

EXECUTIVE SUMMARY

0.1 INTRODUCTION

Gujarat State Road Development Corporation Limited (GSRDC), Government of Gujarat Undertaking ("Authority") is engaged in the development of state highways and as part of this endeavour, the Authority has decided to develop a fully access controlled expressway between Ahmedabad and Dholera Special Investment Region (SIR) (the "Project").

With a view to inviting bids for the Project, the Authority has entrusted Stanley-RITES joint venture for the work of Feasibility cum Preliminary Design Report and to provide Technical Assistance to develop Ahmedabad-Dholera six lane Expressway.

0.2 PROJECT ROAD

The Project Highway, being the new Greenfield alignment, starts near Sarkhej on Sardar Patel Ring Road and ends at Dholera Special Investment Region and merging with SH-6 at termination point. It also includes the proposed Dholera Airport connectivity and its approximate length is 110 km. Proposed corridor RoW is 250 m in Dholera Special Investment Region (SIR) for an approximate length of 25-28km and 150 m (minimum) outside the SIR. ROW consisting of 50 mtr RoW is specially reserved for the Ahmedabad-Dholera Rail Link. The proposed corridor, tentatively, traverses around the establishments of Tajpur, Umal, Rupavati, Jalalpur, Kesargarh, Sela, proposed International Airport and shall terminate ahead of Velavadar Black Buck Sanctuary.

The proposed access controlled expressway project with new alignment has been envisaged through an area which shall have the advantage of simultaneous development as well as shall result in a shorter distance to travel. The junctions with existing road has been planned in the form of interchanges and flyover to ensure uninterrupted flow of traffic.

0.3 PROJECT INTERVENTION

At present Dholera has connectivity through SH-6, and other MDRs. This road carries mainly local village traffic as well as heavy traffic i.e. mixed traffic from Alang, Pipavav and Bhavnagar. SH-6 is two lane road without divider which reduces vehicle speed and increases travel time & cost. The government recognizes the importance of connectivity and therefore has initiated plans to develop a 6 lane dual carriageway highway between the Dholera SIR and Ahmedabad and Bhavnagar.

Expressways are the highest class of roads and have full control of access onto them. They are used for long distance travel at a high speed. The Dholera SIR sits astride the main highway route linking the DMIC via Ahmedabad and Vadodara to Bhavnagar and Pipavav port. This road has been planned to be upgraded to expressway standard as part of the Dholera SIR project. The proposed road cross-section of the expressway is for a dual carriageway highway with an overall RoW of 100m. This will be capable of accommodating a maximum of ten lanes, if such provision were ever to be required. The configuration will be three lanes in each direction, each lane width being 3.75m with a hard shoulder of 3.0m on either side. A central median of 15m has been provided including 0.75m edge strip for each carriageway.

Fig. Es 1: Index Map



Table Es 1: Summary of Salient Features of Project Road

S. No.	Features	Details
1.	Existing Chainage	Project road starts near Sarkhej on Sardar Patel Ring Road and ends at Dholera Special Investment Region and merging with SH-6 at termination point.
2.	Length (Km)	107.400km
3.	Improvement	Six lane Greenfield Alignment development
4.	Village/Towns.	Visalpur, Tajpur, Bhat, Vasna chacharavadi, Kavitha, Chaloda, Juval-rupvati, Sindhraj, Lana, Jalalpur (godhneshwar), Sarandi, Kariyana, Ruggadh, Kesargadh, Vejalka, Saragwala, Bholad, Anandpur, Pipli, Valinda, Ambli, Kadipur, Dholera, Mundi, Sandhida, Panchi, Hebatpur, Bavliyari, Adhelai
5.	Rivers	Ghelo, Bhogavo, Bhadar, Lilka
6.	Existing and Proposed Bridges	Existing : 2 nos; Proposed : 6 major and 20 minor bridges and 6 canal bridges
7.	Culverts Existing and proposed	Nil / 609 new culverts
8.	Trees on ROW	1604 nos

0.4 ENVIRONMENTAL IMPACT ASSESSMENT OF THE PROJECT

The Environmental Impact assessment comprised of collection of environmental baseline conditions in the project area, identification of potential positive/negative environmental impacts and their feasible remedial measures (including avoidance, mitigation and enhancements) and formulation of Environmental Management Plan and monitoring programme.

0.5 THE STUDY METHODOLOGY

The Environmental impact assessment in this project has an approach in which potential environmental impacts have been examined at successive levels of detail and specificity at each step in the process. Following is the methodology used:

- Collection and review of the documents and legal policies.
- Defining scope of work and project influenced study area as per the MoEF, Government of India, EIA guidelines for Highway project.
- Collection of secondary data.
- Generation of primary data - field surveys, public consultation, strip planning, tree counting.
- Documentation of secondary & primary data and defining the Environment.
- Analysis of alternatives.
- Assessment of potential impacts followed by identifying possible mitigation measures.
- Preparation of Environmental Management Plan (EMP) and development of Environmental Monitoring Programme.

0.6 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

Review of the existing legislation, institutions and policies relevant to the Environmental Impact Assessment at the National and State levels has been conducted and clearance requirements for the project implementation at various stages of project development have been identified.

Environmental Clearance

The Environment Impact Assessment (EIA) notification 2006 by Ministry of Environment and Forests (MoEF), Government of India, came into effect from 14th September 2006. The EIA Notification, 2006 specifies the various development projects requiring prior clearance from Ministry of Environment and Forests (MoEF). As per Schedule of the Notification; the Highway project falls under Physical Infrastructure including Environmental Services and have been listed under item no. 7(f), including new highways or expansion of existing highways. The projects and activities under the Notification have been classified into two categories- Category A and Category B, based on the spatial extent of potential impacts on human health and natural and man made resources. The highway projects have also been classified into two categories- Category A and Category B based on the following conditions.

Category A	i) New National Highways; and ii) Expansion of National Highways, greater than 30 km involving additional right of way greater than 20m involving land acquisition.
Category B	i) All New State Highway Projects; and ii) State Highway expansion projects in hilly terrain (above 1,000 m AMSL) and or ecologically sensitive areas.

Moreover any project or activity specified in Category B will be treated as Category A if located in whole or in part with in 10 km from the boundary of:

1. Protected areas notified under the Wild Life (Protection) Act, 1972;

2. Critically Polluted areas as notified by Central Pollution Control Board from time to time;
3. Eco sensitive areas as notified under section 3 of Environment Protection Act, 1986 such as Mahabaleshwar, Panchangi, Matheran, Pachmarhi, Dahanu, Doon Valley; and Inter State boundaries and international boundaries.

(The project termination point being located in the restricted 10 Km. From the boundary of velavadar National Park has been categorised as "A".)

Tree felling permission would be required to be taken for cutting of trees that are existing within the proposed ROW. Also permission will be required to be taken from State Forest Department for land diversion of notified reserved and protected forest area as per the Forest conservation Act, 1927 & 1980.

As per Wild Life (Protection) Act, 1972 prior Environmental Clearance will be needed from NBWL (National Board for Wildlife) for survey and investigation as the project termination point being located in the restricted 10 Km. From the boundary of velavadar National Park.

The proposed project alignment crosses Ghelo, Bhogavo, Bhadar and Lilka rivers. These comes under the purview of Coastal Regulation and Management Zone of Gujarat and hence construction would require clearances from Gujarat Coastal Zone Management Authority and MoEF (Coastal Regulation Zone Notification, 1991 & 2011).

Land Acquisition Act, 1894 & 1989 will be applicable as land is being acquired for the project road.

Ancient Monuments and Archaeological Sites and Remains Act, 1958 is applicable in case of any chance finds during construction phase of the project which may be remains/ monuments which are deemed to be protected by ASI or the State Directorate of Archaeology.

Hazardous Waste (Management and Handling) Rules, 1986 & 2003 will applicable because contractors during construction phase will store and handle hazardous material such HSD and paints etc.

The Explosives Act (& Rules) 1884 & 1983 is applicable as this Act specifies regulations regarding the use of explosives and precautionary measures while blasting and quarrying. Provisions of these rules are applicable to this project also

Besides the above, the requirement of obtaining the clearances from authorities at the state level for the project is indicated in **Table Es 2**.

Table Es 2: Clearance Requirement for the Present Project

S. No.	Activity	Statutory Authority	Relevant Statute
1.	Permission for sand mining from river bed	Department of mining, Govt. of Gujarat. The Collector of the district will grant short-term mining lease.	Gujarat Minor Minerals Rules, 1966
2.	Setting of hot mix plants, crushers and batching plants	Gujarat Pollution Control Board	Air (Prevention and Control of Pollution) Act, 1981 and the Noise Pollution (Regulation and

S. No.	Activity	Statutory Authority	Relevant Statute
			Control) Rules, 2000
3.	Establishment of workers camp, equipment and storage yards	Gujarat Pollution Control Board	Environment Protection Act, 1986 and Manufacturing, Storage and Import of Hazardous Chemicals Rules, 1989
4.	Storage, handling and transport of hazardous materials	Gujarat Pollution Control Board	Hazardous Waste (Management and handling) Rules, 1989 and Manufacturing, Storage and Import of Hazardous chemical Rules, 1989
5.	Waste water discharge from labour camps	Gujarat Pollution Control Board	Water (Prevention and Control of Pollution) Act, 1974
6.	Disposal of bituminous wastes	Local Civil Body to identify solid waste disposal sites	Hazardous Waste (Management and Handling) Rules, 1989
7.	Opening up new quarries	Department of Commerce and Industries, Govt. of Gujarat	Mines and Minerals (Regulation and development) Act, 1957 as amended in 1972
8.	Tree felling and removal from non-forest areas	District Level Committee constituted by the State Govt. and chaired by the District Collector	Procedural Guidelines developed by the Department of Environment, under the orders of the Hon'ble High Court; Tree removal will be guided as per state government rules.

0.7 DESCRIPTION OF ENVIRONMENT

As defined in the scope of works, baseline data on various physical, biological and social aspects have been collected, analyzed and compiled in order to get the picture of the existing environment condition in the project area.

0.8 PHYSICAL RESOURCES

Climate

The project area experiences semi-arid tropical to arid climatic conditions. The region has four seasons namely summer, south-west monsoon, post monsoon and winter. The summer season starts from March and continues up to June end. October and November constitute the post monsoon season. The weather is generally cold during December to February.

Temperature

The average temperature varies between summer maximum is 45 °C (113 °F), and the minimum is 23 °C (73 °F) and winter maximum temperature is 30 °C (85 °F), minimum is 15 °C (59 °F),. The period from March to May experiences continuous increase in temperature. The month of May is generally the hottest.

Wind

The wind speeds are light to moderate with some strengthening during the south-west monsoon. The wind speeds are generally high during the period from April to August. The prevalent wind direction in Ahmedabad is from N-NE to S-SW in winter and post monsoon seasons and from SW-W TO NE-E during summer and monsoon. The wind direction persistent in Bhavnagar is slightly different than Ahmedabad and the dominant direction is W-NW to E-SE throughout the year.

Rainfall

On average, the district receives annual rainfall of 700 and 800 mm respectively. The average number of rainy days per month varies from 10 to 30 in monsoon months and the rainy season in area extends from June to September.

Humidity

The average relative humidity in monsoon months is recorded as 88% . The relative humidity is generally high during the period from June to September .Summer months form the driest part of the year when humidity is low particularly in April and May. During the south-west monsoon season the relative humidity is generally 60% and over. In the rest of the year, the air is comparatively dry. In summer season humidity is 25% while in monsoon generally the rainfall occurs whenever the relative humidity is more than 80%.

Physiography

The expressway alignment passes through plain terrain which falls in mainland Gujarat and generally termed as Saurashtra. The physical altitude in the project area is around 150m.

Geology

The entire area of Ahmedabad district comprises of a cover of thick Alluvium with a few sporadic outcrops of Deccan Trap and Limestone towards southern part of the region. The area is almost flat covered by brown sandy and clayey soil and has gentle southerly and south westerly slope. It forms part of cambay basin. The sub surface geological history of the Ahmedabad District has to be understood along with that of the entire cambay sedimentary basin as the area covered by this district forms but a small part of it.

Soil Type

The proposed expressway alignment starts at Ahmedbad where the soil type is Goradu Sandy loam and towards Dholera, the soil type is medium black soil. At the DSIR section of the project road the soil is coastal alluvium and marine clay soil.

Seisomology

The entire stretch of the proposed expressway alignment traverses through seismic zone III (Moderate Damage Risk Zone) as defined by IRC 6:1966, seismic zoning classification system, i.e., a zone of relative stability. The horizontal Seismic coefficient for zone III is 0.04 measured on a scale from I to V zones where zone I is most stable and zone V is considered to be least stable.

Natural Disaster/ Hazard

According to seismologists, 23% of the area in Gujarat lies in seismic zone V with probable intensity on Richter scale 6-9 and almost 75% of area lies in seismic zone III and IV. The entire stretch of the proposed expressway alignment traverses through seismic zone III (moderate damage risk zone) and falls in flood zone.

Surface Water

Along the project stretch, a number of water sources are found. These can be broadly classified in two categories: Flowing water resources viz. River and canals and stagnant water resources viz. Ponds and water logged area

Name of River	Chainage (Km)
Bhogavo	60.320-60.962
Ghelo	69.363
Bhadar	78.110
Lilka	93.360
Lilka	101.780

The proposed project area comes under Sub zone 3(a) for Mahi and Sabarmati Basin. Determination of Design Discharges has been done in line with the IRC codal stipulations. The Return Period Flood adopted in design is as follows.

- Waterway for bridges: 100 Years
- HFL for Bridges: 50 Years
- Scour for foundation design: 50 Year Flood multiplied by suitable factor
- Design of Roadside Drains/Culverts: 25 Years (both for rural and urban areas)

Ground Water

As per Central Ground Water Board reports, the net annual groundwater availability for the state of Gujarat is 15.02 BCM (Billion Cubic Meters), annual groundwater draft is 11.49 BCM and the stage of groundwater development is 76%. The alluvial plains in the project area provide better conditions for the storage of groundwater. The ground water table in the project area is very high at about 2 to 3m. However the water is contaminated with salt ingress. The source of drinking water is piped supply and the irrigation is either through canals or natural ponds in which water is collected during rains. Depth to groundwater table for pre monsoon and post monsoon for the project area given in following figures. This shows that the depth to groundwater table in Bhavnagar and Ahmedabad districts varies between 5 to 10 mbgl.

The published Groundwater quality map of Gujarat by Gujarat Ecology commission reveals that the project road traverses areas having fluoride content in excess of 1.5 ppm.

Land Use Pattern

The existing landuse around the proposed expressway primarily comprises of agricultural land both under private and government ownership, land for cattle grazing, forest, village settlements and village ponds and mangrove vegetation along Gulf of Khambhat. Land adjoining Gulf of Khambhat is regulated under CRZ and is highly restricted for development. The alignment proposed passes mostly through uninhabited area avoiding village establishments. The agriculture practiced is mostly multicrop due to the network of canals and the main crops grown in the area are rice, jowar, bajra, wheat and maize. The habitation along the expressway corridor are Vishalpur, Tajpur, Bhat, Vasna Chacharavadi, Kavitha, Chaloda, Juval-Rupvati, Sindhraj, Lana, Jalalpur, Sarandi, Karyana, Ruggadh, Kesargadh, Vejalka, Saragwala, Bholad, Anandapur, Pipli, Valinda, Ambli, Kadipur, Dholera, Mundi, Sandhida, Panchi, Hebatpur, Bavliyari, Adhelai

Air Quality

Air quality throughout the rural alignment is good although dust storms may occur and affect the project area during dry season. Data available from secondary sources on Ambient Air Quality reveals that concentration of pollutants such as SPM, RPM, SO₂ and

NOx in the ambient air is within the specified permissible limits. There is no major pollution generating activities along the planned alignment

Noise Level

Noise is not a major issue in the project corridor, except in congested settlements due to high anthropogenic activity and heavy traffic movement. No ambient noise data for the site is available in the published sources. The project alignment does not have any commercial and industrial activities; therefore ambient noise levels are expected to be well within the limits the specified by the CPCB for rural and residential areas.

Ecological Resources

The project region and its surroundings exhibit sparse vegetation of shrubs and thorny bushes and trees such as Azadirachta Indica (Neem), Acacia Nilotica (Desi Bawal), Prosopis Juliflora (Gando bawal), Eucalyptus Globulus (Nilgiri), Mangifera Indica (Mango), Phyllanthus emblica (Amla), Syzygium cumini (Jamun), Cassia Fistula (Amaltas) . The area adjoining Gulf of Khambhat has practically no vegetation except for mangroves at some location

There are large numbers of trees / plants of various species coming within and outside the ROW. Initial tree inventory within the proposed ROW revealed that there are about 1604 no. of trees (of which about 183 are in DSIR) which are likely to be affected due to the Greenfield expressway development activity. Some of the trees along the proposed alignment are mature with good girth size.

Fauna

The Velavdar Black Buck Sanctuary is famous as one of the few Black Buck Habitat in the sub-continent is situated just to the south of expressway alignment near DSIR at the end of the project stretch covering an area of nearly 34.08 sq km of flat grasslands. Established in 1976 the Sanctuary is characterised by a unique grassland ecosystem that has attracted fame for the successful conservation of the Black buck, the wolf and the lesser known Florian, one of the 50 rarest birds in the world. The National park has been classified as 4B Gujarat-Rajwada biotic province of semi-arid bio-geographical zone. Apart from Black bucks other fauna found in the sanctuary include the nilgai , jackal, wolf, jungle cat, fox and bird species like Pelicans, flamingos, white and painted storks, three kinds of cranes and the rare Stolzica's Bushchat mostly in the southern part of the park, where all the wetlands lie. MoEF mandates a buffer of 10kms around National Parks and Sanctuaries and a small portion of the project alignment falls under this buffer. The alignment is terminating at about 2.5kms before the boundary of the Velavadar national Park and hence needs prior approval from National Board For Wildlife.

0.9 SOCIO CULTURAL ENVIRONMENT

Total 29 villages are affected in the project. The Chainage-wise list of villages falling all along the Expressway is presented below:

Sr no.	Taluka	Village	Chainage
1	Daskroi	Visalpur	00 to 3.750
2	Sanand	Tajpur	3.750 to 6.450
3	Daskroi	Bhat	6.450 to 9.702
4	Sanand	Vasna chacharavadi	9.702 to 11.001
5	Bavla	Kavitha	11.001 to 15.401
6	Dholka	Chaloda	15.401 to 17.350
7	Bavla	Juval-rupvati	17.350 to 20.978
8	Dholka	Sindhraj	20.978 to 24.742
9	Dholka	Lana	24.742 to 27.420
10	Dholka	Jalalpur (godhneshwar)	27.420 to 29.705
11	Dholka	Sarandi	29.705 to 33.954
12	Dholka	Kariyana	33.954 to 36.904

Sr no.	Taluka	Village	Chainage
13	Dholka	ruggadh	36.904 to 41.750
14	Dholka	kesargadh	41.750 to 45.274
15	Dholka	Vejalka	45.274 to 51.172
16	Dholka	Saragwala	51.172 to 55.034
17	Dholka	Bholad	55.034 to 60.500
18	Dhandhuka	Anandpur	60.700 to 61.950
19	Dhandhuka	Pipli	61.950 to 69.226
20	Dhandhuka	Valinda	69.226 to 71.050
21	Dhandhuka	Ambli	71.050 to 76.968
22	Dhandhuka	Kadipur	76.968 to 81.850
23	Dhandhuka	Dholera	81.850 to 88.976
24	Dhandhuka	Mundi	88.976 to 90.595
25	Dhandhuka	Sandhida	90.595 to 93.900
26	Dhandhuka	Panchi	93.900 to 95.600
27	Barwala	Hebatpur	95.600 to 107.421
28	Dhandhuka	Bavliyari	101.881 to 107.421
29	Bhavnagar	Adhelai	107.421 to 110.55
Total			110.55 km

The Table below indicates that there are 103 number of structures that is envisaged to be affected with the proposed project development. Keeping in view that the project road will have ROW 150 meters the impacts are permanent and total loss of structures will be there. The estimate of the above number of structures to be affected has been through the preliminary field surveys and discussions with the local communities.

Serial No	Description	Number
1	Building	37
2	Temple And Samshan	10
3	Factory	1
4	Electric Sub Station	1
5	Agriculture Well And Tanks	24
6	Brickfied Chimney	3
7	Pond And Water Bodies	27
	Total	103

0.10 PUBLIC CONSULTATION

Community consultations were held with Project Affected Persons (PAPs), other stakeholders and the general public to determine their views about the proposed road and incorporate their suggestions while finalizing the alignment. The people were generally in favour of construction of the road, as it would reduce traffic congestion, increase safety and improve socio-economic status of the area. On the basis of community consultations following recommendations have been made:

- Adequate Compensatory plantation of trees; irrespective of the State Forest Department for each tree removed .
- Adoption of stringent control measures for air and noise pollution during construction and operation particularly near settlements and junctions.
- Provision of adequate cross drainage structures.
- Prevention of deterioration in surface water quality through sediment control and adoption of a protocol for material handling & storage.
- Safety measures at work site through traffic management and provision of personal protective equipment for work force.

- Protecting sensitive receptors like schools and hospitals close to ROW from high noise level.
- Impacting minimum number of cultural properties like temples/shrines coming close to ROW.
- Employment of local labour during construction stage.
- Provision of pedestrian/cattle underpasses at needed locations

0.11 ANALYSIS OF ALTERNATIVES

An analysis of “With” and “Without” Project scenario reveals that the positive impacts outnumber the negative impacts due to the proposed development. The negative impacts are envisaged only during the construction period which will be limited, time-bound and restricted to construction stage only. Further mitigation measures will be adopted to limit the impacts during the construction phase.

Highway projects promote access to markets, materials and opportunities by facilitating movement of persons and goods and improve earning and thereby level of living. This in turn enhances the demand for transport. This two-way interactions works through a host of inter-sectoral forward and backward linkages effects and dynamic externalities tends to relocate industries, services and labors thus help the shape the economic geography of the region.

The proposed access controlled expressway project with new alignment has been envisaged through an area which shall have the advantage of simultaneous development as well as shall result in a shorter distance to travel. The junctions with existing road will be planned in the form of interchanges and flyover to ensure uninterrupted flow of traffic. It is envisaged that the new industry cluster to be developed along the spine would considerably be benefited with central linkage. It will also act as catalyst to other developments in the region in general and that of SIR in particular. This is also a part of master plan submitted to central govt. for DMIC road connectivity which is approved by the Central Government.

0.12 IMPACT ON ENVIRONMENTAL RESOURCE

Impacts on environmental parameters and proposed mitigation measures are detailed in the matrix at **Table Es 3**.

Table Es 3: Summary Impact Mitigation Matrix

Subject	Potential Impact	Mitigation Measures
Topography	Impact is very low, but permanent.	No mitigation measure is required.
Geology	Impact will be of less intense through removal of stones aggregate and sand from identified quarries.	No mitigation measure is required.
Soils	<ul style="list-style-type: none"> • Physical & chemical contamination of soil. • Compaction and structural damage. • Soil erosion. 	<ul style="list-style-type: none"> • Dumping of construction waste at approved locations protected by berms. • Reuse of construction waste. • Storage of construction material in accordance with the IRC norms. • Avoiding work during periods of heavy rainfall. • Rehabilitation of borrow area for productive use. • Conservation of topsoil for reuse in planting pits and rehabilitation of borrow areas, sodding /grass turving and implementation of soil erosion control plan.

Subject	Potential Impact	Mitigation Measures
		<ul style="list-style-type: none"> • Provision of silt fencing and sedimentation traps
Climate(Temperature/Rainfall/Humidity)	Impact is Less, spatially restricted and of short-term impact.	<ul style="list-style-type: none"> • No mitigation measure is required but proposition of adequate avenue and median plantation would soothe the microclimate.
Loss of Productivity	<ul style="list-style-type: none"> • Land will be diverted for this project including agricultural land affecting productivity at the micro-level. Impact will be significant at micro level and insignificant at macro-level. 	<ul style="list-style-type: none"> • Payment of compensation for loss of lands under agriculture.
Induced Development	<ul style="list-style-type: none"> • Insignificant change in the land use pattern 	<ul style="list-style-type: none"> • Civil authorities to plan and guide any induced development using the prevailing regulatory framework.
Surface water	<ul style="list-style-type: none"> • 4 rivers and 27 ponds will be impacted due to the project. • Degradation of water quality parameters like pH, COD, BOD, TDS, Turbidity etc. • No impact on availability. 	<ul style="list-style-type: none"> • Use of sediment traps, silt fencing sodding grass turfing, etc. for minimization of soil movement, use of cofferdams for construction of abutments and bridge pier. Cofferdams to be made of such material that cannot be brought into suspension by flowing waters. • Minimization of disturbance of stream substrate if at all inevitable for placing abutments or piling. • Tarpaulins or other catchment devices will be slung under the bridge to prevent entry of debris, wastes and toxic items into the stream • Provision of adequate cross drainage structures. • Implementation of a protocol for storage of topsoil construction waste away from water sources. • Location of onsite refueling station away from water resource. • Use of oil/water separators to extract floating. • Avoidance of lead-based paints in painting components of the bridge • Monitoring of water quality during construction and operation.
Ground water quality	<ul style="list-style-type: none"> • Not very significant impact on quality and no impact on availability. 	<ul style="list-style-type: none"> • Out of these water sources a few numbers will be impacted due to eccentric and concentric widening of the road. • Relocation of impacted ground water facility in consultation with communities. • Provision of separate water facilities for construction camp. • Provision of rainwater harvesting structures have been proposed at equal intervals for the entire stretch of the road.
Environment		
Air	<ul style="list-style-type: none"> • Increased gaseous pollution along with fugitive dust emissions. 	<ul style="list-style-type: none"> • Asphalt plant, Crusher, Batching Plant, will be sited 1000 m in down wind direction from nearest settlements. • Vehicles and construction equipments to be maintained properly; to obtain PUC certificates periodically. • Transportation and delivery of construction materials & waste properly covered to avoid spills & dispersion.

Subject	Potential Impact	Mitigation Measures
		<ul style="list-style-type: none"> • Construction of wind breaking walls near stone crusher units will avoid dust laden air travelling to built-up areas and sensitive locations.
Noise	<ul style="list-style-type: none"> • Construction phase impact will be low to moderate and spatially restricted and reversible. • During operation phase, beneficial impact in the initial phase and persistence of such beneficial impact will depend on the future traffic volume & quality of maintenance of road. 	<ul style="list-style-type: none"> • Construction plant & machinery to be located 1 Km away from settlements. • Displacement of people and demolition of structures will be avoided to the extent possible. • Construction vehicles and equipments fixed or mobile to be equipped and maintained with effective muffler system. • Proper Traffic management to be in place near sensitive receptors. • Putting up " no horn" signage near sensitive receptors. • Provision of earplugs to workers. • Noisy construction to be restricted during the hours between 7 am and 7 pm. • Provision of sound screens near sensitive receptors during construction phase. • Provision of noise barriers near sensitive receptors during operation phase.
Ecology		
Flora	There are about 1604 trees in the ROW likely to be felled	<ul style="list-style-type: none"> • Adequate Compensatory avenue and median plantation along the roadside; trees to be planted for each trees removed as per State Government guideline.
Fauna	Apart from Black bucks other fauna found in and around the sanctuary include the nilgai , jackal, wolf, jungle cat, fox and bird species like Pelicans, flamingos, white and painted storks, three kinds of cranes and the rare Stolizca's Bushchat .	<ul style="list-style-type: none"> • No mitigation measures required. Construction workers will be made aware about the provision of the Wild life (Protection) Act 1972 as forest areas come within the area of indirect influences in some stretches.
Socio Environment		
Socio Environment	<ul style="list-style-type: none"> • Displacement of people. • Demolition of Structures. • Acquisition of agricultural land. • Influx of construction workers. 	<ul style="list-style-type: none"> • Resettlement of people as per provisions of RAP. • Displacement of people and demolition of structures will be minimized to the extent possible. • Compensation for loss of structures - private, community and public will be provided. • Compensation for loss of land under agriculture will be provided. • Ensure employment of local labour in unskilled and semi skilled sector. • Setting up migrant workers camp at least 1 Km away from settlements.
Archeological Monuments / Historical structure.	<ul style="list-style-type: none"> • Archeological sites such as Lothal, dargahBhadiyadPir,K han masjid, hazratshah Bava ki dargah etc. exist on either side of the proposed alignment. 	<ul style="list-style-type: none"> • No mitigation measure required. Also, it will be ensured that the project development and material procurement doesnot adversely affect these properties.

Subject	Potential Impact	Mitigation Measures
Religious Structures/cultural property	<ul style="list-style-type: none"> There are a total of 10 religious structures along the ROW out of which a few may get impacted. 	<ul style="list-style-type: none"> The structures will be relocated in consultation with the community. Also, through technical viable maneuvering these structures can be protected.
Public Health and Road Safety		
Public health and road safety	<ul style="list-style-type: none"> Psychological impacts of project affected people. Migration of worker may lead to sanitation problem creating congenial condition for the growth of disease vectors. Discomfort arising of air and noise pollution. Hazard of accidents. 	<ul style="list-style-type: none"> Continued consultation with PAPs and the competent authority for speedier settlements of appropriate compensation package and resettlement. Ensure sanitary measures at construction camp to prevent water borne diseases and vector borne diseases. Provide appropriate personal protective equipments like earplugs, gloves gumboots, and masks to the work force. Safe traffic management at construction area.

0.13 ENVIRONMENTAL MONITORING AND MANAGEMENT PLAN

Environmental Monitoring and management Plan ensures that the environmental mitigation measures and enhancement programme are properly implemented and the responsibility for implementation is clearly demarcated. Monitoring of environmental quality during construction and during operation reflects the success of implementation of the mitigation measures. Monitoring will be conducted by the project authority with the help of an independent monitoring laboratory approved by MOEF/CPCB. Monitoring parameters, locations and frequency for air, water, noise quality testing have been suggested. Monitoring of survival rate of plantations also has been suggested.

An environmental budget for Rs. 20 crores has been drawn up. This provides for compensatory plantation, enhancement of sites, and cost of monitoring. This amount has been integrated into the budget.

0.14 CONCLUSIONS

The proposed expansion will aid in infrastructure development and will act as a catalyst to boost the economic progress of the state. The six lane expressway is proposed to connect Dholera with Ahmedabad. The proposed road will serve as a central spine for Ahmedabad-Dholera SIR. The proposed access controlled expressway project with new alignment has been envisaged through an area which shall have the advantage of simultaneous development as well as shall result in a shorter distance to travel. The junctions with existing road will be planned in the form of interchanges and flyover to ensure uninterrupted flow of traffic. It is envisaged that the new industry cluster to be developed along the spine would considerably be benefited with central linkage. It will also act as catalyst to other developments in the region in general and that of SIR in particular. This is also a part of master plan submitted to central govt. for DMIC road connectivity which is approved by the Central Government.

The indirect benefit of proposed widening would work through the dynamic developmental externalities generated through the forward and backward linkages. There will be change in Landuse pattern in the areas that have greater connectivity due the highway, since there will be a change in the patterns of settlement, agricultural land use

and location of industries, trading and other services and non-farm unorganized sector activities. All the above would reflect in the changes in the pattern of economic activities, income generation, price evolution, employment condition and ground rent prevailing in the region. A new Landuse pattern may in turn induce greater accessibility to job market, health and educational facilities and attract investment for development of feeder roads, power distribution networks, telecommunication facilities and other modes of connectivity among other, leading to a greater access to of the local people to markets and infrastructure facilities.

With best management practices and a proper environmental management & monitoring plan in place during construction and operation stages, the proposed project is not expected to cause any significant adverse effects on the surrounding environment.

• • •