Nearer to railway head
- Compatible landuse
- Nearer to sea/creek (for effluent disposal and source for desalination water)
- Environmentally less sensitive
- Presence of industrial estate/industry nearby (KFTZ)
- Availability of social infrastructure in Gandhidham



The area available at the proposed shortlisted site is upto the tune of 1000 Ha. For the initial setting up , upto 500 Ha of land with predominantly Govt. Waste land may be earmarked as first phase of development. The land holdings for the 500 Ha site is 35% govt. land, 5% KPT land and rest as Private land. The landuse is 45% waste land, 45% current fallow, and 15% agriculture. The site is predominantly flat with a gradual slope towards the sea. The land prices range from Rs.50,000/- to Rs.2,00,000/- per acre for the private plots.

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