Final Report

FINAL ENVIRONMENTAL ASSESSMENT
KHURJA – PILKHANI SECTION
(220.710 Km)

[VOLUME – I]

SFG1115 V2

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Submitted to:

Dedicated Freight Corridor Corporation India Ltd.

Public Disclosure Authorized

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ABBREVIATIONS

ABBREVIATION	FULL FORM
IR	India Railways
DFCCIL	Dedicated Freight Corridor Corporation Ltd.
DFC	Dedicated Freight Corridor
Kms.	Kilometers
MMD	Maximum Moving Dimensions
SOD	Schedule of Dimensions
TLD	Track Loading Density
Kmph	Kilometer Per Hour
ROB	Railway Over Bridge
RUB	Railway Under Bridge
EDFC	Eastern Dedicated Freight Corridor
MOEF&CC	Ministry of Environment , Forests & Climate Change
UPPCB	Uttar Pradesh Pollution Control Board
GoI	Government of India
CCE	Chief Controller of Explosives of PESO
EA	Environmental Assessment
EIA	Environment Impact Assessment
PC	Public Consultation
ROW	Right of the Way
ToR	Terms of Reference
EMP	Environment Management Plan
EMF	Environmental Management Framework
BOQs	Bill of Quantities
SEIAA	State Environment Impact Assessment Authority
AAQ	Ambient Air Quality
PM_{10}	Particulate Matter 10
$PM_{2.5}$	Particulate Matter 2.5
SO_2	Sulphur dioxide
NO_x	Nitrogen oxide
CPCB	Central pollution Control Board
COI	Corridor of Impact
dB(A)	Decibels
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
DO	Dissolved Oxygen
PF	Protected Forest
RF	Reserve Forest
IMD	Indian Meteorological Department
DFO	Divisional Forest Officer
DPEP	District Primary Education Programme
WB	World Bank
MSL	Mean Sea Level
BIS	Bureau of Indian Standards
CCOE	Chief Controller Of Explosives (PESO)

ABBREVIATION	FULL FORM
DIN 4150	German standard “Deutsches Institute für Normung”
APHA	American Public Health Association
ISO	International Organization for Standardization
JIS	Japanese Industrial Standards
BS	British Standards
VDV	Vibration Dose Value
PPV	Peak Particle Velocity
A-Route	Mugalsarai to Ghaziabad
B Route	Mugalsarai-Zafrabad-Sultnpur-Utretia (Lucknow)-Moradabad-Saharanpur-Umbala

EXECUTIVE SUMMARY

1.0 BACKGROUND

Ministry of Railways initiated action to establish a Special Purpose Vehicle for construction, operation and maintenance of the dedicated freight corridors. This led to the establishment of "Dedicated Freight Corridor Corporation of India Limited (DFCCIL)", to undertake planning & development, mobilization of financial resources and construction, maintenance and operation of the dedicated freight corridors. DFCCIL was incorporated as a company under the Companies Act, 1956 on 30th October 2006. Mumbai-Delhi and Delhi-Howrah routes have a current capacity utilization of more than 140%. This has led to the saturation of the Railways system in terms of line capacity utilizations on these corridors, which are specifically called the Western and Eastern corridor respectively. Dankuni -Sonnagar-Ludhiana section has been identified as part of the Eastern corridor (EDFC) and from JNPT to Dadri via Vadodara – Ahmedabad - Palanpur-Phulera - Rewari is called Western corridor. EDFC corridors encompass double line electrified traction from Dankuri-Khurja-Dadri and single line from Khurja to Ludhiana. The total length of EDFC works out to 1839 Kms. The present section i.e. Khurja – Pilkhani section (220.71 Km) has been identified as part of eastern corridor, lies on A-route from Khurja to Meerut City in Moradabad division and B- route from Meerut City to Saharanpur in Delhi & Ambala division.

2.0 OBJECTIVES OF THE ASSIGNMENT

As per the current regulations of Government of India, railway projects do not require conducting Environmental Impact Assessment (EIA) studies and obtaining Environmental Clearance (EC) from the Ministry of Environment Forests Climate Change (MoEF&CC). However, considering the magnitude of activities envisaged as part of EDFC, the DFCCIL has undertaken steps to conduct an EIA and prepare an Environmental Management Plan (EMP) to mitigate potential negative impacts for the project. The EIA study will enable DFC to identify the likely environmental impacts and their magnitude during various stages (design, construction & operation) of the project and develop cost effective mitigation and monitoring measures along with institutional mechanism to enhance the environmental sustainability of the project.

3.0 SCOPE OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

The environmental assessment scope includes environmental impact assessment, preparation of environment profile and environmental management plans for Khurja-Pilkhani section of EDFC. Environmental Management Framework (EMF) for EDFC prepared earlier & available on DFCCIL website will be referred for this Khurja-Pilkhani section as well.

4.0 DESCRIPTION OF PROJECT

The present section Khurja-Pilkhani of Eastern Dedicated Freight Corridor is planned to be **single line** with **electrified track** and located in the **Moradabad, Delhi & Ambala** Divisions of Northern Railway. The proposed freight corridor is being designed for a maximum speed of 100 km/h for train operation. This report deals with the portion of corridor from Khurja junction station from where flyover for Meerut line takes off and end at Pilkhani at Existing km. 187.5 of Indian Railway Track.

This section lies on A route from Khurja to Meerut City in Moradabad division and B route from Meerut City to Saharanpur in Delhi & Ambala division. The route classification is on the basis of the future maximum permissible speeds. The entire stretch (Khurja to Pilkhani) is in the State of Uttar Pradesh and passes through **6 districts** i.e. Bulandshahr, Ghaziabad, Hapur, Meerut, Muzaffarnagar and Saharanpur.

The terrain here is generally flat and the alignment crosses no major river except Kali & Hindon. Hence there is no Important Bridge in the section. The entire length lies in the Indo- gangetic plain. The soil in the area is Loamy as usually found on doab region. Agriculture is the predominant land use in this region.

At some sections, the planned route is parallel to existing IR tracks at minimum distance of 6m from the existing Railway track. This distance varies due to space constraints in built up areas near the Railway Land. Total length of the corridor is 220.710 km of which 110.515 km is detour and remaining 110.195 km runs parallel to IR track maintaining the minimum distance. Salient features of the project are presented in **Table 1**.

Table 1: Salient features of the Project

Sr. No.	Description	Details
1	Route Length (km)	220.710
2	Parallel	110.195 (78.495+31.5)
3	Detour (excluding Khurja flyover)	110.515 (+0.2)
4	No. of Detour	02(MTC & MOZ Detour), 1 RFO at Tapri
5	Number of Major Bridges	42
6	Number of RUBs	407
7	Number of Rail Flyovers	4 (1 on GZB-CNB Line near Khurja City,1 on GZB-MB Line near Hapur, one on GZB-SRE Line near Meerut City&1 RFO DLE-SHAMLI-TAPRI respectively)
8	Crossing Stations	21
9	Additional Land required (ha.)	829.08

5.0 KEY ENVIRONEMNTAL LAWS AND REGULATIONS

Table 2 presents the environmental regulations and legislations relevant to project.

Table 2: Environmental Regulations and Legislations

Sr. No.	Act/Rules	Purpose	Applicability	Authority
1	Environment Protection Act-1986	To protect and improve overall environment	The project activities should maintain emission standards	MoEF. GoI; DoE, State Gov. CPCB; SPCB
2	Environmental Impact Assessment Notification- 14th Sep-2006	To provide environmental clearance to new development activities following environmental impact assessment	Railway projects are not included in the Notification of 14th Sep, 2006 and EC under this Act is not applicable. However, as per MoEF's amended notification dated 9.9.2013 mining of minor minerals through borrow / quarry areas which will be used in project, require prior environmental clearances	MoEF/SEIAA

Sr. No.	Act/Rules	Purpose	Applicability	Authority
3	Notification for use of fly ash, 1999	Reuse large quantity of fly ash discharged from thermal power plant to minimize land use for disposal	Possibility of use of fly ash shall be explored in Engineering designs	MoEF
4	The Indian Forest Act, 1927 The Forest (Conservation) Act, 1980 The Forest (Conservation) Rules, 1981	To check tree felling deforestation by restricting conversion of forested areas into non-forested areas	Applicable, As plantation parallel to existing track is declared as protective forest.	MoEF and state Forest Department
5	MoEF circular (1998) on linear Plantation on roadside, canals and railway lines modifying the applicability of provisions of Forest (Conversation) Act, to linear Plantation	Protection / planting roadside strip as avenue/strip plantations as these are declared protected forest areas.	Applicability of Forest (Conservation) Act to Roadside and railside strip Plantations	MoEF and state forest department
6	Air (Prevention and Control of Pollution) Act, 1981	To control air pollution by specifying the emission standards.	Emissions from construction machinery and vehicle should be checked time to time.	State Pollution Control Board of Uttar Pradesh,
7	Water Prevention and Control of Pollution) Act, 1974	To control water pollution by controlling discharge of pollutants as per the prescribed standards	Various parameters in effluents from construction sites and workshops are to be kept below the prescribed standards	State Pollution Control Board of Uttar Pradesh,
8	Noise Pollution (Regulation and Control Act), 2000	The standards for noise for day and night have been promulgated by the MoEF for various land uses.	DG sets at construction sites and workshops should be provided with acoustics enclosures.	State Pollution Control Board of Uttar Pradesh,
9	Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010	Conservation of cultural and historical remains found in India	No. No ASI monument is located within 300m from proposed DFC track on either side. But 'chance find', if any, shall be governed by the Act & to be surrendered to Competent Authority.	Monuments Authority of India
10	Public Liability and Insurance Act, 1991	Protection form hazardous materials and accidents.	Shall be taken as per requirements	State Pollution Control Board of Uttar Pradesh,
11	The Explosives Act, 1884	Safe transportation, storage and use of explosive material	Respective Authorization shall be obtained from CCoE	Chief Controller of Explosives (CCoE)
12	Minor Mineral and Concession Rules, The Mining Act	For opening new borrow pits & quarry.	Quarry Licenses shall be obtained by Contractors.	District Collector/Mining authority of the area
13	Central Motor Vehicle Act, 1988 and Central Motor Vehicle Rules, 1989	To check vehicular air and noise pollution and authorisation to drive vehicle	All vehicles in Use shall obtain Pollution Control Check certificates and shall be driven by personnel with proper licence.	Motor Vehicle Department of the state

Sr. No.	Act/Rules	Purpose	Applicability	Authority
14	The Mining Act	For safe & sound mining activity	Quarry licence to be obtained by the Contractor	State Govt. Dept. Of Mines
15	Hazardous waste (Management , Handling & Tran boundary) Rules, 2008	Management and storage of hazardous waste.	Applicable	State Pollution Control Board of Uttar Pradesh / MoEF
16	The Railway (Amendment) Act, 2008	Land acquisition	Applicable	GoI
17	The Petroleum (Amendment) Rules, 2011	Use and storage of petroleum products	Applicable	CCOE /District Collector of the area
18	Municipal Solid Wastes (Management and Handling) Rules, 2000.	Management & disposal of Construction & Demolition debris	Applicable	SPCB

For projects with potential to have significant adverse environmental impacts (Category A) an environmental impact assessment (EIA) is required. Category B projects are judged to have some adverse environmental impacts, but of lesser degree or significance than those for category A projects and require an Environmental Assessment (EA) to determine whether or not significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the EA is regarded as the final environmental assessment report as is the case for this project. No presence of endangered fauna and flora along the project railway line envisaged. The Government of India has issued Environmental Impact Assessment Notification in 1994 as a part of Environmental (Protection) Act, 1986 and amendments in September 2006. Railway projects do not fall under any category requiring an environmental clearance from MOEF&CC. Only No Objection Certificate (NOC) is required from SPCB under the Air and Water Acts where applicable. Mining related to the constructions activity will require environment clearance under the provisions of the EIA Notification.

It has been established that there is a need for improving the infrastructure capacity of the transport sector to cater the projected demand for freight and good movement. By building up the rail infrastructure which uses $1/6^{th}$ the fossil fuel consumption as compared to road, overall improvement environmental condition is envisaged. Over and above since traction in this case would be electricity based, there is a possibility that this electricity can come from the budding nuclear capacity of the nation. Thus there cannot be more eco-friendly and efficient transport system to meet with the demand of India's growth economy.

The project is proposed to be funded by the World Bank. This will require project to comply with World Bank Operational Policies. The operational policies of the Bank that are triggered with details of their applicability to the Project are provided in the following **Table 3.** The World Bank Environment Assessment (EA) requirements are based on a three-part classification system such as Category 'A', Category 'B' and Category 'C' as defined by the World Bank OP 4.01. A Project designated as Category 'A', requires a full Environmental Assessment (EA) whereas Category 'B' projects require a lesser level of environmental investigation. Category 'C' projects require no environmental analysis beyond determination.

Table 3: World Bank Safeguard Policies

Sr. No.	Safeguard Policy	Subject Category	Triggered	Triggered By	Mitigation Measures	Documentation
1.	OP 4.01	Environment Assessment	Yes	Sensitive areas and impacts on	Mitigation measures incorporated	EA and EMP prepared

Sr. No.	Safeguard Policy	Subject Category	Triggered	Triggered By	Mitigation Measures	Documentation
				environmental and social components		
2.	OP 4.11	Physical Cultural Resources	Yes	Risk to cultural properties	Adequate mitigation measures if affected	EMP & RAP prepared
3.	OP 4.36	Forestry	Yes	Diversion of forest land	To be carried out as per Forest (Conservation) Act, 1980	As applicable under the Act.
4.	IFC Performance Standards	Labour & Occupational Health	Yes	Labour and construction camp	Compliance of IFC Standards	EIA & EMP prepared; Safety & Occupational Health measures during construction adequately covered in Contract document & reference document of SHE manual.

Physical work proposed under this project is expected to cause Environmental & Social impacts involving large scale land acquisition (829.08 Ha.), 0.17 Billion cubic meter earth work & 0.6 million cubic meter ballast, felling of around 19013 trees & diversion of approx. 109 ha. Protected Forest land, construction work on 220.710 km linear work front involving various construction equipment etc. Therefore, the Project is considered as Category **'A'** as per the World Bank safeguard policy. This will help in making the construction stage more environmental compliant and also setting up a system for better and more environment friendly construction in the project area. DFCCIL is committed to establish the most efficient and eco-friendly systems.

6.0 BASELINE ENVIRONMENT

The primary data was collected through sampling, testing and analysis for physical environment namely- air quality, water, soil, noise & vibration, biological and socio-economic aspects at various locations to assess the baseline status both in the core and buffer zone. Data was collected from secondary sources for the macro-environmental setting like climate, physiography (Geology and slope), biological and socio-economic environment within Project Influence Area which is 100 meter on each side of corridor as core zone & 5 km. on each side of corridor as buffer zone. First-hand information has been collected to record the micro-environmental features within Corridor of Impact (CoI). Collection of first hand (Primary) information includes preparation of base maps, extrapolating environmental features on proposed alignment, environmental monitoring covering ambient air, water, soil, noise and vibration, tree enumeration, location and measurement of socio cultural features abutting project alignment. The environmental profile and strip plan have been prepared. The baseline status is summarised below in **Table 4**.

Table 4: Summary of Environmental Features

Sr. No.	Components	Environmental Features	Remarks
1.	Ecological	No ecologically sensitive area in both core and buffer zone of the study area	However, approx 109 Ha. Protected Forest land diversion is proposed

Sr. No.	Components	Environmental Features	Remarks
			along existing IR track.
	Tree cover	Khajur, Eucalyptus, Mango, Neem, Gulmohar and Shisam are the most dominant species observed. Approx.19013 trees need to be cut.	All along the alignment
2.	Archaeological Monuments	No ASI monument / structure is affected.	-
3.	National Park, Wildlife Sanctuary, Wetland	None	-
4.	Water Bodies	Surface water quality largely conforms to the CPCB prescribed standards while the groundwater quality conforms to the drinking water standards (BIS: 10500). The alignment passes through only one Semi-critical ground water block of Hapur Districts.	Crossing Rivers – Kali & Hindon. Crossing Canals – Upper Ganga Canal & It's distributaries.
5.	Land-use	Primarily agricultural (72%) followed by settlement area (18.3%), water bodies (0.9%), open land (6.8%), vegetation (1.8%), barren land (0.2%).	-

7.0 PUBLIC CONSULTATION AND DISCLOSURE

The Public Consultation meetings for the proposed Eastern Dedicated Freight Corridor were conducted during the study period in February-March, 2015 for these meetings; environmentally sensitive villages that could potentially be affected by the proposed project were selected. The overall objective of the public consultation was to provide information to the stakeholders and collect feedback from them on related environmental issues. The concern of local communities and the affected people was mainly on the request for employment, appropriate and timely compensation as per new LARR Act, 2013. All the meetings were held in the villages/settlements along the corridor where in all the stakeholders including the Gram panchayat representative and DFCC personnel. The villagers though expressed the concern of pollution – air, noise and water also expressed satisfaction after learning that the train was an electrified train and being a high speed cargo train impacts would be minimum from its operations. The issue of tree compensation was also conveyed which was answered with the option of 1:2 compensatory plantation and minimizing felling of any productive or fruit bearing trees being impacted due to the project development. Summary of views & concerned expressed during PCM are as follows:

- The concern of local communities and the affected people was mainly on the request for employment, appropriate and timely compensation as per new LARR 2013 Act.
- Impact on environment, forest, national park/ wildlife sanctuary, afforestation policy.
- Air/ water / soil pollution and noise / vibration issues
- Access through level crossings, underpasses, FOB, traffic congestion, drainage
- Possibility of accident due to DFC alignment's close proximity to habitation
- Loss of livelihood due to land acquisition, job to landless families
- Land compensation, jobs in lieu of land.

During discussions, project proponent DFCCIL clarified and explained proposed measures to be taken in design stage, construction phase as well as operation phase to either eliminate or reduce the issues to acceptable level. Participants were satisfied with response of project authority & Consultants. The main point of concern of the villagers, residents in the encroached area was pertaining to compensation against loss of land and the mode of payment. People are looking forward for quick compensation and start of work. The Government regulators like Forest Department, Pollution Boards, Municipal Authorities and Local NGOs also supported and favored the project.

8.0 ANALYSIS OF ALTERNATIVES

There are number of Major cities and settlements all along the section and to avoid such heavily built up area, two detours have been proposed at these locations. Since the proposed DFC track generally runs on the left side of the IR tracks (Facing Khurja to Pilkhani), proposed detours are not considered for the right side (RHS) of the IR network because of technical constraints and high cost of construction for underpass / flyover to the IR tracks. However, various alternatives have been analysed keeping in view environmental, social and technical parameters. The details of the parallel (110.195 Km) and detour locations (110.515 km) are given in **Table 5**. All the detours are on the left side (w.r.t. railway alignment from Khurja to Pilkhani) of the railway track .All the parallel alignments are on the left hand side of the existing railway track.

Table 5: Locations of the Parallel & Detour Alignment

Sr. No.	Description	Chainage		Length (Km)	Type of Track	Remark
		From	To			
1	DFC(KC)	-3.20	0.00	3.20	Khurja Flyover Detour	Khurja Talheri Section
2	IR	3.20	49.695	46.495	Parallel	
3	DFC (MTC Detour)	0	67.750	67.750	Detour	49.650-86.900 Km (IR)
4	IR	86.900	112.000	25.100	Parallel	
5	DFC (MOZ Detour)	0	42.765	42.765	Detour	112.00-152.300Km (IR)
6	IR	153.300	156.000	3.7000	Parallel	
Total				**189.010**		
7	IR	156.000	187.500	31.700	Parallel (incl Tapri RFO)	Talheri – Pilkhani
Total				**220.710**		

Parallel = 110.195, Detour = 110.515

9.0 POTENTIAL IMPACT

The project is unlikely to cause significant environmental impacts. The environmental impacts will be temporary during construction and EMP provides mitigation measures. Brief details of identified potential impacts associated with this project are given below:

a) Diversion of approx. 109 ha protected forest on account of linear plantation on railway land and along highways in UP; Trees are local species. Number of trees cutting in the forest area will be finalised after joint survey with Forest Dept.
b) Cutting of about 19013 trees on other govt and private lands;
c) 0.17 Billion cubic meter earth work of in embankment and & 0.6 million cubic meter of ballast;
d) Increased noise & vibration levels in Sensitive Receptors (SRs) located close to the alignment; while SRs within ROW will be relocated, 4 SRs are proposed to have noise barriers.
e) Health & safety issues during construction activities;
f) Alignment passes over one perennial river Hindon and Kali & upper Ganga canal, it's distributaries.

g) Compensatory afforestation shall be undertaken as per the forest clearance conditions and the conditions of tree felling as laid down by the State Government.
h) 110 Community Properties Resources will be affected.
i) PAFs 5926
j) PAPs 31526

10. MEASURES FOR THE MITIGATION OF ENVIRONEMNTAL IMPACTS

Mitigation measures have been proposed for countering potential impacts. These are as follows:

a) Compensatory afforestation against approx. 109 Ha. protected forest land acquired as per conditions of MoEF while granting permission;
b) Plantation of about 38,026 trees; compensatory plantation will be carried out as described in the chapter.
c) Dust suppression measures are proposed during earthwork.
d) Permission will be obtained from concerned authority for quarrying and necessary conditions complied with;
e) Noise suppression & suitable noise barriers are proposed for sensitive receptors; 5 sensitive receptors will require noise barrier. However, all sensitive receptors within RoW required re-location.
f) Vibration control measures during design stage of track and locomotive & rakes besides vibration suppression measures like plantation are proposed for the identified sensitive receptors;
g) Relocation of affected 110 CPRs;
h) Occupational Health & safety measures for workers during construction activities and at labour camps;
i) Water quality of perennial river Hindon, Kali & other canals crossing the DFC alignment will be monitored and maintained;
j) Suitable drainage will be provided.
k) Discharge of wastewater during construction phase will be as per EMP and suitable oil catch pits will be provided where necessary.
l) Seismic zone-IV in U.P. will be considered during detailed design as per relevant Railway codes/ standards.
m) Water requirement plan will be drawn by the Contractor for meeting water demand during construction. Effort will be to use surface water to maximum extent and dependence on ground water will be minimized.
n) Resilient fasteners or its improved version will be provided for suppression of vibration. This is in practice in Indian Railways already.
o) Water requirement management during construction, Construction wastes & debris management plan, Siting management plan of construction camp & facilities and Silicosis exposure reduction plan are annexed as broad guidelines for the contractor to develop own plans & implement during construction.

11. ENVIRONMENTAL MANAGEMENT PLAN

Environmental Management Plan describes specific mitigation measures. These include following:

i. About 19013 trees along the alignment will be felled. Total no. of trees to be felled will be finalised after joint survey with Forest Dept. for PF. Plantation plan is drawn and would be taken up;.
ii. Afforestation against approx. 109 ha. protected forest land to be diverted;

iii. Rehabilitation plan for borrow areas/quarry sites;
iv. Noise barriers of various degrees for 4 number of sensitive receptors;
v. Borrow area management plan to control degradation of surrounding landscape for excavation work following of standard IRC-10:1961;
vi. Specific safety and silicosis exposure reduction strategy during construction;
vii. Soil protection measures;
viii. Silt fencing at major bridge work to prevent construction debris, mud etc. going into the river to protect movement of fish fauna;
ix. Permission will be obtained for tree cutting with suitable compensation;
x. Measures to be taken for archaeologically important 'chance find', if any, as per ASI Act.
xi. Estimated cost for Environmental Management is Rs. 234.328 million excluding land acquisition cost**.** In addition, Land cost is estimated as Rs. 9500 million.
xii. Silicosis Exposure Reduction Strategy will be adopted by the contractor during construction as per guidelines given;
xiii. Waste & debris management guideline has been drawn for the Contractor to adopt & prepare its own plan according to the same;
xiv. Guideline for siting, & construction management & construction camp is prepared for reference to the Contractor during construction.

DFCCIL has a Social and Environmental Management Unit (SEMU) headed by General Manager (SEMU) for EDFC, along with GM/Environment & Consultant (Environment). Implementation of the project & Supervision of Construction activities will be by Chief Project Manager (CPM), supported by Deputy CPM, PM and designated APM/Env. SEMU together with the field unit will ensure implementation of EMP during pre-construction, operation phases and by Contractor through Engineer during construction.

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

Indian Railway (IR) is one of the largest railway systems in the world. It serves a landmass of over 3.3 million sq.m. and population of over one billion. The last 50 years have seen a tremendous growth in the Indian transportation sector. In the past few years, the volume of rails freight has increased by over five times and the number of passenger kilometers has increased over seven times. This rapid increase in freight traffic is attributed to India's economic growth, which resulted in traffic congestion on the existing railway track. This traffic congestion has given rise the concept of dedicated freight corridors which will carry the freight traffic and will reduce the burden on IR thereby leading to increased capacity of IR to carry passenger traffic.

"Dedicated Freight Corridor Corporation of India Limited (DFCCIL)" has been created to undertake planning and development, mobilization of financial resources and construction, maintenance and operation of the Dedicated Freight Corridors. DFCCIL has been registered as a company under the Companies Act, 1956 on 30th October, 2006.

The railway network connecting the four metros of Delhi, Mumbai, Kolkata and Chennai carries more than 55% of the freight and passenger traffic of Indian Railways (IR) and is known as 'Golden Quadrilateral' of IR and is highly congested due to large passenger & freight traffic. To cater the growing freight traffic needs of this corridor and ensure efficient transportation of freight, DFCCIL has proposed to develop Dedicated Freight Corridors (DFC) along this network. At present DFC is implementing Eastern and Western Dedicated Freight Corridors covering 3322 route Kms along the Eastern and Western routes with interlinking of two corridors at Dadri. Eastern Dedicated Freight Corridor (EDFC) from Dankuni to Ludhiana has length of 1839 km whereas Western Dedicated Freight Corridor is of 1483 km. While the development of western corridor is being financed by JICA, the eastern corridor (Ludhina – Mughulsarai Section) is financed by The World Bank.

1.2 EASTERN DEDICATED FREIGHT CORRIDOR

Khurja – Pilkhani section (220.71Km) is a part of Eastern Dedicated Freight Corridor with a route length of 1839 km consisting of two distinct segments: an electrified double-track segment of 1392 km between Dankuni (West Bengal) & Khurja (Uttar Pradesh) & and electrified single-track segment of 447 km between Ludhiana - Khurja - Dadri in the state of Haryana, Punjab and Uttar Pradesh. **Figure 1.1** depicts the alignment route of the Eastern DFC and Khurja Pilkhani Section.

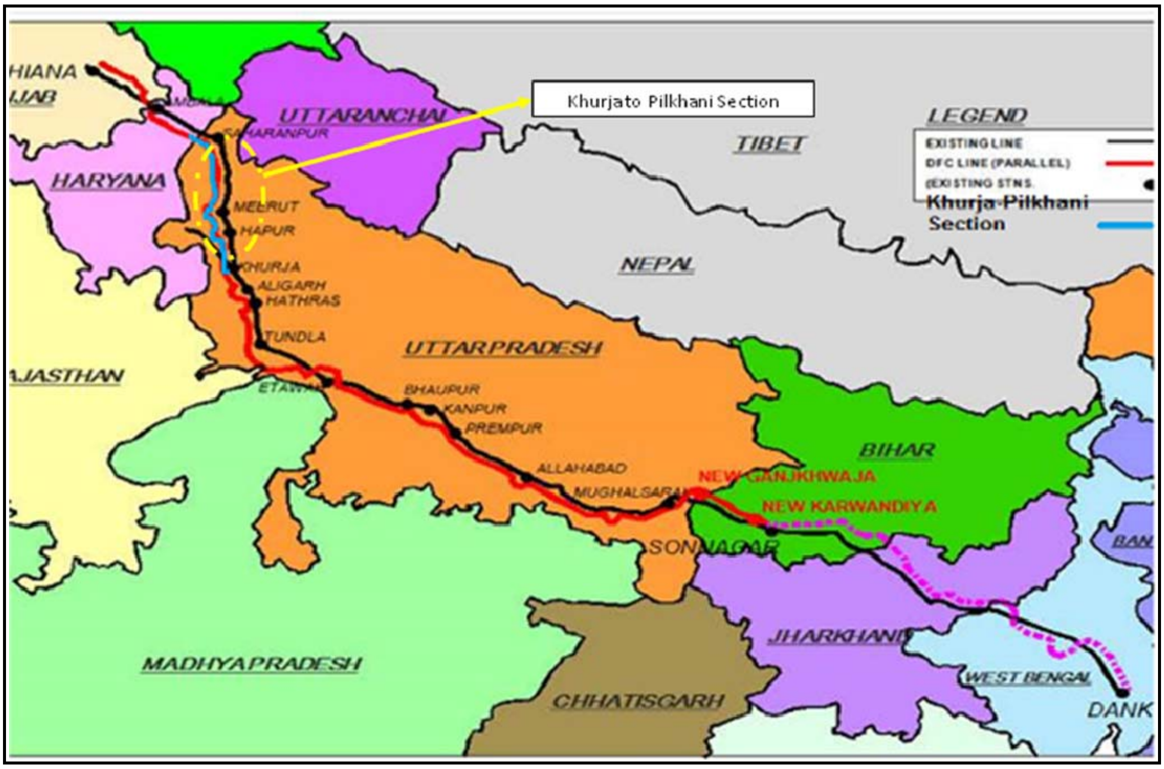


Figure 1.1: Eastern Dedicated Freight Corridor and Khurja Pilkhani Section

1.3 BRIEF ABOUT Khurja – Pilkhani Section

Section from Khurja to Meerut City lies on A-route of IR network and section from Meerut City to Saharanpur lies in B route of IR network. The entire stretch is in the State of Uttar Pradesh and traverse through 6 districts of U.P. i.e. Bulandshahr, Ghaziabad, Hapur, Meerut, Muzaffarnagar and Saharanpur.

The terrain here is generally flat and there is no major river crossing the alignment except Kali & Hindon. Hence there is no Important Bridge in the section. The entire length lies in the Indo-Gangetic planes. The soil in the area is alluvial as usually found on doab region. Agriculture is the predominant land use in this region.

Environmental impacts could occur, if the alignment is not carefully selected, designed, constructed, operated and maintained. In view of the above, DFCCIL intends to integrate environmental aspects at all stages of the project. DFCCIL has appointed IRG Systems South Asia Pvt. Ltd. to carry out environment impact assessment study. This will help to identify the environmental and social impacts of the project and to draft the impact mitigation plan and environment management plan for the project.

1.4 OBJECTIVES OF THE PROJECT

The Dedicated Freight Corridor project has been conceptualized with the following broad objectives:

- Reduction in the unit cost of transportation by speeding up freight train operations and achieving higher productivity through better utilization of railway assets, reduction in inventory costs and achieving greater customer satisfaction.

- Creating rail infrastructure capability to move a substantially higher level of freight traffic, adequate to meet the requirements for the next 30 years or more.
- Off-loading the existing rail corridor of a substantial part of the present freight traffic, thereby releasing capacity for augmenting passenger services, decongesting busy terminals and junction stations, and resulting in improved safety in passenger train operations.
- Introduction of high end technology in freight operations, resulting in higher axle loads, higher maximum moving dimensions (MMD), higher schedule of dimensions (SOD) and track loading density (TLD), improved pay load/tare weight ratio and substantially improved traffic throughput by way of introduction of heavy/long haul freight services and double-stack container trains.
- Introduction of time-tabled freight services and guaranteed transit times.
- Improving the railways' share in the total land transportation of goods in the country and enhancing customer satisfaction.

1.5 PURPOSE OF THE EIA

This report primarily focuses on the environmental impacts of the proposed dedicated freight corridor development in Khurja – Pilkhani section, including design, construction and operation stages impacts and their mitigation. The impacts are identified for all project activities on physical, terrestrial, and aquatic ecology. Environmental management and monitoring programme is devised to minimise these impacts and sustain the benefits. Institutional mechanism is also recommended for effective implementation of EMP and Environment Monitioring Plan

1.6 OBJECTIVES OF EIA STUDY

As per the current regulations of Government of India, railway projects do not require conducting Environmental Impact Assessment (EIA) studies and obtaining Environmental Clearance (EC) from the Ministry of Environment, Forests & Climate Change (MOEF&CC). However, considering the magnitude of activities envisaged as part of EDFC and the Environemntal Management Framework developed for EDFC, DFCCIL has engaged the services of IRG South Asia Pvt. Ltd. as an independent consultant to conduct an EIA and prepare an Environmental Management Plan (EMP) to mitigate significant negative impacts.

The objectives of the EIA study are to:

- Identify potential environmental impacts to be considered in the design of Khurja-Pilkhani section of EDFC and recommend specific measures to avoid / mitigate the impacts.
- Formulate an implementable Environmental Management Plan (EMP) integrating the measures to avoid the identified impacts and an appropriate monitoring and supervision mechanism to ensure EMP implementation.
- Review the proposed alignment and other components of section and identify possible environmental issues to be addressed during the planning, design, construction and operation of the project.

1.7 SCOPE OF WORK

The scope of work of Environmental Impact Assessment consists of the following:-

- Brief Description of the proposed project comprising various proposed activities, their phased implementation and their inter-linkages with regard to environmental impacts.
- Detailed Environmental Profile of the Project Influence Area (within 5 km on either side of the proposed alignment) with details of all the environmental features such as Reserve Forests, Sanctuaries / National Parks, Rivers, Lakes / Ponds, Religious Structures, Archaeological monuments, Natural Habitats, School, Irrigation Canals, Utility Lines, other sensitive receptors, etc. have been covered.
- Detailed Field Reconnaissance of the Proposed Alignment, with strip maps presenting all the environmental features and sensitive receptors (trees and structures in the ROW, Structures Reserve Forests, Sanctuaries / National Parks, Rivers, Lakes / Ponds, Religious Structures, Archaeological monuments, Natural Habitats, Schools, Irrigation Canals, Utility Lines, other sensitive structures) along the project corridor. The environmental features recorded on the strip maps indicating their distance from the centre line of the proposed alignment.
- Detailed Base Line Environmental Monitoring of various Environmental Attributes such as ambient air quality, noise levels, vibration levels, water quality (surface & groundwater), ecological profile, etc.
- Assessment of Environmental Impacts of the project, including analysis of alternatives has been carried out for both 'with the project' and 'without the project' scenarios. In case of detour / by pass locations the alternatives should consider alignment parallel to the existing rail line and the proposed detour / bypass alignment (s).
- Measures for the Mitigation of Environmental Impacts and opportunities for enhancement for all the impacts identified. The measures for the mitigation of impacts should consider options such as minor modifications in alignment, reduction of RoW and engineering measures such as noise barriers / attenuation measures, RUBs/ ROBs, protection of water bodies, conservation of archaeological / heritage structures, etc. Opportunities for enhancement of environmental resources, cultural properties or common property resources explored and recommendations for appropriate measures for implementation.
- Public Consultation and Disclosure of the project and its impacts have been carried out as per the WB operational policies.
- Environmental Management and Monitoring Plan, comprising a set of remedial (prevention, mitigation and compensation) measures have been developed by the consultant and ensure that these are commensurate with nature, scale and potential of the anticipated environmental impacts with necessary Institutional Mechanism for the implementation and monitoring of EMP.

1.8 METHODOLOGY

In order to assess the environmental impacts due to the proposed project, observations were made through repeated field visits, investigations and environmental monitoring. Relevant secondary data was also collected from various government agencies such as District Collector/Gazetteer Office, Indian Meteorological Department, District Statistical Office, Central Ground Water Board, Survey of India, Geological Survey of India, District Industries Centre, District Forest Office, and Archaeological Survey of India. Primary baseline study has been carried out throughout the stretch and its surroundings during study period so as to get the information on the existing baseline scenario of the environmental and social attributes.

The **environmental profile** of the project influence area and strip maps are prepared based on the following.

- **Topo sheets (scale 1:50000) of Survey of India: -** Toposheets have been collected from Survey of India, Dehradun and proposed alignment has been marked on the topo sheets.
- **Field reconnaissance of the proposed alignment: -** The entire area has been surveyed to gather the information on environmental features.
- **Collecting the data of sensitive receptors during field visit: -** The details on sensitive receptors such as schools, religious structures, hospitals etc. are collected and marked on the strip map.
- **Public consultation at village level: -** During public consultation, the information on sensitive receptors are also collected and marked on strip maps.

Based on the data collected, the strip maps and environmental profile was developed to present all the environmental features and sensitive receptors.

Preparation of Base line environmental profile comprised, collection of meteorological data from nearest IMD stations and field monitoring of ambient air quality, water quality, noise, vibration, soil quality and ecological components as per relevant IS methods / Central Pollution Control Board Standards.

An **analysis of alternatives** alignments was also carried out and finalized based on reconnaissance survey of project impact zone, analysis of data and screening to minimize impact on environment covering settlements, sensitive receptors, ecological components.

Series of **Public consultations** were conducted at villages through the project office of DFCCIL at Meerut.

Based on the baseline environmental status and project activities, potential impact has been identified, assessed and predicted and appropriate mitigative measures have been suggested in planning phase, construction phase and post-construction phase.

Environmental management and monitoring plan have been formulated based on the outcome of the environmental impact assessment.

1.9 ORGANIZATION OF THE REPORT

The outputs of the study are presented in nine chapters, as presented below.

Chapter 1 provides brief background of the project, scope of the EIA study, methodology and organization of the report.

Chapter 2 describes type of the project, salient features of the project with details on various components of the project.

Chapter 3 describes legal and administrative framework / policy relevant to the present project.

Chapter 4 covers the environmental profile of the study area within 5 km on either side of the proposed alignment and strip maps presenting all the environmental features and sensitive receptors covering trees and structures within RoW.

Chapter 5 assesses the nature, type and dimensions of the study area and describes the relevant physical and biological environmental components along the proposed railway line. The database on the environmental components relevant to decisions about project location; design and operation have been assembled from various secondary sources and primary monitoring of ambient air quality, noise and vibration levels, water and soil quality, aquatic and terrestrial ecology.

Chapter 6 assesses the various alternatives covering parallel alignment / detours options and details on selection of final alignment to minimize the negative social and environmental impacts.

Chapter 7 covers the prediction of potential environmental impacts by the development of the project on the surrounding area. The impacts due to development of the proposed Dedicated Freight Corridor are assessed for planning phase, construction phase and implementation phase.

Chapter 8 covers the mitigation measures to mitigate the negative impacts due to the development of proposed EDFC on various parameters of the environment during various phases of the project are discussed in this chapter.

Chapter 9 covers the details on public consultation meeting, disclosure of the project and its impacts are covered in this chapter.

Chapter 10 covers the environmental management plan for various environmental parameters, implementation details, monitoring plan and environmental budget.

CHAPTER 2: PROJECT DESCRIPTION

2.1 INTRODUCTION

This chapter presents the details of various project components and their salient features, based on the detailed project report prepared by DFCCIL.

2.2 SIZE & LOCATION OF THE KHURJA – PILKHANI SECTION

The present section Khurja-Pilkhani of Eastern Dedicated Freight Corridor is planned to be Single line with Electrified track and located on the Moradabad, Delhi & Ambala Division of Northern Railway. The proposed freight corridor is being designed for a maximum speed of 100 km/h for train operations. This report deals with the section of corridor from Khurja junction station from where flyover for Meerut line takes off and end at Pilkhani at Existing km. 187.5 of Indian Railway Track.

As per the DFCCIL guidelines, efforts have been made to keep the proposed alignment parallel to existing railway track. In this portion, existing track from Khurja junction to Meerut City which is part of Moradabad division is single line and similarly existing track from Meerut City to Pilkhani which is part of Delhi & Ambala division is also single line.

This section lies on A route from Khurja to Meerut City in Moradabad division and B route from Meerut City to Saharanpur in Delhi & Ambala division. The entire stretch is in the State of Uttar Pradesh and passes through 6 districts i.e. Bulandshahr, Ghaziabad, Hapur, Meerut, Muzaffarnagar and Saharanpur. The route classification of A-route & B-route is on the basis of the future maximum permissible speeds.

The terrain is generally flat and there is no major river crossing the alignment except River Kali & Hindon. There is no Important Bridge in the section. The entire length lies in the Indo- gangetic plains. The soil in the area is alluvial as found normally on Doab region. Agriculture is the predominant land use in this region. At some sections the planned DFC route is parallel to existing IR tracks at an average distance of 11.30 m to 32.89 m from the existing Railway track. This distance of 11.30m to 32.89 m varies due to space constraints in built up areas and independent banking near the Railway Land. Total length of the corridor is 220.710 km of which 110.515 km is in detours (bypassing major cities) and remaining 110.195 km runs parallel to IR track maintaining the minimum distance of app.12 m.

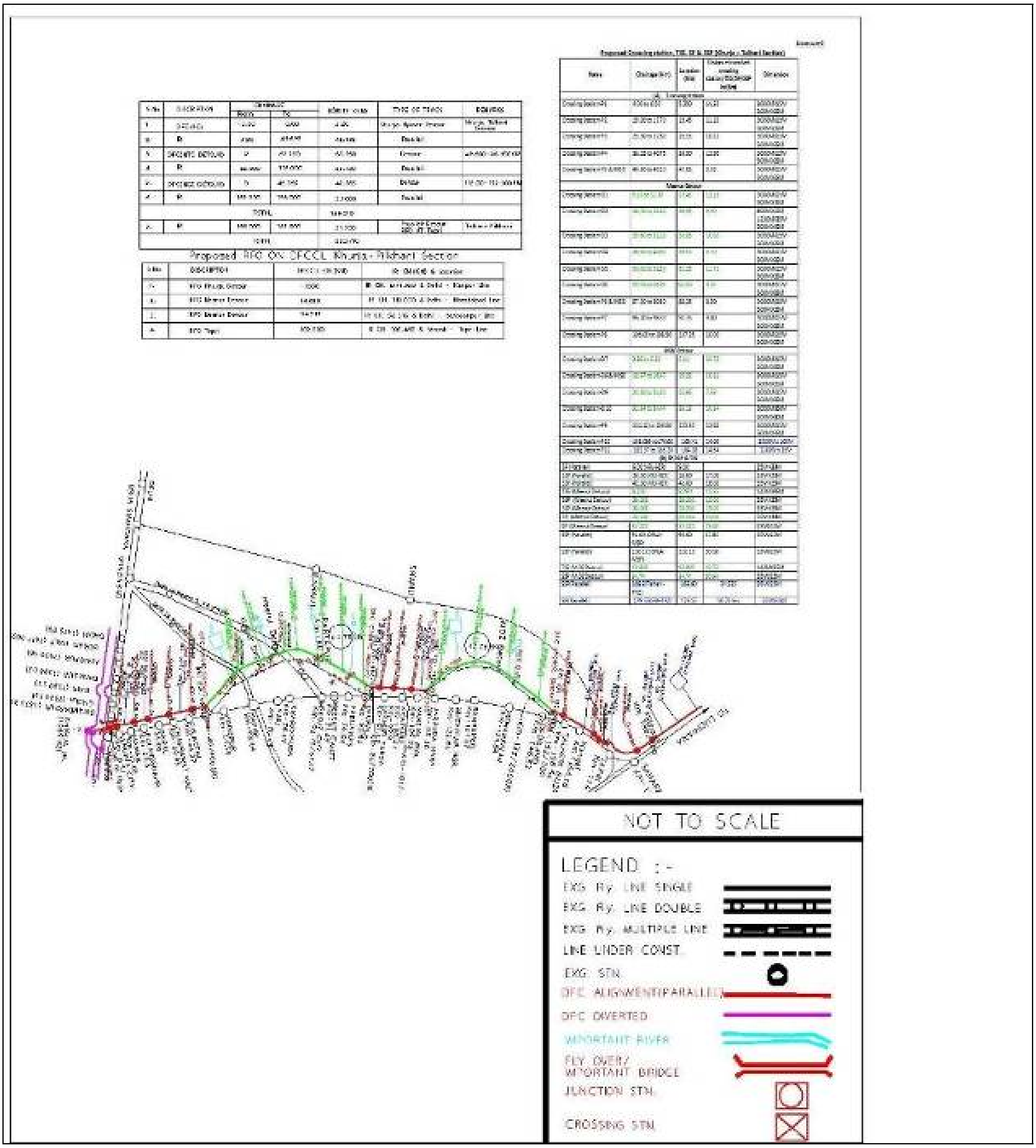


Figure 2.1: Project Corridor Alignment

2.3 SALIENT FEATURES OF THE PROJECT

The summarized description of section are presented in **Table 2.1**

Table 2.1: Summarized Description of the Project

Sr. No.	Description	Details
1	Route Length (km)	220.710
2	Parallel	110.195 (78.495+31.7)
3	Detour (excluding Khurja flyover)	110.515
4	No. of Detours	02(MTC & MOZ Detour), 1 RFO at Tapri
5	**Gradient**	
A	Ruling Gradient	1 in 200 (Compensated)
B	Steepest Gradient in yards	1 in 1200 (1 in 400 in Exceptional cases)
6	**Standard of Construction**	
a	Gauge	1676mm
b	Rails	60 Kg 90 UTS rails
c	Sleeper	PSC, 1660 Nos./km for main line & 1540 Nos./km for loop line & sidings (Max 366378 nos of sleepers will be required)
d	Points & Crossings	60 kg rail, 1 in 12 curved switches with CMS crossings on Fan shaped PSC sleepers layouts. Major RUBs in alignment are 32 and major bridges are 25.
e	Ballast	350 mm machine crushed
f	Design Speeds	100 kmph
g	Design Axle load	Freight Traffic with 32.5 tone axle load
7	**Formation**	
a	Bank width for Single line	7.6 m
b	Slop on Embankment	2H:1V
c	Cutting width for Single line	7.5 m
d	Earthwork	C.B.R. > 5 (0.017 billion cum)
e	Earthwork for Top 1m.	C.B.R. > 8
f	Slope of cutting (ordinary Soil)	1 : 1
g	Blanketing thickness	60 cm
8	**Curves**	
a	Maximum degree of curvature	2.5 degree
b	Grade compensation on curves	at the rate of 0.04 % per degree of curvature
9	**Track Centres (Minimum)**	
a	Between Existing track and DFC	11.30m to 32.89m
10	**Bridges**	
a	Standard of Loading	25 tonnes axle load on formation of 32.5 tonnes, 15 tonnes/m trailling load (DFC Loading)
b	Number of Important Bridges (Important bridges is one which has total area of waterway of more than 1000 sq m or linear waterway more than 300 m.)	Nil
c	Number of Major Bridges	42
d	Number of RUBs	409
f	Number of Minor Bridges	295
g	Number of Rail Flyovers	4 (1 on GZB-CNB Line near Khurja City,1 on GZB-MB Line near Hapur, one on GZB-SRE Line near Meerut City&1 RFO DLE-SHAMLI-TAPRI respectively)
h	ROBs (ROBs are sanctioned by Railways in Pink book 2013-2014)	22
11	**Road Crossings**	
a	Number of level crossings	58
12	**Stations**	
a	Crossing Stations	21
13	**Additional Land required**	**828.08**

2.4 DESIGN FEATURES

2.4.1 Gauge

The proposed alignment DFC line almost is parallel to the existing line and the Gauge for the DFC line is proposed to be Broad Gauge (BG) (1676 mm).

2.4.2 Category of Line

The proposed DFC line is having a potential of maximum permissible speed of 100 kmph for goods trains to meet the anticipated traffic requirements. All bridges will be constructed to DFC loading standard with 32.5 t axle load.

2.4.3 Ruling Gradients

The ruling gradient for the proposed line has been kept as 1 in 200(compensated). Grade compensation has been provided at the rate of 0.04% per degree of curvature as per Para 418 of Indian Railway's Permanent Way Manual. The maximum length of loop and tonnage of goods trains catered for in the design are 1500m and 3600T respectively.

2.4.4 Curves

Maximum degree of curve is restricted to 2.5 degrees.

2.4.5 Section

Vertical curves have been provided only at those locations where the algebraic difference in change of grade is equal to or more than 4mm/m i.e.0.4%. Minimum radius of the vertical curves is 4000m.

2.4.6 Spacing between Tracks

Spacing of DFC tracks from existing track has been specified as at 11.30 m to 32.81 m to avoid the infringement of existing IR infrastructure. However, spacing of DFC track has been reduced at thickly populated locations to reduce/avoid the displacement of inhabitants.

2.4.7 Formation

Being a single line construction, a top width of 7.6 m has been considered for embankment with side slopes of 2:1. The embankments from outside earth having more than 5% C.B.R. is proposed for bottom layer of the embankment. Total earth required for the project will be app. 0.17 billion cubic meter.

2.4.8 Bank

Formation width of 7.6m on straight alignment has been considered. The slopes on banks are proposed as 2H: 1V. Where the bank height is more than 6m, a berm of suitable width has been proposed at every 6m height. The **Figure 2.1** below shows the Earthwork Profile Single Independent Line.

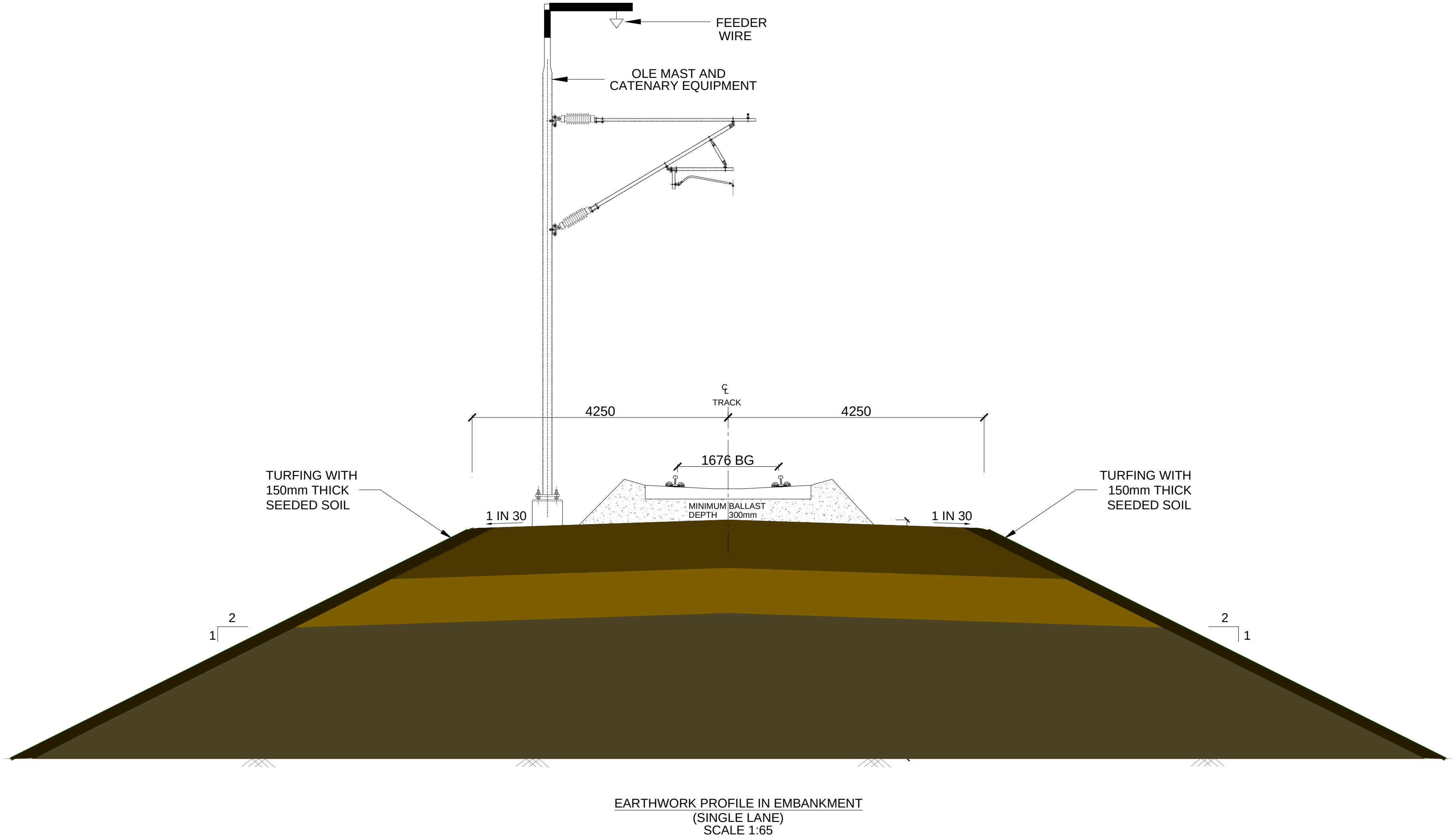


Figure 2.2: Earthwork Profile Single Independent Line

2.4.9 Cutting

A bottom width 7.5 m with 1:1 slopes including side drains on both sides have been kept. Where the cutting height is more than 6m, berm of 3m width has been proposed at every 6 m cutting height.

2.4.10 Blanketing

Blanketing layer is provided with 0.600 m depth.

2.4.11 Fixed Structure Clearance

Minimum vertical clearance as per SOD for ROB and FOB would be 6.85 to accommodate OHE suitable for the design speed of 100 kmph.

2.4.12 Permanent Way

The track structure shall consist of 60 kg/m, 90 UTS, IRS T-12 rails on PSC sleepers having 1660 nos. per km density for main line. PSC sleepers having 1540 nos/km density have been adopted for Loop lines and sidings. It is proposed to provide CWR/LWR.

2.4.13 Points and Crossings

Points and Crossing with 60 kg rail on MBC sleepers with fan shaped Layouts, 1 in 12 on running lines and for non-running lines and sidings with curved switches and CMS crossings have been proposed.

2.4.14 Ballast

The depth of hard stone ballast (65mm size) cushion below PSC sleepers has been kept as 350 mm for main lines. Therefore, a quantity of 4.316 cum/m for straight portion is provided. Provision for wastage, curvature and Points & crossing has been considered as per the provision of Para 263 of P-Way Manual. Total ballast requirement for the project is estimated to be 0.6 million cubic meter.

2.4.15 Stations

The Freight Corridor will have two types of stations. Stations required for normal operating requirements are called crossing stations and stations where the loads have to be transferred to/ from existing railway network have been called as Junction Stations. There is no Junction Station in the present section however twenty one Crossing Stations have been proposed along the alignment. The salient features along with the photographs of proposed crossing station are enclosed as **Annexure 2.1.** The layouts of crossing stations shall be as per approved general arrangement drawings of DFCCIL. The details of the existing railway stations are provided in the **Table 2.2** and proposed in **Table 2.3**

Table 2.2: Details of the existing stations

Details of the Existing Station		
Sr. No.	**Station**	**Km(IR)**
1	Khurja city (KJY)	6.57
2	Maman (MOM)	15.65
3	BulandSahir (BSC)	22.66
4	Baral (BARL)	34.66
5	Chhaprawat Halt (CHWT)	39.95

Details of the Existing Station		
Sr. No.	**Station**	**Km(IR)**
6	Gulaothi (GLH)	44.27
7	Sakhoti Tanda (SKF)	91.32
8	Khatauli (KAT)	100.47
9	Mansur Pur (MSP)	109.93
10	Talheri Buzurg	156.54
11	Nangal	164.18
12	Tapri	174.19
13	Saharanpur	180.79

Table 2.3: Details of the Proposed Stations on Khurja- Pilkhani Section of EDFC

Sr. No.	Details of the Proposed crossing Station				
	Name	**Chainage (Km)**	**Location (Km)**	**Distance from last crossing station in (Km)**	**Dimension**
(A) Crossing station					
1.	Crossing Station-P1	4.00 to 6.50	5.250	11.30	2000MX15M 500MX35M
2.	Crossing Station-P2	15.20 to 17.70	16.45	11.20	2000MX15M 500MX35M
3.	Crossing Station-P3	25.30 to 27.80	26.55	10.10	2000MX15M 500MX35M
4.	Crossing Station-P4	38.25 to 40.75	39.50	12.95	2000MX15M 500MX35M
5.	Crossing Station-P5 & IMSD	46.60 to 49.10	47.85	8.35	2000MX15M 500MX35M
Meerut Detour					
6.	Crossing Station-D1	9.20 to 11.70	10.45	12.25	2000MX15M 500MX35M
7.	Crossing Station-D2	18.70 to 21.20	19.95	9.50	800MX15M 1200MX25M 500MX45M
8.	Crossing Station-D3	29.60 to 32.10	30.85	10.90	2000MX15M 500MX35M
9.	Crossing Station-D4	38.30 to 40.80	39.55	8.70	2000MX15M 500MX35M
10.	Crossing Station-D5	50.00 to 52.50	51.25	11.70	2000MX15M 500MX35M
11.	Crossing Station-D6	59.35 to 61.85	60.60	9.35	2000MX15M 500MX35M
12.	Crossing Station-P6 & IMSD	87.00 to 89.50	88.25	8.50	2000MX15M 500MX35M
13.	Crossing Station-P7	96.00 to 98.50	97.25	9.00	2000MX15M 500MX35M
14.	Crossing Station-P8	106.00 to 108.50	107.25	10.00	2000MX15M 500MX35M
MOZ Detour					
15.	Crossing Station-D7	3.86 to 6.36	5.11	10.76	2000MX15M 500MX35M
16.	Crossing Station-D8 & IMSD	13.97 to 16.47	15.22	10.11	2000MX15M 500MX35M
17.	Crossing Station-D9	21.60 to 24.10	22.85	7.63	2000MX15M 500MX35M
18.	Crossing Station-D 10	31.94 to 34.44	33.19	10.34	2000MX60M 500MX80M
19.	Crossing Station-P9	154.10 to 156.60	155.35	12.62	2000MX15M 500MX35M
20.	Crossing Station-P10	168.039 to170.66	169.41	14.06	2500M x 105M
21.	Crossing Station-P11	182.97 to 185.20	184.08	14.54	2100M x 35M

2.4.16 Accomodation

Residential accommodation is planned at stations. Standard type II, III & IV quarters have been proposed as per the requirement. At each station quarters have been proposed to house the essential staff. There are app.20 nos. of quaters at two existing IR stations and about 165 nos. quaters at crossing stations.

2.5 LAND

Proposed DFC track is planned at about 6m - 33m c/c from existing Railway. Formation width of proposed DFC track (single line) has been planned for 7.6 and side slopes of 2:1 in embankment and 1:1 in cutting.

Since the detour is proposed in embankment, the land requirements are higher compared to the parallel. Land is also required for proposed stations. The total land requirement for project is 829.08 Ha

2.5.1 Gauge

The project involves shifting of number of utility services such as electrical lines (HTL/LTL), oil pipeline transformers, tubewells, bore wells, hand pumps etc. Utility shifting will be carried out by CST contractor under supervision of DFCCIL.

The utilities will be shifted in consultation with the stakeholder agencies including local panchayats and owners of private utilities. Appropriate funds will be allocated in the project for utility shifting.

2.5.2 Turfing

Turfing of embankment slopes will be undertaken to prevent erosion. Trufing may be provided in slopes a about 110 km length of detour is at 6 m height embankment and slope is 1V:2H

2.5.3 Tree Cutting

Around 19013 trees need to be cut by the proposed project as per details given in **Annexure 2.2**. The compensatory plantations will be done in consultation with Forest Department according to the conditions of tree felling permission. Tree plantation plan is prepared and enclosed as **Annexure 10.5.**

2.5.4 Side Drains

Suitably designed longitudinal and catch water drains are proposed in parallel sections and on detours wherever required. Length of the drains will depend on the actual need /requirements in the yard to ensure adequate drainage.

2.5.5 Retaining Walls

The project proposes retaining walls to manage site specific issues such as lack of space or impacts on densely populated areas, etc. The location will be identified in consultation with local population considering the engineering requirements.

2.6 STRUCTURE WORK

2.6.1 Major and Minor Bridges

Major and Minor bridges shall be designed for DFC loading as per the provisions of IRS manuals for design and construction of bridges. A total 42 Nos of Major Bridges and 295 nos. of Minor Bridges will be constructed.

2.6.2 Level Crossings

There are fifty eight level crossings on the alignment between Khurja to Pilkhani section. The details of Level Crossing are given in **Annexure-2.3.**

2.6.3 Railway Flyovers

Rail Flyovers have been provided wherever the Freight Corridor line is to cross any existing branch or main line. Rail flyovers are proposed with earthen embankment & main structure with composite Girder. Five Rail flyovers have been proposed along the proposed alignment to cross either double line or single line. All flyovers are proposed on existing double line and on earthen embankment with central portion in composite girders.

Four No. of rail fly over are proposed at 1) on GZB-CNB line near Khurja City, 2) on GZB-MB line near Hapur, 3) on GZB-SRE Line near Meerut City and 4) on RFO DLE-Shamli-TAPRI respectively. The details are given in **Annexure-2.3**

2.6.4 ROBs

Total 22 ROB's have been proposed out of which 7 are in Talheri-Pilkhani Section and 15 in Khurja-Talheri Section. The detail is given in **Annexure-2.3**

2.6.5 RUBs

DFC alignment has been taken on embankment at detours, RUBs have been proposed at road crossing where existing railways alignment cross the road.

There are 409 nos RUBs which are proposed in the section. While deciding the spanning arrangement, future widening of respective road has been duly considered.

2.6.6 Sleepers

60 Kg rails on PSC sleepers with a density of 1660 sleepers per km with 350 mm ballast cushion have been provided for the main line. In station yards, for the loop lines, 60Kg rails on PSC sleepers with a density of 1540 sleepers/Km with 350 mm ballast cushion has been proposed. The main line is proposed to be provided with LWR / CWR. Entire project length is proposed for track circuiting. 60 Kg points and crossings on PSC fan shaped layouts are proposed.

Flash butt welding is proposed to convert the single rails into LWR/CWR as per plan approved by DFCCIL by contractor's mobile flash butt welding machine.

The required quantity of ballast to the maximum extent is to be brought by contractor and laid on the proposed alignment. Mechanised laying of track is proposed. Extensive testing on the completed new tracks is proposed to be done using the recording cars for assessing track geometry and ride quality.

2.6.7 Electrical Sub-stations

The electric sub-stations are having the facilities of signals / relay rooms and have a requirement of area around 140 x 85m. The sub-stations are having booster transformers and return conductors with a maximum voltage capacity of 27.5 KV. The details of TSS, SP and SSP are presented in **Table 2.4**. The photographs and discreption of electric sub-stations are presented in **Annexure 2.1.**

Table 2.4: Details of TSS, SP and SSP

Sr.No.	Name	Chainage (Km)	Location (Km)	Distance from last crossing station/TSS/SP/SSP in (Km)	Dimension of land
1	SP (Parallel)	9.00 (KRJ-HZR)	9.00		55MX30M
2	SSP (Parallel)	26.00 (KRJ-HZR)	26.00	17.00	55MX25M
3	SSP (Parallel)	42.00 (KRJ-HZR)	42.00	16.00	55MX25M
4	TSS (Meerut Detour)	8.200	8.200	15.85	140MX85M
5	SSP (Meerut Detour)	23.200	23.200	15.00	55MX25M
6	SSP (Meerut Detour)	38.200	38.200	15.00	55MX25M
7	SP (Meerut Detour)	53.220	53.220	15.00	55MX30M
8	SSP (Parallel)	90.00 (DRLA-MSP)	90.00	17.85	55MX25M
9	SSP (Parallel)	110.10 (DRLA-MSP)	110.10	20.10	55MX25M
10	TSS (MOZ Detour)	13.800	13.800	15.70	140MX85M
11	SSP (MOZ Detour)	34.74	34.74	20.94	55MX25M
12	SSP (Parallel)	155.5 (Deobond-Talheri)	155.500	11.225	55MX25M
13	SSP(Parallel)	168.8(Talheri-TPZ)	168.80	13.300	55MX25M
14	SP (Parallel)	179.55(SRE-TPZ)	179.55	10.75 km	55MX30M

a) Traction Service Stations (TSS)

The basic consideration in locating the traction substations is to ensure the satisfactory voltage condition on the OHE, while the maximum voltage at sub-station should not exceed 27.5 kV, the voltage of the farthest and based on the traction load conditions taking into account the traffic density, the loads and the speed of the train and terrain shall not fall below 19 kV. The total area requirement for each TSS is 140 x 85 meter and these shall be located along the railway track. The photographs and discreption of TSS are presented in **Annexure 2.1**

b) Sectioning and Paralleling Post (SP)

The conventional neutral section in the OHE at the sectioning and paralleling post is 41 m long and overlaps type. The electric locomotive coasts through this dead section in case it comes to a halt under this portion of OHE, there being no power in the OHE, electric locomotive becomes immobile. In such a situation it needs to be pushed or pulled by another locomotive to bring it under a live OHE. The site for location of the neutral section, therefore, needs to be selected with case, so that the terrain assists the train in negotiating it. Accordingly the natural section for the sectioning post should be located on a straight track at sufficient distance from a stop signal either behind or ahead of it. In undulating terrain the neural section should be located in a valley. They are requirement for each SP 55m x 30m. The photographs and discreption of SP are presented in **Annexure 2.1**

c) Sub-Sectioning and Paralleling Post (SSP)

Between the feeding post and the sectioning post a number of intermediate sub-sectioning and paralleling posts are inserted in the OHE, to provide remote controlled switches for facilitating isolation of faulty sections of OHE. The area requirement for the SSPs is 55 x 25 meter. The photographs and discreption of SSP are presented in **Annexure 2.1**

d) Tower Wagon Sheds

These are proposed at crossing stations and junction stations.

e) Signal and Signal Rooms

Signals are proposed at every 2 km length with a provision of one signal rooms for ten numbers of signals.

2.7 RESIDENTIAL FACILITY AND LABOUR CAMPS

The staff quarters are proposed to be constructed at each of crossing stations. The construction camps are likely to be set up at every major bridge construction location or on an average at each 50 km.

2.8 FENCING

Suitable unscalable, see through fencing will be provided between IR & DFC tracks at IR stations and other locations for separation of IR and DFC traffic.

2.9 LABOUR FOR CONSTRUCTION

Local skilled and unskilled labours will be engaged by contractor / sub-contractor commensurate with the requirement of the work.

2.10 WATER REQUIREMENT

The total water requirement during construction period will be about 3600 cubic meter per kilometre spread over the construction period of about 1350 days. Water management plan for meeting water requirement during construction is attached as **Annexure 10.8.** Source of the water can be ground water, if so permission should be taken from CGWA prior digging any well for the purpose.

2.11 CONSTRUCTION MATERIAL

The main construction material required for the project is earth material, cement, ballast, stone chips and sand etc. All these materials are locally available. Mining of minor minerals shall be undertaken after obtaining environmental clearance from the MoEF/SEIAA. Earth will be borrowed preferably from government wasteland or private non-agricultural land. Agricultral land will be taken with the consent of the land owner and shall be excavated to the needs of the owner subject to other approvals. The availability of wasteland is limited to the 15 km radius of entire stretch. Attempt has been made to identify the probable earth sources using GIS and ground truthing techniques and the same is detailed in Chapter 5 of this report. Stone chips/ ballast will be procured from licensed quarries units nearby. Cement will be procured from suitable sources. These sources will be identified during the project implementation. Construction material will be required in sufficiently large quantities. While sand will be obtained from River Yamuna after permission from concerned authority (within 100 km from the Project alignment), rail, sleepers, cement and steel will be obtained through respective by manufacturers.

The ballast would be obtained by the contractor from authorized quarries, as approved by the Engineer in charge and in compliance to the guidelines detailed out in the subsequent sections of this report.

2.12 CONSTRUCTION PERIOD

The construction period for the completion of the freight corridor from Khurja to Pilkhani will be 1350 days.

2.13 GREEN INITIATIVES

Opportunity will be explored for energy conservation, rain water harvesting and utilisation of solar energy.

- Harnessing of solar energy can be fruitfully implemented in staff quarters, station & substation buildings as well as for street lighting. Also effort will be made by contractor to use solar energy during construction wherever possible.
- Water conservation procedures will be adopted in staff quarters & stations.
- Rain water harvesting can be implemented in staff quarter complex, stations.
- Feasibility of such initiatives will be considered during design stage.
- Also efforts will be made by Contractor to use solar energy during construction phase, whereever possible

Annexure-2.1: The photographs and discreption of TSS

<u>Proposed Crossing Station, Parallel Section-1:</u> Topography of the surrounding area is plain. Landuse is dominated by agricultural land. There are only 2 to 4 Trees were observed near the Track. Mainly shrubs were found along the track. No water body is found close by.

Crossing Station- P1 (Parallel)/New Khurja City

Chainage: 5.25 km

Proposed Crossing Station, Parallel Section-2: Topography of the surrounding area is slightly undulating .Land use is dominated by Open shrub and grass land. There are 50 to 60 Trees were observed at a distance of 60 to 70 Meters from the track. No trees were observed near the railway track. There is canal and a bridge at a distance of 50 Meters from the Proposed Railway crossing station.




Crossing Station-P2 (Parallel)/New Maman

Chainage: 16.45 km

<u>Proposed Crossing Station, Parallel Section-3:</u> Topography of the surrounding area is plain. Land use is dominated by habitation on both the sides. There are only 2 to 5 Trees were observed near the track. There is no water body observed near the site.

Crossing Station P3 (Parallel)/New Bulad Shahar

Chainage: 26.55 km

Proposed Crossing Station, Parallel Section-4: Topography of the surrounding area is plain. Land use is dominated by agricultural and open shrub land. There are 50 to 60 Trees were observed at a distance of 70 to 100 from the track. No water body is found near the alignment.

Crossing Station-P4 (Parallel)/New Chaprawat

Chainage: 39.50 km

Proposed Crossing Station, Parallel Section-5: Topography of the surrounding area is plain. Land use is dominated by agricultural land. There are 50 to 70 Trees were observed at a distance of 50 to 80 from the Track. No water body is found nearby.

Crossing Station P5 & IMSD (parallel)/New Gulaothi

Chainage: 47.85 km

<u>Proposed Crossing Station, Parallel Section-6:</u> Topography of the surrounding area is plain.Landuse is dominated by agricultural and open shrub land. There are 40 to 60 Trees were observed at a distance of 70 to 100 from the Track. No water body is found.

Crossing Station P6 & IMSD (parallel)/New Sakoti

Chainage: 88.25 km

Proposed Crossing Station, Parallel Section-7: Topography of the surrounding area is plain. Land use is dominated by Habitation on both the sides. There are only 1 to 2 trees observed near the Track. No water body is found.

Crossing Station P7 (parallel)/New Khatauli

Chainage: 97.25 km

<u>Proposed Crossing Station, Parallel Section-8:</u> Topography of the surrounding area is plain. Land use is dominated by agricultural and protected forest land. There are 50 to 60 Trees were observed near the Track No water body is found. One Existing Railway crossing is also observed at a distance of 100 Meters from the proposed Railway crossing station.

Crossing Station P8 (parallel)/New Mansurpur

Chainage: 107.25 km

Proposed Crossing Station, Parallel Section-9: Topography of the surrounding area is plain. Land use is dominated by agricultural land. One Existing Railway crossing is observed at proposed crossing station

Crossing Station P9 (parallel)/New Talheri Bujurg

Chainage: 155.35 km

Proposed Crossing Station, Parallel Section-10: Topography of the surrounding area is plain. Land use of the area is agriculture. A road crossing is observed near to proposed crossing station location.


Crossing Station P10 (parallel)/New Talheri Bujurg

Chainage: 170.00 km

Proposed Crossing Station, Parallel Section-11: Topography of the surrounding area is plain. Station is proposed at agriculture land and the area is surrounded by settlements.


Crossing Station P11 (parallel)/New SRE

Chainage: 184.030 km

Proposed Crossing Stations at Detour: All Detours Railway crossings are dominated by Agricultural land. Topography of the area is almost plain. They are away from the water bodies and selected mainly in agricultural land with least tree cutting. The photographs of proposed crossing stations at Detour are presented below:

 **Crossing Station-D1 (MTC Detour)/Raghunath pur** **Chainage: 10.45 km**	 **Crossing Station-D2 (MTC Detour)/Kilhora** **Chainage: 19.95 km**
 **Crossing Station-D3 (MTC Detour)/Saidpur urf Husainpur Dhilna** **Chainage: 30.85 km**	 **Crossing Station-D4 (MTC Detour)/Mahroli** **Chainage: 39.55 km**
 **Crossing Station-D5 (MTC Detour)/Govindpur urf Ghausoli** **Chainage: 51.25 km**	 **Crossing Station-D6 (MTC Detour)/Ghesupur Baphawt** **Chainage: 60.6 km**

 **Crossing Station-D7 (MOZ Detour)/Jaroda** **Chainage: 5.11 km**	 **Crossing Station-D8 & IMSD (MOZ Detour)/Salempur** **Chainage: 15.22 km**
 **Crossing Station-D9 (MOZ Detour)/Badhi Khurd** **Chainage: 22.85 km**	 **Crossing Station-D10 (MOZ Detour)/Gunarsa** **Chainage: 33.19 km**

<u>Proposed TSS & SSP:</u> All SSP & TSS are proposed to be located within Agricultural land. Topography of the area is almost plain. Area requirement for TSS is 140 m X 85 m and SSP is 55 m X 25 m. They are away from the water bodies and selected mainly in agricultural land with least tree cutting involved. The photographs of proposed location of TSS & SSP are given below.

DETOUR	
 **TSS-(Meerut Detour)** **Chainage: 8.2 km**	 **TSS-(MOZ Detour)** **Chainage: 13.8km**
Site Description: The site is on	**Site Description: The site is on**

agricultural land having flat topography and away from the water bodies. No tree cutting is involved.	agricultural land having flat topography and away from the water bodies. No tree cutting is involved.
 SSP-(Meerut Detour) Chainage: 23.2 km	 SSP-(Meerut Detour) Chainage: 38.2 km
Site Description: The site is on agricultural land having flat topography and away from the water bodies. No tree cutting is involved.	Site Description: The site is on agricultural land having flat topography and away from the water bodies. No tree cutting is involved.
 SP-(Meerut Detour) Chainage: 53.220 km	 SSP-(MOZ Detour) Chainage: 34.74 km
Site Description: The site is on agricultural land having flat topography and away from the water bodies. No tree cutting is involved.	Site Description: The site is on agricultural land having flat topography and away from the water bodies. 5 trees need to be cut.
PARALLEL	

 **SP-(KRJ-HZR)** **Chainage: 9.0 km**	 **SSP-(KRJ-HZR)** **Chainage: 26.0 km**
Site Description: The site is on agricultural land having flat topography and away from the water bodies. 10 Babul tree need to be cut.	**Site Description: The site is on agricultural land having flat topography and away from the water bodies. 6 Khajur trees need to be cut.**
 **SSP-(KRJ-HZR)** **Chainage: 42.0 km**	 **SSP-(DRLA-MSP)** **Chainage: 90.0 km**
Site Description: The site is on agricultural land having flat topography and away from the water bodies. 2 Khajur tree need to be cut.	**Site Description: The site is on agricultural land having flat topography and away from the water bodies. No tree cutting is involved.**

 SSP-(DRLA-MSP) Chainage: 110.10km	 SSP Chainage: 168.80 km
Site Description: The site is on agricultural land having flat topography and away from the water bodies No tree cutting is involved.	Site Description: The site is on agricultural land having flat topography and away from the water bodies. 5 Babor & 2 Khajur tree need to be cut.
 SP Chainage: 179.550 km	 SSP (Parallel) Chainage 155.5
Site Description: The site is on agricultural land having flat topography and away from the water bodies No tree cutting is involved	Site Description: The site is on agricultural land having flat topography and away from the water bodies No tree cutting is involved

ANNEXURE-2.2: DETAILS OF TREES

Sr. No.	District	Chainage		Length (Km)	District wise Length (Km)	No. of Trees	Type of Track	Tree Species
		From	To					
1	Buland-shahr	-3.2	0	3.2	48.17	3432	Khurja Flyover Detour	The major trees are Kikar *(Acaacia karoo)*, Khajur *(Phoenix dactylifera)*, babol *(Acacia nilotica)*, Sheesham *(Dalbergia sissoo)*, Aam *(Mangifera indica)*, Jamun *(Syzygium cumini)*, Gulmohar *(Delonix regia)*, Sirisf *(Albizia lebbeck)* and Khair *(Senegalia catechu)*.
		3.2	48.17	44.97			Parallel	
2	Hapur	48.17	49.695	1.525	20.995	584	Parallel	
		0	19.47	19.47		7456	Detour	
3	Ghaziabad	19.47	33.54	14.07	14.07	5388	Detour	
4	Meerut	33.54	67.75	34.21	41.83	85	Detour	
		86.9	94.52	7.62		19	Parallel	
5	Muzaffarnagar	94.52	112	17.48	42.695	453	Parallel	
		0	25.215	25.215		654	Detour	
6	Saharanpur	25.215	42.765	17.55	52.95	3144	Detour	
		152.3	187.5	35.4		6341	Parallel	
	Total			**220.71**	**220.71**	**19013**		

ANNEXURE-2.3: LIST OF LEVEL CROSSING

KHURJA-TALHERI SECTION

S. NO	LC no. / Class/ Traffic/ Eng.	Location (Km)	BETWEEN STATION		Level Crossing			TVUs	REMARK
					Un Manned	Manned	Inter Locking		
1	2/C/E	3 /5-6	KHURJA Jn.	KHURJA City	UM			516	RUB Sanctioned
2	3/C/E	4/8-9	KHURJA Jn.	KHURJA City	UM			1464	RUB Sanctioned
3	4/C/E	5/4-5	KHURJA Jn.	KHURJA City	UM			504	RUB Sanctioned
4	5/B/T	7/1-2	KHURJA City	MAMAN		M	1	112176	ROB Sanctioned
5	6/C/E	7/8-9	KHURJA City	MAMAN	UM			4620	RUB Sanctioned
6	7/C/T	7/21-8/1	KHURJA City	MAMAN		M		11820	RUB Sanctioned
7	8/A/E	11/2-3	KHURJA City	MAMAN		M	1	194590	ROB in progress
8	9/C/E	12/1-2	KHURJA City	MAMAN	UM			11580	RUB Sanctioned
9	10/C/E	15/3-4	KHURJA City	MAMAN		M		11280	RUB Sanctioned
10	11/C/E	18/4-5	KHURJA City	MAMAN		M		40800	ROB Sanctioned
11	12/C/E	20/15-21/0	KHURJA City	MAMAN		M		1608	RUB Sanctioned
12	13/B/T	23/0-1	BULANDSAHAR	BARAL		M	1	112518	ROB Under construction
13	14/C/T	24/0-1	BULANDSAHAR	BARAL		M		27706	D/RUB Sanctioned
14	15/A/E	24/10-11	BULANDSAHAR	BARAL		M	1	261436	ROB Under construction
15	16/B/E	26/6-7	BULANDSAHAR	BARAL		M	1	56602	ROB Sanctioned
16	17/C/E	28/3-4	BULANDSAHAR	BARAL		M		17990	RUB Sanctioned
17	18/C/E	30/3-4	BULANDSAHAR	BARAL		M		20958	RUB Sanctioned
18	19/C/E	31/2-3	BULANDSAHAR	BARAL		M		10416	RUB Sanctioned
19	20/C/E	32/5-6	BULANDSAHAR	BARAL		M		14084	RUB Sanctioned
20	21/C/T	35/10-11	BULANDSAHAR	BARAL		M		14322	RUB Sanctioned

S. NO	LC no. / Class/ Traffic/ Eng.	Location (Km)	BETWEEN STATION		Level Crossing			TVUs	REMARK
					Un Manned	Manned	Inter Locking		
			KHURJA-TALHERI SECTION						
21	22/C/E	37/11-12	BARAL	GULAOTI	UM			2338	RUB Sanctioned
22	23/C/E	39/10-11	BARAL	GULAOTI		M		43358	D/Lane RUB Sanctioned
23	24/C/E	41/6-7	BARAL	GULAOTI		M		21700	D/Lane RUB Sanctioned
24	25/C/T	44/10-11	GULAOTI YARD			M		24822	RUB Sanctioned
25	26/B/T	45/5-6	GULAOTI	HAFIZPUR		M	1	80948	ROB Sanctioned
26	27/C/E	46/13-14	GULAOTI	HAFIZPUR		M		16884	RUB Sanctioned
27	28/C/E	48/5-6	GULAOTI	HAFIZPUR	UM			4200	-
28	29/C/E	49/7-8	GULAOTI	HAFIZPUR		M		8260	RUB Sanctioned
29	37/C/E	86/13-14	DAURALA	SAKHOTI TANDA	UM			4091	Single Lane RUB Sanctioned
30	38/C/E-2	88/4-5	DAURALA	SAKHOTI TANDA		M		19082	D/Lane RUB Sanctioned
31	39/C/T	90/1-2	DAURALA	SAKHOTI TANDA		M		37293	D/Lane RUB Sanctioned
32	40/B/T-2	91/8-9	SAKHOTI TANDA	KHATAULI		M	1	76447	ROB EXISTS
33	41/C/T-2	93/2-3	SAKHOTI TANDA	KHATAULI		M		64867	ROB Sanctioned
34	42/C/E-2	96/8-9	SAKHOTI TANDA	KHATAULI		M		71226	ROB Sanctioned
35	43/C/E-2	97/8-9	SAKHOTI TANDA	KHATAULI		M		43531	D/Lane RUB Sanctioned
36	43A/C/T-2	99/0-1	SAKHOTI TANDA	KHATAULI		M		69572	ROB Sanctioned
37	44/B/T-2	100/7-8	KHATAULI	MANSURPUR		M	1	169178	ROB in Progress
38	45/C/T-2	101/8-9	KHATAULI	MANSURPUR		M	1	73231	ROB Sanctioned
39	46/C/E-2	104/6-7	KHATAULI	MANSURPUR		M		58250	ROB Sanctioned
40	47/C/T-2	108/9-10	KHATAULI	MANSURPUR		M		15782	Single Lane RUB Sanctioned
41	48/C/T-2	109/13-14	KHATAULI	MANSURPUR		M		50337	ROB Sanctioned
42	49/C/T-2	111/10	MANSURPUR	JARUADA NARA	UM			17001	Single Lane RUB Sanctioned
43	72/C/E	152/4-5	DEOBAND	TALHERI BUZURG		UM		1694	Single Lane RUB Sanctioned
44	74/C/E-2	153/10-11	DEOBAND	TALHERI BUZURG		M		18648	Single Lane RUB Sanctioned
			TALHERI-PILKHANI SECTION (14 nos LCs)						
45	75/C/T-2	156/7-8	DEOBAND	TALHERI BUZURG		M		66249	ROB Sanctioned
46	76/C/E-2	159/ 6-7	TALHERI BUZURG	NAGAL		M		48295	RUB Sanctioned
47	77/C/E-2	161/ 12-13	TALHERI BUZURG	NAGAL		M		58941	RUB Sanctioned
48	78/C/T-2	163/13-14	TALHERI BUZURG	NAGAL		M		101613	ROB Sanctioned
49	79/C/T-2	165/ 5-6	NAGAL	TAPRI		M		65797	ROB Sanctioned
50	80/CU/E	167/4-5	NAGAL	TAPRI		M		3355	RUB Sanctioned
51	81/C/E-2	168/14-15	NAGAL	TAPRI		M		6659	RUB Sanctioned
52	82/C/E-2	171/ 4-5	NAGAL	TAPRI		M		48018	RUB Sanctioned
53	83B/C/T-2	173/700-800	NAGAL	TAPRI		M		226088	ROB Sanctioned
54	84/C/E-2	175/ 27-29	TAPRI	SAHARANPUR		M		362514	ROB Sanctioned

KHURJA-TALHERI SECTION									
S. NO	LC no. / Class/ Traffic/ Eng.	Location (Km)	BETWEEN STATION		Level Crossing			TVUs	REMARK
					Un Manned	Manned	Inter Locking		
55	84A/C/E	177/6-7	TAPRI	SAHARANPUR		M		322608	No Decision
56	86/B/T	181/15-17	SAHARANPUR	PILKHANI		M		787081	ROB (ROB Commissioned/LC Closed)
57	88/C/E	185/1-3	SAHARANPUR	PILKHANI		M		56437	No Decision
58	89/C	186/15-17	SAHARANPUR	PILKHANI		M		66711	ROB Sanctioned

SUMMARY OF TREATMENT OF LEVEL CROSSINGS

Type of Treatment	Sanctioned/Not Constructed	Progressed/Under construction	Commissioned/LC Closed
ROBs	16	4	2
RUBs	33	0	0
No decision	3		
Total	**58**		

RFO LIST KHURJA-PILKHANI SECTION			
Sr. No.	Discription	DFCCIL CH.(KM)	IR CH.(KM) & Location
1.	RFO KHURJA DETOUR	-1550	IR CH. 1371.950 & DELHI-KANPUR LINE
2.	RFO MEERUT DETOUR	14.020	IR CH. 112.030 & DELHI- MORADABAD LINE
3.	RFO MEERUT DETOUR	34.715	IR CH. 56.316 & DELHI- SAHARANPUR LINE
4.	RFO TAPRI	102.200	IR CH. 105.460 & SHAMLI- TAPRI LINE

DETAILS OF ROBs

KHURJA-PILKHANI SECTION

Sr. No.	LC no. / Class/ Traffic/ Eng.	Location (Km)	BETWEEN STATION		Level Crossing			TVUs	REMARK
					Un Manned	Manned	Inter Locking		
1	5/B/T	7/1-2	KHURJA City	MAMAN		M	1	112176	ROB Sanctioned
2	8/A/E	11/2-3	KHURJA City	MAMAN		M	1	194590	ROB Under construction
3	11/C/E	18/4-5	KHURJA City	MAMAN		M		40800	ROB Sanctioned
4	13/B/T	23/0-1	BULANDSAHAR	BARAL		M	1	112518	ROB Under construction
5	15/A/E	24/10-11	BULANDSAHAR	BARAL		M	1	261436	ROB Under construction
6	16/B/E	26/6-7	BULANDSAHAR	BARAL		M	1	56602	ROB Sanctioned
7	26/B/T	45/5-6	GULAOTI	HAFIZPUR		M	1	80948	ROB Sanctioned
8	40/B/T-2	91/8-9	SAKHOTI TANDA	KHATAULI		M	1	76447	ROB EXISTS
9	41/C/T-2	93/2-3	SAKHOTI TANDA	KHATAULI		M		64867	ROB Sanctioned
10	42/C/E-2	96/8-9	SAKHOTI TANDA	KHATAULI		M		71226	ROB Sanctioned
11	43A/C/T-2	99/0-1	SAKHOTI TANDA	KHATAULI		M		69572	ROB Sanctioned
12	44/B/T-2	100/7-8	KHATAULI	MANSURPUR		M	1	169178	ROB in Progress
13	45/C/T-2	101/8-9	KHATAULI	MANSURPUR		M	1	73231	ROB Sanctioned
14	46/C/E-2	104/6-7	KHATAULI	MANSURPUR		M		58250	ROB Sanctioned
15	48/C/T-2	109/13-14	KHATAULI	MANSURPUR		M		50337	ROB Sanctioned
16	75/C/T-2	156/7-8	TalheriBuzurg	Tapri		M		66249	ROB Sanctioned
17	78/C/T-2	163/13-14	TalheriBuzurg	Tapri		M		101613	ROB Sanctioned
18	79/C/T-2	165/~~4-5~~ 5-6	Nagal	Tapri		M		65797	ROB Sanctioned
19	83B/C/T-2	173/700-800	Tapri	Saharanpur		M		226088	ROB Sanctioned
20	84/C/E-2	175/27-29	Tapri	Saharanpur		M		362514	ROB Sanctioned
21	86/B/T	181/15-17	Saharanpur	Pilkhani		M		787081	ROB (ROB Commissioned /LC Closed)
22	89/C	186/15-17	Saharanpur	Pilkhani		M		66711	ROB Sanctioned

CHAPTER 3: LEGAL AND ADMINISTRATIVE FRAMEWORK / POLICY

3.1 INTRODUCTION

This chapter presents a review of the existing institutions and legislation relevant to this project at the National and State levels. Regulations, relevant procedures and requirements that may directly affect the project, the capacity of the concerned institutions and their ability to successfully implement the environmental management measures have been addressed in this chapter. This chapter also outlines various issues related to the framework in place for environmental clearance of projects with reference to the central government and state government of Uttar Pradesh.

3.2 GOVERNMENT OF INDIA'S REQUIREMENTS

3.2.1 Environment Clearance Requirements

As per MoEF&CC notification dated 14 September 2006 and its amendment till date, Railway projects do not require environmental clearance.

3.2.2 Forest Clearance Requirements

As per MoEF&CC circular (1998) on linear Plantation on roadside, canals and railway lines modifying the applicability of provisions of forest (Conversation) Act, to linear Plantation and the plantation along the parallel tracks declared as protected forest for which clearance will be required from forest department.

The proposed project requires app. 109 ha of protected forest land in Bulandshahr district to be diverted for project development. To divert this land, permission from forest department is required to be obtained under Forest (Conservation) Act, 1980

3.3 STATE LEVEL CLEARANCE REQUIREMENTS

Besides, the MoEF, GOI environmental clearance requirements, the project requires clearance from some of the state level agencies as discussed below.

3.3.1 Environment Clearance Requirements

Projects require obtaining No Objection Certificate (NOC) from Uttar Pradesh State Pollution Control Boards in pursuant to the Water (Prevention and 'Control of Pollution) Act of 1974, the Cess Act of 1977 and the Air (prevention and Control of Pollution) Act of 1981. In the present project context it needs to obtain NOC from UPPCB for setting up of batching plants, peg mills, quarry sites , borrow areas etc. Contractor will take these consents prior establishment and operation.

3.3.2 Forest Clearance Requirements

Project requires cutting of trees for which permission from District Magistrate office and Forest Department are required. DFCCIL will take the clearance from Forest Department and had already applied for modified stage 1 clearance.

3.3.3 Clearance Requirements

The Indian legislations and environmental regulations are given in the **Table 3.1** below.

Table 3.1: Related Indian Legislation and their Applicability

Sr. No.	Act/Rules	Purpose	Applicability	Authority
1	Environment Protection Act-1986	To protect and improve overall environment	The project activities should maintain emission standards	MoEF. GoI; DoE, State Gov. CPCB; SPCB
2	Environmental Impact Assessment Notification-14th Sep-2006	To provide environmental clearance to new development activities following environmental impact assessment	Railway projects are not included in the Notification of 14th Sep, 2006 and EC under this Act is not applicable. However, as per MoEF's amended notification dated 9.9.2013 mining of minor minerals through borrow / quarry areas which will be used in project, require prior environmental clearances	MoEF/SEIAA
4	The Indian Forest Act, 1927 The Forest (Conservation) Act, 1980 The Forest (Conservation) Rules, 1981	To check tree felling deforestation by restricting conversion of forested areas into non-forested areas	Applicable, As platation parallel to existing track is declared as protected forest (19 ha protected forest land in Bulandshahr district) and also tree cutting involved	MoEF and state Forest Department
5	MoEF circular (1998) on linear Plantation on roadside, canals and railway lines modifying the applicability of provisions of Forest (Conversation) Act, to linear Plantation	Protection / planting roadside strip as avenue/strip plantations as these are declared protected forest areas.	Applicability of Forest (Conservation) Act to Roadside and railside strip Plantations	MoEF and state forest department
6	Air (Prevention and Control of Pollution) Act, 1981	To control air pollution by specifying the emission standards.	Emissions from construction machinery and vehicle should be checked time to time.	State Pollution Control Boards of Uttar Pradesh,
7	Water Prevention and Control of Pollution) Act, 1974	To control water pollution by controlling discharge of pollutants as per the prescribed standards	Various parameters in Effluents from construction sites and workshops are to be kept below the prescribed standards	State Pollution Control Boards of Uttar Pradesh,
8	Noise Pollution (Regulation and Control Act), 2000	The standards for noise for day and night have been promulgated by the MoEF for various land uses.	DG sets at construction sites and workshops should be provided with acoustics enclosures.	State Pollution Control Boards of Uttar Pradesh,
9	Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act,2010	Conservation of cultural and historical remains found in India	No. No ASI monument is located within 300m from proposed DFC track on either side. But 'chance find', if any, shall be governed by the Act & to be surrendered to	Monuments Authority of India

Sr. No.	Act/Rules	Purpose	Applicability	Authority
			Competent Authority.	
10	Public Liability and Insurance Act, 1991	Protection form hazardous materials and accidents.	Shall be taken as per requirements	State Pollution Control Boards of Uttar Pradesh,
11	The Explosives Act, 1884	Safe transportation, storage and use of explosive material	Respective Authorization shall be obtained from CCoE	Chief Controller of Explosives (CCoE)
12	Minor Mineral and Concession Rules, The Mining Act	For opening new borrow pits & quarry.	Quarry Licenses shall be obtained by Contractors.	District Collector/Mining authority of the area
13	Central Motor Vehicle Act, 1988 and Central Motor Vehicle Rules, 1989	To check vehicular air and noise pollution and authorisation to drive vehicle	All vehicles in Use shall obtain Pollution Control Check certificates and shall be driven by personnel with proper licence.	Motor Vehicle Department of the state
14	The Mining Act	For safe & sound mining activity	Quarry licence to be obtained by the Contractor	State Govt. Dept. Of Mines
15	Hazardous waste (Management , Handling & Tran boundary) Rules, 2008	Management and storage of hazardous waste.	Applicable	State Pollution Control Boards of Uttar Pradesh / MoEF
16	The Railway (Amendment) Act, 2008	Land acquisition	Applicable	GoI
17	The Petroleum (Amendment) Rules, 2011	Use and storage of petroleum products	Applicable	CCOE /District Collector of the area
18	Municipal Solid Wastes (Management and Handling) Rules, 2000.	Management & disposal of Construction & Demolition debris	Applicable	SPCB

3.4 OTHER LEGISLATIONS APPLICABLE TO CONSUTRUCTION PROJECTS

The DFCCIL shall ensure that other legislations like Child Labour (prohibition and Regulation) Act; 1986, Minimum Wages Act; 1948, The Factories Act; 1948, The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 etc. are followed. Details of applicable statutory rules & regulations during construction stage are also given in DFCCIL's SHE Manual, which forms part of the contract document.
Environment management plan prepared for this project is inline with the Environment Management Framework of DFCCIL. EMF suggest suitable mechanisms for the operationalisation/Implementation of EMP, appropriate institutional mechanisms and specific training / capacity building needs and environmental guidelines to prepare a work plan. For better understanding the Environmental Management Framework, EMF is divided into three sub sections

Part 1: Environmental Management Regulatory Procedure EMRP: The EMRP will be used to establish criteria to identify the level of environmental studies /environment related clearances required for the project and the processes involved, their sequence to conduct the studies for various components/phases of freight corridor projects including their legal requirements and implications. Comprehending the level of studies will help the DFCCIL in assessing the requirement of external agency in the form of consultancy services and also the stage of such requirement, like Planning Consultant at planning and design stage and Construction Supervision Consultant, CSC at construction stage etc.

Part 2: Capacity Building Plan, CBP: An important part of this capacity building is ensuring that people have the skills and training necessary to understand the linkages between freight corridor development and environmental consequences. The CBP will suggest suitable mechanisms for the operationalisation/implementation of EMP, appropriate institutional mechanisms and specific training/capacity building needs and environmental guidelines to prepare a work plan.

Part 3: Environmental Code of Conduct, ECoC: These guidelines have been prepared to provide an outlook and practical methods to counter the problems faced in environmental assessment and management by engineers in designing and executing the project components. Based on these generic guidelines/measures, a specific action plan needs to be worked out for the project such that any environmental issues arising due to the intervention can be countered.

3.5 WORLD BANK OPERATIONAL POLICIES

The operational policies of the Bank, both triggered and non-triggered, the details and the applicability to the Project road are provided in the **Table 3.2**. The World Bank environment assessment (EA) requirements are based on a three-part classification system such as Category A, Category B and Category C as defined by the World Bank OP 4.01. A Project designated as Category A, requires a full environmental assessment (EA) whereas Category B projects require a lesser level of environmental investigation. Category C projects require no environmental analysis beyond that determination.

Table 3.2: World Bank Safeguard Policies

Sr. No.	Safeguard Policy	Subject Category	Triggered	Triggered By	Mitigation Measures	Documentation
1.	OP 4.01	Environment Assessment	Yes	Sensitive areas and impacts on environmental and social components	Mitigation measures incorporated	EA and EMP prepared
2.	OP 4.11	Physical Cultural Resources	Yes	Risk to cultural properties	Adequate mitigation measures if affected	EMP & RAP prepared
3.	OP 4.36	Forestry	Yes	Diversion of forest land	As per the bank operational policies	As applicable under the Act.
4.	WBG Performance Standards	Labour & Occupational Health	Yes	Labour, construction camp and construction activities	Compliance to WBG Standards	EIA & EMP prepared; Safety & Occupational Health measures during construction adequately covered in Contract document & reference document of SHE manual.

Environment Categorization and Need of Environment Assessment as per OP 4.01

For projects with potential to have significant adverse environmental impacts (Category A) an environmental assessment (EA) is required. Category B projects are judged to have some environmental impacts, but of lesser degree or significance than those for category A projects and require an Environmental Assessment (EA)

Physical work proposed under this project is expected to cause significant Environmental & Social impacts involving large scale land acquisition (829.08 Ha.), 0.17 Billion cubic meter earth work & 0.6 million cubic meter ballast, felling of around 19013 trees, diversion of approx. 109 ha protective forest land, construction work on 220.710 km linear work front involving construction equipment etc. Therefore, the Project is considered as **Category 'A'** as per the World Bank safeguard policies and EMF for EDFC. Environment Asssessment study is thus carried out for the project and this will help identify significant impacts (if any) and appropriate mitigation measures.

3.6 CLEARANCE REQUIREMENTS FOR THE PROJECT

The summary table showing time requirements for agency responsible for obtaining clearance, and a stage at which clearance will be required is given below:

Table 3.3: Summary of Clearances & NOCs

Sr. No	Type of clearance	Statutory Authority	Applicability	Project stage	Time required	Responsibility
1	Prior Environmental Clearance	MOEF&CC/SEIAA	Not applicable for Railway project but requires for borrow areas and new quarry sites	Pre construction	-	-
2	Permission for Activities near archaeological protected area	Archaeological survey of India / the state department of Archaeology	Not applicable as no Archaeoloical site falling witnin 300 m of EDFC alignment	Pre construction	-	DFCCIL
3	Clearance for working / diversion of sanctuary land	Chief Wild Life Warden	Not applicablie as no Eco-sensitive zone lies within 10 km of EDFC alignment section	Pre construction	-	DFCCIL
4	Forest Clearance	State Department of Environment and Forest and MOEF&CC	Diversion of Protected Forest land of app. 109 ha	Pre construction	6-8 months	DFCCIL
5	Tree felling permission	Forest department	Felling of trees	Pre construction	15 days	DFCCIL
6	NOC And Consents Under Air , Water, EP Acts & Noise rules of SPCB	State Pollution Control Board	For establishing plants	Construction (Prior to work initiation)	2-3 months	Concessionaire / Contractor
7	NOC And Consents Under Air , Water, EP Acts & Noise rules of SPCB	State Pollution Control Board	For operating Hot mix plants, Crushers, WMM and batching plants	Construction (Prior to work initiation)	1-2 months	Concessionaire / Contractor
8	Permission to store Hazardous Materials	State Pollution Control Board	Storage and Transportation Of Hazardous Materials and Explosives	Construction (Prior to work initiation)	2-3 months	Concessionaire / Contractor
9	Explosive license	Chief controller of explosives	Storage of explosive materials	Construction (Prior to work initiation)	2-3 months	Concessionaire / Contractor
11	PUC certificate for use of vehicles for construction	Department of Transport	For all construction vehicles	Construction (Prior to work initiation)	Regular	Concessionaire / Contractor
12	Quarry lease deeds	Dept. of Geology	Quarrying and	Construction (Prior	2-3 months	Concessionaire /

Sr. No	Type of clearance	Statutory Authority	Applicability	Project stage	Time required	Responsibility
	and license	and Mines	borrowing operations	to work initiation)		Contractor
13	NOC for water extraction for construction and allied works	Ground Water Authority	Ground water extraction	Construction (Prior to work initiation)	2-3 months	Concessionaire / Contractor

3.7 CONCLUSION

Review of environmental regulations indicates that the project requires no prior environmental clearance. However, clearance for the diversion of forest land and permission for cutting the trees within the proposed right of way of the alignment will be required from the Forest Department. Table 3.3 summarizes the clearances required to be obtained from various departments during construction and operation stage of the project. The Contractor shall obtain above NOC for construction work. Apart from the above clearances, the concessionaire also has to comply with the following:

- Clearance of Engineer for location and layout of Worker's Camp, Equipment yard and Storage yard.
- Clearance of Engineer for Traffic Management Plan for each section of the route after it has been handed over for construction.
- An Emergency Action Plan should be prepared by the contractor and approved by the Engineer for accidents responding to involving fuel & lubricants before the construction starts. Submit a Quarry Management Plan to the Engineer along with the Quarry lease deeds.

CHAPTER 4: ENVIRONMENTAL PROFILE OF THE PROJECT INFLUENCE AREA

4.1 INTRODUCTION

This section presents the environmental profile of the project influence area and its salient features. The objective of the profile is to ascertain the environmental sensitivity of the project, and identify the likely impact zones of the project.

Considering the nature of the project alignment, an area of 5.0 km on either side of the corridor has been considered for studying the environmental sensitivity along the project corridor. Eco-sensitive zones like wildlife sanctuaries and national park, bio-sphere reserves will be identified within 5 km. This area is termed as **Buffer zone** of study for this project. Detailed study of environmental and social sensitive features has been carried out 100 m from centre of existing IR track for parallel sections and EDFC alignment for detour sections through detailed field inventories and are presented on the topo sheets (on a scale of 1:50,000/1:2,50,000) of Survey of India. This area is termed as **Core zone** for the purpose of the study. This zone is considered to be directly impacted by development of the project.

4.2 METHODOLOGY

The methodology followed in the preparation of the environmental profile of the project influence area and strip maps comprised the following:

- **Collection of Topo-sheets (scale 1:50,000 & 1:2,50,000) of Survey of India** from Survey of India and demarcation of the proposed alignment on the topo-sheets.
- **Field reconnaissance of the proposed alignment through detailed walk through surveys**
- Mapping of **sensitive receptors** such as schools, religious structures, hospitals, forests, rivers, irrigation canal, ponds etc.
- Interactions with **local villagers and resource persons to understand the importance of various** sensitive features and other local resources (if any).

The data collected from the above tasks was mapped on the strip maps and topo sheets on a scale of 1:50,000.

4.3 ENVIRONMENTAL PROFILE OF THE BUFFER ZONE

Buffer zone is defined as zone of project influence within which EIA study is carried out. EIA study has been carried out to establish the environmental and social sensitivity of the project alignment and following observations are made.

- The alignment generally runs through plains and is devoid of sensitive environmental features like wild life sanctuary, national park etc.
- Kali & Hindon River crosses the alignment (at one location each). Hindon is pereniial river and is tributary to Yamuna where as Kali Nadi is seasonal river. Water of Kali Nadi is blackish and highly polluted so river is named as Kali Nadi. Alignment is

crossed by several major and minor irrigation canals (31 nos.). List of the rivers & canals along with their distance and directions within buffer zone is attached as **Annexure 4.1 & 4.2**

- No Archeological feature is also found to be present within 300 m on either side of the project alignment.

4.4 ENVIRONMENTAL FEATURES WITHIN CORE ZONE

The environmental features within the **core zone** were recorded through site visits and are given in the strip maps, as presented separately (**Volume-II)** in the EA report. The report indicates that the proposed alignment.

- Does not pass through any wild life sanctuary or sensitive natural resources
- Does not affect designated wetlands
- . Requires diversion of 109 ha protected forest land in Bulandshahr. Permission will be obtained from forest department for the same. Also it is required to fell 19013 nos. of trees for which also permission is required from Forest Department.
- There are number of major cities and settlements all along the section and to avoid such heavily built up area, two detours, i.e. Meerut detour-67.75 km & Muzzaffarnagar detour-42.765 km are proposed. Small realignment with RFO at Khurja (3.2 km), & Saharanpur (3.1 km at Tapri) are proposed.
- The project alignment crosses perennial River Hindon & seasonal River Kali.
- The alignment crosses the Upper Ganga Canal & branch canals at various locations. Alignment crosses total 31 nos. of canal.. Details of the same is attached as **Annexure 4.2**
- Number of religious structures, schools / educational institutions and Hospitals are located along the proposed alignment (core zone). . In total 102 nos. of structures including religious structures, schools, hospitals, graveyards and ponds will be affected. List of these structures is attached as **Annexure 4.3. Table 4.1** below presents the summary of the sensitive features located within the core zone.
- Total 19013 nos. of trees within the project alignment are required to fell for which prior permission from forest department will be taken. District wise details of the tree to be cut are attached as **Annexure 2.1.** As per the sample survey, it is found that percentage of fruit bearing trees is app. 20% & 30% are timber yielding trees.

Table 4.1: Details of Sensitive Receptors within the core zone

Summary of Important Features Along with Corridor – Khurja to Bulanshehar (-3.2 DFC to 0 DFC + 3.2 IR to 48.17 IR) – 48.17 km		
Sensitive Feature	**Nos. of structures within ROW**	**Nos. of structures within 200 m buffer (100 m on either side of centre lineof IR track)**
Religious Structure	7	27
Educational Institution	Nil	5
Hospital	Nil	2
Ponds	Nil	2
Graveyards/Shamshan	Nil	3
Playgrounds	Nil	1
Trees	3432	NA
Summary of Important Features Along with Corridor –Bulanshehar to Hapur (48.17 IR to 49.695 IR)-1.525 km		
Sensitive Feature	**Nos. of structures within ROW**	**Nos. of structures within 200 m buffer (100 m on either side of centre line of IR track)**
Religious Structure	Nil	3
Trees	584	NA

Summary of Important Features Along with Corridor – Khurja to Bulanshehar (-3.2 DFC to 0 DFC + 3.2 IR to 48.17 IR) – 48.17 km		
Sensitive Feature	**Nos. of structures within ROW**	**Nos. of structures within 200 m buffer (100 m on either side of centre lineof IR track)**
Summary of Important Features Along with Corridor –Meerut Detour (0 DFC-19.47 DFC)-19.47 km		
Sensitive Feature	**Nos. of structures within ROW**	**Nos. of structures within 200 m buffer (100 m on either side of centre line of EDFC alignment)**
Educational Institution	Nil	1
Trees	7456	NA
Summary of Important Features Along with Corridor –Meerut Detour (19.47 DFC to 33.54 DFC)-14.07 km		
Sensitive Feature	**Nos. of structures within ROW**	**Nos. of structures within 200 m buffer (100 m on either side of centre line of EDFC alignment)**
Trees	5388	NA
Summary of Important Features Along with Corridor –Meerut Detour (33.54 DFC to 67.75 DFC)-34.21 km		
Sensitive Feature	**Nos. of structures within ROW**	**Nos. of structures within 200 m buffer (100 m on either side of centre line of EDFC alignment)**
Trees	85	NA
Summary of Important Features Along with Corridor –Meerut Parallel (86.9 IR to 94.52 IR)- 7.62 km		
Sensitive Feature	**Nos. of structures within ROW**	**Nos. of structures within 200 m buffer (100 m on either side of centre line of IR track)**
Educational Institution	Nil	5
Trees	19	NA
Summary of Important Features Along with Corridor –Muzzafarnagar Parallel (94.52 IR to 112 IR)- 17.48 km		
Sensitive Feature	**Nos. of structures within ROW**	**Nos. of structures within 200 m buffer (100 m on either side of centre line of IR track)**
Religious	2	8
Pond	Nil	1
Educational Institution	1	2
Hospital	Nil	1
Graveyards/Shamshan	Nil	1
Tree	453	NA
Summary of Important Features Along with Corridor –Muzzafarnagar Detour (0 DFC to 25.215 DFC)-25.215 km		
Sensitive Feature	**Nos. of structures within ROW**	**Nos. of structures within 200 m buffer (100 m on either side of centre line of EDFC alignment)**
Trees	654	NA
Summary of Important Features Along with Corridor –Saharanpur Detour (25.215 DFC to 42.765 DFC)-17.55 km		
Sensitive Feature	**Nos. of structures within ROW**	**Nos. of structures within 200 m buffer (100 m on either side of centre line of EDFC alignment)**
Trees	312	NA
Summary of Important Features Along with Corridor –Saharanpur Parallel (152.3 IR to 187.5 IR)-35.4 km		
Sensitive Feature	**Nos. of structures within ROW**	**Nos. of structures within 200 m buffer (100 m on either side of centre line of IR track)**
Religious structures	3	26
Schools	5	8
Ponds	1	4
Graveyards	1	2
Trees	630	NA
Total Structures **Total Trees**	**20** **19013**	**102** **NA**

ANNEXURE-4.1: LIST OF RIVERS WITHIN 5 KM DISTANCE ON EITHER SIDE OF PROJECT ALIGNMENT

River/Nalla	Latitude	Longitude	Distance & Direction
Karwan Nalla (Seasonal)	28 12.870N	77 47.563E	0.5 km, West
Kali Nadi (Seasonal)	28 20.901N	77 52.446E	1.2 km, East
Chhoiya Nalla (Seasonal)	28 40.501N	77 47.585E	0.7 km, East
Abu Nalla (Seasonal)	29 4.739N	77 39.684E	0.3 km, East
Kali River (Seasonal)	29 7.378N	77 41.351E	Crossing
Kali Nadi (Seasonal)	29 7.465N	77 44.545E	4.0 km, East
Kali Nadi (Seasonal)	29 22.056N	77 41.108E	2.8 km, West
Hindon River (Perennial)	29 54.059N	77 35.665E	Crossing
Dhamola Nalla (Seasonal)	29 54.241N	77 33.797E	2.5 km, West
Nagedo Nalla (Seasonal)	29 56.813N	77 35.966E	3.6km, East

ANNEXURE-4.2: LIST OF IRRIGATION CANALS CROSSING & PARALLEL TO PROJECT CORRIDOR WITHIN CORE ZONE

S. No.	Irrigation Canal	Position	Latitude	Longitude
1.	Irrigation Canal	Crossing	29 44.430N	77 39.275E
2.	Irrigation Canal	Crossing	29 58.648N	77 30.539E
3.	Irrigation Canal, Rukanpur	Crossing	29 28.605N	77 39.024E
4.	Irrigation Canal, Mandhera	Crossing	29 27.352N	77 39.475E
5.	Irrigation Canal, Jhangirpur	Crossing	29 20.459N	77 43.345E
6.	Irrigation Canal, Jhangirpur	Crossing	29 19.835N	77 43.507E
7.	Irrigation Canal, Bhainsi	Crossing	29 18.174N	77 44.002E
8.	Irrigation Canal, Shekhpura	Crossing Crossing Parallel	29 15.625N 29 15.646N 29 15.525N	77 44.042E 77 44.090E 77 44.067E
9.	Irrigation Canal, Bhaingi	Crossing	29 13.991N	77 43.687E
10.	Irrigation Canal, Sakoti	Parallel	29 10.473N	77 42.911E
11.	Irrigation Canal, Sakoti		29 8.724N	77 42.651E
12.	Irrigation Canal, Sakoti,	Crossing	29 8.505N	77 42.525E
13.	Irrigation Canal, Mataur	Crossing	29 7.661N	77 41.775E
14.	Drain & Canal	Crossing	29 7.368N	77 41.365E
15.	Irrigation Canal, Khirwa Nauabad	Crossing	29 4.379N	77 39.039E
16.	Irrigation Canal, Pohali	Crossing	29 4.006N	77 38.725E
17.	Irrigation Canal, Pepla	Crossing	28 59.492N	77 37.259E
18.	Irrigation Canal, Ghat	Crossing	28 56.972N	77 36.868E
19.	Irrigation Canal, Bahadurpur	Crossing	28 52.311N	77 38.074E
20.	Irrigation Canal, Hapur Hulaothi Road-- Branch Of Upper Ganga Canal	Crossing	28 38.912N	77 47.023E
21.	Kadirabad Nallah Murshadpur	Crossing	28 38.286N	77 47.307E
22.	Irrigation Canal, Gulohti	Crossing	28 35.528N	77 48.170E
23.	Irrigation Canal, Kurval Banaras	Crossing	28 25.885N	77 49.984E
24.	Irrigation Canal, Aimanpur	Crossing	28 20.223N	77 51.729E
25.	Irrigation Canal, Maman Kalan-Upper Ganga Canal	Crossing	28 19.486N	77 51.497E
26.	Irrigation Canal, Machhipur	Crossing	28 19.364N	77 51.573E
27.	Irrigation Canal, Khurja	Crossing	28 16.347N	77 50.972E
28.	Irrigation Canal, Khurja City railway Station	Crossing	28 15.375N	77 50.711E
29.	Irrigation Canal, Khurja City railway Station	Crossing	28 15.005N	77 50.278E
30.	Irrigation Canal, Nizampur	Crossing	28 14.874N	77 50.111E
31.	Irrigation Canal, Budhena	Crossing	28 13.967N	77 48.976E

Culverts, minor and major bridges are provided as cross drainage structure at all these locations as applicable to ensure the drainage of storm water and prevention of water logging.

ANNEXURE-4.3: LIST OF ENVIRONMENTAL SENSITIVE FEATURES ALONG THE PROJECT CORRIDOR WITHIN CORE ZONE

S. No.	Environmental Features	Latitude	Longitude	Distance from IR track (m)	Direction
	Religious Structure				
1.	Pathvari Mata mandir	28 15.275N	77 50.776E	80	RHS
2.	Balaji Mandir	28 15.275N	77 50.776E	65	RHS
3.	Gurudwara	28 15.289N	77 50.715E	85	RHS
4.	Temple-small	28 15.396N	77 50.807E	18	LHS
5.	Bhole temple	28 15.358N	77 50.779E	30	LHS
6.	Mosque	28 15.380N	77 50.776E	28	LHS
7.	Shanidev Temple	28 15.377N	77 50.307E	19	LHS
8.	Jain Temple	28 15.400N	77 50.849E	85	RHS
9.	Gorakhnath Temple & Temple (2 Nos)	28 15.593N	77 51.009E	35	RHS
10.	Temple	28 24.864N	77 50.475E	30	RHS
11.	Temple	28 24.420N	77 50.034E	28	LHS
12.	Satyashani Mandir	28 24.424N	77 50.650E	18	RHS
13.	Temple	28 24.535N	77 50.595E	23	RHS
14.	Church	28 24.557N	77 50.557 E	65	RHS
15.	Shiv Temple	28 24.318N	77 50.688E	60	RHS
16.	Ram Mandir	28 24.024 N	77 50.755E	52	RHS
17.	Play School	28 24.323N	77 50.648E	68	RHS
18.	Renaissance School	28 25.371N	77 50.263E	59	RHS
19.	Mosque	28 24.652N	77 50.427E	70	LHS
20.	Peer Baba	28 23.953N	77 50.813E	40	LHS
21.	Temple near Pallav vihar	28 31.402N	77 48.247E	95	LHS
22.	Mosque	28 33.178N	77 47.811E	62	LHS
23.	Quait Ul Islam Maszid	28 33.208N	77 47.865E	20	RHS
24.	Peer Baba	28 33.262N	77 47.865E	8	LHS
25.	Jain Temple	28 33.424N	77 47.830E	80	LHS
26.	Mosque, Gulhoti	28 35.466N	77 48.101E	89	LHS
27.	Mosque	28 35.502N	77 48.237E	98	RHS
28.	Jama maszid, Hridyapur	28 37.673N	77 47.686E	55	RHS
29.	Temple, Hridyapur	28 37.619N	77 47.574E	26	RHS
30.	Temple (2 Nos), Avaas Vikas Coloy	29 15.934N	77 44.173E	30	LHS
31.	Temple	29 16.245N	77 44.195E	25	RHS
32.	Shiv Mandir, Vishnupuri	29 16.626N	77 44.274E	15	RHS
33.	Temple (3 Nos)	29 16.632N	77 44.349E	64	RHS
34.	Jharkhand Mandir	29 16.819N	77 44.396E	84	RHS
35.	Temple	29 44.464N	77 39.115E	62	LHS
36.	Mosque	29 56.365N	77 33.971E	14	RHS
37.	Mosque	29 56.767N	77 33.642E	13	LHS
38.	Hanuman Temple	29 56.380N	77 33.996E	63	RHS
39.	Maa kalka temple	29 58.146N	77 31.546E	12	RHS
40.	Shive temple & Mosque (2 Nos)	29 58.114N	77 31.535E	15	LHS
41.	Temples (3 Nos)	29 57.708N	77 32.606E	56	RHS
42.	2 Temples and 1 Mazid (3 Nos)	29 57.737N	77 32.582E	45	RHS
43.	temple	29 57.806N	77 32.203E	37	RHS
44.	temple	29 57.937N	77 32.054E	23	RHS
45.	Gurudwara & Temple (2 Nos)	29 58.026N	77 31.831E	72	RHS
46.	Temples (3 Nos)	29 58.148N	77 31.623E	87	RHS
47.	Temple	29 58.102N	77 31.743E	92	RHS
48.	Idgah	29 58.139N	77 31.896E	93	RHS
49.	Temple	29 58.140N	77 32.133E	75	RHS
50.	Gurudwara	29 57.903N	77 32.486E	84	RHS

S. No.	Environmental Features	Latitude	Longitude	Distance from IR track (m)	Direction
51.	Temple	29 57.511N	77 32.948E	76	RHS
52.	Maszid	29 57.295N	77 33.355E	72	RHS
53.	Maszid	29 58.338N	77 31.080E	88	LHS
	Hospitals				
54.	Krishna Hospital	28 24.045N	77 50.915E	60	RHS
55.	Vedmani hospital	28 24.646N	77 50.555E	23	RHS
56.	Vet Hospital	29 16.690N	77 44.375E	74	RHS
57.	Hospital	29 16.825N	77 44.400E	85	RHS
	Schools				
58.	Lal Bhadur shastri Vidalaya	28 15.361N	77 50.837E	89	RHS
59.	All Saint School	28 24.540N	77 50.562 E	70	RHS
60.	Primary School	28 26.308N	77 49.765E	78	LHS
61.	School	28 33.178N	77 47.811E	74	LHS
62.	Madsra Hazarat Zainab	28 33.208N	77 47.865E	20	RHS
63.	Primary School, Hridyapur	28 37.673N	77 47.686E	55	RHS
64.	School, Murshadpur	28 38.465N	77 47.341E	89	RHS
65.	HK inter college Sakoti	29 10.980N	77 43.136E	30	RHS
66.	Kusum Public School	29 10.461N	77 42.952E	50	RHS
67.	Madrsa sakoti	29 10.938N	77 43.058E	65	RHS
68.	SMHSS- High School, Sakoti	29 11.546N	77 43.186E	70	RHS
69.	Janta Inter college	29 16.640N	77 44.352E	89	RHS
70.	Tilak ram inter college	29 16.825N	77 44.400E	85	RHS
71.	Jai Hind School & Open School	29 56.965N	77 33.504E	21	LHS
72.	Star Public School	29 56.932N	77 33.503E	40	LHS
73.	Saharanur Public School	29 56.929N	77 33.463E	80	LHS
74.	Girls school	29 58.026N	77 31.831E	72	RHS
75.	Inter College	29 58.141N	77 32.064E	83	RHS
76.	IIT Roorkee (Saharanpur Campus)	29 56.291N	77 33.954E	50	LHS
77.	Bharat tibiya inter college	29 55.903N	77 34.213E	12	LHS
	Ponds				
78.	Pond	28 25.073N	77 50.392E	67	RHS
79.	Pond	28 15.079N	77 50.441E	40	RHS
80.	Pond	29 16.178N	77 44.209E	25	RHS
81.	Pond, Bharatpur	29 47.219 N	77 38.234 E	19	LHS
82.	Pond, Lakhnaur	29 53.619 N	77 35.984 E	30	RHS
83.	Pond	29 55.917N	77 34.182E	90	LHS
84.	Pond	29 58.338N	77 31.080E	88	LHS
	Graveyards				
85.	Graveyard	28 24.652N	77 50.427E	70	LHS
86.	Grave yard	28 35.466N	77 48.101E	89	LHS
87.	Kabristan	28 35.502N	77 48.237E	98	RHS
88.	Samshan ghat, Khatoli	29 16.825N	77 44.400E	85	RHS
89.	graveyard	29 58.063N	77 31.760E	20	LHS
90.	graveyard	29 58.112N	77 31.666E	15	RHS

CHAPTER 5: BASELINE ENVIRONMENTAL PROFILE

5.1 INTRODUCTION

This chapter assesses the nature, type and dimensions of the study area and describes the relevant physical and biological environmental components along the proposed railway line. The data on various environmental components related to the project area has been assembled from various secondary sources and primary environmental surveys on ambient air quality, noise and vibration levels, water and soil quality, aquatic and terrestrial ecology. A detailed profile prepared based on the above information is presented in the subsequent sections of this chapter.

5.2 BASELINE STUDY AREA

Study area is divided into core zone and buffer zone. Core zone is considered as area of 100 m on both sides of existing IR track in parallel sections and 100 m on both sides of EDFC alignment in detour sections. Buffer zone is similarly area of 5 kms distance on either side from centre line of IR track in parallel sections and centre of EDFC alignment in detour sections. Summary of environmental features within core & buffer zone is given below in **Table 5.1.**

Table 5.1: Summary of Environmental Features

Sr. No.	Environmental Features	Within Core Zone	Within Buffer Area
1.	**Ecological**		
a	Presence of Wildlife Sanctuary/ National Park	None	None
b	Reserved Forests	None	Only reserve forests lies within 5 km area of EDFc alignment in Bulandshahr district. List is attached as **Annexure 5.1.**
c	Protected Forest	Area of 109 ha in Bulandshahr District	Bulandshahr District
d	Wetlands	None	None
e	Migratory Route of Birds	None	None
f	Migratory Route of Wild Animals	None	None
g	Migratory Route of Fishes	None	None
h	Prescence of Schedule 1 animals	Peacock (but species of least concern)	Peacock (but species of least concern)
i	Tree Covers	Major species: Kikar, Khajur, babol, Sheesham, Aam, Jamun, Gulmohar, Siras and Khair. Total 19013 will be cut as they are falling within ROW	Rich variety of Flora in Uttar Pradesh
2	Archaeological Monuments	None	Yes. List of Archealogical Monuments within the districts through which EDFC section traverse is attached as **Annexure 5.2**
3	Water bodies	Kali Nadi & Hindon River crosses proposed alignment. Various	List of Rivers, nallah, irrigation canals and ponds within the buffer

Sr. No.	Environmental Features	Within Core Zone	Within Buffer Area
		Irrigation canals and ponds are present within core zone. Refer **Annexure 4.2 & 4.3**	zone is attached as **Annexure 4.1, 4.2 & 4.3**
4	Ground Water	District Hapur is semi-critical zone, Ghaziabad is safe zone, Muzaffar Nagar-Critical zone, Bulandshahar-Over-exploited zone, Meerut is safe zone & Saharanpur-semi critical	District Hapur is semi-critical zone, Ghaziabad is safe zone, Muzaffar Nagar-Critical zone, Bulandshahar-Over-exploited zone, Meerut is safe zone & Saharanpur-semi critical
5	Land Use	Majorly agriculture	Majorly agriculture
6	Physically sensitive cultural resources	110 as identified during SIA	None
7	Social	High poverty and low literacy rate in Uttar Pradesh	High poverty and low literacy rate in Uttar Pradesh

5.3 BASELINE ENVIRONMENTAL SURVEYS

As presented in **Table 5.1** below, detailed base line environmental surveys were carried out for the key components of environment during February to March, 2015. Data on meteorology has been collected from the nearest IMD stations at Meerut and Roorkee. The environmental monitoring was done along the proposed freight corridor covering detour as well as parallel sections.

The sampling of physical environment namely- air quality, water, soil, noise & vibration was done at various locations to estimate the baseline status in both the core and buffer zone along the finalized alignment.

Table 5.2: Details of Baseline Data Collection Schedule

Field	Parameters	No. of Sampling Locations	Sampling Duration	Study Period	Criteria for selection of no. of samples and locations
Ambient Air Quality	SO_2 NO_x PM_{10} $PM_{2.5}$	15	24 hrs continuous	During February to March, 2015, once for 24 hours at each location	Covering residential, commercial and industrial locations as per NAAQS, 1994 and as per NAAQS. 2009. The no. of samples have been selected to represent the baseline ambient air quality covering parallel as well as detour locations
Meteorology	Wind Speed Wind Direction Temperature Rainfall Humidity Atmospheric Pressure	02	Dec, 2014-Feb, 2015	Long term data at 8:300 and 17:30 IST	Nearest IMD stations at Meerut & Roorkee to represent the meteorological condition of the study area
Water Quality (Surface & Ground	Physio-Chemical & Biological Parameters	20 (15 ground water &05 surface water)	Random	During February to March, 2015, once at each	**As per IS:10500 Standards covering ground water and surface water**

Field	Parameters	No. of Sampling Locations	Sampling Duration	Study Period	Criteria for selection of no. of samples and locations
Water Sample)				location	
Noise	L_{eq}	23 (15 within villages along corridor and 8 at Railway Track)	24 hrs continuous	During February to March, 2015, once at each location	The monitoring was done to represent sensitive, residential locations as per Ambient Air Quality Standards w.r.t. Noise,2000 covering parallel as well as detour locations
Vibration	L_{max}	8	During passing of various trains	During February to March, 2015, once at each location	The sensitive and residential locations have been covered in parallel sections
Soil	Physio-Chemical Parameters	15	Random	During February to March, 2015, once at each location	As per Soil Survey Manual (IARI, 1970)
Ecology	Aquatic	1	River Hindon & canal	February,2015	Terrestrial by line transact and secondary data from Forest Deptt.
	Terrestrial	03	Random	February ,2015	

5.3 PHYSICAL ENVIRONMENT & CLIMATE

5.3.1 Meteorology

The project area presents tropical climatic characteristics; however, variations exist due to the difference in altitudes between various locations. The entire stretch from Khurja to Pilkhani passes through six districts of Uttar Pradesh i.e. Bulandshahr, Ghaziabad, Hapur, Meerut, Muzaffarnagar and Saharanpur. To understand the meteorological features of the project area, data has been collected from the two nearest meteorological stations (monitored by Indian Meteorological Department), at Meerut and Roorkee (distance of app. 35 km from Saharanpur). **Table 5.2** summarizes the meteorological characteristics of the project area.

Table-5.2: Meteorological Data during December, 2014 to February, 2015

Month	Ambient Temperature, °C		Atmospheric Pressure, hPa		Relative Humidity, %		Average Wind Speed, km/hr.	Pre-dominant Wind Direction	Rainfall, mm
	Average Daily Max.	Average Daily Min.	Maximum	Minimum	Maximum	Minimum			
IMD Station: Meerut (height above msl : 98 m)									
Dec, 2014	20	14	1024	1012	94	14	6.1	West	0.0
Jan, 2015	17	8.1	1023	1013	91	43	7.3	West	0.0
Feb, 2015	25	13	1025	1008	89	16	8.0	West	0.0
IMD Station: Roorkee (height above msl : 126 m)									
Dec, 2014	22.4	6.5	1025	1015	92	23	4.2	NW	64.0
Jan,	21.0	7.6	1017	1012	93	21	5.1	NW	18.80

IMD Station: Meerut (height above msl : 98 m)									
Month	**Ambient Temperature, ⁰C**		**Atmospheric Pressure, hPa**		**Relative Humidity, %**		**Average Wind Speed, km/hr.**	**Pre-dominant Wind Direction**	**Rainfall, mm**
	Average Daily Max.	**Average Daily Min.**	**Maximum**	**Minimum**	**Maximum**	**Minimum**			
2015									
Feb, 2015	23.5	10.1	1024	1015	90	20	6.5	NW	10.00

Source: IMD, Meerut & Roorkee

5.3.2 Temperature

The meteorological data observed during the study period, i.e. Winter season shows that daily maximum temperature varies from 17⁰C to 25⁰C and the daily minimum temperature varies from 8.1⁰C to 13⁰C in Meerut whereas in Roorkee, daily maximum temperature varies from 21⁰C to 22.4⁰C and the daily minimum temperature varies from 6.5⁰C to 10.1⁰C. Average annual profile of the temperature in the study area is given in **Figure 5.1.**

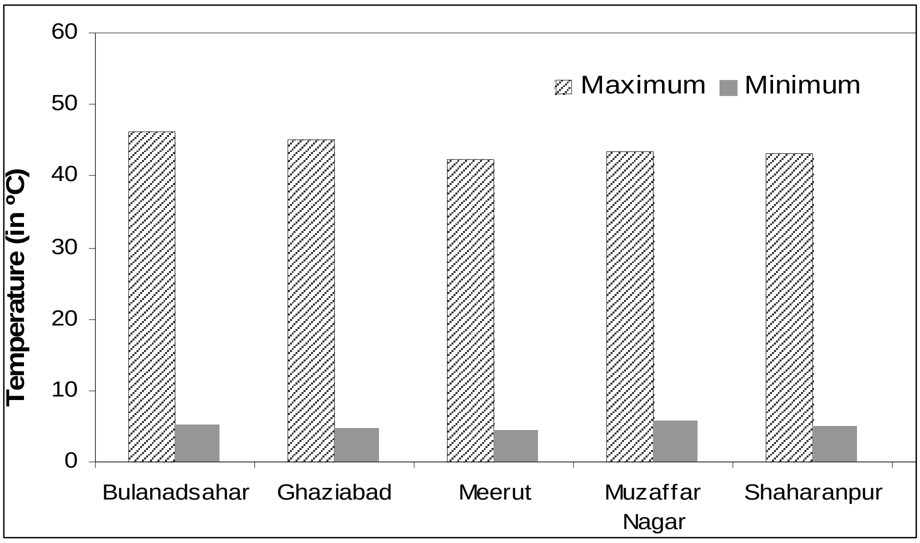


Figure-5.1: Annual Average Temperature in the Study Area

Source: India Meteorological Department, Delhi

5.3.3 Relative Humidity

The relative humidity at Meerut during study period varies from 14% to 94% and at Roorkee it varies from 20% to 93%. Average annual profile of the temperature in the study area is given in **Figure 5.2**

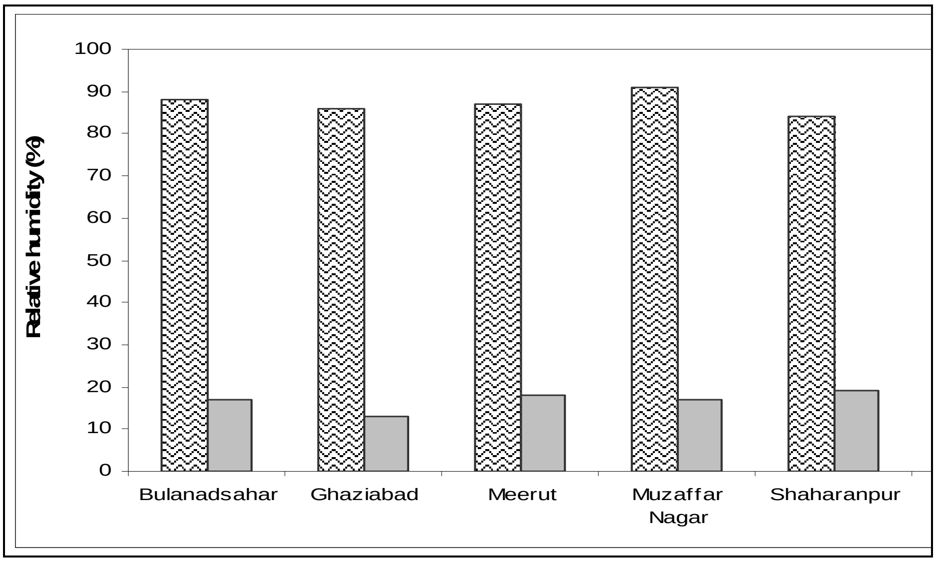


Figure-5.2: Annual Average Relative Humidity in the Study Area

Source: India Meteorological Department, Delhi

5.3.4 Atmospheric Pressure

The minimum and maximum monthly atmosphere pressure varies from 1008 to 1025 hPa at Meerut and varies from 1012 to 1025 hPa at Roorkee.

5.3.5 Rainfall

The rainfall distribution pattern in the entire project area is uneven. District wise monthly rainfall for year 2012 is given in **Table 5.3 below.**

Table 5.3: Details of District wise monthly rainfall for year 2012

District	Precipitation During 2012 (mm)												
	Jan	Feb	Marc	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Bulandshahr	10.7	0.0	0.0	6.7	1.0	5.5	124.8	192.8	56.8	0.0	0.0	0.3	398.6
Ghaziabad & Hapur	5.5	0.0	7.0	3.7	0.1	14.4	74.7	165.2	96.1	0.0	0.0	3.1	369.8
Meerut	14.5	0.0	17.4	20.9	0.0	0.3	68.4	189.3	70.2	0.7	1.0	12.7	395.4
Muzaffarnagar	11.6	0.3	7.7	8.9	1.1	0.0	191.3	217.7	48.4	0.2	1.3	20.6	509.1
Saharanpur	10.3	1.7	3.3	18.3	2.0	4.0	153.0	349.6	162.3	0.0	0.0	8.8	713.3

Source: IMD

Maximum rainfall is received during August in all the districts. Maximum rainfall of 713.3 mm occurs in Saharanpur during 2012. During study period 0.0 mm of rainfall is received in Meerut and rainfall of 64 mm is received during December, 18.80 during January and 10.0 mm during February at Roorkee. The annual rainfall pattern (2012) in the project district is shown in **Figure 5.3.**

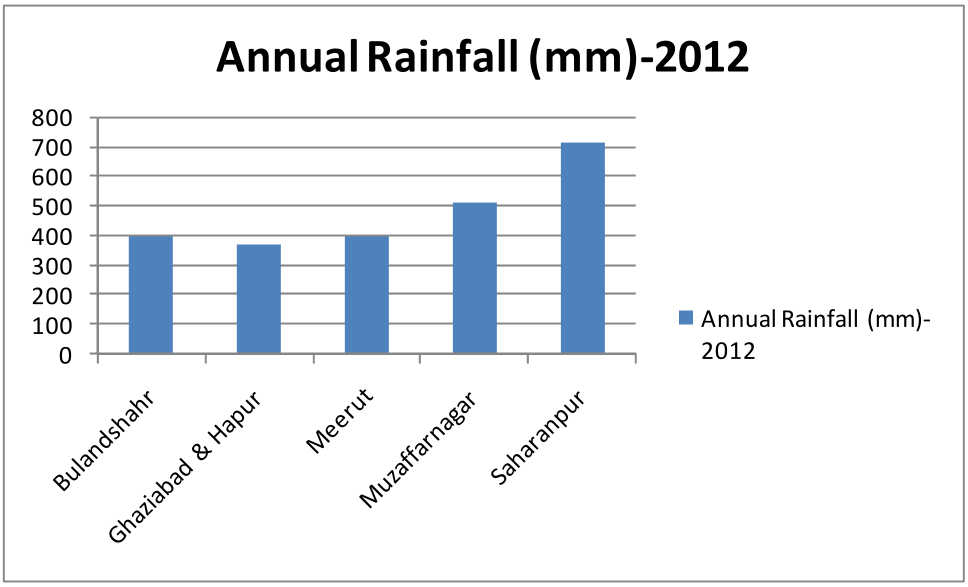


Figure 5.3: Annual Average Rainfall in the Study Area

Source: IMD

5.3.6 Wind Speed and Direction

Analysis of wind records shows that the winds are generally light to moderate in this area. The pre-dominant wind direction is West in Meerut and NW in Roorkee. The maximum average wind speed varies from 6.1 to 8.0 km/hr in Meerut and 4.2 to 6.5 km/hr in oorkee. Windrose Diagram for Meerut and Roorkee is given in **Figure 5.4 & 5.5**

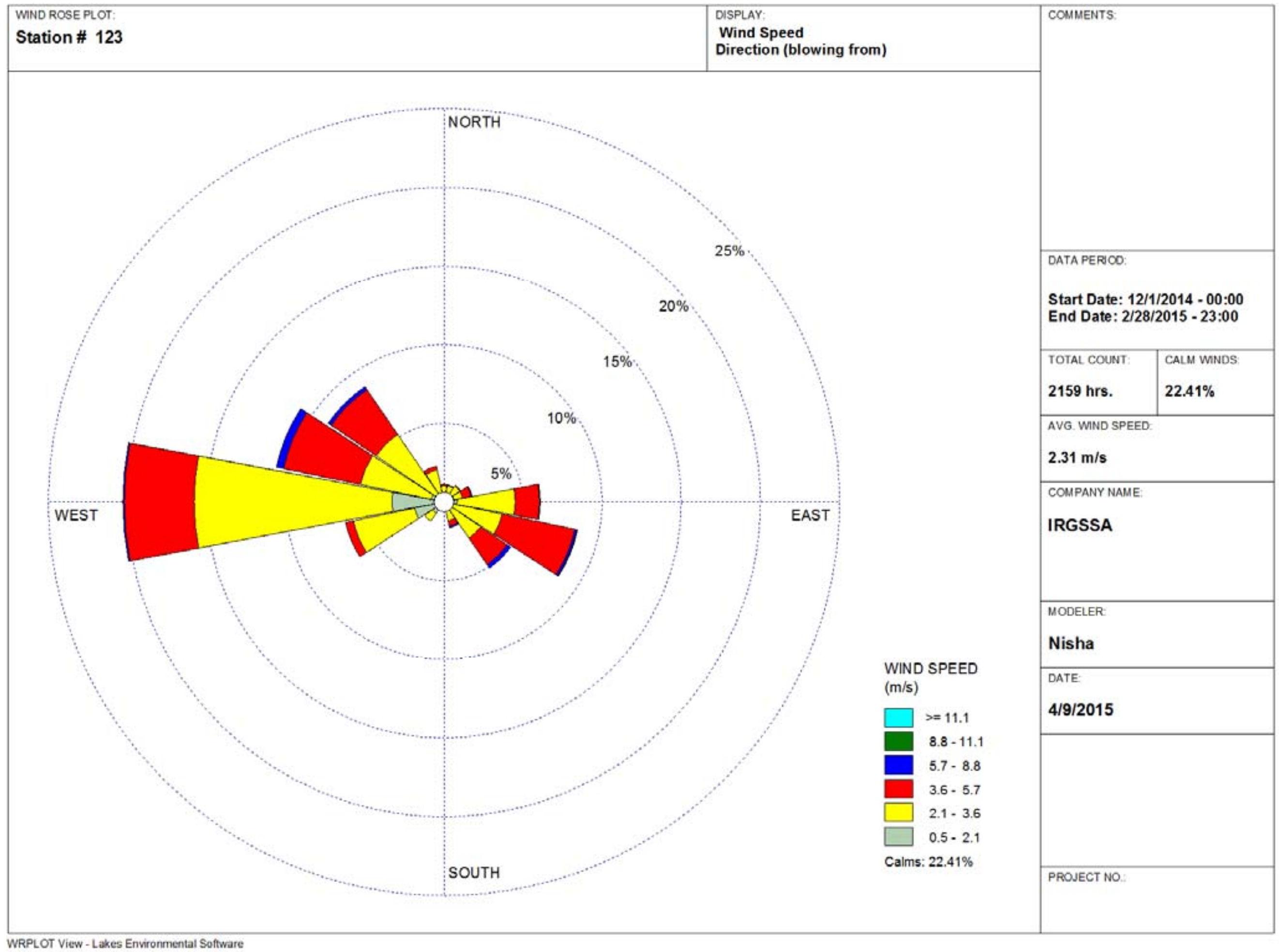


Figure 5.4: Wind rose Diagram for Meerut During Winter Season (Dec, 2014 - February, 2015)

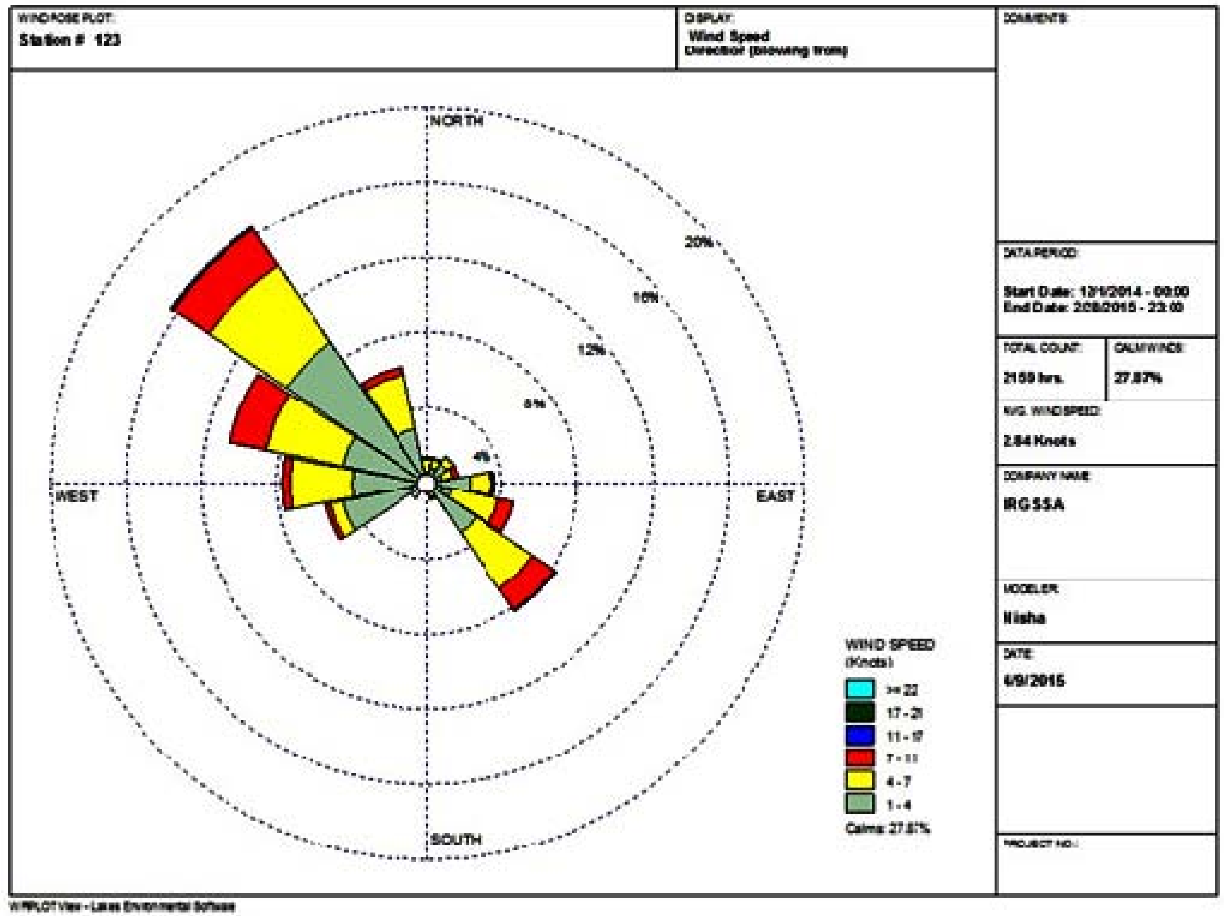


Figure 5.5: Windrose Diagram for Roorkee During Winter Season (Dec, 2014 - February, 2015)

5.3.7 Ambient Air Quality

Sulphur dioxide (SO_2), Oxides of Nitrogen (NO_x), PM_{10} and $PM_{2.5}$ are the major air pollutants, which cause concern to environment and have health impacts. In order to understand the base line trends of these pollutants in the project area, ambient air monitoring was carried out at 15 locations during February to March, 2015 along the proposed section of EDFC corridor, i.e. Meerut to Saharanpur. Criteria for selection of the air quality monitoring location are:

1. Air quality monitoring stations should also be selected at sensitive zones like educational institutes, religious structures, eco-sensitive zone, forest area etc.
2. Air quality monitoring stations should also be selected at residential zones, commercial zones, industrial and mixed-use zones

The samples are selected as per above criteria which helped to obtain a representative air quality data of whole project corridor.

Methodology (Air Monitoring)

The air pollution analysis techniques include the evaluation of the following:

1. PM_{10}
2. $PM_{2.5}$
3. Sulphur dioxide (SO_2)
4. Nitrogen oxides (NO_x)

As regard the techniques for collection of sample of particulate matter, the "Respirable Dust Sampler Envirotech Model APM 460 BL" was used for air monitoring. PM_{10} was collected on filter paper of size GF/A 20.3 x 25.4 cm and $PM_{2.5}$ was collected on filter paper of specification 2um PTFE 46.2mm and the gaseous pollutants were collected simultaneously by a known volume of air through a number of bubblers of different flow rate through appropriate solution for absorbing different gases. The gaseous air pollutant samples were collected in glass impinges filled with adsorbing solvents by passing of ambient air and analyzed according to standard method.

Calculation

For particulate matter

PM_{10} ($\mu g/m^3$) = (weight of filter paper after sampling – initial weight of filter paper) / volume of air.
$PM_{2.5}$ = (weight of filter paper after sampling – initial weight of filter paper) / volume of air

For gaseous pollutants

SO_2 ($\mu g/m^3$) = $(A – A_0)$ x 1000 x B x D/ V
NO_x ($\mu g/m^3$) = $(A – A_0)$ x 1000 x B x D/ 0.82V

Where, A = Sample Absorbance,
A_0 = Reagent blank Absorbance, and

B = Calibration factor (μg/absorbance)
D = Volume of absorbance solution in impinger during monitoring / volume of absorbing solution taken for analysis.
V = Volume of Air Sample in liters.

Ambient air quality monitoring was carried out for continuous 24 hours from February to March, 2015. Photographs of Ambient Air Quality Monitoring is give below in **Figure 5.6**

Figure 5.6: Photographs of Ambient Air Quality Monitoring

	
Ambient Air Quality Monitoring at Nizampur, Khurja	Ambient Air Quality Monitoring at Sunhera Village, Bulandshahr
	
Ambient Air Quality Monitoring at Faizabad Rodavali, Gulohti	Ambient Air Quality Monitoring at Village Murshidpur
	
Ambient Air Quality Monitoring at Jahangir Pur	Ambient Air Quality Monitoring at Anwarpur

Ambient Air Quality Monitoring at Walidpur

Ambient Air Quality Monitoring at Mirapur

Ambient Air Quality Monitoring at Awas Vikas Colony, Khatauli

Ambient Air Quality Monitoring at Saharanpur

Ambient Air Quality Monitoring at Bhat Khedi Nangal

Ambient Air Quality Monitoring at Sakhan Kalan

Ambient Air Quality Monitoring at Baseda

Ambient Air Quality Monitoring at Panchil Khurd

Ambient Air Quality Monitoring at Sarsina

Source: Field Survey

The ambient air monitoring was done from February to March, 2015. The monitoring result is presented in **Table 5.4** & **Figure 5.7 (a-d)**

Table 5.4: Ambient Air Quality along the Project Corridor (Feb-March, 2015)

Sr. No.	Monitoring Stations	Land Use	Section	Emissions (ug/m³)			
				PM_{10}	$PM_{2.5}$	SO_2	NO_x
1	Nizampur (Khurja)	Residential Area-Village	Parallel	115	47	8.6	17.5
2	Buland Shahar	Mixed Use	Parallel	126	52	10.5	21.2
3	Gulhoti	Residential Area-Highly populated	Parallel	112	44	11.2	23.0
4	Murshidpur	Residential Area-Village	Detour	85	36	8.5	17.0
5	Anwarpur at NH-24	Near National Highway & Educational Institute	Detour	106	45	7.7	16.6
6	Panchali Khurd NH-58	Residential Area-Village	Detour	98	40	7.3	13.0
7	Walidpur NH-58	Residential Area-Village	Detour	114	48	8.0	18.8
8	Khatauli	Near Temple	Parallel	136	55	12.6	25.0
9	Jahangirpur	Near School	Parallel	108	43	10.4	19.5
10	Mirapur	Residential Area-Village	Detour	112	47	9.6	19.0
11	Sakhan Kalan	Residential Area-Highly populated	Parallel	87	35	7.7	15.0
12	Sarisna	Residential Area	Parallel	84	33	8.0	16.8
13	Baseda	Residential Area	Parallel	90	38	8.4	17.0
14	Nangal	Commercial Area	Parallel	102	42	7.1	14.7
15	Saharanpur	Near Temple, Mixed Use Area	Parallel	140	56	14.5	26.6
Prescribed Limit as per NAAQS ,2009 in ug/m3 PM_{10}-100 $PM_{2.5}$-60 SO_2-80 NO_x-80							

Source: Field Survey

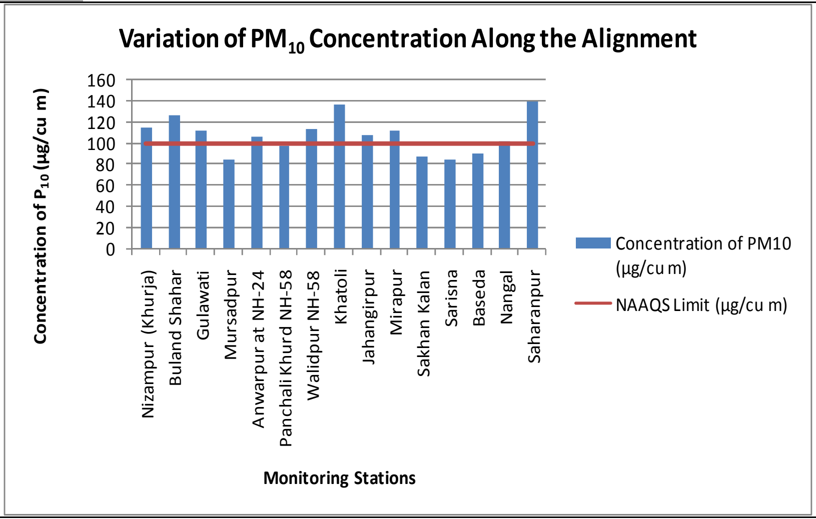


Figure 5.7 a: Variations of PM_{10} Concentration Along the Alignment

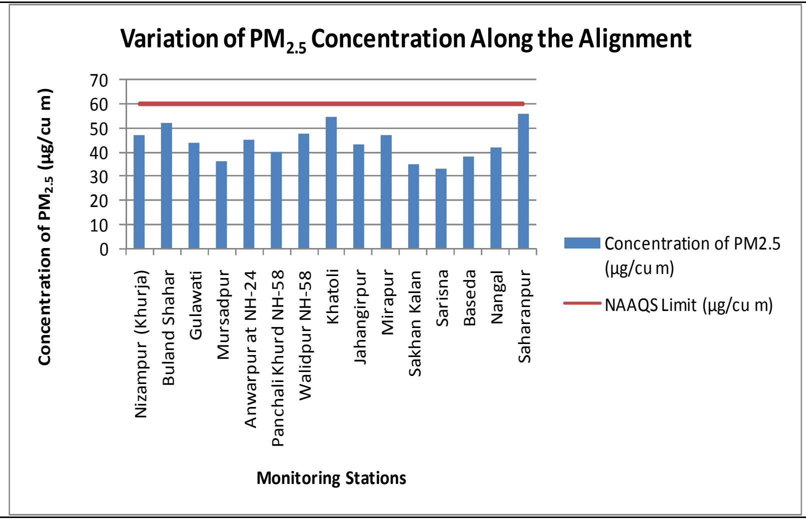


Figure 5.7 b: Variations of $PM_{2.5}$ Concentration Along the Alignment

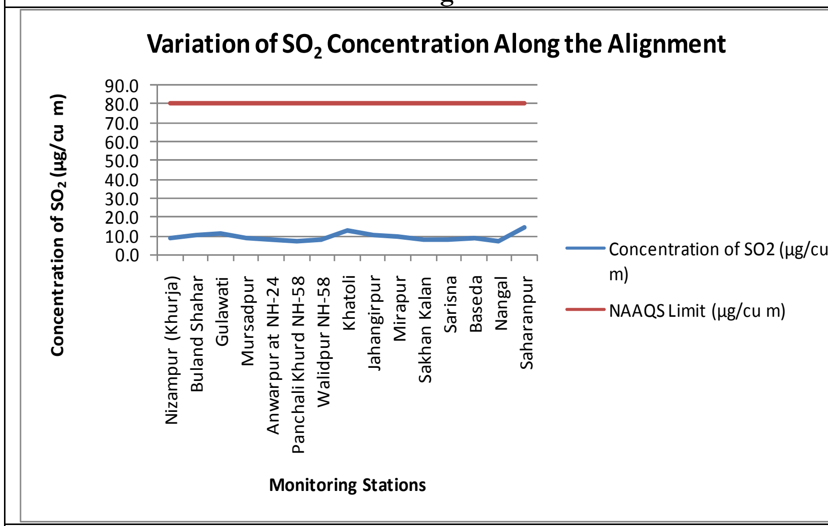


Figure 5.7 c: Variations of SO_2 Concentration Along the Alignment

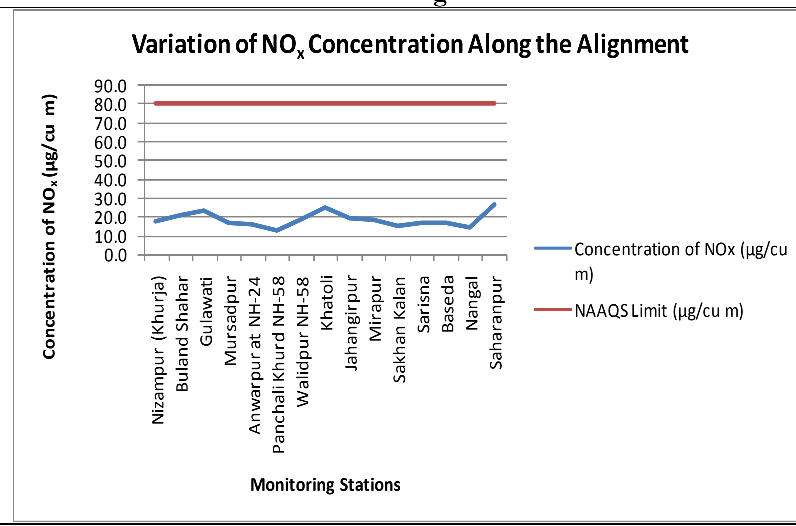


Figure 5.7 d: Variations of NO_x Concentration Along the Alignment

Source: Field Stud

Result and Discussion

Level of PM_{10} is found to be higher than the prescribed limits as per NAAQS at all the locations. All the locations selected are located along the highways/railway track. Highest level of PM_{10} is recorded in Saharanpur followed by Khatauli. Both of these areas are highly populated and have mixed use kind of activities. Level of $PM_{2.5}$ is found to be within the prescribed limits as per NAAQS at all the locations. Level of $PM_{2.5}$ is higher at Bulandshahr, Khatauli and Saharanpur. All of these locations are busy and congested with both commercial and residential activities. Measures are required to be taken during construction phase at these locations so as to prevent any incremental dust load. Concentrations of SO_2 & NO_x are well within the prescribed limits of NAAQS, 2009.

5.3.8 Noise Levels

Noise attributed to a line project depends on factors such as traffic intensity, the type and condition of the traffic and the nature of activities happen in the areas through which alignment passes. Excessive high noise levels are a concern for sensitive receptors, i.e., hospitals, educational institutions, etc. The baseline information about the existing noise level along the railway tracks have been collected by monitoring the noise levels.

The Central Pollution Control Board has specified ambient noise standards for different land uses for day and night times and is termed National Ambient Air Quality Standards W.R.T Noise, 2000. Importance was given to the timing of exposure and areas designated as sensitive. **Table 5.5** presents the noise standards specified by the Central Pollution Control Board.

Table 5.5: National Standards for Ambiant Noise, 2000

Area Code	Category	Limits in Decibels (dB A)	
		Day Time	Night Time
A	Industrial	75	70
B	Commercial	65	55
C	Residential	55	45
D	Silence Zones	50	40

Source: Central Pollution Control Board, New Delhi

Note: (1) Daytime: 6 AM to 10 P.M., Night-time 10 PM to 6 AM;
(2) Silence zone is an area up to 100 m around premises as hospitals, educational institutions and courts.

Locations for noise monitoring along the project route were identified based on the criteria same as those used for air monitoring but the relative importance of each criterion carries a weight age in arriving at the final set of locations. The noise monitoring was carried out at 23 locations covering areas along tracks, commercial, residential and silence zones from February to March, 2015. Noise levels are monitored both in the villages located along the proposed DFC alignment (15 locations) and within 30 m of existing IR track in parallel sections (8 locations).

Noise levels are monitored for both during the day and night as per relevant Noise standards of CPCB in the villages located along the proposed alignment (15 locations). Noise levels were recorded within 30 m from existing IR track in parallel sections when the trains pass.

Methodology for Noise Monitoring

The intensity of sound energy in the environment is measured in a logarithmic scale and is expressed in a decibel (dB) scale. Ordinary sound level meter measures the sound energy that reaches the microphone by converting it into electrical energy and then measures the magnitude in dB. In a sophisticated type of sound level meter, an additional circuit is provided, which modifies the received signal in such away that it replicates the sound signal as received by the human ear and the magnitude of sound level in this scale is denoted as dB (A). The sound levels are expressed in dB (A) scale for the purpose of comparison of noise levels, which is accepted by Central pollution Control Board(CPCB) as per Environment (Protection) Act, 1986 (29 of 1986) read with rule 5 of the Environment (Protection) Rules, 1986, the Central Government.

Noise level monitoring is carried out by using Envirotech SLM 100 Sound Level Meter at all the locations. Photographs of Air Quality Monitoring along the IR Track and within the villages is given in **Figure 5.8 & Figure 5.9** respectively.

Figure 5.8: Photographs of Noise Level Monitoring along the Existing IR Track for Parallel Sections

Noise Level Monitoring at LC at Khurja

Noise Level Monitoring at LC at Gulohti

Noise Level Monitoring at LC at Mushidpur

Noise Level Monitoring at LC at Khatauli

	
Noise Level Monitoring at LC at Jhangirpur	Noise Level Monitoring at LC at Sakhan Kalan
	
Noise Level Monitoring at LC at Sarsina	Noise Level Monitoring at LC at Baseda

Figure 5.9: Photographs of Noise Level Monitoring within the Villages along the Proposed Alignment

	
Noise Level Monitoring at Village Nizamura	Noise Level Monitoring at Village Sunhera, Bulandshahr
	
Noise Level Monitoring at Gulohti	Noise Level Monitoring at Murshidpur

Noise Level Monitoring at Khatauli

Noise Level Monitoring at Jhangirpur

Noise Level Monitoring at Walidpur

Noise Level Monitoring at Sakhan Kalan

Noise Level Monitoring at Nangal

Noise Level Monitoring at Saharanpur

The L_{eq} during day and night (6 AM to 10 PM reckoned as Day and 10PM to 6 AM as Night) were calculated for the data recorded at 15 monitoring locations. The monitored noise levels during the study period (February to March, 2015) along the railway track and in villages are presented in **Table 5.6 and 5.7** respectively. Results are illustrated in **Figure 5.10 & 5.11** for day & night time respectively.

Table 5.6: Noise Levels along the Existing IR Track for Parallel Sections

Sr. No.	Monitoring Stations	L_{eq} Day (dB(A)) Train Passing by	L_{eq} Day (dB(A)) Without Train
1	Khurja	82.5	48
2	Gulhoti	80.4	52
3	Murshidpur	78.5	43
4	Khatoli	81.6	42
5	Jahangirpur	79.5	49
6	Sakhan Kalan	78.2	52

Sr. No.	Monitoring Stations	L_{eq} Day (dB(A)) Train Passing by	L_{eq} Day (dB(A)) Without Train
7	Sarsina	80.6	46
8	Baseda	78.4	54

Table 5.7: Noise Levels within the Villages along the Proposed Alignment

S.N.	Monitoring Stations	Zone & Type	Section	L_{eq} Day dB(A)	CPCB Standards- Day time dB(A)	L_{eq} Night dB(A)	CPCB Standards- Night Time dB(A)	Remarks
1	Nizampur (Khurja)	Residential Area-Village	Parallel	50.2	55	41.3	45	Within the CPCB limits
2	Village Sunhera, Buland Shahar	Mixed Use	Parallel	53.5	65	42.6	55	Within the CPCB limits
3	Gulhoti	Residential Area-Highly populated	Parallel	51.6	55	43.3	45	Within the CPCB limits
4	Murshidpur	Residential Area-Village	Detour	48.7	55	40.5	45	Within the CPCB limits
5	Anwarpur at NH-24	Near National Highway & Educational Institute	Detour	50.8	50	41.2	40	Slightly higher than CPCB limits
6	Panchali Khurd at NH-58	Residential Area-Village	Detour	48.5	55	40.2	45	Within the CPCB limits
7	Walidpur atNH-58	Village Near National Highway	Detour	51.3	55	41.5	45	Within the CPCB limits
8	Khatoli	Silence zone-near Temple	Parallel	55.4	50	44.4	40	Slightly higher than CPCB limits
9	Jahangirpur	Silence zone-near School	Parallel	50.1	50	40.7	40	Slightly higher than CPCB limits
10	Mirapur	Residential Area-Village	Detour	48.8	55	40.1	45	Within the CPCB limits
11	Sakhan Kalan	Residential Area-Highly populated	Parallel	50.7	55	41.3	45	Within the CPCB limits
12	Sarisna	Residential Area	Parallel	51.3	55	42.0	45	Within the CPCB limits
13	Baseda	Residential Area	Parallel	52.5	55	42.4	45	Within the CPCB limits

S.N.	Monitoring Stations	Zone & Type	Section	L_{eq} Day dB(A)	CPCB Standards-Day time dB(A)	L_{eq} Night dB(A)	CPCB Standards-Night Time dB(A)	Remarks
14	Nangal	Commercial Area	Parallel	53.0	65	44.7	45	Within the CPCB limits
15	Saharanpur	Silence zone - Near Temple Mixed Use Area	Parallel	56.6	50	47.5	40	Higher than CPCB limits

Source: Field Survey

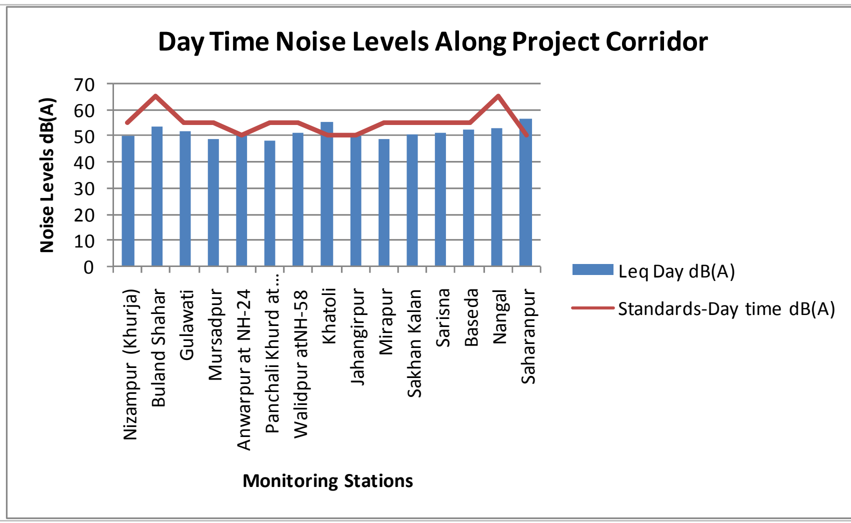


Figure 5.10: Day Time Noise Levels Recorded in villages Along the Project Corridor

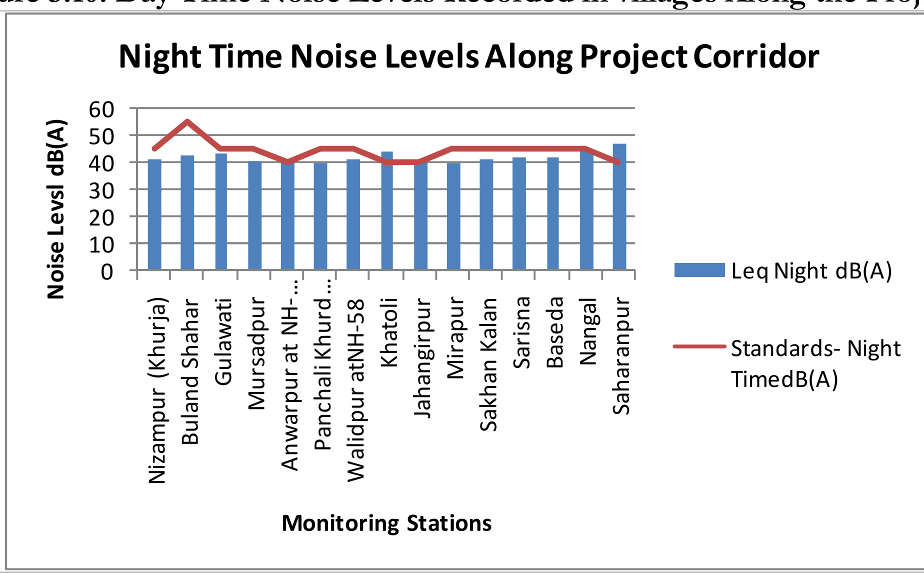


Figure 5.11: Night Time Noise Levels Recorded in villages Along the Project Corridor

Result and Discussions

Review of noise levels presented in **Table 5.6** indicates that noise levels are very high when train pass by as compared to prescribed standards by CPCB, i.e. NAAQS W.R.T. Noise, 2000. High noise levels are due to train movement only as the normal noise level are comparatively low and varies from 42-54 dB(A).

Review of noise levels presented in **Table 5.7** indicates that noise level is within the prescribed limit within the villages at most of the locations both during day and night time. Slightly higher level of noise is recorded at sensitive locations, i.e. Anwarpur near temple, Khatoli near temple, Jhangirpur near school and Saharnpur near temple. Higher noise level in these areas is due to the commercial activities and vehicular movement.

5.3.9 Vibration

Background Information

Vibration assessments are a key element of the environmental impact assessment process for mass transit projects. Vibration may lead to damage of cultural assets and other establishments near railway tracks and also may have impact on the human health.

Experience has shown that vibration is among the major concerns with regard to the effects of a railway project on the surrounding community.

Vibration is often associated with noise but is a problem in its own right. Notwithstanding health effects to the passengers it impacts the inmates of the buildings close to the track in the form of scare, sleeplessness and postural discomfiture. It also affects the buildings in the form of short and long term impacts.

Vibration can also be affecting the train drivers and operators including drivers of specialist vehicle used during the construction phase. Appropriate mitigation measures will vary but may include design considerations for vehicles and equipment, control of exposure times, proper maintenance, protective clothing and alterations to working practices. A detailed elaboration has been provided regarding the mitigation measures available.

Measurement

As discussed in the earlier sections, the proposed track runs in two different alignments.

I. One parallel to the existing track, which could involve,
   - Higher amplitude vibrations impacting the buildings now coming closer to railway vibrations (within critical distance) on the side of new track
   - Higher amplitude vibrations impacting all close buildings and human inmates due to instances of multiple trains running at same instance of time
   - Higher frequency of such multiple train running instances resulting to higher time of exposure

- Increased impact due to increased speeds of Freight Trains.
- Increased impact due to higher No of freight trains running closer

II. Detours from the existing track passing through areas of different land use:

On detours there are no existing tracks at the moment. And introduction of DFC tracks cause vibration. In addition there will be impact due to construction activity itself.

Finally there will be impacts due to DFC operations which will be in the form of

- Creation of a new Vibration environment along the detour effecting the building and inmates present within the critical distance of impact of vibrations
- Impacts due to trains running, at higher speeds / axle loads.

As part of the base line analysis of vibration levels, data was collected through measurement of vibration levels at several locations along parallel tracks as well as detour locations, covering all the possible scenarios mentioned above.

The data collected along with the patterns of Vibration propagation with distance, speed, axle load for single, dual and multiple train operations have been estimated. The same data has been used to predict impacts on sensitive locations along the entire corridor. The highest vibration values based on the 100km/hr speed of freight trains (containers or tankers) have been used for the prediction of impacts.

Standards on Vibration Measurements for Rail Projects

There are no specific standards for vibration levels in India. However there are number of international standards (as indicated below) for evaluating the potential impacts for building damage and also the human response.

- ISO Standards on vibration (ISO 2631/2- 1989, ISO 8041-1990, and ISO 4866-1990)
- JIS Z-8735 (Method of measurement for vibration levels) and JIS C-1510 (Standard for Vibration level meter).
- BS 6472
- DIN 4150

While each of the above standards has specific approach to the measurement and assessment of vibration impacts, considering the fact that the feasibility study for the project was carried out based on Japanese standards (JIS 8735 and JIS 1510) and DFC is also implementing same standards in the western corridor, the same standards have also been in the current study. The important features of JIS 8735 are:

- depend on one single parameter i.e. Lpeak as against multiple parameters such as (VDV and PPV)
- does not require further calculations after the collection of data,
- The standards suggest single parameter to assess the vibration impacts on buildings and the residents with one common parameter.

Considering the above, the above JIS Z 8735 have been following for measuring and prediction of vibration impacts of the project.

Methodology

The ambient vibration levels and railway vibration levels were measured as part of the base line surveys.

While railway vibrations were measured for various train types and speeds at varying distances, the ambient vibrations were measured on Sensitive Receptors

Measurement Instrument

As according to JIS C 1510, vibration meter 1220E manufactured by IMV Japan, was chosen for measuring vibration. The instrument provides vibration measurements in all the three axes and also measures velocity or acceleration parameters. The instrument also captures and stores values at predefined intervals and calculates maximum and minimum or percentile values. Specifications of the selected instrument are below:

Features	
●	Conforms to JIS C1510-1995.
●	Measures vibration pollution from factory, construction site and traffic
●	Calculates Vibration level Lv, Vibration acceleration level Lva, Max. value Lmax, Min value Lmin, Time rate vibration level (Lx : 5-value), Power averaged level (L_{eq}) in 3-direction and displays with selection

Frequency Range	1 - 80 Hz
Measuring Range	30 - 120 dB
Level Range	20 dB step, 2-range 30 -90dB, 50 -110dB
Linearity	75dB
Measured Item	Vibration level L_v, Vibration acceleration level L_{va}, Max. value L_{max}, Min value L_{min}, Time rate vibration level (L_x: 5-value),Power averaged level (L_{eq})
Measuring Time	1s,3s,5s,10s,1min,5min,10min,15min,30min,1h,8h,24h Manual (Max 199h59min59s)
Ambient Condition	Temperature Range: 10 -50^{0}C Humidity: 30 – 90% (not dew condensation)

Result and Discussion

Based on the approach formulated above, the vibration levels were measured at 8 locations along the existing IR track in the parallel section. Result of vibration recorded at all locations is presented in **Table 5.8.** Photographs of vibration level monitoring are given in **Figure 5.12.**

Table 5.8: Vibration Level along the IR Track in Parallel Section

Sr.No.	Monitoring Stations	Coordinates	Type of Train	Spped of Train (km/hr)	Passage duration (seconds)	Vibrations (Max) When Train Passes at 12.5 Meter from Track(dB)	Vibrations (Max) When Train Passes at 25 Meter from Track(dB)
1	Khurja	28°14'24.61"N & 77°49'33.57"E	Passenger	110	16	79.1	62.1
2	Gulhoti	28°35'27.03"N & 77°48'9.34"E	Freight	42	40	76.4	60.5
3	Murshidpur	28°38'57.15"N & 77°47'6.94"E	Freight	70	25	76.8	60.8
4	Khatoli	29°15'41.60"N & 77°44'3.25"E	Passenger	120	18	75.9	59.7
5	Jahangirpur	29°20'40.58"N & 77°43'19.49"E	Passenger	105	20	77.2	61.1
6	Sakhan Kalan	29°44'31.74"N & 77°39'9.74"E	Passenger	92	24	77.9	61.5
7	Sarsina	29°47'28.10"N & 77°38'12.64"E	Passenger	104	20	78.4	62.0
8	Baseda	29°48'39.06"N & 77°37'47.68"E	Freight	64	33	78.3	61.8

Figure 5.12: Photographs of Vibration Level Monitoring along the Existing IR Track for Parallel Sections

Vibration Monitoring at LC at Khurja

Vibration Monitoring at LC at Gulohti

	
Vibration Monitoring at LC at Mushidpur	Vibration Monitoring at LC at Khatauli
	
Vibration Monitoring at LC at Jhangirpur	Vibration Monitoring at LC at Sakhan Kalan
	
Vibration Monitoring at LC at Sarsina	Vibration Monitoring at LC at Baseda

Inferences:

As per the vibration monitoring study it is found that the vibration level varies from 75.9 to 79.1 dB at distance of 12.5 m from the track and 60.5 to 62.1 dB at distance of 25 m from track. Vibration will increase with addition of one more track of the DFCCIL parallel to existing track. In detour sections at present there is no impact due to vibration, after construction of DFCCIL track, vibration will be experienced in the area due to movement of trains of order of 60-62 dB at distance of 25 m. Impact of Vibration dissipateds with increase in distance. However detour sections crosses majorly through agriculture fields and no structures are present within the ROW.

5.3.10 Topography & Geomorphology

Entire stretch of section is flat plain land with not variable natural forms. Elevation level varies in the alignment from 198 amsl in Khurja to 280 amsl in Saharanpur.

The town of Khurja in Bulandshahar is situated on the right bank of the Kali River, a tributary of Ganga. The area represents a typically uniform plain ecosystem with a gradual slope from northwest to southeast. The general average slope of the area is about 0.29 m/km, i.e. gentle.

Meerut district also falls in the alluvial plain (gangetic plain) and is more or less flat with an average elevation of 224 meter above mean sea level and having a gentle southerly and south-westerly slope. However about 2 km north-east of the Meerut cantonment, a series of sand drives, trending NNW-SSE occur in an echelon pattern. These drives rise to a maximum height of 1m above the general

land surface. Kali River flows east of the area, which is traversed mostly by minor canals and their distributaries.

The Muzaffarnagar district and further (till Pilkhani) is occupied by Indo-Gangetic alluvim. Physiographically the area is flat terrain. However a little part in the extreme north-eastern area of the district is occupied by Siwalik hills, and falls in the zone of "Dissected Rolling Plain". The area slopes towards southwest with an average gradient of 1.5m/km. The general elevation of the alignment varies between 245 m to 260 m above mean sea level, the proposed alignment of the project is a part Ganga plain lying between the rocky Himalayan belt in the north and the southern hilly tract comprising Pre-Cambrian rocks. Flexing of the Indian lithosphere in response to the compressive forces due to collision, and thrust fold loading produced the Ganga Plain foreland basin. The basin is filled with recent alluival sediments which is at places more than 1,000 m, thick and an amalagam of sand, silt, clay in varying proportions. Project corridor from Khurja to Pilkhani is located in the younger alluvium of Ganga Basin and generally there is no significant variation in geology. Geology map of Uttar Pradesh is given in **Figure 5.13** below.

Figure 5.13 Geology Map of Uttar Pradesh

Source: Directorate of Geology and Mining, U. P.

5.3.11 Surface Water & Drainage

The project area from Khurja to Pilkhani is a part of the Ganges basin, which contains the largest river system on the subcontinent comprising the Rivers of Ganga, Yamuna and number of other rivers. The flow in the basin is largely contributed by the southwesterly monsoon winds from July to October, as well as on the flow from melting Himalayan snows in the hot season from April to June. Tropical cyclones originating between June and October in Bay of Bengal also contribute to water flows in the basin. The average annual rainfall varies from 760 mm at the western end of the basin to more than 2,290 mm at the eastern end.

District Saharanpur is drained by five major rivers, i.e. Yamuna, Solani, Hindon, Ratmau and Nagdev. All these river flows into either Ganges or Yamuna. Meerut district is drained by River Yamuna, Kali River, River Hindon and River Ganga. Kali and Hindon rivers are tributaries of River Yamuna. Muzaffar Nagar district is demarcated by river Ganga in the east and by river Yamuna in the west. In fact, the drainage pattern of the district is strictly governed by these two major rivers. Both the rivers in their respective course flow more or less north to south. Major tributary of Ganga is Solani river. Yamuna has the tributaries named Hindon, Krisni and Hari rivers and the Katna nala. Ghazaiabad & Hapur district are drained by rivers Ganga, Yamuna and the tributaries Kali, Chhaiya and Hindon. River Ganga forms a natural boundary between District Bulandshahr as well as Badaun and Amroha districts. District is drained by river Hindon, Bhuriya, East Kali Nadi, Chhoiya Channel, Mat branch of Upper Ganga Canal and two drainage lines known as the Patwai and Karon or Karwan.

The proposed alignment of DFC crosses perennial river Hindon and non-perennial Kali river only. The general slope of the area was noted to be from North West to South East with elevation ranging from 280 amsl at Saharanpur to 198 Khurja. Details of the irrigation canal/rivers crossing the proposed alignment and ponds along the alignment are listed in **Table 5.9** below.

Table 5.9: List of Water Bodies Crossing/Along the Project Alignment

Water body	Latitude	Longitude	Position
River			
Kali River	29 7.378N	77 41.351E	Crossing
Hindon River	29 54.059N	77 35.665E	Crossing
Ponds			
Pond	28 25.073N	77 50.392E	RHS
Pond	28 15.079N	77 50.441E	RHS
Pond	29 16.178N	77 44.209E	RHS
Pond, Bharatpur	29 47.219 N	77 38.234 E	LHS
Pond, Lakhnaur	29 53.619 N	77 35.984 E	RHS
Pond	29 55.917N	77 34.182E	LHS
Pond	29 58.338N	77 31.080E	LHS
Irrigation Canal			
Irrigation Canal	Crossing	29 44.430N	77 39.275E
Irrigation Canal	Crossing	29 58.648N	77 30.539E
Irrigation Canal, Rukanpur	Crossing	29 28.605N	77 39.024E
Irrigation Canal, Mandhera	Crossing	29 27.352N	77 39.475E
Irrigation Canal, Jhangirpur	Crossing	29 20.459N	77 43.345E
Irrigation Canal, Jhangirpur	Crossing	29 19.835N	77 43.507E
Irrigation Canal, Bhainsi	Crossing	29 18.174N	77 44.002E
Irrigation Canal, Shekhpura	Crossing Crossing Parallel	29 15.625N 29 15.646N 29 15.525N	77 44.042E 77 44.090E 77 44.067E
Irrigation Canal, Bhaingi	Crossing	29 13.991N	77 43.687E
Irrigation Canal, Sakoti	Parallel	29 10.473N	77 42.911E
Irrigation Canal, Sakoti		29 8.724N	77 42.651E
Irrigation Canal, Sakoti,	Crossing	29 8.505N	77 42.525E
Irrigation Canal, Mataur	Crossing	29 7.661N	77 41.775E
Drain & Canal	Crossing	29 7.368N	77 41.365E
Irrigation Canal, Khirwa Nauabad	Crossing	29 4.379N	77 39.039E
Irrigation Canal, Pohali	Crossing	29 4.006N	77 38.725E
Irrigation Canal, Pepla	Crossing	28 59.492N	77 37.259E
Irrigation Canal, Ghat	Crossing	28 56.972N	77 36.868E
Irrigation Canal, Bahadurpur	Crossing	28 52.311N	77 38.074E
Irrigation Canal, Hapur Hulaothi Road--Branch Of Upper Ganga Canal	Crossing	28 38.912N	77 47.023E
Kadirabad Nallah Murshadpur	Crossing	28 38.286N	77 47.307E
Irrigation Canal, Gulohti	Crossing	28 35.528N	77 48.170E
Irrigation Canal, Kurval Banaras	Crossing	28 25.885N	77 49.984E
Irrigation Canal, Aimanpur	Crossing	28 20.223N	77 51.729E

Water body	Latitude	Longitude	Position
Irrigation Canal, Maman Kalan- Upper Ganga Canal	Crossing	28 19.486N	77 51.497E
Irrigation Canal, Machhipur	Crossing	28 19.364N	77 51.573E
Irrigation Canal, Khurja	Crossing	28 16.347N	77 50.972E
Irrigation Canal, Khurja City railway Station	Crossing	28 15.375N	77 50.711E
Irrigation Canal, Khurja City railway Station	Crossing	28 15.005N	77 50.278E
Irrigation Canal, Nizampur	Crossing	28 14.874N	77 50.111E
Irrigation Canal, Budhena	Crossing	28 13.967N	77 48.976E

5.3.12 Ground Water

Groundwater is an important resource for meeting the water requirements for irrigation, domestic and industrial uses. It is an annually replenish able resource but its availability is non-uniform in space and time. The project area is underlined by thick pile of quaternary sediments which comprises sands of various grades, clays and kankar. All the districts through which proposed alignment passes form part of Ganga alluvial plain. Tectonically the alluvial plain of Ganga basin represents a structural trough (Fore deep) or down wrap of earth crust. The Original of which is correlated to plate tectonic and Himalayan uplift. The area is underlain by quaternary sediments, there thickness increase from west to east and also towards north east. Lithologically the alluvial sediments comprise of sand, silt, clay and kankars in varying proportions.

The depth of ground water varied from 10-40 metre from the ground level as per the ground water survey report by Central Ground Water Authority (CGWA) conducted for different districts. Status of ground water in the districts through which alignment crosses is given in **Table 5.10** below. The alignment passes through only one Semi-critical block of Hapur in Hapur District.

Table 5.10: Ground Water Status of Districts through Which Alignment Traverse

District	Category of district	Nos. of blocks over exploited	Nos. of blocks critical	Nos. of blocks semi-critical	Nos. of blocks safe	Remarks
Ghaziabad & Hapur	Ghaziabd-safe & Hapur-Semi critical	0	0	4	4	Ground water extraction from semi-critical blocks should not be used for construction purpose
Bulandshahr	Over exploited	8	4	3	1	Ground water should not be used for construction purpose
Meerut	Safe	0	1 (Kharkha-uda)	3	8	Ground water extraction from critical & semi-critical blocks should not be used for construction purpose

Muzaffar Nagar	Critical	3	1	8	2	Ground water should not be used for construction purpose
Saharanpur	Semi-critical	2 (Gangoh & Nakur)	2 (Nangal & Sarsawa)	2	5	Ground water should not be used for construction purpose

Source: CGWB

5.3.13 Water Quality

In order to assess the base line water quality of water bodies, samples were collected from 4 irrigation canals, 1 pond and 15 hand pumps. Locations of surface and ground water monitoring are given in **Table 5.10.** Ground water samples were collected & tested from February to March, 2015. Photographs of surface water and ground water quality monitoring are given in **Figure 5.14 & 5.15**

Table 5.10: Locations of Surface and Ground Water Monitoring Locations

Sr. No.	Monitoring Location	Source of Water
Surface Water		
1.	Village Sunhera, Bulandshahr	Irrigation Canal
2.	Gulhoti	Irrigation Canal
3.	Khatauli	Irrigation Canal
4.	Panchli Khurd	Pond
5.	Sarsina	Irrigation Canal
Ground Water		
1.	Village Nizampura	Handpump
2.	Village Sunhera, Bulandshahr	Handpump
3.	Gulhoti	Handpump
4.	Murshidpur	Handpump
5.	Anwarpur	Handpump
6.	Panchli Khurd	Handpump
7.	Walidpur	Handpump
8.	Khatoli	Handpump
9.	Jahangirpur	Handpump
10.	Mirapur	Handpump
11.	Sarsina	Handpump
12.	Baseda	Handpump
13.	Sakhan Kalan	Handpump
14.	Nangal	Handpump
15.	Saharanpur	Handpump

Figure 5.14: Photographs Showing Surface Water Quality Monitoring

	
Surface Water Quality Monitoring at Bulandshahr	**Surface Water Quality Monitoring at Gulohti**
	
Surface Water Quality Monitoring at Panchli Khurd	**Surface Water Quality Monitoring at Khatauli**

Surface Water Quality Monitoring at Sarsina

Figure 5.15: Photographs Showing Ground Water Quality Monitoring


Ground Water Quality Monitoring at Village Nizamura	Ground Water Quality Monitoring at Village Sunhera, Bulandshahr
	
Ground Water Quality Monitoring at Gulohti	Ground Water Quality Monitoring at Murshidpur
	
Ground Water Quality Monitoring at Khatauli	Ground Water Quality Monitoring at Jhangirpur

5.3.14 Results and Discussion

Results of surface and ground water quality is given in **Table 5.11 and 5.12 a & b.** Ground Water Quality results are compared to IS:10500 to comment upon the quality of the ground water samples collected from villages along the project corridor. Ground water is found to be potable and within the permissible limits as per IS:10500. Surface water quality results are compared with the Criteria of CPCB for "Classification of Surface Water Bodies". As per criteria pH of the water bodies at village Sunhera, Gulhoti, Khatoli & Panchli Khurd is in range of 6.5-8.5 and qualifies for class A. But pH value of water body at Sarsina does not lies within this range and qualifies for class C. Coliform count in all the water bodies is more than 50 which is critera for Class A water body but coliform count is less than 500 in all the sampled water bodies and the water bodiesfalls under Class B. DO levels of all the water bodies are below 5 thus water bodies for this parameter neither qualifies for class A nor B. However values of DO is higher than 4 in all water bodies except at Panchli Khurd which is 1.2 mg/l. Water bodies with DO>4 mg/l falls under category C. BOD levels in all the water bodies is higher than 3 and thus none of the water body classifies for category A, B & C. Thus we can conclude all the water bodies falls under category D, i.e. suitable for propogation of wildlife and fisheries.

Table 5.11: Surface Water Quality Results (February to March, 2015)

Sr. No.	Parameters	Unit	Test Methods	Location				
				Village Sunhera, Buland shahr (Canal)	Gulohti (Canal)	Khatoli (Gang Nahar)	Panchli Khurd (Pond)	Sarsina (Canal)
1	pH	-	APHA-4500	7.04	7.38	7.45	7.44	8.59
2	Colour	Hazen Unit	APHA-2120B	Colourless	Colourless	Colourless	12	Colourless
3	Taste	-	APHA-2160C	Agreeable	Agreeable	Agreeable	-	Agreeable
4	Conductivity	µmhos/cm	APHA-2510	198	209	209	1562	176
5	Turbidity	NTU	APHA-2030B	2	2	2	7	2
6	Total Dissolved Solids	mg/l	APHA-2540B	152	163	160	1187	134
7	Total Alkalinity	mg/l	APHA-2320B	40	50	60	510	30
8	Total Hardness as $CaCO_3$	mg/l	APHA-2340C	70	80	80	340	50
9	Calcium as Ca	mg/l	APHA-4500B	20	16	20	64	12
10	Magnesium as Mg	mg/l	APHA-4500B	4.9	9.7	7.3	43.7	4.9
11	Chlorides as Cl	mg/l	APHA-4500B	8	10	12	112	6
12	Nitrate as NO_3	mg/l	APHA-4500	5.2	5.8	4.8	5.6	4.8
13	Sulphate as SO_4	mg/l	APHA-4500E	22	23	22	24	18
14	Fluorides as F	mg/l	APHA-4500D	0.46	0.48	0.48	0.96	0.52
15	Sodium as Na	mg/l	APHA-3500B	18	20	16	324	18
16	Potassium as K	mg/l	APHA-3500B	1.6	1.8	1.2	32.6	1.5
17	Iron as Fe	mg/l	APHA-3111B	0.018	0.020	0.014	0.18	0.024
18	Copper as Cu	mg/l	APHA-3111B	<0.02	<0.02	<0.02	<0.02	<0.02
19	Lead (as Pb)	mg/l	APHA-3111B	<0.01	<0.01	<0.01	<0.01	<0.01
20	Manganese as Mn	mg/l	APHA-3111B	<0.05	<0.05	<0.05	<0.05	<0.05
21	Zinc (as Zn)	mg/l	APHA-3111B	0.28	0.26	0.14	0.48	0.22
22	Chromium as Cr^{6+}	mg/l	APHA-3111B	<0.05	<0.05	<0.05	<0.05	<0.05
23	Cadmium as Cd	mg/l	APHA-3111B	<0.001	<0.001	<0.001	<0.001	<0.001
24	Mercury as Hg	mg/l	APHA-3111B	<0.001	<0.001	<0.001	<0.001	<0.001
25	Arsenic as As	mg/l	APHA-3111B	<0.001	<0.001	<0.001	<0.001	<0.001
26	Dissolved Oxygen	mg/l	APHA-4500C	4.9	4.7	4.8	1.2	4.8
27	COD	mg/l	APHA-5220B	14	12	12	74	18
28	BOD	mg/l	APHA-5210B	3.6	3.5	3.2	14.8	2.2
29	Oil & Grease	mg/l	APHA-5520D	Nil	Nil	Nil	Nil	Nil
30	Total coliform	mg/l	APHA-9230B	58	52	54	186	86

Table 5.12 a: Ground Water Quality Results (February to March, 2015)

Sr. No.	Parameters	Unit	Test Methods	Maximum Permissible Limits as per IS:10500	Locations						
					Nizampur (Khurja)	Buland Shahar	Gulohti	Murshidpur	Anwarpur at NH-24	Panchali Khurd at NH-58	Walidpur at NH-58
1	pH	-	APHA-4500	6.5-8.5	7.59	7.68	7.63	7.46	7.3	7.53	7.69
2	Colour	Hazen Unit	APHA-2120B	15	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless
3	Taste	-	APHA-2160C	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Conductivity	µmhos/cm	APHA-2510	-	1309	670	693	890	1518	704	572
5	Turbidity	NTU	APHA-2030B	5	2	2	2	2	2	2	2
6	Total Dissolved Solids	mg/l	APHA-2540B	2000	976	508	520	672	1136	549	444
7	Total Alkalinity	mg/l	APHA-2320B	600	410	180	300	310	540	230	190
8	Total Hardness as $CaCO_3$	mg/l	APHA-2340C	600	310	240	220	270	300	240	230
9	Calcium as Ca	mg/l	APHA-4500B	200	44	48	48	60	56	48	68
10	Magnesium as Mg	mg/l	APHA-4500B	30	48.6	29.2	24.3	29.2	38.9	31.6	14.6
11	Chlorides as Cl	mg/l	APHA-4500B	1000	52	18	8	30	68	12	14
12	Nitrate as NO_3	mg/l	APHA-4500	45	8.6	6.2	7.2	7.6	11.5	7.2	7.2
13	Sulphate as SO_4	mg/l	APHA-4500E	400	72	40	28	18	74	22	28
14	Fluorides as F	mg/l	APHA-4500D	1.5	0.74	0.62	0.58	0.54	0.54	0.48	0.52
15	Sodium as Na	mg/l	APHA-3500B	-	58	36	32	40	52	56	40
16	Potassium as K	mg/l	APHA-3500B	-	4.6	4.2	1.6	2.2	3.6	8.2	3.6
17	Iron as Fe	mg/l	APHA-3111B	0.3	0.022	0.024	0.18	0.026	0.034	0.026	0.28
18	Copper as Cu	mg/l	APHA-3111B	1.5	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
19	Lead (as Pb)	mg/l	APHA-3111B	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
20	Manganese as Mn	mg/l	APHA-3111B	0.3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Zinc (as Zn)	mg/l	APHA-3111B	15	0.62	0.46	0.44	0.72	0.86	0.54	0.58
22	Chromium as Cr^{6+}	mg/l	APHA-3111B	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
23	Cadmium as Cd	mg/l	APHA-3111B	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
24	Mercury as Hg	mg/l	APHA-3111B	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
25	Arsenic as As	mg/l	APHA-3111B	0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
26	COD	mg/l	APHA-5220B	-	18	14	12	18	20	14	10

Table 5.12 b: Ground Water Quality Results (February to March, 2015)

Sr. No.	Parameters	Unit	Test Methods	Maximum Permissible Limits as per IS:10500	Locations							
					Khatoli	Jahangirpur	Mirapur	Sarsina	Baseda	Sakhan Kalan	Bhat Khedi Nangal	Saharanpur
1	pH	-	APHA-4500	6.5-8.5	7.57	7.69	7.52	7.3	7.25	7.89	7.72	7.62
2	Colour	Hazen Unit	APHA-2120B	15	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless	Colourless
3	Taste	-	APHA-2160C	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Conductivity	mhos/cm	APHA-2510	-	539	539	550	1276	946	352	693	1353
5	Turbidity	NTU	APHA-2030B	5	2	2	2	2	2	2	2	2
6	Total Dissolved Solids	mg/l	APHA-2540B	2000	423	422	428	962	728	276	528	1028
7	Total Alkalinity	mg/l	APHA-2320B	600	180	170	190	340	290	110	260	480
8	Total Hardness as $CaCO_3$	mg/l	APHA-2340C	600	220	210	230	490	370	140	240	340
9	Calcium as Ca	mg/l	APHA-4500B	200	60	40	56	140	92	32	68	76
10	Magnesium as Mg	mg/l	APHA-4500B	30	17	26.7	21.9	34	34	14.6	17	36.5
11	Chlorides as Cl	mg/l	APHA-4500B	1000	12	10	8	96	32	8	16	42
12	Nitrate as NO_3	mg/l	APHA-4500	45	6.8	7.8	7.4	12.5	11.2	7.9	10.5	11.8
13	Sulphate as SO_4	mg/l	APHA-4500E	400	32	24	16	38	90	23	7	116
14	Fluorides as F	mg/l	APHA-4500D	1.5	0.94	0.58	0.52	0.56	0.48	0.58	0.72	0.56
15	Sodium as Na	mg/l	APHA-3500B	-	32	28	24	42	74	22	34	58
16	Potassium as K	mg/l	APHA-3500B	-	3.2	2.2	3.4	4.1	11.8	1.7	2.2	4.9
17	Iron as Fe	mg/l	APHA-3111B	0.3	0.026	0.018	0.02	0.036	0.032	0.018	0.28	0.12
18	Copper as Cu	mg/l	APHA-3111B	1.5	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
19	Lead (as Pb)	mg/l	APHA-3111B	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
20	Manganese as Mn	mg/l	APHA-3111B	0.3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Zinc (as Zn)	mg/l	APHA-3111B	15	0.52	0.46	0.52	0.88	0.76	0.44	0.56	0.82
22	Chromium as Cr^{6+}	mg/l	APHA-3111B	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
23	Cadmium as Cd	mg/l	APHA-3111B	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
24	Mercury as Hg	mg/l	APHA-3111B	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
25	Arsenic as As	mg/l	APHA-3111B	0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
26	COD	mg/l	APHA-5220B	-	10	8	7	10	8	8	6	14

5.3.15 Soil Quality

Since the project is situated in the younger alluvium of Ganga Basin, the soil is prone to erosion. The entire alluvial plain along the alignment is in western tract of UP comprising well developed irrigation system.

However, being alluvial the land is very fertile and cultivation of rice, wheat, millets, gram, barley and sugar cane, etc are the chief crops of the region.

In order to establish the base line soil profile, samples were collected from fifteen (15) locations in villages along the project corridor from February to March, 2015. List of soil quality monitoring location is given in **Table 5.13** below. Photographs of Soil Quality Monitoring are given in **Figure 5.16.**

Table 5.13: Location of Soil Quality Monitoring Stations

Sample Code	Sampling Locations	Location Remark	Land Mark	District
S-1	Nizampur(Khurja)	Agril. Field	Railway Track	Bulandshahr
S-2	Bulandshahr	Agril. Field	Highway	Bulandshahr
S-3	Gulawathi	Agril. Field	Railway Track	Bulandshahr
S-4	Murshadpur	Agril. Field	Railway Track	Ghaziabad-Hapur
S-5	Anwarpur at NH-24	Agril. Field	NH-24	Ghaziabad
S-6	Panchali Khurd at NH-58	Agril. Field	NH-58	Meerut
S-7	Walidpur at NH-58	Agril. Field	NH-58	Meerut
S-8	Khatauli	Agril. Field	NH-58	Muzaffarnagar
S-9	Jahangirpur	Agril. Field	Railway Track	Muzaffarnagar
S-10	Mirapur	Agril. Field	Mirapur Village	Muzaffarnagar
S-11	Sakhan Kalan	Agril. Field	Railway Track	Saharanpur
S-12	Sarsina	Agril. Field	Railway Track	Saharanpur
S-13	Baseda	Agril. Field	Baseda Village	Saharanpur
S-14	Bhat Khedi Nangal	Agril. Field	Bhat Khedi Nangal Village	Saharanpur
S-15	Saharanpur	Agril. Field	Railway Track	Saharanpur

Figure 5.16: Photographs of Soil Quality Monitoring

Soil Quality Monitoring at Village Nizamura

Soil Quality Monitoring at Village Sunhera, Bulandshahr

Soil Quality Monitoring at Gulohti

Soil Quality Monitoring at Murshidpur

Soil Quality Monitoring at Khatauli

Soil Quality Monitoring at Jhangirpur

Soil Quality Monitoring at Pachli Khurd

Soil Quality Monitoring at Walidpur

5.3.16 Result and Discussion

Soil Quality analysis results are given in Table 5.14 & 5.15 below. Analysis of soil quality is given below. According to Soil Survey Manual (IARI, 1970), the soils are grouped under different soil reaction classes viz; extremely acidic (pH<4.5), very strongly acidic (pH 4.5-5.0), strongly acidic (pH 5.1-5.5), moderately acidic (pH 5.6-6.0), slightly acidic (pH 6.1-6.5), neutral (pH 6.6-7.3), slightly alkaline (pH 7.4-7.8), moderately alkaline (pH 7.9-8.4), strongly alkaline (pH 8.5-9.0).The soils are rated as low (below 0.50 %), medium (0.50-0.75 %) and high (above 0.75 %) in case of organic carbon, low (<280-kg/ha-1), medium (280 to 560-kg/ha-1) and high (>560-kg/ha-1) in case of available Nitrogen, low (<10-kg/ha-1), medium (10 to 25-kg/ha-1) and high (>25-kg/ha-1) for available Phosphorus, low (<108-kg/ha-1), medium (108 to 280-kg/ha-1) and high (>280-kg/ha-1) for available Potassium and low (<10-mg/kg-1), medium (10-20-mg/kg-1) and high(>20-mg/kg-1) for available Sulphur (Singh et. al. 2004, Mehta et. al.1988). Critical limits of Fe, Mn, Zn, Cu and B, which separate deficient from non-deficient soils followed in India, are >4.5, >2.0,< 0.5,< 0.2 and <0.5-mg/kg-1 respectively. (Follet & Lindsay-1970 and Berger & Truog-1940).

As per the soil quality analysis study it is found that soil in the study area is clay loamy in texture. Soil color varies and are of grey, light brown, dark grey, light grey and brown color. Soil sampling results shows that soils are alkaline in nature in study area. High alkalinity is found in the Nizampur (Khurja), Bulandshahr, Khatauli, Jahangirpur, Sarsina, Sakhan Kalan and Bhat Khedi Nangal. Organic carbon content in the soil is low and varies from 0.38-0.56%. Available Nitrogen content in soils is also low, i.e. <280 kg/ha. Available phosphorus content in all the soil samples is high, i.e. >25 kg/ha. Potassium levels in the soil is moderate, i.e. in range of 108 & 280 kg/ha. Soils are moderately fertile of the area.

Table 5.14: Soil Analysis Result (February to March, 2015)

Sr. No.	Parameters		Unit	Nizampur (Khurja)	Buland shahar	Gulawthi	Murshadpur	Khatauli	Jahangirpur
1	pH		-	9.97	8.42	7.72	7.59	8.71	8.9
2	Electrical Conductivity		µmhos/cm	165	110	88	77	99	88
3	Colour		-	Grey	Grey	Light Grey	Grey	Grey	Grey
4	Bulk Density		gm/cm3	1.3	1.33	1.44	1.17	1.33	1.32
5	Water Holding Capacity		%	32	33	34	30	33	31
6	Moisture		%	0.86	0.94	0.76	0.64	0.88	0.78
7	Porosity		%	17	18	16	17	18	20
8	Permeability		cm/hr	2.8	3	2.6	3.2	3.5	3.8
9	Cation Exchange Capacity		-	22	20	20	21	22	21
10	Texture	Sand(>0.2-mm Dia)	%	32	33	32	33	36	35
		Silt(0.02 to 0.2-mm Dia)	%	27	28	26	24	26	24
		Clay(<0.002-mm Dia)	%	41	39	42	43	38	41
		Type	-	Clay Loam	Clay Loam	Clay Loam	Clay Loam	Clay Loam	Clay Loam
11	Organic Carbon		%	0.48	0.56	0.4	0.38	0.44	0.43
12	Available Nitrogen as N		kg/ha	146	138	154	138	166	172
13	Available Phosphorus as P		kg/ha	44.6	42.8	46.2	40.4	42.4	42.4
14	Available Potassium as K		kg/ha	194	210	186	178	164	176
15	Iron as Fe		mg/kg	1.12	1.84	1.68	1.54	1.76	1.48
16	Zinc as Zn		mg/kg	68.6	74.4	76.6	58.8	74.4	74.8
17	Organic Matter		%	1.17	0.97	0.85	0.9	0.95	1.06

Table 5.15: Soil Analysis Result (February-March, 2015)

Sr. No.	Parameters	Unit	Mirapur	Sarsina	Baseda	Sakhan Kalan	Saharanpur	Bhat Khedi Nangal	Anwarpur at NH-24	Panchali Khurd at NH-58	Walidpur at NH-58
1	pH	-	7.64	8.43	7.77	8.35	7.33	8.12	7.12	8.09	7.64
2	Electrical Conductivity	µmhos/cm	264	198	118	66	99	66	44	55	88
3	Colour	-	Light Brown	Grey	Dark Grey	Light Grey	Grey	Grey	Brown	Light Brown	Dark Grey
4	Bulk Density	gm/cm3	1.42	1.24	1.32	1.36	1.32	1.28	1.35	1.4	1.35
5	Water Holding Capacity	%	34	30	32	33	32	31	33	34	34
6	Moisture	%	0.62	0.58	0.76	0.74	0.82	0.56	0.64	0.86	0.72
7	Porosity	%	19	18	17	18	16	15	20	22	19
8	Permeability	cm/hr	3.4	3.3	2.9	3.8	3.2	2.8	3.6	3.9	3.5
9	Cation Exchange Capacity	-	20	22	24	24	22	20	24	25	23

Sr. No.	Parameters		Unit	Mirapur	Sarsina	Baseda	Sakhan Kalan	Saharanpur	Bhat Khedi Nangal	Anwarpur at NH-24	Panchali Khurd at NH-58	Walidpur at NH-58
10	Texture	Sand(>0.2-mm Dia)	%	34	35	32	32	30	34	33	31	30
		Silt(0.02 to 0.2-mm Dia)	%	25	23	28	28	29	27	28	29	31
		Clay(<0.002-mm Dia)	%	41	42	40	40	41	39	39	40	39
		Type	-	Clay Loam	Clay Loam	Clay Loam	Clay Loam	Clay Loam	Clay Loam	Clay Loam	Clay Loam	Clay Loam
11	Organic Carbon		%	0.49	0.46	0.42	0.42	0.43	0.4	0.37	0.4	0.44
12	Available Nitrogen as N		kg/ha	206	194	178	166	179	169	158	172	188
13	Available Phosphorus as P		kg/ha	49.6	45.5	40.4	39.6	40.4	41.6	37.6	42.4	42.8
14	Available Potassium as K		kg/ha	198	182	168	182	174	168	164	176	179
15	Iron as Fe		mg/kg	1.82	1.56	1.88	1.36	1.22	1.44	1.54	1.36	1.28
16	Zinc as Zn		mg/kg	68.4	64.5	84.4	52.8	59.6	44.9	48.4	52.8	49.5
17	Organic Matter		%	0.95	0.83	0.89	0.86	1.1	0.83	0.98	0.84	0.93

5.4 LAND USE

The study area lies under the Gangetic Plain is flat and mostly featureless. The Ganges and its tributaries have washed down silt and soils. These have formed rich beds of alluvium, up to 600 metres deep. The elevation of the plain gradually decreases from 276 metres in the northwest at Saharanpur to 201 metre in the west at Khurja.

Study area is a part of catchment of Yamuna and Ganga Rivers and the alluvial soils found are extremely fertile. There are few areas where the salt content in the soil is too high for successful cropping. Soils in the shivalik tend to be thin, stony, easily drained, and with much lower fertility.

The terrain of the proposed alignment passes through plain terrain. The proposed project is located in plain terrain. Land use pattern for the rest of the rail line is predominantly agricultural barring few built up areas in the towns & villages. There is no existence of reserved forest along the project route, however reserved forest exists within 5 Km. Also 109 ha approx. of protected forest land in the Bulandshahr district will be diverted for development of corridor. Land use classification of the core and buffer zone is given in **Table 5.16** below.

Table 5.16: Land Use Classification of Core & Buffer Zone

Land Use Categories	Study Area (sq km)	
	Buffer Zone (10 km radius)	Core Zone (100 m radius)
Agriculture	1696.0	27.5
Forest	0.5	0.12
Water Bodies	14.4	0.3
Vegetation	15.9	0.78
Habitation	248.7	7.34
Open Land	227.5	7.94
Waste Land	4.0	0.12
Total Area	2207.0	44.1

Source: Landuse Mapping

5.5 ECOLOGICAL RESOURCES

Flora and fauna are indicators of the environment. They respond not only to one environmental factor but also to an interacting group of factors. These communities influence and react sensitively to change in the balance of environmental stresses. Depletion of biodiversity is mainly due to intense anthropogenic pressure owing to "Population Explosion" mainly for expansion of agriculture, over exploitation of forests for day to day needs, over grazing and illicit felling, shifting cultivation, development activities like, irrigation, construction of hydro-electric dams, road construction including mining activities- all leading to dysgenic selection. Rationale use of the resources is therefore, quite important in the management of biodiversity, the habitat, species and gene pools prevalent in an area, because once it is lost, it becomes an uphill task to reverse the process. Therefore, a detailed knowledge of the diversity of the area definitely helps in managing the area properly following suitable practices. The study was conducted in the project area to assess all possible consequences on the biological environment.

Floral and faunal surveys conducted for assessing the biological diversity and its status over a period of time forms an integral part of Impact Assessment Techniques. The present study is highlighting the various issues pertaining to floristic diversity and the faunal wealth including ethno-botany and silvicultural issues in the Dedicated Freight Corridor alignment and also the area beyond the alignment. Accordingly, for Environmental Impact Assessment (EIA) studies, the total area has been sub-divided into the following areas:

- Dedicated Fright Corridor alignment
- About 5km surrounding area of DFC
- Natural vegetation in the study area.
- Forest area (Protected/Reserved forest)
- Rivers in vicinity

Site Selection Criteria:

Sampling locations were selected for terrestrial eco-system, with due consideration to the following points.

a) Major affected area
b) Natural vegetation in the study area.
c) National Parks, Sanctuaries, Reserve / Protected Forest in the study area.
d) Natural Water Bodies in the study area

On sight survey & visual examination of terrestrial flora & fauna have been made in the entire area in the vicinity of proposed DFC Project. Aquatic Study carried out at river Hindon.

5.5.1 Objectives of Ecology Study

The biological study of the area has been conducted in order to understand the ecological status of the existing natural environment and fauna to generate baseline information and evaluate the probable impacts on the biological environment. Objectives of study are given below:

- To make an inventory/checklist of plants & fauna found in the study area.
- To analyze the status of flora and fauna within core & buffer zone
- To assess impacts of the DFC project on flora and fauna

5.5.2 Flora Study

5.5.2.1 Methodology of Flora Study

A nested quadrate technique was used for sampling the vegetation. The size and number of quadrates needed were determined using the species area curve (Mishra, 1968) and the running mean method (Kershaw, 1973). Summarization of previously used methods and recommendations led to the use of more than often (10x10m) quadrates laid out for sampling the tree stratum and 1x1m quadrates for herbs, grasses and seedlings of tree species less than 1.3cm dbh (diameter at breast height) at different altitudinal gradients using GPS. However, for examining the shrub species 3x3m sample plots were laid out. The enumeration of the vegetation was done by measuring dbh individually in case of woody vegetation, and collar diameter in case of herbs and grasses using the tree caliper and electronic digital caliper. In case of grasses and sedges, each erect shoot is considered to a plant tiller and the enumeration was done by laying 1m x 1m quadrates at random, further subdivided into 10 x 10 cm segments. Four such segments selected at random were analyzed from each quadrate by counting the tillers individually as per the method used was that of Singh and Yadava (1974). Total 20 quadrates were selected for sampling trees and 20 quadrates for sampling grasses and sedges. The vegetation data collected was analyzed for identification of the species and its usage. This helped to identify the existing floral bio-diversity of the area.

5.5.2.2 Flora of the Project Area

General survey of flora has been carried out district wise. On the basis of Survey and secondary data collected from forest office a large variety of Trees, herbs and shrubs found suited to climatic condition. The structure and type of vegetation depends on climatic conditions and physiographic as well as requirements of the local inhabitants of an area. The vegetation in the study area is deciduous type in nature. Mainly three types of forests were found in the study area in a mosaic of small patches which are the remnants of the past forest cover in the area

Tropical moist deciduous forests: These forests are found in the moist region of terai. These types of forest patches were few and are observed to be present near the riparian zones of the rivers in the buffer zone only. They grow in regions that record 100 to 150 cm of rainfall annually; have an average temperature between 26˚-37 ˚c and have considerable degree of humidity.

Tropical dry deciduous forests: These forests are found in all parts of the plains, and usually in central eastern and western regions. The trees are mostly deciduous. Since sunlight reaches the ground in abundance, shrubs and grasses also grow here.

Tropical thorny forests: These are mostly found in western parts of the project distance. Such forests are confined to the areas with low annual rainfall (50-70 cms), mean annual temperature between 25˚c to 37˚c and low humidity (less than 47%).

Plantations: Plantations were seen mainly of the polar type- eucalyptus, mango, teak etc. The plantations were observed to be done mainly by the forest department in forest areas (protected forests area) and by public (in open land).

5.5.2.3 Brief Description of Flora in the Study Area

Trees in the study area are mostly deciduous in nature. Since sunlight reaches the ground in abundance, shrubs and grasses also grow here. Important trees are Sal, Palas, Amaltas, Bel, Anjeer etc. Neem, Peepal, Sheesham, Mango, Jamun, Babool, Imli (Tamarind) etc. grows along riverbanks and in other moist regions. Flora of study area on the basis of general survey is listed in **Table 5.16.**

Table 5.16: List of General Flora of Study Area

Plant Species	Vernacular Name	Enthnobotanical Values
Anisomeles ovata	Jangali Tulsi	Medicinal
Achyranthes aspera	Apmarg	Drugs, Medicinal
Azadirachta indica	Neem	Medical, Timber, Fuel
Acacia nilotica	Kikar	Timber, Fuel
Acacia leucophloea	Babul	Timber, Fuel
Albizzia lebbek	Siras	Timber, Fuel
Acacia catechu	Khair	Medical, Timber, Kattha
Aegle marmelos	Bel	Food, Timber, Mythological
Bauhinia variegate	Kachnar	Ornamental
Butea monosperma	Palash	
Cassia fistula	Amaltas	Aesthetic, Fuel
Calotropis procera	Aak	Medicinal
Cynodon dactylon	Dub	Fodder
Calotropis procera	Akman	
Cuscuta reflexa	Amarbel	Medicinal

Plant Species	Vernacular Name	Enthnobotanical Values
Dalbergia sissoo	Shisham	Timber, Fuel
Desmostachya bipinnata	Dab	Huts
Delonix regia	Gulmohar	Aesthetic, Recreational
Eucalyptus hybrid	Safeda	Timber, Fuel
Emblica officinalis	Amla	Mythological, Fuel Timber,
Erianthus munja	Munj	Huts
Ficus religiosa	Papal	Mythological, Timber
Ficus benghalensis	Bargad	Timber, Fuel
Holoptelea intgrifolia	Papri	Timber, Medicinal
Mimosa pudica	Chiumui	Aesthetic
Mangifera indica	Aam	Food, Timber, Fuel
Madhuca indica	Mahua	Recreational, Medicinal
Moringa oleifera	Sahijan	Food, Fuel, Medicinal
Nerium indica	Kaner	Aesthetic, Recreational
Opuntia dillenii	Nagphani	Medicinal
Polyalthia longifolia	Ashok	Aesthetic, Recreational
Prosopis julifera	Kabuli kikar	Timber, Fuel
Phoenix dactylifers	Khajur	Food, MFP (Fan)
Populus sp.	Poplar	Timber
Pongamia glabra	Karanj	Medicinal
Ocimum gratissimum	Ram Tulsi	
Sathura matel	Datura	Poison, Medicinal
Saccharum spontaneum	Kans	Huts
Syzygium cumini	Jamun	Food, Timber
Tarminalia arjuna	Arjuna	Aesthetic, Recreational
Teminalia belerica	Baheda	Medicinal, Timber
Tribulus terrestris	Gokharu	Medicinal
Tactona grandis	Teak	
Zizyphus numularia	Jahrberi	Food, Fodder

All the plant species which are used by the people for various purposes are also distributed in other parts of the state are listed in **Table 5.17.**

Table 5.17: List of Ethno-botanically important Plant Species recorded along chainage and its Adjoining Area

Sr. No.	*Species*	Habit	Local name	Edible	Fodder	Fuel wood	Med-icinal	Timber	Orna-mental
1.	*Aconitum heterophyllum*	Herb	Atish				+		
2.	*Aesculus indica*	Tree	Khanor	+	+	+			
3.	*Ailanthus* sp.	Tree	Dhunri		+	+			
4.	*Ajuga bracteosa*	Herb	Neel khanti				+		
5.	*Ajuga parviflora*	Herb	Neel khanti				+		
6.	*Alnus nitida*	Tree	Peeyak			+			
7.	*Angelica glauca*	Shrub	Chora				+		
8.	*Artemisia dracunculus*	Herb	Jhaum				+		
9.	*Artemisia gmelli*	Herb	Thav				+		
10.	*Asparagus sp.*	Shrub					+		
11.	*Astragalus candolleanus*	Shrub				+			
12.	*Berberis lycium*	Shrub	Kashmal, Chindu	+			+		
13.	*Bergenia stracheyi*	Herb	Saprotri				+		
14.	*Brassica campestris*	Herb	Sarson	+					
15.	*Cannabis sativa*	Herb	Bhang	+					
16.	*Carum carvi*	Herb	Kala zira				+		
17.	*Cedrus deodara*	Tree	Diar					+	
18.	*Celtis australis*	Tree	Khirik		+	+			

Sr. No.	Species	Habit	Local name	Edible	Fodder	Fuel wood	Med-icinal	Timber	Orna-mental
19.	*Coriandrum sativum*	Herb	Dhania	+					
20.	*Cotoneaster acuminate*	Shrub		+					
21.	*Cynodon dactylon*	Herb	Dhup grass		+				
22.	*Delphinium denudatum*	Herb					+		
23.	*Desmodium microphyllum*	Shrub	Piri		+	+			
24.	*Duchesnea indica*	Herb		+					
25.	*Elaeaganus umbellata*	Shrub	Kanju	+					
26.	*Ferula jaeskeana*	Shrub					+		
27.	*Ficus palmata*	Tree	Thuva	+	+				
28.	*Foeniculum vulgare*	Herb	Saunf	+					
29.	*Fragaria vesca*	Herb	Mobala	+					
30.	*Hypericum oblongifolium*	Shrub					+		
31.	*Jasminum humile*	Shrub							+
32.	*Lilium thomsonianum*	Herb							+
33.	*Lonicera quinqueloculans*	Herb							+
34.	*Mentha longifolia*	Herb	Pudina				+		
35.	*Micromeria biflora*	Herb					+		
36.	*Morchella esculenta*	Herb	Guchhi	+					
37.	*Morus serrata*	Tree	Croon/toot/ Gurun	+	+	+			
38.	*Nasturtium officinale*	Herb	Chu nali	+					
39.	*Olea cuspidata*	Tree	Kou		+				
40.	*Phytolacca acinosa*	Shrub	Rantlag				+		
41.	*Picea smithiana*	Tree	Rae					+	
42.	*Picrorhiza kurrooa*	Herb	Karoo				+		
43.	*Pinus wallichiana*	Tree	Kail					+	
44.	*Pistacia intergerrima*	Tree	Kakar shinghi		+		+	+	
45.	*Poa* sp	Herb	Ghaas		+				
46.	*Polygonum capitatum*	Herb					+		
47.	*Populus deltoidea*	Tree	Popuar					+	
48.	*Populus nigra*	Tree	Poplar					+	
49.	*Prinsepia utilis*	Shrub		+					
50.	*Prunus armeniaca*	Tree	Chulli	+					
51.	*Punica granatum*	Tree	Rare/dadu	+					
52.	*Pyrus pashia*	Tree	Kainth	+	+				
53.	*Quercus ilex*	Tree	Ban		+	+			
54.	*Plectranthus rugosus*	shrub	Kot				+		
55.	*Rhamnus virgatus*	Shrub	Tharangu		+				
56.	*Rhus cotinus*	shrub				+			
57.	*Rhus parviflora*	shrub				+			
58.	*Robinia pseudoacacia*	Tree			+	+			
59.	*Rosa brunonii*	shrub							+
60.	*Rubus elipticus*	shrub	Akhae	+					
61.	*Rubus lasiocarpus*	Shrub	Gulabri	+					
62.	*Rumex hastatus*	Herb		+	+				
63.	*Rumex nepalensis*	Herb	Albar	+					
64.	*Salix daphnoides*	Tree	Badoh		+	+			
65.	*Salix tetrasperma*	Tree	Badoh		+	+			
66.	*Salvia moorcroftiana*	Herb					+		
67.	*Solanum nigrum*	Herb	Makoh/ Kyangi	+			+		
68.	*Spiraea sorbifolia*	shrub	Karnahe						+
69.	*Spiraea canescens*	shrub	Lot						+
70.	*Tagetes minuta*	Herb					+		+
71.	*Thalictrum foliolosum*	Herb					+		

Sr. No.	*Species*	Habit	Local name	Edible	Fodder	Fuel wood	Med-icinal	Timber	Orna-mental
72.	*Thymus linearis*	Herb					+		
73.	*Trifolium minus*	Herb			+				
74.	*Trifolium pratense*	Herb			+				
75.	*Trifolium repens*	Herb			+				
76.	*Urtica dioica*	Shrub		+	+				
77.	*Valeriana hardwickii*	Herb					+		
78.	*Valeriana jatamansi*	Herb	Ain				+		
79.	*Verbascum thapsus*	shrub					+		
80.	*Viburnum foetens*	Shrub				+			
81.	*Viola canescens*	Herb	Nephalu ka phool				+		
82.	*Yucca aloifolia*	Shrub							+
83.	*Abelia triflora*	Shrub							+

Source: *(Reconnaissance Survey.)*

5.5.2.4 Tree Cutting Details

Project alignment is parallel to existing IR track at maximum places and is detoured at only 2 locations majorly. Thus impacts on flora will be major in the detoured area where gardens, forests etc may come. As per tree inventory study it is estimated that about 19013 trees will be cut for construction of alignment which are majorly Kikar, Khajur, babol, Sheesham, Aam, Jamun, Gulmohar, Siras and Khair. District wise detail of the trees to be cut is given in **Annexure 2.1.**

5.5.2.5 Ecologically Sensitive Areas

There are no ecologically sensitive areas within the study area. However protected forest occurs along the EDFC alignment in Bulandshahr. 109 ha of protected forest land is required to be diverted in this stretch. Also RFs are present within buffer zone in Bulandshahar districts. List of the same is attached as **Annexure 5.1.** There are total 2612 nos. of trees in the protected forest area.

5.5.3 Faunal Study

5.5.3.1 Methodology of Faunal Study

Terrestrial Fauna

A ground survey was carried out in the impact zone of the proposed DFC project. Important animal groups: butterflies (insects), birds and mammals inhabiting the area were surveyed.

For sampling butterflies the standard '*Pollard Walk method*'; for birds '*point sampling*' along the fixed transect (foot trails) and for sampling mammals, '*direct count on open width (20m) transect*', were used on fixed transects. Sampling was carried for 3 h on each of the tree transects at each site.

Seasonal variation in species diversity of different groups of animals (butterflies and birds) were evaluated using Shannon-diversity Index (***H'***) to know the season of peak diversity in the area amongst the post monsoon seasons studied.

$$H' = -\Sigma^{N}_{1} \mathbf{Pi\ In\ Pi}$$

(From species 1 to n; n= total number of species)
Where, **Pi** is the proportion of the individual species in the total population.

Aquatic Fauna

Evaluation of Phyto-benthos and Plankton

Samples of periphyton were obtained by scraping of 3 cm^2 area of the boulders and preserved in 1 ml of Lugol's solution. The upper surface of boulders was scraped with the help of sharp razor. Three replicates were obtained and integrated. For qualitative studies the keys of Trivedy and Goel (1984) and Ward and Whipple (1959) have been used for identifying the filamentous and non-filamentous algae. However, for identifying diatoms, permanent mounts were prepared and identified. For computing abundance (as %) 300-400 diatom cells were identified in each sample (with BX-40). Plankton samples were collected using a tericot ring net. The samples were preserved in lugol's solution and carried to the laboratory for their study. Sedgewick-Rafter cell counts (APHA 1992, 1998) were made and density was recorded as cell mm^2. Zooplanktons were also counted and the density was recorded as cell per litre volume of water.

Evaluation of Benthic Macro-Invertebrates

Benthic macro-invertebrates were collected using raviusing surber's square foot sampler (Welch, 1948) adopting random sampling device, from the designated sampling sites in Hindan and upper Ganga canal. The samples were collected from the pebbles, cobbles and gravels surface upto 15 cm sediment depth at different elevations. All collected specimens were preserved in 8% formalin solution or 70 % alcohol and identified upto the generic level with the aid of keys given by Usinger (1950), Pennak (1953), Ward and Whipple (1959), Edmondson (1959), Needham and Needham (1962), Macan (1979), Tonapi (1980) and Edington and Hildrew (1995). The density of benthic macroinvertebrates was expressed as unit per meter square (unit/m^2). The spatial variations in community structure were recorded by computing percentage abundance.

Evaluation of Fish Fauna

Fish including their spawns, fry and fingerlings were caught from the different selected sites. Various morphometric parameters of the captured specimens had been recorded and fish were identified up to the species level with the help of keys given in Day-Fauna, Jayaram (1981), Menon (1987) and Talwar and Jhingran (1997). Aquatic vegetation, which the fish might have preferred as a food and breeding substrate was also sampled. Percentile contribution of different fish species (by umber and by weight) to the total fish catch was determined. The information was also sought from primary sources as well as secondary sources

To assess the fish diversity different fishing gears like cast net, scoop net, hand net, hook and line method and pot method were used. They were also visually observed in different habitats. The fishes were caught on spot, counted and immediately released back into the water. The cast net was thrown in different habitats in a stretch of about 500 m of the river reach length at all study sites. Only few specimens of individual fish species were collected.

5.5.3.2 Terrestrial Fauna of Study Area

The domestic animals observed in the study area are mainly mammals, as listed. In absence of natural forest in the study area, wild animals in the study area are poor. Peacock can be easily seen in the study area even in villages. It is found as pet birds. A list of birds, reptiles, amphibians and rodents based on information gathered from local enquiries and Forest department is presented in

Table 5.18 & 5.19. Wildlife Act, 1972 has classified the species into six schedules depending on the sensitivity & vulnerability of the species and gives varying degree of protection. Schedule I and

part II of Schedule II provide absolute protection - offences under these are prescribed the highest penalties. Species listed in Schedule III and Schedule IV are also protected, but the penalties are much lower. Schedule V includes the animals which may be hunted. The plants in Schedule VI are prohibited from cultivation and planting.

Table 5.18: List of Domestic Fauna Observed in the Study Area

Sr. No.	Zoological Name	Common Name	Schedule
1.	*Bos indicus*	Cow	
2.	*Bubalus indicus*	Buffalo	
3.	*Boselaphus tragocamelus*	Nilgai	III
4.	*Cains familieris*	Dog	
5.	*Capra hircus*	Goat	
6.	*Equus cabilus*	Horse	
7.	*Equus hermionus*	Ass	
8.	*Felis domesticus*	Cat	
9.	*Ovius polic*	Sheep	
10.	*Sus cristatus*	Pig	
11.	*Suborder ruminantia*	Camel	

Table 5.19: List of Birds, Reptiles, Amphibians and Rodents observed in the Study Area

Sr. No	Scientific Name	Common Name	Schedule
Birds			
1.	*Alcedo atthis*	Common Kingfisher	IV
2.	*Cucculus micropterus*	Indian Cuckoo	IV
3.	*Columba livia*	Rock Pigeon	IV
4.	*Corvus splendens*	House Crow	V
5.	*Eudynomys scolopacea*	Asian Koel	
6.	*Prinia hodgsonii*	Grey-breasted Prinia	
7.	*Pycnotus jacosus*	Red-whiskered Bulbul	IV
8.	*Ploceus philippinus*	Baya Weaver	
9.	*Pavo cristatus*	Peafowl	I
10.	*Polyplectron bicalearaturn*	Peacock pheasants	I
11.	*Streptopelia chinensis*	Spotted Dove	IV
Reptiles			
1.	*Calotes versicolor*	Garden lizard	
2.	*Varanus monitor*	Monitor lizards	
Amphibian			
1	***Bufo malanostidus***	Toad	
2	*Rana cynophlyctis*	Frog	
3	*Rana tigrina*	Frog	
Rodent			
1	***Bandicota indica***	Bandicoot rat	
2	*Mus muscatus*	Mouse	
3	*Ratus ratus*	House rat	V
4	*Ratufa indica*	Squirrel	

5.5.3.3 Conservation of India Peafowl

The **Indian peafowl** or **blue peafowl** (*Pavo cristatus*), a large and brightly coloured bird, is a species of peafowl native to South Asia. The species is listed as schedule I species as per Wild Life Conservation Act, 1972, but considered as "species of least concern" as per IUCN red list. "Species of Least Concern" are defined as species which has been categorized by the IUCN for conservation of nature as evaluated but not qualified for any other category. As such they do not qualify as threatened, near threatened, or conservation dependent. Peacock was observed at the

site during visit. Conservation plan has been prepared for peafowl which should be implemented by contractor. Measures to be taken under conservation plan are listed below:

- The people living in the surrounding area and employee of the company would bemotivated towards the protection of the animal. Motivation will lead to timely information to the project authorities about any threat to peafowl or any cases of pouching/hunting of this bird.
- Strict monitoring of labourers and associated workers for any activity related to endangering the life or habitat of Peafowl.
- Strict restrictions will be imposed on the project workers at project activity sites to ensure that they do not harvest any produce from the natural forests and cause any danger or harm to the birds.
- The prolific use of harmful chemicals (insecticides/pesticides) would be strictly banned in the project area as these are disadvantageous and highly involved in killing of insects which are natural prey of the bird.
- The project authorities will be bound by the rules and regulations of the Wildlife Protection Acts or any such agency of the State, which may exist or will be promulgated from time to time for the preservation of habitats and protection of wild animals and birds.
- Each worker engaged in project activity shall be provided with identity card and would not be allowed access to forest areas without permission.
- Possession of firearms by project workers shall be strictly prohibited, except for dedicated security personnel.
- **Habitat Improvement:** Habitat of peafowl us generally forest area and no thick forest will be cleared for project development. Side plantation (including 109 ha of protected forest) and trees in detous will be cut for project development which also serve as habitat for the peafowls. Due to cutting of trees this habita will be disturbed. But it is proposed to carry out the compensatory plantation.Compensatory plantation should includeindigenous plant species found in the area. Plantation should be carried out in different phases on forest blanks, moist areas, and scrub jungles. Seedlings/saplings of native plant species will be distributed to villagers in the various villages of project area and a comprehensive plantation programme will be organized by the project proponent along with greenbelt development programme. The natural water sources will be strengthened through engineering as well as biological works and water will be filled in water pits available in the study area by water tankers during dry season. Habitat improvement programme will also includes plantation of tall tree species along river banks as peafowl likes tall trees in river banks to roost. Plantation of native species of *Ziziphus* will be encouraged as a large percentage of their food is made up of the fallen berries of *Zizyphus*.
- **Improve Vigilance:** For improvement of vigilance and measures to check poaching at site and nearby areas, supervisors will be available at site all the time.
- **Awareness Promotion:** Awareness will be spread among residents, contractor and staff for promoting conservation of peafowl.

5.5.3.4 Aquatic Ecology

Aquatic ecosystem is the most diverse in the world. It harbors a variety of plants and animals from primary producers to large consumers, intermittently occupied by plankton, insects, fishes etc. and aquatic biological diversity depends on the environmental quality of that ecosystem. Therefore to assess the possible impact, the aquatic fauna study was conducted in the influence zone to evolve appropriate mitigation measures.

From the baseline survey on existing aquatic environmental conditions in and around the proposed site on the river Hindan and Upper Ganga canal the following data's were generated:

- Biological characteristics of river water
- Estimation of coliform organisms
- Inventorization of phytobenthos and Zoobenthos
- Present status of riverine fish fauna: Identification of fish species
- Migratory pattern, feeding and breeding grounds of the fish fauna
- Assessment of local catches during the field trips to assess the fish fauna.

Study Sites

Aquatic Study was carried out at Hindon River during the February, 2015.

Planktons

Water is polluted with some agricultural wastes & agro based industries and thus has very low level of pollution which is indicated by the species composition of these microorganisms.

Macrophytes

There was only limited number of macrophyte species present at the study site. Although this aspect could have indicated that the study site must be a polluted one but at the same time, the low density of these macrophytes is an indicative of low pollution level. The details presented in **Table 5.20.**

Benthos and Fishes

The benthic fauna of the study site is represented by Insecta, Annelida and Mollusca. The high diversity of benthos is indicative of low pollution level at the study site. Similarly, major fish groups are represented by carps, catfishes. The diversity indices of benthos and fishes are an indicative of non-polluted status of the study site.

Rare and Endangered Species

In reference to Red Data Book of Botanical Survey of India and Wildlife (Protection) Act 1972, no endangered species of flora and fauna have been found during the study period.

Table 5.20: Details of Macrophytes

Macrophytes	
Habit	**Plants**
Free floating	*Eichhornia crassipes*
Rooted floating	*Marselliaquadrifoliata*
Submerged	*Hydrilla vertivilata*
Emergent	*Typha angustata, Colocasia* sp., *Polygonum* sp. (2 species), *Saccharum* sp.,

	grasses
Dominant species	*Eichhornia crassipes*, *Polygonum*, *Saccharum* sp.

Aquatic sampling Results: The Aquatic sampling result for Hindon River are presented in **Table 5.21.**

Table 5.21: Details of Phytoplanktons (Hindon River)

Common Species	Group	% Upstream	% Dowstream
Rhizoclonium sp.	Chlorophyceae	12.4	15.1
Ankistrodesmus sp.			
Chlorella sp.			
Pediastrum sp.			
Chlosterium sp.			
*Spirogyra*sp.			
Scenedesmus sp.			
Staurastrum			
Pandorina sp.			
Peridinium sp.			
Selenastrum sp.			
Oocystis sp.			
Tetraedron sp.			
Kirchneriella sp.			
Cosmarium sp.			
Chlamydomonas sp.			
Navicula sp.	Bacillariophyceae	10.6	14.1
Centronella sp.			
Synedira sp.			
Fragillaria sp.			
Melosira sp.			
Cyclotella sp.			
Gomphonema sp.			
Nitzeschia sp.			
Trabellaria sp.			
Amphora sp.			
Euglena vedinas sp.	Euglenaineae	7.2	9.0
Lagerheimia			
Trachelomonas sp.			
Phacus sp.			
Aphanothece sp.	Cyanophyceae	11.2	11.3
Anabaena sp.			
Microcystis sp.			
Phormidium sp.			
Synechosystis			
Spirullina sp.			
Merismopaedia sp.			
Vorticelia sp.	Protozoa	12.7	13.20
Paramecium			
Didinium			
Asplanchna	Rotifera	34.2	31.6
Brachionus			
Euchlanis			
Lecana			
Polyarthra			
Rotaria			
Daphinia sp.	Cladocera	33.0	28.7
Ceriodiaphnia cornusa			
Bosmina loniotris			
Daphinia lumphasia			

Common Species	Group	%	
		Upstream	Dowstream
Daphnirosoma sp.			
Moina			
Mesocyclops Hyalimus	Copepoda	20.5	19.5
Cyclops			
Microcyclops varicous			
Heliodiaptomus sp.			
Diaptomus			
Mesocydops.			
Nauplii	Crustacea	4.50	5.1

Table 5.22: Details of Zooplanktons (Hindon River)

Phylum	% Diversity Index	
	Up Stream	Down Stream
Nematoda	2.4	2.1
Oligochaeta	15.7	14.2
Decapoda	2.5	2.7
Coleoptera	3.0	2.5
Diptera	44.0	49.5
Ephemeroptera	18.0	16.0

List of Fishes in the Study Area

Fish species reported in the area are listed. Main fishes are *Notopterusnotopterus, Catla catla, Labeo calbasu, Labeo rohita, Labeo bat, Mystus vittatus, Rita rita, Barbus spp* and *Cirrinus raba.* List of fishes in the study area presented in **Table 5.23.**

Table 5.23: List of Fishes Reported In in the Study Area

Sr. No.	Fish Species
1	*Notopterus notopterus*
2	*Catla catla*
3	*Labeo calbasu*
4	*Labeo rohito*
5	*Labeo bata*
6	*Cirrihinus mrigala*
7	*Cirrihinus raba*
8	*Clarius batrachus*
9	*Wallago attu*
10	*Heteropneustres fossiliis*
11	*Mystus vittatus*
12	*Mystus aor*
13	*Hilra ilisha*
14	*Barbus spp.*
15	*Rita rita*

5.6 SOCIO-ECONOMIC DEVELOPMENT

5.6.1 Population

Uttar Pradesh has a large population and a high population growth rate. From 1991 to 2001 its population increased by over 26%. Uttar Pradesh is the most populous state in India, with 199,581,477 people on 1 March 2011. The state contributes 16.16% of India's population. The population density is 828 people per square kilometer, making it one of the most densely populated states in the country

The sex ratio in 2011, at 908 women to 1000 men, was lower than the national figure of 933. The state's 2001–2011 decennial growth rate (including Uttrakhand) was 20.09%, higher than the national rate of 17.64%.] Uttar Pradesh has a large number of people living below the poverty line.

5.6.2 Urbanization

The pace of urbanization has been lower in the state. The level of urbanization has also been lower than most other states. The numbers of urban centers with more than one lakh population have grown slowly over last thirty years. The growth of urban centers with population less than five thousand have, on the other hand, have grown more significantly and these centers have grown in larger numbers in the western part of the state.

5.6.3 Economy

In terms of net state domestic product (NSDP), Uttar Pradesh holds the third largest economy (2011–2012) in India, with an NSDP of INR7080 billion (US$110 billion .Agriculture is the leading occupation in Uttar Pradesh The per capita income of Uttar Pradesh is Rs. 33,269 in the year 2012-2013, according to the latest data released by the government of India.

The per capita income of the state at Rs. 4787 in 1993-94 is one of the lowest in the country except Orissa (Rs. 4726) and Bihar (Rs. 3620). The per capita of the state in 1950-51 at Rs. 259 was very close to the national per capita income of Rs. 267, short by only Rs. 8 i.e. 3 per cent only. In 1995-96 this shortfall stood at Rs. 35.8 and is likely to go up. The average annual growth in total income of the state in the period between 1951-74 was always far less than the country. However, the population growth in the state being lower in the country during the period, the gap in the per capita income between the state and the country was constructed to some extent.

The post-1974 period was, however, marked by a significant improvement in the total income of the state. The state achieved a growth of 5-7 per cent per annum, which is higher than the national growth of 5.3 per cent. But this gain in higher growth rate of total income in the state was lost to the state due to increase in the growth rate of population from 1.8 per cent per annum in 1961-71 to 2.3 per cent in 1971-81 which is higher than the country's population growth rate of 2.2 percent.

The increasing trend of growth in income in the period following 1974 is likely to be replaced by an average annual growth of even less than 3 percent that is much lower that the country's growth rate of almost six per cent. This means that the shortfall in the states per capita income, which was 35 percent in 1994-95, is unlikely to change in recent time.

Thus the lower rate of growth in the total income of the state during the period 1951-74 was followed by high population growth in the last two decades. But the state is now faced with the reappearance of lower growth of income while the population growth remaining unchanged in foreseeable future.

The structure of state income shows that the contribution of primary sector has declined to 41 percent of the state income though the sector still sustain 73 percent of the total working force. This shows the continued pressure of working population in the primary sector. The share of secondary sector, on the other hand, has gone up to 20 percent of the total state income which now employ 9 percent of the total workers in the state. This percentage is the lowest among all the major Indian states except Bihar (4.6 percent in 1991 census), Madhya Pradesh (8.4 percent in

1991) and Orissa (7.5 percent in 1991). The share of tertiary sector has been more impressive from 25 percent in 1970-71 to 37 percent in 1994-95 and the percentage share of workers employed by this sector has risen from 15 percent to 18 percent in 1991. It thus shows that the U.P.'s growth has been more capital intensive than labours intensive, more urban based than rural based and the

shift income from primary to other sectors is not accompanied by corresponding change in employment pattern.

Distinguishing feature of Uttar Pradesh's economy is its regional imbalances. In terms of economic indicators like agricultural productivity, infrastructure facilities, industrial growth, the Uttar Pradesh's economy can be categories into five regions; Western, Eastern, Central, Ruhelkhand and Hill. The Western Uttar Pradesh is agriculturally prosperous. It is relatively industrialized and has seen greater degree of urbanization. At the other end is Bundelkhand. Low agricultural growth, less number of industrial units, lesser gross value of industrial products marks touts his region as the least developed in the state.

5.6.4 Agriculture

Farming is the main occupation of three-quarters of the working population. Many peasants have farms that are too small for efficient agriculture. The main problem is the pressure of population on land sources. The soils are fertile and there is good rainfall over nearly all the region. Irrigation facilities bring water to about one-third of the cropped area. Wheat, rice, maize, millet, and pulses, such as beans, peas and lentils, are the major food crops. Uttar Pradesh is one of the country's major producers of sugar cane. Cotton, oilseeds, jute, potatoes, and tobacco are other important cash crops. As part of national and state projects for sericulture (the production of silk fibre), large-scale planting of mulberry trees is under way across the state. Mulberry trees provide food for the caterpillars of the silkworm moth.

5.6.5 Industries

Khurja (starting point of the project) is famous for its pottery industries. There are numbers of large to small scale industries in the entire study area. Meerut is famous for sport goods manufacture industries along with other heavy to medium scale industries. Sugarcane and Paper industries dominate the industrial sectors of Saharanpur & Muzaffar Nagar. The industrial area map of U.P. is presented in **Figure 5.17.**

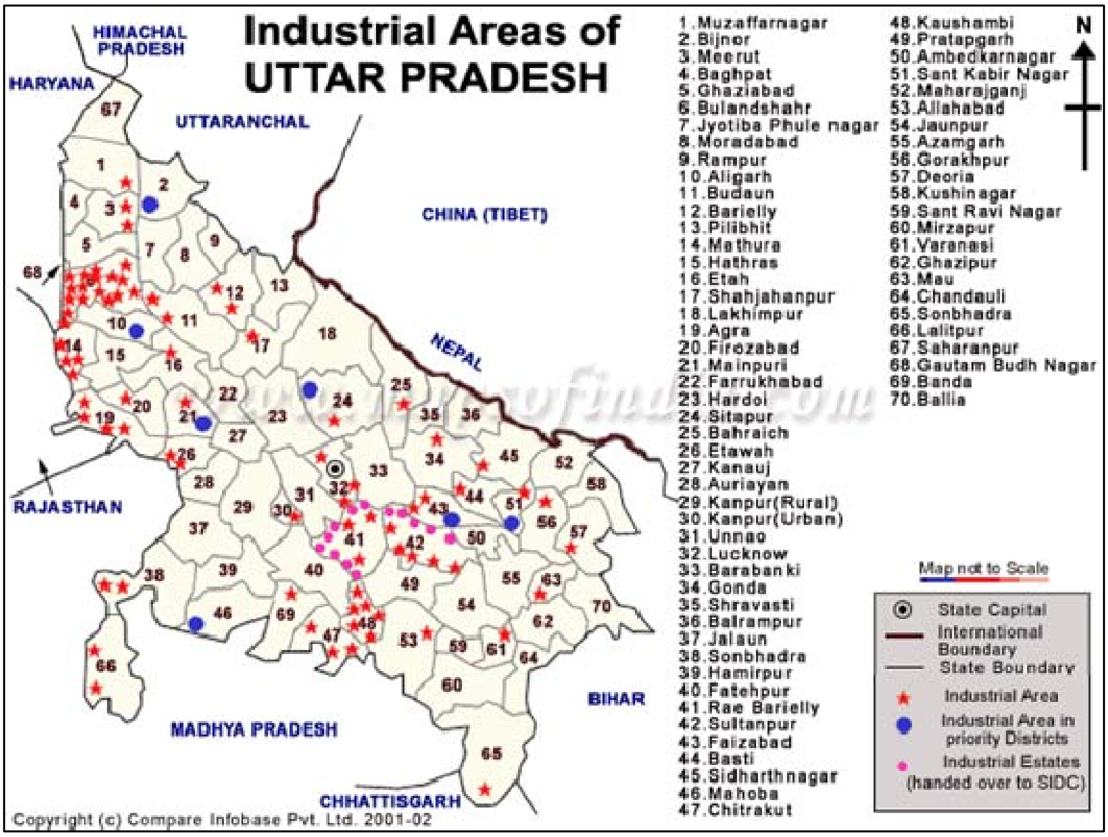


Figure 5.17: Industrial Area Map of Uttar Pradesh

5.6.6 Population

Uttar Pradesh does not have rich mineral resources. Mines and quarries produce limestone, silica, magnesite, and phosphatic shale. Soapstone, copper, lead, zinc, marble, and bauxite are also found in the state. Electricity produced by coal-burning power stations is the most important source of energy.

5.6.7 Tourism

Uttar Pradesh contains many famous tourist sites. They include ancient monuments, such as the Taj Mahal at Agra and the Mughal city of Fatehpur Sikri. Millions of pilgrims visit Allahabad and Varanasi to bathe in the waters of the Ganges River, which Hindus consider to be sacred.

5.6.8 Social and Cultural Resources

5.6.8.1 Critical Stretches

The sensitive social cultural receptors viz., temples, mosque, school and hospitals along the existing RoW of existing railway line and proposed track have been given in Strip Plan.

5.6.8.2 Educational Institutes and Health Center

The identification of educational institutes and health centres is important from design of noise barrier point of view. The educational institutes & health care centre adjacent to project railway line are given in Strip Plan..

5.6.9 Social Issues

Almost all social indicators of the state show that the state stands on 13th or 14th position among the sixteen major states. Bihar and in some cases Orissa, are the only two states which lag behind U.P. in terms of social development indicators like medical facilities, teacher-pupil ratio in primary schools, birth rate, death rate, infant mortality rate, literacy, per capita income, electrification of villages, per capita power consumption etc. Uttar Pradesh is often seen as a case study of development in a region of India that currently lag behind other parts of the country in terms of a number of important aspects of well-being and social progress. Their region consists of Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh. There are important differences between these four states. But the cause of social backwardness in these four different States, never the less, appear to have much in common and recent comparative research have pointed to many similarities in the social, cultural and even political makeup of these states which have contributed to their backwardness.

5.6.10 Health

Life in Uttar Pradesh is short and uncertain. Female expects to less than 55 years and the under-file mortality rate is as high as 141 per thousands. In these respects Uttar Pradesh resembles Saharan Africa for with 53 years of life expectancy and 160 under five mortality rate. Among all major Indian states, Uttar Pradesh has the highest under five-mortality rate, the second highest crude death rate and the third lowest life expectancy figure. The number of maternal deaths per 100,000 live birth in the state estimated to be 931 in the mid 1980s. If a girl is born in Kerala she can expect to live 20 years longer than if she is born in Uttar Pradesh. The probability that she will die before the age of one is more than six times as high in Uttar Pradesh compared to some other state. According to the recent National Family Health survey, Uttar Pradesh comes second to Bihar among the major Indian states in terms of the incidence of under nutrition among children below the age of five. This corroborates as well as explains to a large extent the lower possibility of child survival in Uttar Pradesh.

Further, the demographic transition of U.P. has been slow. Among all the major Indian states, Uttar Pradesh has the highest birth rate and the highest fertility rate

Education-Four states identified as lagging behind other major states in terms of democratic transition turn out to be the four states with the lowest literacy level. The 1991 census indicates that the age literacy rate in these four states in the age group between 7 years and above ranges from 38 percent in Bihar to 44 percent in Madhya Pradesh.

Female literacy situation in Uttar Pradesh is dismal. Only one out of four in the 7+ age group was able to read and write in 1991. This figure go down to 19 per cent for rural areas, 11 percent for the scheduled castes, 8 per cent for scheduled castes in rural areas, and 8 per cent for the entire rural population in the most educationally backward districts. The 1981 census figures suggest that in Uttar Pradesh the crude female literacy rate among scheduled castes in rural Uttar Pradesh in 1981 was below 18 per cent in 18 out of Uttar Pradesh's 56 districts and below 2.5 per cent in a majority of districts.

In terms of more demanding criteria of educational attainment on the completion of primary or secondary education, in Uttar Pradesh, in 1992-93 only 50 percent of literate males and 40 per cent of literate females could complete the cycle of eight years of schooling involved in the primary and middle stages. One other distinguishing feature of Uttar Pradesh education system is the persistence of high level of illiteracy in the younger age group. Within the younger age group, the illiteracy was endemic in rural. In the late 1980s, the incidence of illiteracy in the 10-14 age group was as high as 32 per cent for rural males and 61 per cent for rural females, and more than two-thirds of all rural girls in the 12-14 age group never went to school.

The problem of the education system is exacting. Due to public apathy the school are in disarray, privately run school are functional, but beyond the reach of ordinary people. The State government has taken programmes to make the population totally literate. There are special programmes like World Bank aided DPEP. Steps are being taken with the help of NGOs and other organizations to raise popular participation. At the level of higher education and technical education Uttar Pradesh has 16 general universities, 3 technical universities, one Indian Institute of Technology (Kanpur), one Indian Institute of Management (Lucknow), one Indian Institute of Information Technology and large number polytechnics, engineering institutes and industrial training institutes. This provides the State with firm basis for providing opportunities for higher education to its youth.

5.6.11 Socio-Economic Assessment of Study Area

This section describes about the project area and socio-economic profile of the project affected families. This section specifically analyzes the impacts on land and other immovable assets based on detailed measurement survey done after the final designs. Based on the impact on land and structures, a Census Survey was carried out; and the results of the survey established socio-economic status of PAFs. The Census Survey has indicated the nature and characteristics of R&R interventions required to mitigate negative impacts of the proposed project.

5.6.11.1 Project Area

The proposed DFC Corridor of Khurja-Pilkhani section passes through six Districts Uttar Pradesh covering about 156 villages. This project falls in the basin of Ganga-Yamuna river in Uttar Pradesh. The average annual rainfall varies between 550 mm to 863 mm. The important crops of the project area are sugarcane, wheat, maize, rice, barley, gram, pigeon pea, moong, lentil, groundnut, rapeseed and mustard. Out of total 220.71 km of project length about 110.195 km is in parallel and about 110.515 km is on detour stretch. (**Refer Table 5.24**)

Table 5.24: Project Area: Salient Features

Chainage (km)		Distribution of length (km)		Total			
From	To	Parallel	Bypass	Length	Districts	Villages	LA (Ha)
-3.2	0.00	3.2	0.00	3.2	6	136	821.95
3.2	49.695	46.495	0.00	46.495			
0	67.750	0.00	67.750	67.750			
86.90	112.000	25.10	0.00	25.10			
0.00	42.765	0.0	42.765	42.765			
152.3	156.00	3.7	0.00	3.7			
156.0	187.50	31.7	0.00	31.7	1	20	50.8
		110.195	**110.515**	**220.71**	**6 (One district SRE is common)**	**156**	**829.08**

5.6.11.2 Findings of the Census and Baseline Survey

The census and socio-economic surveys have been carried out in 156 affected villages. These surveys were carried out from February to March 2015. The census identified a total of 5926 project affected families comprising of 31526 persons. During the census survey, the data gathered from the census survey reveals that amongst the affected 5926 PAFs, the majority 79.86% will incur impact on agricultural land and 20.14 % families incurring impact on their residential or commercial structures.

The following section will analyze the key data findings of the census survey and impacts on the people along the project area.

5.6.11.3 Project Impacts

The proposed project stretch will involve acquisition of about 829.08 ha of land of which approximately 678.18 (81.80%) is private land **(Table 5.25)**. However, the project will require very less (approximately 8.20 ha) built-up area which includes residential and commercial or residence-cum commercial and community properties (0.11%). At many built-up locations land width has been reduced to as less as 17 meters which has resulted in reducing impact on residential as well as commercial structures.

Table 5.25: Project Area: Loss of Land

Section	Private Land(in ha)			Government	Total (In Ha.)
	Agri.	Resi. /Com.	Community		
Khurja-Pilkhani	669.98 (80.81%)	7.33 (0.88%)	0.87 (0.10%)	150.90 (18.21%)	829.08 (100%)

5.6.11.4 Agricultural Land

Table 5.26 presents extent of loss in terms of loss of area of agricultural land of each PAF. Explorative techniques have been used to extrapolate the data of 156 villages for entire project length. Analysis of the data indicate that out of the total 4733 PAFs losing their agricultural land, about 90.47% PAFs will lose less than 0.15 ha of land, about 6.95 % will lose between 0.15 ha to 0.50 Ha., 1.56% will lose between 0.50 Ha. or 0.5 ha to 1 ha of land and 1.02% will lose more than 1 ha of land. As per the provisions of NRRP, all Khatehdars would receive the same (Rs. 20,000) ex-gratia irrespective of their extent of loss. The ex- gratia of Rs 20,000 will help land losers to find replacement value of land losing about 0.15 ha of land. Severity of Impact is adequately addressed by providing additional INR 15 per sq meter for additional land

beyond 0.15 Ha.

Table 5.26: Parcel of Plot Affected of each PAFs

Section	Category of Affected Area of Agriculture Land in (Ha.)				Total
	0 – 0.15	0.15 – 0.5	0.5 – 1.0	More than – 1.0	
Khurja-Pilkhani	4282 (90.47%)	329 (6.95%)	74 (1.56%)	48 (1.02%)	**4733 (100%)**

5.6.11.5 Structures

Table 5.27 indicates the physical impact on the structures being acquired. As can be seen from the Table all structures are losing more than 75% of its part and will require to be relocated. During census survey and consultations, it was established that losing more than 25% of structures may cause displacement of the people. Hence social assessment has categorized families losing more than 25% of area as displaced families. However actual displacement categories will be verified at the time of R&R implementation.

Table 5.27: Assessment of Impact on Structures

Section	0-25%	25-50%	50-75%	75-100%	Total
Khurja-Pilkhani	0 (0.00%)	0 (0.00%)	0 (0.00%)	431 (100%)	**431**

5.6.11.6 Identification of Small, Marginal and Landless Farmer

Census and baseline survey has ascertained that about 516 PAFs are landless, marginal or small. Out of 4733 agricultural PAFs about 2.68% are landless, 4.02% Marginal and 4.20 % are small **(Table 5.28)**. The landowners, who have been reduced to the status of small /marginal or landless as a result of DFCC land acquisitions, will be assisted as described in the Entitlement Matrix (based on the relevant provision of NRRP 2007). However; these numbers will be verified by the concern Revenue Department during implementation.

Table 5.28: Identification of Small and marginal farmers

Section	Landless	Small	Marginal	Total (S+M+L)	General	Total
Kurja-Pilkhani	127 (2.68)	199 (4.20)	190 (4.02)	516 (10.90)	4217 (89.10)	**4733 (100%)**

5.6.11.7 Impact on PAFs Losing Structure Due to the Project

Information given in **Table 5.29** indicates the families that will be affected because of loss of structure (residential or commercial) in the project. It can be seen from the Table 2.6 that out of 1193 affected families about 77.95% are titleholders and 22.05% are non-title holders. As mentioned in Table 2.6 all these families are losing more than 25% of their properties hence all of these families will be considered as displaced. However, nature and extent of displacement of PAFs will be determined during implementation stage.

Table 5.29: Project Affected Families (PAFs) Losing Structures

Section	Titleholders		Non-Title holders (Squatters, Tenant & Kiosks)				Total
	Resi	Comm	Resi	Comm	Tenants	Kiosks	
Kurja-Pilkhani	691	239	49	138	69	7	1193

5.6.11.8 Impact on Community Structures

Apart from individual assets, SIA had identified 110 CPRs within the proposed ROW. Efforts were made to minimize the impact on these CPRs by reducing Corridor of impact (COI) to minimum (about 17 m). As a result, number of CPRs need relocation will be reduced **(Table 5.30)**. Consultation with the community suggests that these facilities are used by people very often. Therefore these facilities will be replaced in consultation with the communities who are using it, irrespective of ownership of these CPRs. Enhancement of the CPRs along with environmental measures such as plantation of trees is being planned under EIA&EMP. Wherever required suitable boundary wall will be constructed to mitigate noise and vibration impact. All these community properties will be enhanced in consultation with community.

Table 5.30: Affected Community Properties Resources (CPRs)

Section	Temple	Mosque	Hospital	School	Others/Burial ground/Samadhi	Total
Kurja- Pilkhani	3	0	0	0	107	**110**

5.6.11.9 Socio-Economic Analysis of the PAFs and PAPs

Age-Sex Composition

Amongst PAPs (31526) under the project, there are 17752 males (56.31%) and 13774 females (43.69%). Average family size is about 5.32. It is noticed from **Table 5.31** that the sex ratio for this stretch is 775.

Table 5.31: Age-Sex Composition

Type of Impact	0-6		6-15		15-18		18-45		45-59		59-Above		Total	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Total	1344	964	2792	1727	1814	1293	7653	6141	2296	2187	1853	1462	**17752**	**13774**

Source: Census Survey, 2012

5.6.11.10 Annual Income Patterns of the PAFs

Information collected during Census survey on income level of each PAF indicates that PAFs are economically weak. It can be seen from **Table 5.32** that out of total 5926 PAFs, about 14.21% of total PAFs are earning less than 50,000. PAFs earning less than Rs 25,000 have been considered as people 'Below the Poverty line (BPL) which is about 4.67% of total PAFs.

Table 5.32: Total Annual Income

Section	Income Group (Rs.)				Total
	0 – 25000	25000 – 50000	50000 – 1 Lakh	above 1 Lakh	
Total (KRJ- PKY)	277 (4.67%)	565 (9.54%)	1097 (18.51%)	3987 (67.28%)	5926 (100%)

5.6.11.11 Social Status of the Project Affected Families

Table 5.33 presents information about social status of PAFs. Out of total 5926 PAFs, about 50.53% are general and 43.56% are OBC. About 5.91% are schedule caste. As mentioned in **Table 5.33** schedule tribes are not found in the project.

Table 5.33: Social Status of the PAFs

Section	General	Schedule caste	Schedule Tribe	Other backward caste	Total
Kurja-PKY	2994 (50.53%)	350 (5.91%)	0 (0%)	2582 (43.56%)	**5926 (100%)**

Furthermore, the SIA established the proposed project will not impact any tribal groups in the project area. Moreover, the assessment found that there are no tribal specific habitations along the proposed DFC corridor. Therefore, this project triggers the Bank's operational policy (OP 4.12) on involuntary resettlement and **not OP 4.10 on Indigenous Peoples (referred as tribal in Indian context).**

5.6.11.12 Vulnerability

Table 5.33 presents number of PAPs under vulnerable categories as per NRRP 2007. Among the PAPs, there are 15282 vulnerable persons Out of these, 81.32% are people above the age of 50 years. Other significant categories are widows (13.30%) and unmarried girls above the age of 18 years (2.71%). This would become significant while planning for the women's income generation and restoration strategies. These vulnerable categories of PAPs will be supported by the project but within the purview of NRRP 2007.

From the Table 5.33, it is ascertained that about 277 PAPs are below the poverty line. Under the project (as per EM), BPL families are also considered as vulnerable. **Table 5.34** presents vulnerability status of the PAPs. These families will be assisted to regain their living standard

Table 5.34: Vulnerability Status of the PAPs

Section	Project Affected Persons					Total
	Disabled / Orphan	Widow	Un Married Girls above 18 years	Below the Poverty Line	Person above 50 years	
Kurja-PKY	129 (0.85%)	2033 (13.30%)	416 (2.72%)	277 (1.81%)	12427 (81.32%)	**15282 (100%)**

Taking into account the socio-economic vulnerabilities of the PAFs, specific provisions in form of additional assistance have been incorporated in the RAP to ensure that they are not marginalized in the process of development. However, the actual number of these vulnerable people eligible for R&R support will be scrutinized by the implementing agencies. The NRRP 2007 defines vulnerable persons as 'disabled, destitute, orphans, widows, unmarried girls, abandoned women, persons above 50 yrs of age, who are not provided or cannot immediately be provided with alternate livelihood, and who are not otherwise covered as a part of family. The information provided in the above table shall be reconfirmed and beneficiaries will be identified for provision of R&R assistance through NGOs.

5.6.11.13 Education Status

Amongst the PAPs, there is a high degree of illiteracy in the project area. About one-fifth (19.69 %) PAPs are uneducated. Another 25.20 % of the PAPs are basic literates. About 16.43% of the total PAPs have studied up to the 8th standard school level (**Refer Table 5.35**). Amongst PAPs, there are 2340 (14.27%) graduates in the area. Since about 20% of the PAPs are illiterate, special efforts and attention would be required for communicating awareness about social issues resettlement and rehabilitation options, compensation and project related decisions. These efforts will include generating awareness, available income restoration schemes, grievance redressal mechanism, under the project. The facilitating NGOs will be given key responsibility for this.

Table 5.35: Education Status of PAPs

Section	Education level						Total
	Un Educated	Educated	8th	10th	Inter mediate	Graduate	
Kurja-PKY	6207 (19.69%)	7945 (25.20%)	5180 (16.43%)	4773 (15.14%)	2922 (9.27%)	4499 (14.27%)	**31526 (100%)**

5.6.11.14 Occupational Background

In the families loosing agricultural land, about 17.52% PAPs are housewives who are engaged in daily household work. Another, 11.72% are students, 8.81% PAPs are labourers in the agricultural sector or otherwise. About 5.46% of the PAPs are engaged in business activities (trade and petty business). Many of these businesses people are associated with the small economic activities such as Tiffin centers, tea centers, general stores, etc.

Table 5.36: Occupation Profile of PAPs

Section	Occupation profile(PAPs)								Total PAPs
	Service	Business	Cultivator	Students	House Wife	Labour	Un-Employed	Workers	
	3890	1721	6680	3693	5523	2777	2170	5072	31526

Section	Occupation profile(PAPs)								Total PAPs
	Service	Business	Cultivator	Students	House Wife	Labour	Un-Employed	Workers	
PAPs	(12.34%)	(5.46%)	(21.19%)	(11.72%)	(17.52%)	(8.81%)	(6.87%)	(16.09%)	(100%)

5.6.11.15 Important Findings and Conclusions of Socio-Economic Study of Study Area

Census survey identifies approximately 5926 PAFs and 31526 PAPs. Out of 4733 agricultural PAFs about 2.68% are landless, 4.02% Marginal and 4.20 % are small. About 721.85 (81.80% private land) is required for the construction of the project. Average acquisition per family works out to be 1218 Sqm (0.1218 Ha). Number of displaced families is approximately 1193. Approximately 5.40 families per kilometer are getting displaced due to this project.

The following are some of the key baseline socio-economic standard of the affected, which will become basis for measuring the changes in the living standards during the impact assessment studies.

Table 5.37: Status on Indebtedness of Affected People

Amount of debt	0 – 10000	10000-25000	25000-50000	50000- above	Reported Cases
Percentage of cases	To be determined at the time of RAP implementation				

Table 5.38: Status on Income Level of Affected PAFs

Income per year in Rs.	0-25000	25000-50000	50000-100000	above 100000	Nos. of families
Percentage	277 (4.67%)	565 (9.54%)	1097 (18.51%)	3987 (67.28%)	5926 (100%)

Table 5.39: Education Status of Affected PAFS

Education level	Un Educated	Educated	8th	10th	Intermediate	Graduate	Total PAPs
Percentage	6207 (19.69%)	7945 (25.20%)	5180 (16.43%)	4773 (15.14%)	2922 (9.27%)	4499 (14.27%)	31526 (100%)

Table 5.40: Occupation Profile of Affexted PAFs

Occupation	Service	Business	cultivator	Students	House Wife	Labour	Un-Employed	Workers	Total PAPs
Percentage	**3890 (12.34%)**	**1721 (5.46%)**	**6680 (21.19%)**	**3693 (11.72%)**	**5523 (17.52%)**	**2777 (8.81%)**	**2170 (6.87%)**	**5072 (16.09%)**	**31526 (100%)**

Project Affected People: Based on an analysis of impacts, the affected people are categorized into various impact categories with applicable entitlements, which is given in the **Table 5.41** below:

Table 5.41: Project Affected Households by Impact Categories

Sr. No.	Impact Category	No. of PAFs	Entitlements	Remarks
(a) Title Holders: Loss of Land				
1	Land owners loosing less than 1500 Sq.mts and becoming Land less/Marginal/Small land owners	516	Compensation as replacement value as per EM Ex-gratia of Rs. 20,000 Reimbursement of stamp duty charges	Reimbursement should be claimed within one year of receipt of compensation
(b) Title Holders: Loss of Structures				
1	Those losing less than 25% of	0	Replacement cost of affected structure evaluated by Independent Valuer	

Sr. No.	Impact Category	No. of PAFs	Entitlements	Remarks
	structures			
2	Those losing than 25% of structures	431	• Replacement cost of affected structures evaluated • Reimbursement of stamp duty charges • Transition allowance Rs. 4,000 • Shifting allowance of Rs. 10,000 • Subsistence allowance of Rs. 30,000 • House construction assistance in case of BPL • Rs 25,000 in case of business/ artisan/ self employed	
3	Affected Tenants/Lease holders	69	• 3 months written notice • Shifting allowance of Rs. 10,000	Rental allowance as per EM in case of advance notice cannot be served
4	Kiosks	7	• 3 months written notice • Shifting allowance of Rs. 10,000	Rental allowance as per EM in case of advance notice cannot be served
(c) Non Title Holders				
1	Those loosing residential /commercial structures	187	• Compensation for structure loss based on Independent valuer's assessment • Transitional allowance Rs. 4,000 • Shifting allowance of Rs. 10,000 • Subsistence allowance of Rs. 30,000 for those living BPL • House construction assistance in case of BPL • Rs 25,000 for business, self employed, artisans	
(d) Additional /Other Assistance				
1	Loss of livelihood (Agricultural Laborers / Employees)	-To be identified	• Rehabilitation Grant of Rs. 75,000 • Training assistance of Rs. 4,000 • Employment with contractors to BPL persons as per EM	
2	Vulnerable People	15282	• Cash grant of Rs. 30,000	
3	Tribal Households	0	• Additional assistance of Rs. 50,000	

(The is to be clarified that the entitlements mentioned in the above table are payable to the eligible PAFs subject to verification of their eligibility and application of the Entitlement Matrix for various categories as shall be decided by the Competent Authority/Administrator R&R in an evidence-based manner and with legal advice wherever necessary from the DFCCIL/Indian Railways).

5.7 Conclusion

The primary and secondary data have been collected during field survey for preparing baseline environmental profile. The following are the sensitivity of the project based on the environmental, ecological and social point of view:

- The noise and vibration level due to the proposed track, specifically in detour location where the present levels are well within the limits.
- Acquisition of fertile agriculture land in detour section.
- Acquisition of residential structure in villages along the alignment.
- Impact on accessibility due to the division of agriculture land in detour section.
- Cutting of around 19013 nos. of trees, which fall within RoW, however impact on ecology of the area is not significant considering these are spread in approximate 220 km length.

Annexure-5.1: LIST OF RESERVE FORESTS

Eco-sensitive Zone/Forests	Latitude	Longitude	Distance & Direction
Azimabad RF	28 13.433N	77 46.292E	2.0 km, West
Ismayilur Budhena RF	28 13.698N	77 47.659E	0.7 km, West
Sikri RF	28 14.697N	77 48.062E	1.7 km, West
4 Nos.of RF	28 12.574N	77 48.786E	0.9 km, East
RF	28 12.972N	77 49.476E	0.9 km, East

Note: DFC alignment does not interfere with any Reserve Forest

Annexure - 5.2: ARCHEOLOGICAL FEATURES

Archeological Features	Distance & Direction from Project Corridor
Bulanshahr	
Several large tumuli (Kheras) in and about Ahar.	>20 km, East
Ruins of an old temple known as Chandrani-ka-Mandir	>30 km, East
Balai Kot or Upper Fort	>30 km, West
Large mound known as Moti Bazaar	>35 km, West
Two cemeteries	>35 km, West
Masonry tank and ancient temple, Dankaur	>28 km, West
Ahirpura mound or lesser temple mound, Indor	>30 km, East
Kundanpura mound or the great temple mound, Indor	>30 km, East
Lofty mound with a small village perched on the east northeastern side of it, Indor	>30 km, East
Khera or mound called Talapatnagari or Myaji Khera, Shikharur	>13 km, East
Ghaziabad	
Archaeological Site & Remains comprised in Survey Plot Nos. 736, 738/2, 738/3 & parts of Survey Plot Nos. 737, 738 / 1 and 738 / 1 and 738 / 4 as shown in the site plan, Gulistanpur	>20 km, West
Raja Karan ka khera, Paragana put, Mustafabad	>8 km, West
Meerut	
Cemetery at the junction of Meerut - Delhi Road	>9km, East
Mound known as Ulta Khera and the mound or Raghunathji, Hastinapur	>25 km, East
Andhra Court, a high brick fortress supposed to have been built by Mahi	>5 km, East
Cemetery of the Meerut racecourse	>5km, East
Tomb of Shah Peer	>7km, East
Begum's Palace, Sardana	> 7km, West
Roman Catholic Church, Sardana	>7 km, West
Tombs or Sardhana Cemetery, Sardana	> 7km, West
Two mounds (Kheras) named Khorkali and Jalapar, Servara	> 7 km, East
MuzaffarNagar	
Mosque and Tomb of Shah Abdul Razak and his four sons, Jinhana	>4 km, East
Octagonal Wall, Majhera	> 2 km, East
Tomb of Diwan Saiyed Mohammad Khan, Majhera	> 2 km
Tomb Saiyed Hussain also called Sayed Chajju Khan, Majhera	> 2 km
Tomb of Saiyed Umar Nur Khan, Majhera	> 2 km
Tomb of Saiyed Saif Khan and his mother, Majhera	> 2 km
Saharanpur	
Badshahi Bagh locally known as Badshahi Mahal	> 700 m, East
Khera ki Bandi, Old Cemetery	
Old British Cemetery, Khata Khedi	>3 km, East
Old British Cemetery, Saharanpur City	> 400 m, East

Note: No ASI protected monument / structure is affected. DFC alignment passes far away from ASI monument boundary, much beyond 300 M.

CHAPTER 6: ANALYSIS OF ALTERNATIVES

6.1 BACKGROUND AND APPROACH

The present 220.71 Km long alignment from Khurja to Pilkhani is an important section of Railway connecting the Northern and Western regions of the country. This section starts with a flyover (Length 3.2Km) over GZB-CNB line near Khurja City and join Meerut line at Km 3.2,run parallel to IR and ends at Pilkhani after Meerut & Muzaffarnagar detours.. The entire stretch is in the State of Uttar Pradesh and passes through Buladshahr, Ghaziabad, Hapur, Meerut, Muzaffarnagar and Saharanpur Districts of Uttar Pradesh. There are number of Major cities and settlements all along the section and to avoid such heavily built up area, Two Detours have been proposed at these locations. Since the proposed DFC track generally runs on the left side of the IR tracks (Facing Khurja to Pilkhani), proposed detours are not considered for the right side (RHS) of the IR network because of technical constrains and high cost of construction for underpass / flyover to the IR tracks. However, various alternatives have been analysed keeping in view environmental, social and technical parameters. The details of the parallel (110.195 Km) and detour locations (110.515) are given below in the **Table 6.1**. The alignment details covering the parallel and detour locations are presented in **Figure 6.1**. All the detours are on the left side (w.r.t. railway alignment from khurja to Pilkhani) of the railway track .All the parallel alignments are on the left hand side of the existing railway track.

Table 6.1: Locations of the Parallel & Detour Alignment

Sr. No.	Description	Chainage		Length (Km)	Type of Track	Remark
		From	To			
1	DFC(KC)	-3.20	0.00	3.20	Khurja Flyover Detour	Khurja Talheri Section
2	IR	3.20	49.695	46.495	Parallel	
3	DFC (MTC Detour)	0	67.750	67.750	Detour	49.650-86.900 Km (IR)
4	IR	86.900	112.000	25.100	Parallel	
5	DFC (MOZ Detour)	0	42.765	42.765	Detour	112.00-152.300Km (IR)
6	IR	153.300	156.000	3.7000	Parallel	
Total				**189.010**		
7	IR	156.000	187.500	31.700	Parallel	Talheri – Pilkhani
Total				**220.710**		

The objective of examining various alternatives was to screen the manifest features of the environment and to assess which of the alternative alignments are likely to have the most significant environmental impacts. Three alternatives i.e. parallel alignment, right side alignment and left side alignment have been considered along the critical area, where environmental and social impacts are significant.

Following activities were undertaken to find out the main environmental features of the above alignments:

- **Study of Project Documents**
  First task was to study the project documents to have the understanding of the project objectives, its main components, boundary etc.
- **Study of World Bank Safeguard Policy**

World Bank has a detailed policy on environment. The policy for different levels of environmental activities has also been studied in order to take a decision regarding the preferred alignment.

- **Study of Laws and Regulations**
  All Laws and regulations enacted by the Government of India and the State of Uttar Pradesh that are relevant to rail construction and environment were closely examined.
- **Collection of Data from Secondary Sources**
  After understanding and examining the background information regarding the project and its environmental aspects from both, legal and policy standpoints, guidelines for such studies were developed and collection of data from relevant secondary sources data was undertaken. Data has on meteorology, demography, forests and related aspects, land use pattern, topography etc, has been collected.
- **Reconnaissance Survey of the Project Impact Zone**
  A team of environmental experts comprising of environmental scientist and environmental engineers were engaged to carry out a reconnaissance survey of the project road. Important environmental components along the corridor of the impact zones were identified. These included trees, wetlands, forests, public utilities, community resources, cultural sites, accident prone areas, etc. On the basis of background information, legal and policy positions, and other information, a checklist was prepared to conduct a screening exercise. In order to obtain the opinion of all stakeholders, discussions were also conducted with the local residents that may be affected by the project.
- **Analysis of Data and Screening Exercise**
  The data collected were then compiled to develop the environmental scenario of the project area and to emphasize the sensitive components within that.
  Project impacts on different environmental components have been identified through a scientific and valid procedure.

Following is a list of important ecosystem components that were identified as the valued ecosystem in the project route during the extensive field survey.

- Plantation
- Disturbance of flora having fruit bearing and fodder capability;
- Disturbance of flora in identified protected/reserved forest;
- Disturbance to existing trees in the railway line.
- Land Use
- Change in Land use due to conversion of agriculture / commercial and forest land into railway line.
- Impact on livelihood of the people due to change in land use.
- Agriculture Land
- Acquisition of agriculture land for widening;
- Requirement of huge amount of soil for the construction of high embankments specially RUBs, and bridges and other major and minor bridges.
- Disturbance to Existing Hillocks if any
- The geometric improvement and widening needs to cut and disturb existing hilly area.
- Trees within the corridor of Impact
- Change in natural drainage system at locations of high embankments.
- Ground water quality and quantity;

- Surface water quality and quantity;
- Community Ponds; and
- Irrigation canal, irrigation pond / reservoir.
- Religious and Cultural Structures
- Temples and Mosques;
- Irrigation Units; and
- Water bodies

6.1 ALTERNATIVES TO THE PROJECT

The scope of assessing alternatives to the project is limited to the "With" and "Without Project" (means do nothing or status quo) options and the same is analysed below:

6.1.1 'Without Project' Option

Physical Environment: In the 'Without project' Scenario, the capacity of timely movement of goods will remain constrained. This will create additional pressure on our already stressed roads. The traffic jams on highways and railways crossing will continue to deteriorate the air quality and Noise levels due to idling of vehicles. GHG emission analysis study has been carried out by DFCCIL and as per the study following estimations are made:

1. In 2016-17, in absence of DFC (i.e. 'No-DFC scenario') GHG emissions would have been 8.7 million ton CO_2 while those in case of DFC would be 2.59 million ton CO_2.
2. According to the projection, in 2041-42, GHG emissions under 'No-DFC scenario' would have been 33.2 million ton CO_2 while those in case of DFC scenario would be 5.97 million ton CO_2.
3. The GHG emission GAP between No-DFC scenario and DFC scenario increases from 6.11 million ton CO_2 in 2016-17 to 27.23 million ton CO_2 in 2041-42 i.e. almost by 4.5 times.
4. Cumulative GHG emissions over the 30 year period in the No-DFC scenario would have been 582 million ton CO_2 while in the DFC scenario it would be 124.5 million ton CO_2. This demonstrates that in absence of DFC implementation approximately 4.5 times more GHG would be emitted in 30 year period for freight transportation in the Eastern and Western Corridor.

Biological Environment: In the 'Without the project' scenario, no direct impact is anticipated on biological environment. However, the very need of road transportation, and resultant widening of roads may lead to cutting of trees and loss of productive agriculture land.

Socio-Economic Environment: Without the project, the agricultural produce may not move from field to market places in a timely manner, which may result in loss of income to farmers. Public at large will continue to waste time in waiting at traffic jams triggered at railway crossings. The project of this size brings substantial investment, employment, and business opportunities, which in turn contribute improving the socio-economic condition of the area. In absence of the project, the project area will be deprived of such benefits.

6.1.2 'With Project' Option

Physical Environment: In the "With project" scenario, the air quality, noise levels are likely to improve around the railway crossings due to the provision of ROBs at most of such locations. The project will immensely enhance the much-needed capacity for fast transport of goods from one end to another end of the country. This in turn will reduce the pressure on roads. The air pollution and noise level are likely to increase during construction phase but that will be confined within the close vicinity of construction sites and will be temporary in nature. The marginal water withdrawal (during construction) from ground in the over exploited areas will marginally deplete the ground water potential. However, this impact will be minimised with the provision of water harvesting. With project scenario will also result in reducing likely generation of GHG emissions and hence contributing in preventing global warming.

The construction materials to be used are ballast, sand, subgrade, steel and cement. The usage of this material will lead to permanent impact at quarry sites of sand and stone. The steel and cement usage will also have indirect impact on natural resources. During operation phase there will be no requirement of these materials. Steel and Cement will be procured from sources which produce steel in environmentally sound production units. Ballast, sand, subgrade will be obtained from sources where these are extracted through sustainable practices. Proper quarry/borrow area management practices will be adopted to minimise the longterm and permanent impacts caused due to project.

Compensatory afforestation and tree plantation shall be taken up by DFCCIL and forest department to mitigate trees loss as detailed in Chapter-10.

The disposal of construction waste at identified location will not have any negative impact because only conventional and non hazardous waste will be disposed off at low productive and waste land. These materials will also be used for levelling the low lying areas.

Minimum agriculture land has been acquired to minimise impacts on landuse and rehabilitation and resettlement plan has been prepared to avoid social impacts. Detailed assessment of detour alignment has been given later in the chpter.

Biological Environment: in the 'with project' scenario, the overall impact of the project is likely to be insignificant on the biological environment except in terms of loss of trees which will be minimised and also regenerate over a period of time due to proposed compensatory tree plantation.

Socio-economic Environment: The 'with project' scenario will bring large investment to the project area and host of employment and business opportunities resulting in substantial improvement in the overall socio-economic conditions of the area. This will also ease the problem of traffic jams and long wait at railway crossings due to the construction of ROBs.

6.1.3 Conclusion

During the EIA, a number of public consultations have also been carried out with the local communities and stakeholders. The overall findings of the meetings are that most of the people consider this project as timely and much needed. They are in favour of the 'With-project' option.

Under the circumstance, and in light of the assessment of the available alternatives, the 'With-project' option is deemed as the optimal solution, as far as its feasibility and sustainability during its project life and beyond can be ascertained. It will generate overall positive social, environmental, and economic impacts and their negative impacts can be mitigated through appropriate safeguard measures as defined under the EIA and the social safeguards assessments.

6.2 ALTERNATIVE ANALYSIS OF PROPOSED DETOUR

Meerut Detour

Hapur & Meerut are two major industrial city of Uttar Pradesh with heavily ribbon development along the existing railway track. To avoid major resettlement detour of 67.750 Km are proposed. Issues related to the detour as per various options are discussed in **Table 6.2** and location is presented in **Figure 6.1.**

Table 6.2: Issues related to Meerut Detour

Sr. No.	Issues	Parallel along existing IR track	On left side of existing IR track	On right side of existing IR track	Recommendation
1.	Land width	15-20 meter additional width is required	Proposed width is 40 meter	Proposed width is 40 meter	The detour is recommended on left side of the existing track. Appropriate measures to mitigate noise and vibration shall be taken along the settlements and cross drainage structures shall be provided Special attention shall be given on farmers who will lose fertile agriculture land for income restoration
2.	Acquisition of structures	About 9600 structures including commercial and industrial units and large scale impacts on families who works involve in industrial & commercial activities.	Passing through agriculture land and crossing water bodies mainly canal and its distributaries. Alignment of Meerut detour crosses 9 irrigation canals.	Passing through Hapur & Meerut city again or large loop line are required and more level crossing to accommodate national highways crossing major flyover are required .More structure get affected	
3.	Issues of ROB	Construction of ROB at LC gate will displace about 900 houses	No such issue	No such displacement, however crossing the existing tracks requires more ROBs.	
4.	Technical constrains	Need modification of yard	Need additional bridges along the water bodies mainly canals, HT lines shall have to be shifted two times adding to the cost ,however major bridges are not required .	Need more underpass and flyovers over national highway. Length of detour I more. Fly overs are required to cross existing line	
5.	Public Opinion	Not favourable	Favourable as population displacement is minimum , however land losers are very apprehensive and asked more compensation	Not favourable	
6.	Environmental issues covering noise, vibration and impact on	Noise and vibration impact on residential and sensitive	Impact are less as less structures are impacted, however introduction of detour will increase the noise	More impacts as meerut bypass and number of educational institutes are on	

Sr. No.	Issues	Parallel along existing IR track	On left side of existing IR track	On right side of existing IR track	Recommendation
	sensitive receptors	receptors as these are all along the tracks	levels ,	this side.	
7.	Site suitability for various facilities such as freight stations, electric substation etc.	Not suitable due to congestion along the track	Suitable as impact is less and land is available	Not Suitable as sufficient land is not available, detour require more land due to increase in length.	
8.	Ecological impact such as tree cutting	Significant	Not significant, and tree cutting is less in comparison to other option.	Significant as bridges on river ganga tributaries cause impacts on aquatic ecology during construction.	
9.	Other impacts	Remaining houses will have problem of vibration and noise pollution	Less but houses close to the proposed line may have some vibration and noise impacts	Impact on receptors in the villages & Institutional area.	

Muzaffarnagar Detour

Muzaffarnagar is the important District of Uttar Pradesh and having ribbon commercial as well as residential development along the existing railway track. Issues related to the detour as per various options are discussed in **Table 6.3** and location is presented in **Figure 6.3**.

Table 6.3: Issues related to Muzaffarnagar Detour

Sr. No.	Issues	Parallel along existing IR track	On left side of existing IR track	On right side of existing IR track	Recommendation
1.	Land width	15-20 meter additional width is required	Proposed width is 40meter	Proposed width is 40 meter	The detour is recommended on left side of the existing track. Appropriate measures to mitigate noise and vibration shall be taken along the sensitive receptors. Special attention shall be given on farmers who will lose fertile agriculture land for income restoration If, the detour is proposed on RHS of existing track, dismantling of
2.	Acquisition of structures	About 2000 structures and 2600 families will be displaced	Passing through agriculture land and crossing and minor canals, power line, and few structures require shifting. Muzaffar nagar detouralignment crosses 2 nos. of irrigation canal	Passing through Muzaffarnagar town as crosses minimum 8 roads, needs more underpasses.	
3.	Issues of ROB	RoB is required	No issue	Railway Flyover is required to cross the existing tracks.	
4.	Technical constrains	Need modification of yard	No rail Flyover is required and less no. of RoBs.	Need more underpasses at road crossing locations	
	Public Opinion	Not favourable	Land losers are very	Not favourable	

Sr. No.	Issues	Parallel along existing IR track	On left side of existing IR track	On right side of existing IR track	Recommendation
5.			apprehensive and need good communication strategies and ask employment and more compensation.		most of the Rly. Station building and curtailment of circulating area / blockade of passenger's access will be involved.
6.	Environmental issues covering noise, vibration and impact on sensitive receptors	Noise and vibration impact on residential and sensitive receptors along the track	Impact on the surrounding villages due to construction of new track	More impacts as city limit extended on that side.	
7.	Site suitability for various facilities such as freight stations, electric substation etc.	Not suitable due to congestion along the track	Suitable as sufficient land is available	Reserve forest is affected	
8.	Ecological impact such as tree cutting	Significant as large no. of tree need to be cut	Not significant and tree cutting is less in comparison to other option.	Significant , more no. of tree as long length of detour is required	
9.	Other impacts	Remaining houses will have problem of vibration and noise pollution	Impact on receptors in the villages	Impact on receptors in the villages	

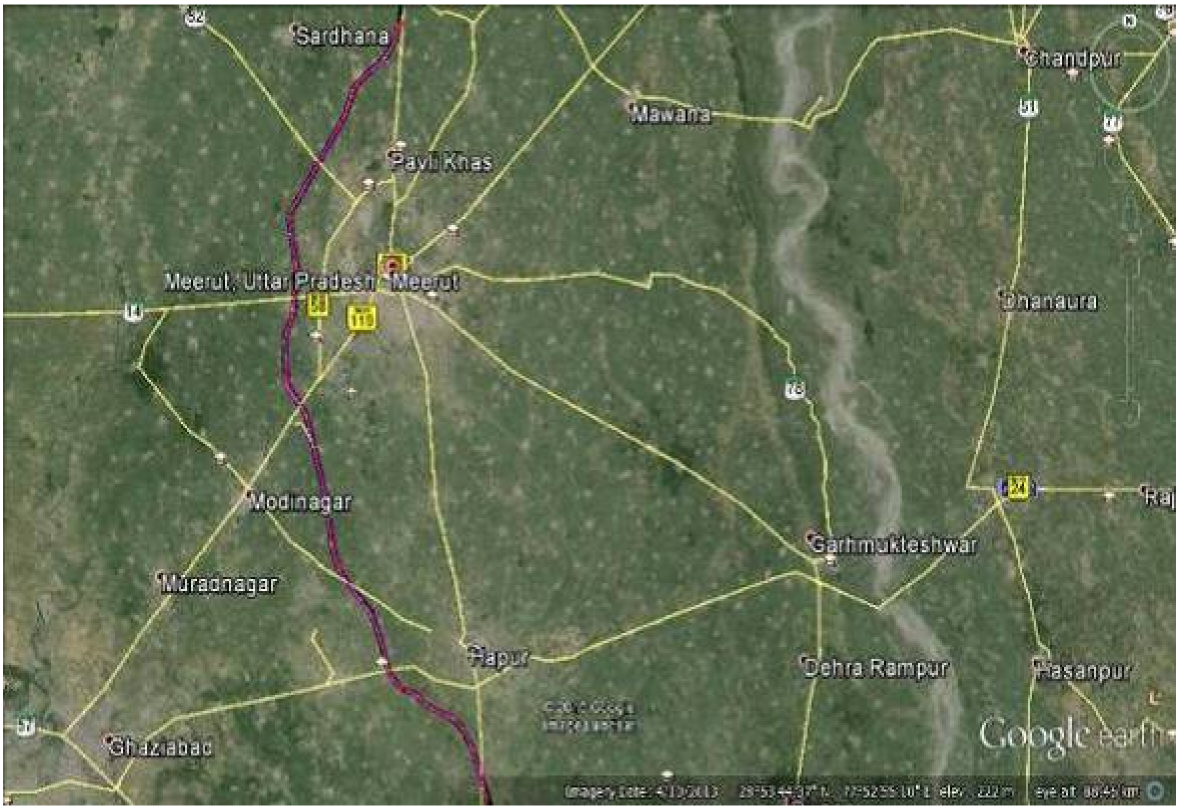


Figure 6.1: Meerut Detour

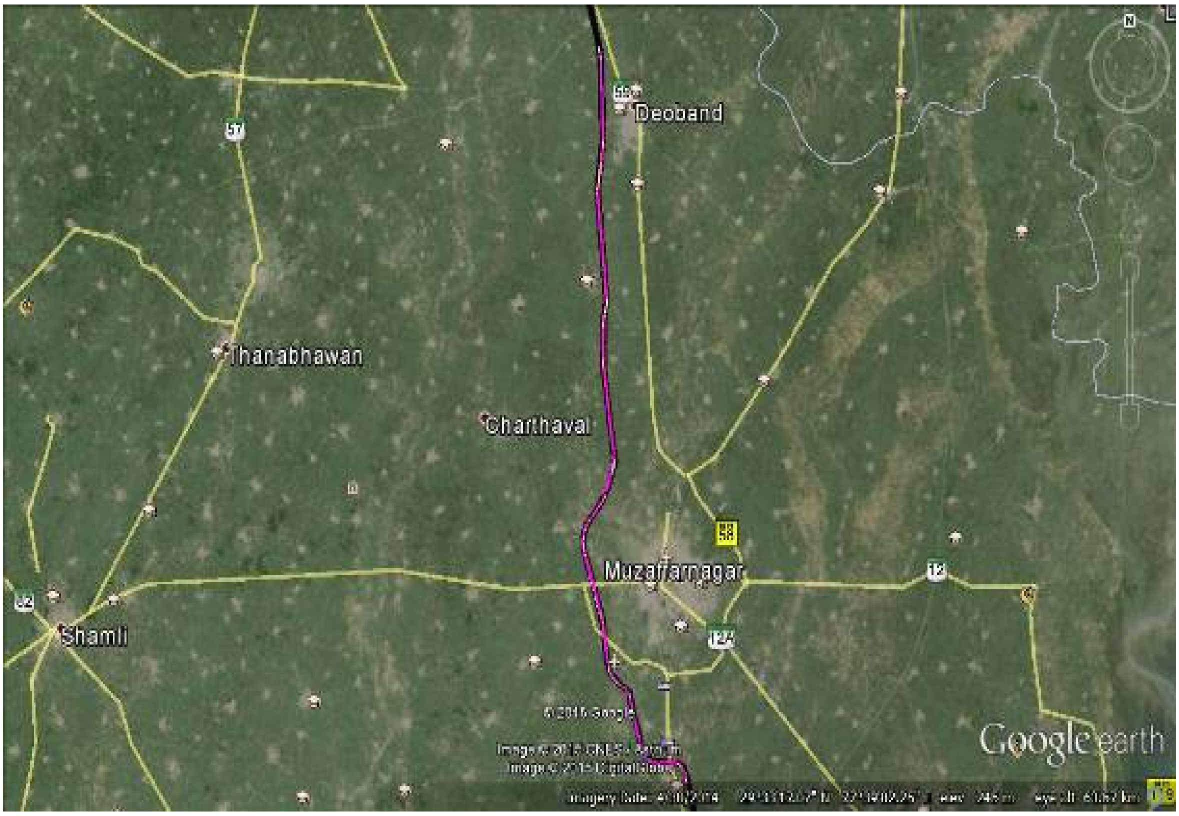


Figure 6.2: Muzaffarnagar Detour

6.3 CONCLUSION

During the EIA, a number of public consultations have also been carried out with the local communities and stakeholders. The overall findings of the meetings are that most of the people consider this project as timely and much needed. They are in favour of the 'Meerut & Muzaffarnagar detours and as per physical, ecological & socio economic reasons, detours are recommended on left hand side of the existing alignment.

Under the circumstance, and in light of the assessment of the available alternatives, the 'With-project' option is deemed as the optimal solution, as far as its feasibility and sustainability during its project life and beyond can be ascertained. It will generate overall positive social, environmental, and economic impacts and their negative impacts can be mitigated through appropriate safeguard measures as defined under the EIA and the social safeguards assessments.

CHAPTER 7: ENVIRONMENT IMPACT ASSESSMENT

7.1 INTRODUCTION

Environmental impact assessment involves prediction of potential impacts by the development of the project on the surrounding area. Based on the baseline environmental status described in earlier section and the proposed project activities, potential impacts have been assessed and predicted, and appropriate mitigation measures are suggested to avoid / reduce / compensate for the potential adverse impacts of the project and enhance its positive impacts. The impacts due to the development of the proposed Dedicated Freight Corridor have been assessed for the planning phase, construction phase and implementation phase.

7.2 IMPACT ASSESSMENT METHODOLOTY

To assess the impact of the project, a simple qualitative method that determines potential existence of impact has been employed. Thereby, the judgments related to the magnitude and importance of the impacts caused by the project is presented. This involves development of Matrix summarizes environmental impacts of the DFC project. The following parameters and scale is adopted for developing matrix. Parameters and scale of impact matrix is presented in **Table 7.1.**

Table 7.1: Parameter and Scale of Impact Matrix

Parameter	Scale		Remarks	
Significance	No impact	E	Positive:+	Negative:-
	Negligible impact	D	Positive:+	Negative:-
	Insignificant impact	C	Positive:+	Negative:-
	Relatively significant impact	B	Positive:+	Negative:-
	Significant impact	A	Positive:+	Negative:-

For the assessment of impacts, the following criteria is adopted

Scale A: If National Parks, Wildlife Sanctuaries or any designated natural reserve, protected species of any kind are directly affect.
Scale B: If large areas of forest, grassland, cultivable land or any natural environment for tourism are indirectly affected.
Scale C: If impacts are insignificant
Scale D: If impacts are negligible
Scale E: No impacts or not applicable to assessment.
Section below assesses the impacts following the above method.

7.3 IMPACT ON PHYSICAL ENVIRONMENT

The description of impacts on natural resources is as follows:

7.3.1 Impact on Climate

Planning & Construction Stage:

Short-term impact in terms of minor increase in temperature may happen in the immediate vicinity of the alignment, construction camp area due to construction activities and cutting of trees falling in the RoW.

Operation Stage

No direct negative impact is anticipated in operation phase. Rather, this project may contribute positively in GHG reduction since project will significantly reduce the goods traffic load on existing roads network. The electrified train movement will additionally contribute in GHG reduction equal to the GHG (CO_2 emission) generation from other fuel based train movement. The project also envisages compensatory tree plantation in the project section. Hence, the climatic condition of the area will improve moderately.

7.3.2 Impact Due to Natural Hazard

Planning & Construction Stage

The Khurja-Pilkhani EDFC is located in seismic zone IV that is high damage risk zone. This may cause failure of civil structures in the event of earthquake if design consideration related to seismicity is not taken into consideration

Operation Stage

Since, no hazard other than seismicity is expected; no adverse impact is anticipated during this stage. However, the constructed structures should be maintained well.

7.3.3 Impact on Air Quality

1) Planning Phase
- Currently the cargo is transported by railway and road. It is estimated one litre of fuel can move 24 ton-km of freight by road, 85 ton-km by rail. Therefore, once the DFC is active in the area the consumption of fuel is likely to decrease which may subsequently decrease emission in the area. Moreover, proposed movement of freight trains would be by electricity, therefore, emissions are negligible. By planning the freight corridor, the overall ambient air quality will improve.
2) Construction Phase
3) During the construction phase, the air quality is likely to be affected due to generation of dust from construction activities and gaseous emissions from construction vehicles. However, the impact will be localized, short-termed and reversible.Operation Phase
   It is basically an eco-friendly project. By decreasing dependency on roads it will help to the cause of Green House effect.
- The movement of trucks during loading / unloading may have some impact near freight stations, however, these impacts are localized and concentrated in a specified area only.
- Plantation along the DFC is likely to improve the air quality of the area.

7.3.4 Impact on Topography & Land Use

1) Planning Phase

The project has been planned to minimize the impacts on topography by avoiding sensitive topographic features such as tunnels, rivers/hills etc. However, impacts due to high embankments are expected due to the project.

2) Construction Phase

- During construction phase changes in topography are envisaged due to the clearing of land, felling of trees, cutting and filling, and due to the construction of structures.
- Construction of railway embankment is also likely to cause aesthetic changes in the landscape. However, suitable landscaping and plantation activities, slope protection activities are envisaged to minimize the aesthetic impacts.
- Filling and cutting of land will be required in the detour stretches, where the track traverses through undulating topography. However, changes will be limited within RoW of the track hence overall impact will be localized.
- No impact is envisaged on geology due to the project.

3) Operation Phase

- Since the alignment runs on high embankment, issues of access of local communities and storm water drainage are anticipated during the operation phase of the project. These impacts are minimized by providing adequate ROBs, RUBs, CD Works etc.

7.3.5 Impact on Soil & Soil Erosion

1) Planning Phase

- The high embankment in water bodies is avoided during the planning stage to minimize the soil erosion.

2) Construction Phase

- Clearing of land, cutting of trees, excavation of borrow areas are likely to trigger soil erosion. Movement of vehicle / machinery / equipment and working force is also likely to cause soil erosion.
- The detour section is likely to traverse through agricultural land which will require clearing of the land.
- Soil in the agricultural regions is fertile and consists of alluvial deposits. Thus, loss of fertile soil is likely to occur.
- Borrow areas will be required for the project. Most portion of the DFC is on embankment. The borrow areas are likely to cause soil erosion and affect agricultural areas. Appropriate measures for borrow area management are suggested in Chapter-8.
- Pits can be formed due to borrowing, which may cause harm to local residents in the vicinity.
- Debris generated due to dismantling of structures
- Oil spills from the operation of the diesel pumps and diesel storage, during transportation and transfer, parking places and diesel generator sets.
- Operation of the emulsion sprayer and laying of hot mix in service road
- Operation of the residential facilities for the labour and officers
- Storage and stock yards of bitumen and emulsion

3) Operation Phase

- Due to change in land use, impact is envisaged on soil during operation phase. However, the impacts are within the RoW.

7.3.6 Impact on Ground Water

1) Planning Phase

- No impact is envisaged on ground water in planning phase as water requirement is very nominal and shall be kept to the minimum.

2) Construction Phase

- During construction phase pollution of groundwater is likely to occur due to seepage and runoff from construction site. However, the impact will be negligible. The total water requirement during construction period will be 3600 cubic meter per day approx. a spread over the construction period of about 3 years. The daily requirement per kilometre length during the construction period will be 5000 litre and will be met through the local water supply. There will be no appreciable impact on ground water. The labour camp, which may be established during construction period, should have proper sanitation facilities and discharge of wastewater through soak pit. Hence, no impact is predicted on ground water quality.
- The impact on water resources due to the proposed project is tabulated in **Table 7.2.**

Table 7.2: Impact on Water Resources due to the Proposed Project

Impacts due to construction	Indicators	Remarks
Loss of water bodies	Area of water bodies affected	Not affected in parallel section
Loss of other water supply sources	Number of well affected	Some tube-well and hand pumps may be shifted / compensated
Alteration of drainage, run-off, flooding	No. of cross drainage channels	May have impact on detour section, sufficient cross drainage structures are proposed
Depletion of ground water recharge	Decrease in water table depth	Not appreciable impact as water requirement is not very high
Use of water supply for construction	Quantum of water used	Not significant
Contamination from fuel and lubricants	Nature and quantum of contaminations	Not significant
Contamination from improper sanitation and waste disposal in construction camp	Area of camp/disposal site and proximity to water bodies/channels	Proper sanitation facilities at construction camp will minimize it

3) Operation Phase

- No impact is envisaged on water quality during the post construction phase as no waste water will be generated during operation. However, the facilities near the stations may release sewage water which shall be disposed in a properly designed treatment facilities.

7.3.7 Impact on Hydrological Condition (Rivers / Canal and Lakes)

1) Planning Phase

- No impact is envisaged on hydrological cycle during planning phase.
- There is no major river crossing the present alignment except River Kali & Hindon.
- Besides rivers, a number of canal also cross the proposed alignment.

2) Construction Phase

- Drainage and flooding problem during construction due to stockpiling of materials, debris and construction of temporary approach road and yards would have impact of temporary nature.
- Local drainage may be affected during construction phase due to formation of embankments. The slope of project alignment is towards east. During the construction phase the embankment should be designed in such a way that the natural drainage pattern is not disturbed in order to avoid any water logging in the low lying area.

- Drainage pattern of the area may be studied in detail and suitable management plan may be prepared in the detailed design stage.

3) Operation Phase

- Local drainage is likely to be affected due to the formation of railway embankment. However, sufficient number of cross drainage structure will minimize the impact.

7.3.8 Identification, Prediction & Evaluation of Impacts Due to Vibration

Vibrations are a complex phenomenon. Railway vibrations are generated by motion of heavy loads on tracks. Vibrations become more complex as speeds of motion change. Further complications are introduced by complex scenarios of multiple trains running in the same or opposite directions to each other. Vibrations require a medium for their transmission. Any variation in the medium present between the track and point of impact plays a significant role and complicates the assessment further.

Most studies in other developed countries have ignored the variation due to multiple factors. Types of trains, speeds have always been considered by them. However impact of variations in medium (ground) between the track and point of impact has mostly not been included in these studies. It did not bring great inaccuracy in their estimations and predictions since a wide strip on both sides of the track was of only one kind / medium. They did not have the variety of the magnitudes as seen in India. The advantage of this simplicity was easy use of formulas and correlations in those studies.

In our study we have depended heavily on live data from real vibrations caused by trains based on earlier EIA study for DFCC projects. The highest vibration generating trains / speeds / loads / grounds and situations. These are all live values and are not estimations. Having picked up these values, graphical extrapolation is used to estimate the vibration levels for train speeds of 100 Km / Hr. Thereafter standard mathematical calculations have been applied to estimate the vibration levels due to multiple trains running together.

Chapter-4 provided a detailed justification for using Japanese As standards JIS Z8735 and JIS 1510 and further explored the laws relating to factory act, labor laws and laws for occupational health for co-relating norms. We have however not found any standards or limits relating to building vibrations or human annoyance due to vibrations. Most these laws cover are the whole body or hand arm vibrations caused by tools and equipment used by the workers. So remained aligned to Japanese standards quoted above and have used Db as units of measurements. This unit also helps in calculating combined effect of two adjacent vibration levels by way of simple formula. The formula used is

$$L_{maxeq} = L_{max} \text{ track } 1 - L_{max}\text{track2} + L_{max} \text{ track } 3$$

As no. of variables existing in this study are over a dozen we have not used co-relational equations as we expected it to introduce mathematical errors in the calculations. Instead we depended on Real time values and graphical assessment and extrapolation.

Methodology: The study has following steps:

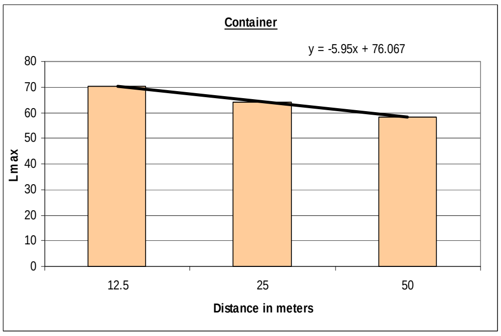
1. Identification of Impacts of Freight trains having different kinds of wagons.
2. Identification of category of train (wagons) causing highest vibrations.
3. Identification of impact of train speeds on vibrations.
4. Identification of impact of train axle loads on vibrations.
5. Identifying highest vibration level from above data.

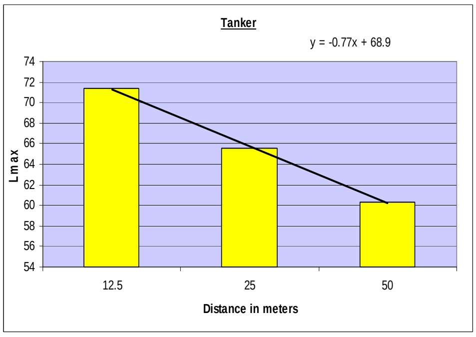
6. Extrapolating this highest level of vibration for train speed of 100 Km / Hr.
7. Calculation of change in this value of vibration of single train due to presence of multiple trains running together.
8. Purifying this highest value for any effects of medium variation between the track and measurement point.
9. Predicting the Maximum vibrations for plain route and for populated areas.
10. Transposing vibration levels so estimated on to Sensitive Receptors identified and predicting the impact.

Identification of Impacts: Identified kind of impacts from the data collated in previous chapters could be of following types typically:

1. Impacts in plain areas i.e travel of vibration; reverberations at 90 degree to the track will affect all the buildings, archeological monuments, inmates of the building. These variations in vibrations could be due to following factors;
   - Distances from the track
   - Speed and
   - Axle loads
   - Train Crossings
2. Impacts due to train crossings i.e. trains while crossing each other or while running parallel to each other in 2 or more numbers cause overall vibrations to increase or reduce. This aspect is to be taken into consideration for estimating maximum impacts in each of the above two situations.
3. Impacts in populated Areas i.e. travel of Vibrations, reverberations through the variety of ground conditions existing between the track and point of measurement / impact assessment. Varieties existing included mix of plain, embankment, hard standing platform of building floors, and roads.

Impacts in Plain areas vis a vis distances from the track: The existing distance based vibration levels being generated by the trains is compared running on the existing tracks. For the four categories of freight trains considered by us, the levels of vibrations generated in plane areas are given below in Figure 7.1





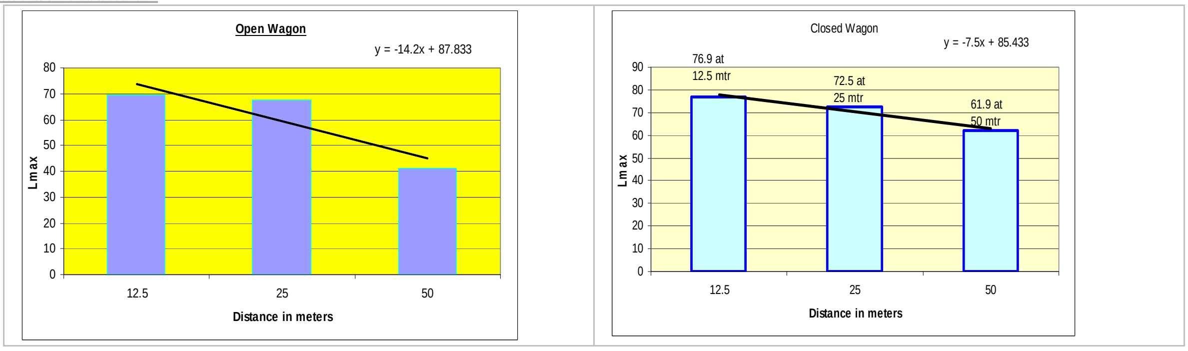


Figure 7.1: The Levels of Vibrations Generated in Plane Areas

From the graphs above, the highest vibration levels of all the categories of train for one distance (say 12.5 or 25 or 50 meters) as the upper limit for that distance, for estimating the impact at 90 degree to the track. This is tabulated below.

Distance	Maximum dB
12.5	76.9
25	72.5
50	61.9

These values for all the three distances coincidentally correspond to only one categories of freight train that is **Closed Wagon**; Graph for this is given below in figure 7.2.

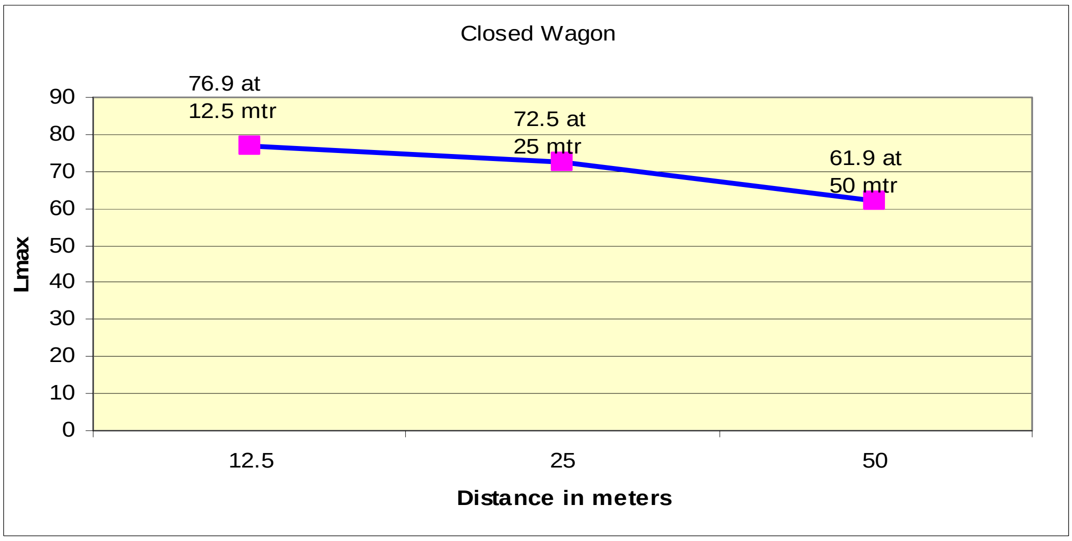


Figure 7.2: Graph for Closed Wagon

Impacts with speed and axle load: These were identified for

- maximum speeds of trains in each category as well as for
- maximum vibration in these categories and are as placed below:

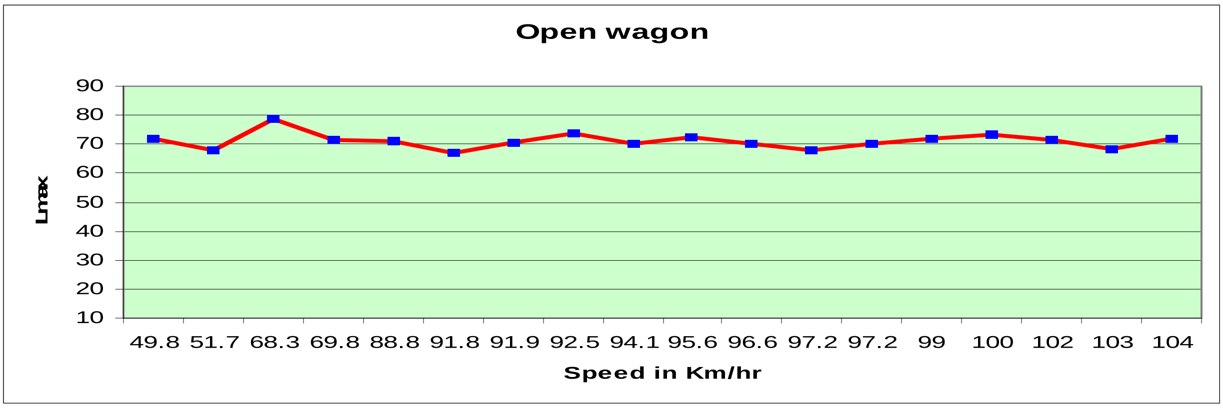


Figure 7.3: Graph for Maximum Vibration

The single occurrence of high vibrations of above 78 dB level looks to be an isolated occurrence in the graph so this isolation is to be eliminated to purify the data. Purifying the above graph the new graph is given below in figure 7.4 & 7.5: The highest vibration in this case has come down substantially.

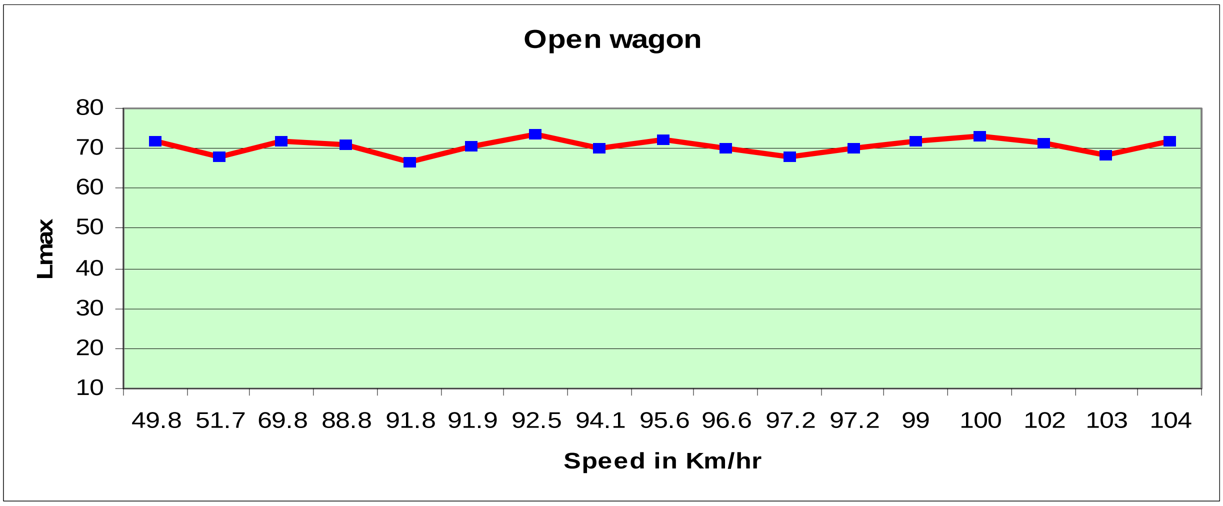


Figure 7.4: Graph of single occurrence of high vibrations for open wagon

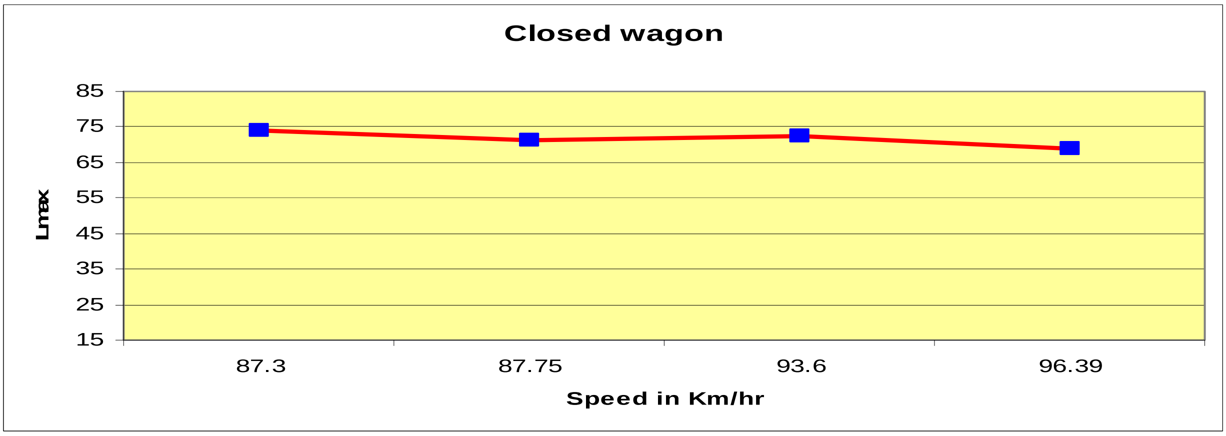
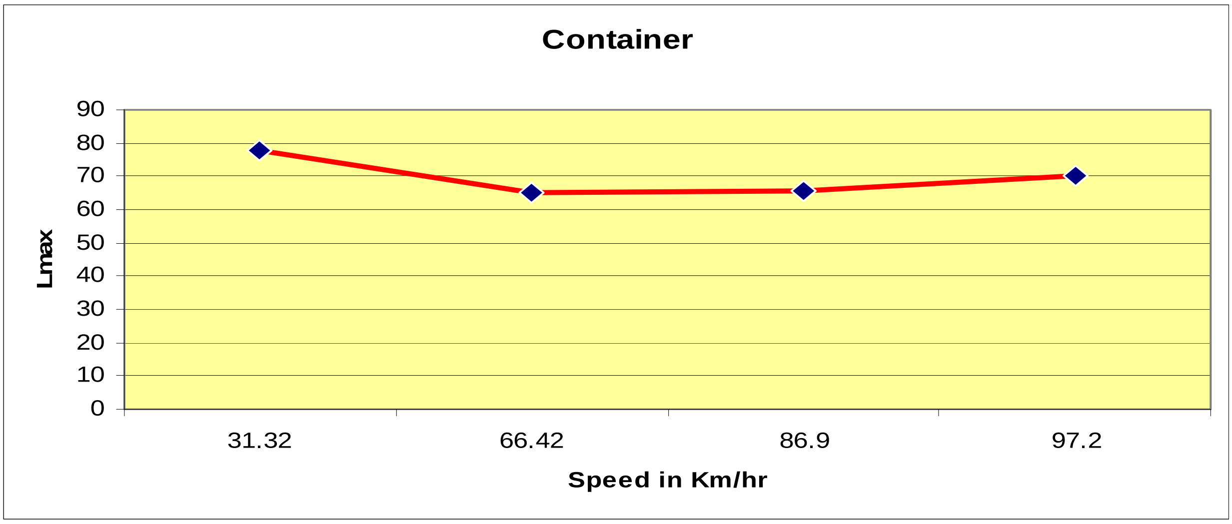
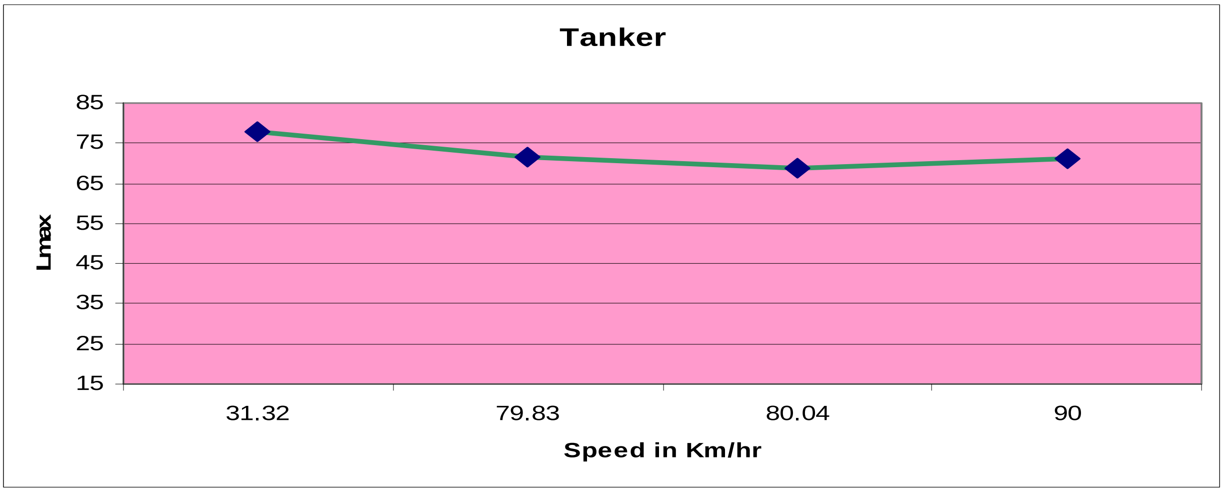


Figure 7.5: Graph of single occurrence of high vibrations for closed wagon

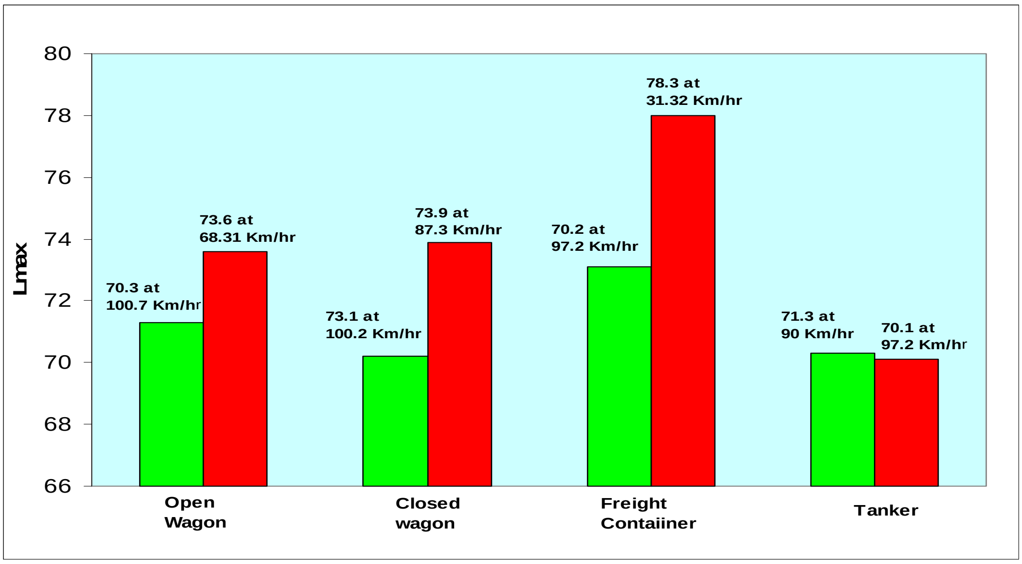




Patterns Identified Here plotted two kinds of patterns

- Relating to Vibration levels corresponding to the maximum speed of the train considered in each category and
- The maximum vibration levels in each category irrespective of speed

Both these patterns are depicted in the figure below:



It is apparent that the maximum vibrations are not occurring on maximum speeds but at other speeds. Highest vibrations were found to occur for closed wagons and Containers. The total variations across train categories however are of the order of 8-10 dBs

Impacts of Two Train Crossings (In Parallel Section)

The data available includes several occasions of crossings of trains. These are in the form of Passenger – Passenger crossing (P-P), Passenger – Freight crossing (P-F), Freight – Passenger Crossing (F-P) and Freight – Freight crossing (F-F). These crossings are representation of similar crossing likely to take place on DFC on parallel tracks. F-F crossing is representation of similar crossing on detours. It is observed that the maximum vibration for two trains crossing occurred at 12.5 was 71.8 dB.

Impacts in populated areas on residential / commercial / Industry/ Social structure: It is quite possible to generate charts for residential/ industrial / commercial complexes including sensitive receptors. However it will not be completely appropriate to use these graphs for assessing impacts on other buildings etc along the track. The variation will be due to dis-similarities of the grounds between the railway track and point of measurement for different structures considered for estimation of impacts. Additionally, impact of vibration caused by road traffic and other movements in corresponding locations may further complicate the estimation. The impact on sensitive receptors are calculated and presented in **Table 7.6**.

Prediction of Impacts

The vibration measurements carried out fall into two groups broadly: For the portion of corridor that will run parallel to the existing track and portion of the corridor that will go through the detours. Parallel track, running of the trains will engage maximum of three parallel tracks. Of these one would be occupied by the freight trains and two by Passenger trains. At present Khurja-Meerut IR has single track & beyond Meerut doubling is in process. The corridor will be completely together and will be parallel to the existing track. Average distance between the centre of passenger and freight trains is expected to be 15 meters

Calculations

Check for vibrations for 100 Km/Hr train speed: By examining the trend of change in Vibration Levels with the increase in speed in the graphs in previous sections we notice that in most cases the vibration levels reduce with Increase in speed except for the Freight Containers. We have extrapolated this trend of vibration of freight container & estimated the **vibration level at 100 km/hr to be 74 dB**. This however is lower than the maximum vibration level for single freight train being considered by us.

Check for multiple train running: From the measurements and graphs as discussed earlier the maximum level of Vibrations occurring for any Freight container Train on any track and at 12.5 mts from the center of the concerned track (Container) = **78.3 dB**

The Mathematically Attenuated value calculated for vibration at 35 meters in reference to the train running on the 3rd track = **75.8 dB** (Refer variation of vibrations with distance for containers) Combined effect of these two Vibration Levels at the same measurement location that is 12.5 meters from the nearer track can be calculated as follows.

$$\mathbf{Lmax_{eq} = Lmax_{track\ 1} - Lmax_{track2} + Lmax_{track\ 3}}$$

In the light of this discussion for predictions, **78.3 dB** as highest vibrations for freight trains have been used in our calculations below.

Predicted Vibration Levels for multiple trains running together– These estimations workout as below.

<u>On DFC side of parallel Track</u>

1. On the freight corridor side, two freight trains running in opposite directions with a gap of 5 meters from each other.
   - Highest value of Vibration level by one freight train = **78.3dB**
   - This level attenuated to 17.5 mts for second freight train = **74.5 dB**.

For these trains running in opposite directions, resultant level is difference of the 2 vibration levels.

$$\mathbf{Lp_{F\text{-}F} = 10*log\ (10\char`^(78.3/10)-10\char`^(74.5/10)) = 75.9\ dB}.$$

2. One freight train running closer to the 12.5 mts measurement point in the same direction from a passenger train 10 mts away
   - Highest value of Vibration level by one freight train = **78.3**
   - Highest value of Vibration level of passenger train attenuated to 35mtrs = **75.9**

Since both the trains are running in same direction the relevant level will be addition of the two levels

$$\mathbf{Lp_F + Lp_{Psngr} = 10*log\ (10\char`^\ (78.3/10) + 10\char`^\ (75.9/10)) = 80.2}$$

3. A Freight train running on the 2nd track farther from the 12.5 meter measurement point and a passenger train running opposite to its direction in the third track.
   - Highest value of Vibration Level of Passenger train attenuated to 35 meters = **75.9**
   - Highest Value of Vibration level by one Freight train attenuated to 20 meters = **74.5**

Since the trains are running in opposite directions. Therefore, resultant value is difference of the 2 vibration levels.

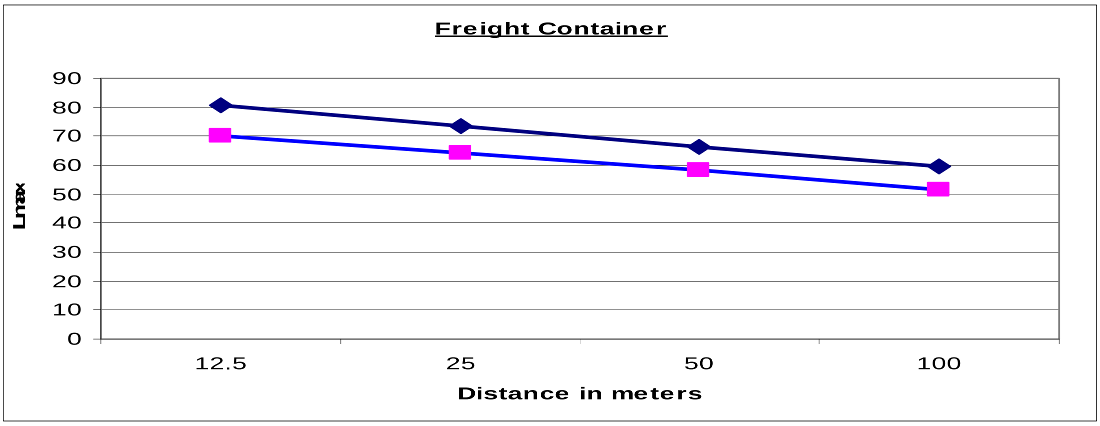
$$\mathbf{Lp_{F\text{-}P} = 10*log\ (10\char`^\ (75.9/10)-10\char`^\ (74.5/10)) = 70.3\ dB}$$

Predicted highest Vibration Levels for the Detour track – These estimations workout as below.

For the detour locations the scenario will always be two Freight trains crossing each other in opposite directions for which we have calculated highest Vibration level as **74.5 dB** at 12.5 meters measurement point, when the interfacing ground is plain ground.

However this value is lower than the highest Vibration Levels generated by running of Single Freight train.

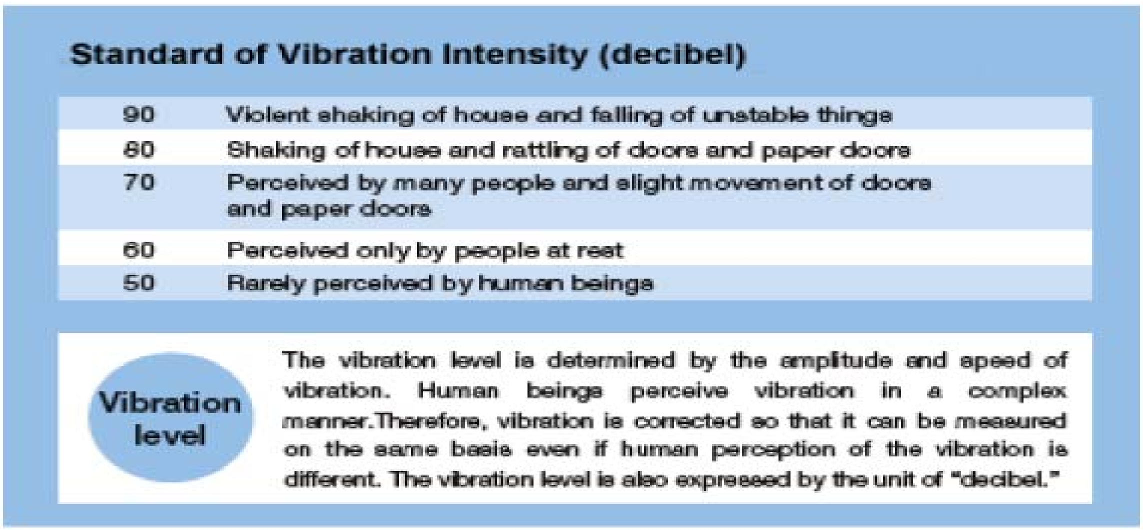
Therefore predicted highest vibration levels for the detour portions = **74.5dB** at 12.5 meters from nearer track for freight containers. These being below the vibrations estimated for parallel track, remain irrelevant. Please refer the graph below.



Evaluation of Impact

Based on the predicted values, evaluation of the impacts has been carried out in following steps:

1. We have examined the Japanese standards for Permissible Vibration values in Habituated and Plane areas. The pictorial information in this regard which also includes the level of complaints received by procure department of railway vibration in 2006 is displayed below;
2.



Standard of Vibration Intensity (decibel)

90	Violent shaking of house and falling of unstable things
80	Shaking of house and rattling of doors and paper doors
70	Perceived by many people and slight movement of doors and paper doors
60	Perceived only by people at rest
50	Rarely perceived by human beings

Vibration level

The vibration level is determined by the amplitude and speed of vibration. Human beings perceive vibration in a complex manner.Therefore, vibration is corrected so that it can be measured on the same basis even if human perception of the vibration is different. The vibration level is also expressed by the unit of "decibel."

3. From the extract above it is apparent that standards 70 dB vibration level defines the acceptability criteria in general, however in densely habituated areas the lower level will have to be allowed based on these criteria the permissible limits for vibrations are provided below.

As worked out in the prediction process above, various highest vibration levels likely to occur in different portions of the DFC are as below:

Plain route: 80.2 as against permissible levels of 70dB

Populated areas 80.2 as against permissible levels of 65dB

Therefore vibration levels have to be reduced by
10.2 dBs – for Plain areas
15.2 dBs – Populated areas
10.2 to 15.2 dBs – plain / SR area

4. Prediction of Impacts on Sensitive Receptors (School & Hospitals) based on the methodology described above has been carried out. The SRs have been identified during survey of the track alignment. From these listed receptors, those falling within the track alignment have been eliminated as they would require removal replacement or shifting. The balance receptors which are RHS/LHS of Tracks have been listed and predicted levels have been estimated. The highest predicted values are at Madrasa is 77.3 dB followed by Madrasa is 77.3 dB and Vedmani hospital having value of 74.9 dB . These details are given in **Table 7.6.** The results shows that highest predicted values are not significant in terms of impacts however using mitigation measures such as efficient track & wheel maintenance, resilient fastners etc. will further reduce the impact upto 7.5 dB.

Table 7.6: List of sensitive Receptors and Predicted Vibration Levels on them

Sr. No.	Name of sensitive Receptors	Latitude	Longitude	Distance from Existing Track	Side	Predicted Max. Vibration Levels(dB)
1	Krishna Hospital	28 24.045N	77 50.915E	60	RHS	60.6
2	Vedmani hospital	28 24.646N	77 50.555E	23	RHS	74.9
3	Vet Hospital	29 16.690N	77 44.375E	74	RHS	55.2
4	hospital	29 16.825N	77 44.400E	85	RHS	51.9
5	Lal Bhadur shastri Vidalaya	28 15.361N	77 50.837E	89	RHS	51.1
6	All Saint School	28 24.540N	77 50.562 E	70	RHS	56.8
7	Primary School	28 26.308N	77 49.765E	78	LHS	53.6
8	School	28 33.178N	77 47.811E	74	LHS	56.2
9	Madsra Hazarat Zainab	28 33.208N	77 47.865E	20	RHS	77.3
10	Primary School, Hridyapur	28 37.673N	77 47.686E	55	RHS	62.5
11	School, Murshadpur	28 38.465N	77 47.341E	89	RHS	49.4
12	HK inter college Sakoti	29 10.980N	77 43.136E	30	RHS	75.4
13	Kusum Public School	29 10.461N	77 42.952E	50	RHS	64.5
14	Madrsa sakoti	29 10.938N	77 43.058E	65	RHS	56.7
15	SMHSS- High School, Sakoti	29 11.546N	77 43.186E	70	RHS	56.8
16	Janta Inter college	29 16.640N	77 44.352E	89	RHS	49.4
17	Tilak ram inter college	29 16.825N	77 44.400E	85	RHS	51.9
18	Star Public School	29 56.932N	77 33.503E	40	LHS	60.1

Sr. No.	Name of sensitive Receptors	Latitude	Longitude	Distance from Existing Track	Side	Predicted Max. Vibration Levels(dB)
19	Saharanpur Public School	29 56.929N	77 33.463E	80	LHS	52.8
20	Girls school	29 58.026N	77 31.831E	72	RHS	56.0
21	Inter College	29 58.141N	77 32.064E	83	RHS	51.7

7.3.9 Prediction and Evaluation of Imapct on Noise alongside Railway Lines

The detailed railway noise survey was conducted at 15 locations along the existing railway track as well as detour locations. The result shows that during train operation along the railway track the noise level always exceeds the statutory limit; however, at detour locations the noise levels are less and within the statutory limits. For the prediction purposes, the highest noise level i.e. 82.5 dB(A) recorded at 12.5m from the centre of the existing track used as a reference for maximum noise level prediction.

Examination of Prediction Method

1) Railway Noise

Regarding railway noise generated by conventional trains (local trains, express trains and limited express trains), main causes include (1) traction movements, (2) structures and (3) machines equipped to the train. Among them, the traction movement contributes to the generation of noise greatly.

Several types of prediction equations were proposed for various types of railway track structures, such as the elevation, embankment and cutting.

Therefore, prediction was carried out applying the actual data of railway noise level, running speed (V) of trains, and the distance from center of the nearest railway track (D).

Based on the obtained the data of railway noise, the empirical equation was extracted by using a simple regression and correlation analysis. The following equation is used for noise prediction.
Assuming V is constant, D is only one variable, and the empirical equation is shown below. A predicted railway noise level is shown in the below table.

$$L_2 = L_1 - 20 \text{ Log } D_2/D_1 \qquad \text{------------- (1-1)}$$
$$L_{Aeq} = 10 \text{ Log } (10^{N1/10} + 10^{N2/10} + 10^{N3/10} + \ldots\ldots)/T$$

Where,
L_1 and L_2 are the noise levels at D_1 and D_2 distance.
N_1, N_2, N_3 are the noise pressure levels at a different time interval. T is the number of reading.
Reference: JICA Study on DFCC Corridor

2) Condition of Prediction

Following conditions are assumed:

- Type of traction: electrified traction (electric locomotive)
- Running operation: 50 trains/direction/day with the same time interval (approximately one train for every five minutes)
- Maximum running velocity: 100 km/h

- Majority of the existing railway line structures is the embankment structures with approximately 2 to 5 m high from the ground level at the site.
- Railway noise and vibration generation level due to planned dedicated freight train; remains the same as the existing freight train,
- DFCC plan would have various factors contributing to reduction in railway noise.

3) Prediction and Evaluation Points

- Sites along the existing railway lines within the parallel sections of the DFCC Project.
- Sites along the planned detour routes where no railway noise was observed as a reference point of the background level monitoring.

4) Prediction and Evaluation Results

Prediction of Railway Noise Levels

Estimated noise levels (L_{Aeq}) were evaluated by comparing with (i) the ambient noise standard in India, (ii) existing ambient noise levels at SR and (iii) existing railway noise at SR. The noises level predicted are presented in **Table 7.7**.

Table 7.7: Prediction of Noise Level on Sensitive Receptors

Sr. No.	Name of sensitive Receptors	Latitude	Longitude	Distance from Existing Track	Side	Predicted Max. Noise Levels in dB(A)
1	Krishna Hospital	28 24.045N	77 50.915E	60	RHS	68.87
2	Vedmani hospital	28 24.646N	77 50.555E	23	RHS	77.20
3	Vet Hospital	29 16.690N	77 44.375E	74	RHS	67.05
4	hospital	29 16.825N	77 44.400E	85	RHS	65.84
5	Lal Bhadur shastri Vidalaya	28 15.361N	77 50.837E	89	RHS	65.45
6	All Saint School	28 24.540N	77 50.562 E	70	RHS	67.54
7	Primary School	28 26.308N	77 49.765E	78	LHS	66.60
8	School	28 33.178N	77 47.811E	74	LHS	67.05
9	Madsra Hazarat Zainab	28 33.208N	77 47.865E	20	RHS	78.42
10	Primary School, Hridyapur	28 37.673N	77 47.686E	55	RHS	69.63
11	School, Murshadpur	28 38.465N	77 47.341E	89	RHS	65.45
12	HK inter college Sakoti	29 10.980N	77 43.136E	30	RHS	74.89
13	Kusum Public School	29 10.461N	77 42.952E	50	RHS	70.46
14	Madrsa sakoti	29 10.938N	77 43.058E	65	RHS	68.17
15	SMHSS- High School, Sakoti	29 11.546N	77 43.186E	70	RHS	67.54
16	Janta Inter college	29 16.640N	77 44.352E	89	RHS	65.84
17	Tilak Ram inter college	29 16.825N	77 44.400E	85	RHS	65.45
18	Star Public School	29 56.932N	77 33.503E	40	LHS	72.39
19	Saharanpur Public School	29 56.929N	77 33.463E	80	LHS	66.37
20	Girls school	29 58.026N	77 31.831E	72	RHS	67.29
21	Inter College	29 58.141N	77 32.064E	83	RHS	66.05

5) Analysis of Evaluated Results

The noise levels have been predicted at all the sensitive receptors located up to 100 m from the centre of the proposed track. The predicted noise level shows that noise level is considerably high at all the locations up to 100 m from the centre of the track. However, no barrier has been considered during the prediction, therefore, the actual noise level may be less due to attenuation of noise.

Railway lines are located in the urban area and city area and the existing noise levels are already higher so it is recommended that DFCC alignment should avoid the urban and city areas not to increase the noise levels.

Although in the detour routes the impacts to residents would be small, the railway noise would be newly added to the residents' life, and the appreciate mitigation measures should be prepared for residences along the railway line.

In the detour section, where the additional impact of the noise is large, it is suggested to adopt necessary mitigation measurement such as providing the green belt and establishing soundproof walls in the Detailed Design stage.

7.4 IMPACT ON BIOLOGICAL ENVIRONMENT

7.4.1 Impact on Flora

1) Planning Phase
- Tree plantation of local species is proposed during planning stage at appropriate places along the alignment.

2) Construction Phase
- The construction activity involving clearing of site, felling of trees, settlement of construction camps and office is likely to affect the flora of the area.
- The proposed alignment may cause cutting of approx. 19013 trees and 109 hactares of protected forest (nos of trees includes the trees within the protected forest). The major species present along the alignment are babool, neem, shisam, papal, mango, bargad, kanji, labhera, ashok, sirsa, guler, jamun, ber, eucalyptus, mahua and bel.
- Tree Cutting and construction activity likely to disturb the habitat. However, the no reserve forest land is involved; there will be no specific impact in terms of habitat loss etc.
- The species within the study area do not fall under the rare, threatened and/or endangered category, and are common in distribution.

3) Operation Phase
- No impact envisaged on flora during post construction phase. However, development of the green belt is suggested near stations and maintenance of plantation may be undertaken by Railway Dept. Plantation carried out along the alignment and as compensatory approx. plantation is likely to enhance the ecological condition of the area.

7.4.2 Impact on Fauna

1) Planning Phase
- No impact envisaged on fauna in planning phase as there is no wildlife sanctuary / national park is falling in the proposed alignment.

2) Construction Phase

- Nilgai-Boselaphus tragocamelus is the most common wildlife found in the study area. Construction activity is likely to affect the movement of the animal. However, to compensate, sufficient number of underpasses are provided at the detour section.
- Felling of aprox. 19013 trees is likely to affect the habitat of avifauna. However, the impact is not significant as it’s a linear project and tree cutting spread in 220Km length. Also tree cutting is being carried out only in left side and similar patten of plantation exists in right side of alignment
- Any construction near water bodies may impact the aquatic life. However no major water bodies are significantly affected due to this project.
- The impact on habitat is likely to be permanent, as the DFC will fragment the area which will restrict the movement of animals on either side.

3) Post Construction Phase

- The movement of freight train is likely to restrict the movement of animal on either side of the track, specifically in the detour section.
- Possibilities of collision of domestic animals with freight train.
- Exposure of domestic animals due to the noise produced during the passage of trains.

7.5 IMPACT ON SOCIO-ECONOMIC ENVIRONMENT

The proposed project will contribute in social and economic development of the region. No negative social impact is anticipated except minor land acquisition and relocation of few structures. The proposed projects shall result in increased employment opportunities for local people during construction stage. Immigration of work force during construction phase is likely to be very less. The demographic configuration will be largely unchanged since majority of the workers will be from local population. Bottlenecks at level crossings where traffic congestion is high shall be removed by providing road over bridges. Underpasses near sensitive locations and where there is habitation on both sides shall reduce accident risks and improve social interaction between communities.

During operation phase of the project, significant socio-economic development will take place in the region. The proposed project will enhance the traffic scenario by providing ROBs and flyovers.

7.5.1 Impact on ASI Protected Monuments

No ASI protected monument is going to be affected by the project alignment. However, any Chance finding of archeological importance shall be reported to ASI as Ancient Monument and Archaeological sites and Remains (Amended & validation) Act, 2010 and would be notified/surrendered to the Competent Authority. Meerut region shall be specifically taken care during excavation.

Other Sensitive Structures

A number of sensitive structures will be impacted as described in Table 4.1 Sensitive receptors include school, hospitals and religious structures. Some of the sensitive receptors need to be completely shifted and some are impacted due to noise and vibration at the time of railway operation Appropriate mitigation measures shall be undertaken as suggested in Chapter-8.

7.5.2 Impact due to Construction of Freight Station, Electric-sub Stations, Various Signaling Facilities etc.

Various developments are proposed as components of the EDFC like crossing station, electrical sub-stations, signaling facilities etc. Detailed impact assessment of each of such facility has been carried out and is briefed in Table 7.3 belowTable 7.3: Impact Assessment of Proposed Facilities for EDFC (Khurja-Pilkhani Section)

S. No.	Development	Photograph	Baseline	Anticipated Impact	Mitigation & Management Measures
1.	Crossing Station-P1 (Parallel)/New Khurja City, Chainage: 5.25 km		Topography of the surrounding area is plain. Landuse is dominated by agricultural land. There are only 2 to 4 Trees were observed near the Track. Mainly shrubs were found along the track. No water body is found close by	• Tree cutting & vegetation removal • Change in land cover • Increased run-off • Integrity of existing railway line may be impacted	• Compensatory plantation as per state forest policy & development of green area • Storm water drainage and RWH pit should be provided • Adoption of water conservation fixtures like dual flushing cisterns, sensor based taps in toilets • Installation of CFL & LED for lighting in plae of conventional lights • Maintaining minimum distance for all developments from existing IR track
2.	Crossing Station-P2 (Parallel)/New Maman Chainage: 16.45 km		Topography of the surrounding area is slightly undulating. Land use is dominated by Open shrub and grass land. There are 50 to 60 Trees were observed at a distance of 60 to 70 Meters from the track. No trees were observed near the railway track. There is canal and a bridge at a distance of 50 Meters from the Proposed Railway crossing station.	• Tree cutting & vegetation removal • Change in land cover • Increased run-off & degradation of quality of canal water during construction phase • Integrity of existing railway line may be impacted	• Compensatory plantation as per state forest policy & development of green area • No construction activity to be undertaken during monsoon, pits or activity area should be covered during rains. Temporary garland drains should be constructed around the excavated pits or activity area to prevent ponding of storm water in pit during rains • Storm water drainage and RWH pit should

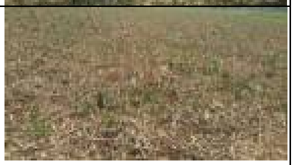
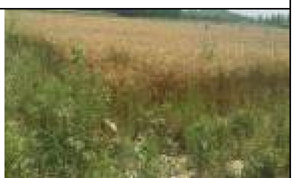
S. No.	Development	Photograph	Baseline	Anticipated Impact	Mitigation & Management Measures
					be provided • Adoption of water conservation fixtures like dual flushing cisterns, sensor based taps in toilets • Installation of CFL & LED for lighting in plae of conventional lights • Maintaining minimum distance for all developments from existing IR track
3.	Crossing Station P3 (Parallel)/New Bulad Shahar Chainage: 26.55 km		Topography of the surrounding area is plain. Land use is dominated by habitation on both the sides. There are only 2 to 5 Trees were observed near the track. There is no water body observed near the site.	• Tree cutting & vegetation removal • Change in land cover • Increased run-off • Integrity of existing railway line may be impacted	• Compensatory plantation as per state forest policy & development of green area • Storm water drainage and RWH pit should be provided • Adoption of water conservation fixtures like dual flushing cisterns, sensor based taps in toilets • Installation of CFL & LED for lighting in plae of conventional lights • Maintaining minimum distance for all developments from existing IR track
4.	Crossing Station-P4 (Parallel)/New Chaprawat Chainage: 39.50 km		Topography of the surrounding area is plain. Land use is dominated by agricultural and open shrub land. There are 50 to 60 Trees were observed at a distance of 70 to 100 from the track. No water body is found near the alignment.	• Tree cutting & vegetation removal • Change in land cover • Increased run-off • Integrity of existing railway line may be impacted	• Compensatory plantation as per state forest policy & development of green area • Storm water drainage and RWH pit should be provided • Adoption of water conservation fixtures like dual flushing cisterns, sensor based taps in toilets

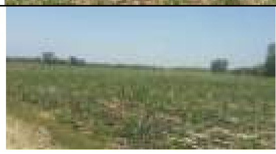
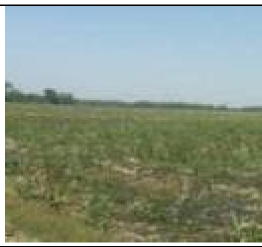
S. No.	Development	Photograph	Baseline	Anticipated Impact	Mitigation & Management Measures
					• Installation of CFL & LED for lighting in plae of conventional lights • Maintaining minimum distance for all developments from existing IR track
5.	Crossing Station P5 & IMSD (parallel)/New Gulaothi Chainage: 47.85 km		Topography of the surrounding area is plain. Land use is dominated by agricultural land. There are 50 to 70 Trees were observed at a distance of 50 to 80 from the Track. No water body is found nearby.	• Loss of agriculture land • Tree cutting & vegetation removal • Change in land cover • Increased run-off • Integrity of existing railway line may be impacted	• Compensatory plantation as per state forest policy & development of green area • Storm water drainage and RWH pit should be provided • Adoption of water conservation fixtures like dual flushing cisterns, sensor based taps in toilets • Installation of CFL & LED for lighting in plae of conventional lights • Maintaining minimum distance for all developments from existing IR track
6.	Crossing Station P6 & IMSD (parallel)/New Sakoti Chainage: 88.25 km		Topography of the surrounding area is plain. Landuse is dominated by agricultural and open shrub land. There are 40 to 60 Trees were observed at a distance of 70 to 100 from the Track. No water body is found.	• Tree cutting & vegetation removal • Change in land cover • Increased run-off • Integrity of existing railway line may be impacted	• Compensatory plantation as per state forest policy & development of green area • Storm water drainage and RWH pit should be provided • Adoption of water conservation fixtures like dual flushing cisterns, sensor based taps in toilets • Installation of CFL & LED for lighting in plae of conventional lights • Maintaining minimum distance for all

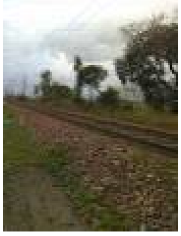
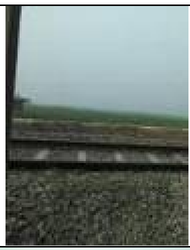
S. No.	Development	Photograph	Baseline	Anticipated Impact	Mitigation & Management Measures
					developments from existing IR track
7.	Crossing Station P7 (parallel)/New Khatauli Chainage: 97.25 km		Topography of the surrounding area is plain. Land use is dominated by Habitation on both the sides. There are only 1 to 2 trees observed near the Track. No water body is found.	• Tree cutting & vegetation removal • Increased noise levels during construction phase • Integrity of existing railway line & structures/ houses may be impacted • Increased risk of accidents at construction site • Disturbance to local movement & activities	• Compensatory plantation as per state forest policy & development of green area • Storm water drainage and RWH pit should be provided • Adoption of water conservation fixtures like dual flushing cisterns, sensor based taps in toilets • Installation of CFL & LED for lighting in plae of conventional lights • Maintaining minimum distance for all developments from existing IR track • Construction works to be carried out during day time only • No roads or passage should be blocked • Raw material should not be piled at site and should be stored under covered sheds only • Construction site should be barricaded from all site and entry to the site should be restricted for authorized personnel • Cautionary boards & signage should be displayed near LC indicating about construction work for awareness of people

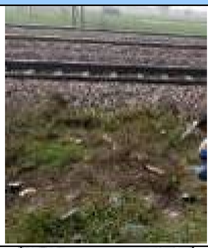
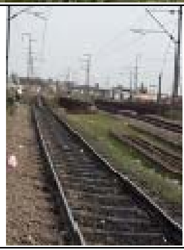
S. No.	Development	Photograph	Baseline	Anticipated Impact	Mitigation & Management Measures
8.	Crossing Station P8 (parallel)/New Mansurpur Chainage: 107.25 km		Topography of the surrounding area is plain. Land use is dominated by agricultural and protected forest land. There are 50 to 60 Trees were observed near the Track No water body is found. One Existing Railway crossing is also observed at a distance of 100 Meters from the proposed Railway crossing station.	• Loss of protected forest • Tree cutting & vegetation removal • Change in land cover • Increased run-off • Integrity of existing railway line may be impacted	• Compensatory plantation as per state forest policy & development of green area • Storm water drainage and RWH pit should be provided • Adoption of water conservation fixtures like dual flushing cisterns, sensor based taps in toilets • Installation of CFL & LED for lighting in plae of conventional lights • Maintaining minimum distance for all developments from existing IR track
9.	Crossing Station P9 (parallel)/New Talheri Bujurg Chainage: 155.35 km		Topography of the surrounding area is plain. Land use is dominated by agricultural land. One Existing Railway crossing is observed at proposed crossing station	• Loss of agricultural land • Tree cutting & vegetation removal • Change in land cover • Increased run-off • Integrity of existing railway line may be impacted • LC and other roads should not ne blocked • Increased risk of accidents at constructio n site • Disturbanc e to local movement & activities • Increased noise level	• Compensatory plantation as per state forest policy & development of green area • Storm water drainage and RWH pit should be provided • Adoption of water conservation fixtures like dual flushing cisterns, sensor based taps in toilets • Installation of CFL & LED for lighting in plae of conventional lights • Maintaining minimum distance for all developments from existing IR track • Construction site should be barricaded from all site and entry to the site should be restricted for authorized

S. No.	Development	Photograph	Baseline	Anticipated Impact	Mitigation & Management Measures
					personnel • Cautionary boards & signage should be displayed near LC indicating about construction work for awareness of people • Construction works to be carried out during day time only • No roads or passage should be blocked • Raw material should not be piled at site and should be stored under covered sheds only
10.	Crossing Station P10 (parallel)/New Talheri Bujurg Chainage: 170.00 km		Topography of the surrounding area is plain. Land use of the area is agriculture. A road crossing is observed near to proposed crossing station location	• Loss of agriculture land • Tree cutting & vegetation removal • Change in land cover • Increased run-off • Integrity of existing railway line may be impacted	• Compensatory plantation as per state forest policy & development of green area • Storm water drainage and RWH pit should be provided • Adoption of water conservation fixtures like dual flushing cisterns, sensor based taps in toilets • Installation of CFL & LED for lighting in plae of conventional lights • Maintaining minimum distance for all developments from existing IR track
11.	Crossing Station P11 (parallel)/New SRE Chainage: 184.030 km		Topography of the surrounding area is plain. Station is proposed at agriculture land and the area is surrounded by settlements.	• Loss of agriculture land • Tree cutting & vegetation removal • Change in land cover • Increased	• Compensatory plantation as per state forest policy & development of green area • Storm water drainage and RWH pit should be provided • Adoption of water

S. No.	Development	Photograph	Baseline	Anticipated Impact	Mitigation & Management Measures
				run-off • Integrity of existing railway line may be impacted	conservation fixtures like dual flushing cisterns, sensor based taps in toilets • Installation of CFL & LED for lighting in plae of conventional lights • Maintaining minimum distance for all developments from existing IR track
12.	Crossing Station-D1 (MTC Detour)/Raghunath pur Chainage: 10.45 km		All Detours Railway crossings are dominated by Agricultural land. Topography of the area is almost plain. They are away from the water bodies and selected mainly in agricultural land with least tree cutting.	• Loss of agriculture land • Loss of livelihood due to loss of agricultural land • Tree cutting & vegetation removal • Change in land cover & generation of paved surfaces • Increased run-off • Increased risk of accidents at construction site • Disturbance to local movement & activities • Increased noise level	• Compensatory plantation as per state forest policy & development of green area • Compensation should be given to land owners as per land acquisition policy of the project • Storm water drainage and RWH pit should be provided • Adoption of water conservation fixtures like dual flushing cisterns, sensor based taps in toilets • Installation of CFL & LED for lighting in plae of conventional lights • Construction site should be barricaded from all site and entry to the site should be restricted for authorized personnel • Cautionary boards & signage should be displayed near LC indicating about construction work for awareness of
13.	Crossing Station-D2 (MTC Detour)/Kilhora Chainage: 19.95 km				
14.	Crossing Station-D3 (MTC Detour)/Saidpur urf Husainpur Dhilna Chainage: 30.85 km				
15.	Crossing Station-D4 (MTC Detour)/Mahroli Chainage: 39.55 km				
16.	Crossing Station-D5 (MTC Detour)/Govindpur urf Ghausoli Chainage: 51.25 km				
17.	Crossing Station-D6 (MTC Detour)/Ghesupur Baphawt, Chainage: 60.6 km				
18.	Crossing Station-D7 (MOZ Detour)/Jaroda Chainage: 5.11 km				

S. No.	Development	Photograph	Baseline	Anticipated Impact	Mitigation & Management Measures
19.	Crossing Station-D8 & IMSD (MOZ Detour)/Salempur, Chainage: 15.22 km				people • Construction works to be carried out during day time only • No roads or passage should be blocked • Raw material should not be piled at site and should be stored under covered sheds only
20.	Crossing Station-D9 (MOZ Detour)/Badhi Khurd, Chainage: 22.85 km				
21.	Crossing Station-D10 (MOZ Detour)/Gunarsa Chainage: 33.19 km				
22.	TSS-(Meerut Detour) Chainage: 8.2 km		The site is on agricultural land having flat topography and away from the water bodies. No tree cutting is involved.	• Loss of agriculture land • Loss of livelihood due to loss of agricultural land • Tree cutting & vegetation removal • Change in land cover & generation of paved surfaces • Increased run-off • Increased risk of accidents at construction site • Disturbance to local movement & activities • Increased noise level • Integrity of existing railway line may be impacted	• Compensatory plantation as per state forest policy but no tree plantation at the site. • Compensation should be given to land owners as per land acquisition policy of the project • Storm water drainage and RWH pit should be provided • Adoption of water conservation fixtures like dual flushing cisterns, sensor based taps in toilets • Installation of CFL & LED for lighting in plae of conventional lights • Construction site should be barricaded from all site and entry to the site should be restricted for authorized personnel • Cautionary boards & signage should be displayed near LC indicating about construction
23.	TSS-(MOZ Detour) Chainage: 13.8km		The site is on agricultural land having flat topography and away from the water bodies. No tree cutting is involved.		
24.	SSP-(Meerut Detour) Chainage: 23.2 km		The site is on agricultural land having flat topography and away from the water bodies. No tree cutting is involved.		
25.	SSP-(Meerut Detour) Chainage: 38.2 km		The site is on agricultural land having flat topography and away from the water bodies. No tree cutting is involved.		
26.	SP-(Meerut Detour) Chainage: 53.220 km		The site is on agricultural land having flat topography and away from the water bodies. No tree cutting is involved.		

S. No.	Development	Photograph	Baseline	Anticipated Impact	Mitigation & Management Measures
27.	SSP-(MOZ Detour) Chainage: 34.74 km		The site is on agricultural land having flat topography and away from the water bodies. 5 trees need to be cut.		work for awareness of people • Construction works to be carried out during day time only • No roads or passage should be blocked • Raw material should not be piled at site and should be stored under covered sheds only • Maintaining minimum distance for all developments from existing IR track
28.	SP-(KRJ-HZR) Chainage: 9.0 km		The site is on agricultural land having flat topography and away from the water bodies. 10 Babul tree need to be cut.		
29.	SSP-(KRJ-HZR) Chainage: 26.0 km		The site is on agricultural land having flat topography and away from the water bodies. 6 Khajur trees need to be cut.		
30.	SSP-(KRJ-HZR) Chainage: 42.0 km		The site is on agricultural land having flat topography and away from the water bodies. 2 Khajur tree need to be cut		
31.	SSP-(DRLA-MSP) Chainage: 90.0 km		The site is on agricultural land having flat topography and away from the water bodies. No tree cutting is involved.		
32.	SSP-(DRLA-MSP) Chainage: 110.10km		The site is on agricultural land having flat topography and away from the water bodies No tree cutting is involved.		
33.	SSP Chainage: 168.80 km		The site is on agricultural land having flat topography and away from the water bodies. 5 Babor & 2 Khajur tree need to be cut.		

S. No.	Development	Photograph	Baseline	Anticipated Impact	Mitigation & Management Measures
34.	SP Chainage: 179.550 km		The site is on agricultural land having flat topography and away from the water bodies No tree cutting is involved		
35.	SSP (Parallel) Chainage 155.5		The site is on agricultural land having flat topography and away from the water bodies No tree cutting is involved		

7.6 ENVIRONMENTAL MATRIX

Based of the potential impacts on natural resources in planning construction and operation phase an impact matrix has been created. The scale of impact is discussed above under individual parameter with mitigation measures. The Environmental Impact Matrix for pre-construction and construction stages are provided in **Table 7.3** and **7.4**.

Most of the impacts are localized, insignificant and temporary in nature, except those related to noise and vibration during the operation phase.

Table 7.3: Impact Matrix (Pre-Construction & Construction Stage)

Sr. No.	Items	Overall Evaluation on the Project	Pre-construction Stage			Construction Stage											
										Construction Works for railway line and related structures							
			Surveying of Planned Areas and Sites	Selection of the Project Location and Sites	Land Acquisition and Resettlement	Extraction of Building Materials (stones, aggregates, sand, soil, etc.) at Quarries and Borrow Areas	Earth Moving: Cutting and Filling of the Construction Works	Preparation of Construction Plants, and Warehouses, Work Camps, etc.	Operation of Construction Plants, Machines and Vehicles for Construction Works	(A) Construction Works for Railway Lines and Installation of Related Facilities (signals, rails, etc.)	(B) Construction Works for ICDs and Freight Logistic Parks	(C) Construction Works for Stations (Terminal, Junction and Crossing)	(D) Construction Works for ROBs and RUBs	(E) Construction Works for Bridges	(F) Construction Works for Tunnels	Localized Employment Opportunities of the Construction Works	Localized Business Opportunities Related to the Construction Works
1	Topography and Geology	C/D	D	D	D	C	C	C	C	C	C	D	D	C	E	E	C
2	Soil	C/D/E	D	D	E	B	B	C	C	C	C	B	D	D	E	E	E
3	Groundwater	D/E	D	D	C	D	D	D	D	D	D	D	D	D	E	E	E
4	Hydrological Condition	D/E	E	E	E	D	E	D	D	D	D	D	D	C	E	C	C
5	Fauna, Flora and Biodiversity	D	D	C	C	C	C	D	C	C	D	D	D	D	E	D	D
6	Protected Areas / sanctuaries	D	D	D	D	D	D	D	D	D	D	D	D	D	E	D	D
7	Landscape	D	D	D	D	D	D	D	D	D	D	D	D	D	E	D	D
8	Local Meteorological Conditions	D	D	D	D	D	D	D	D	D	D	D	D	D	E	D	D
9	Global Warming	D	D	D	D	D	D	D	D	D	D	D	D	D	E	D	D

Table 7.4 : Environnemental Impact Matrix (Post Construction Phase)

Sr. No.	Project Activities / Items of the Environment Subject to Positive / Negative Changes	Logistic conditions of goods, raw materials, agro & industrial products	Traffic condition of roads	Operation & maintenance of railway lines & related structures	Employment opportunities (whole country / local level)	Freight oriented business opportunities	Passenger oriented business opportunities	Promoting development of surrounding areas	Increase in settlers & vision to the project area
1	Topography and Geology	D	D	D	C	C	C	C	C
2	Soil	D	D	E	E	E	C	C	C
3	Groundwater	D	D	C	D	D	D	D	D
4	Hydrological Condition	C	C	C	D	C	D	D	C
5	Coastal and Marine Environment	E	E	E	E	E	E	E	E
6	Fauna, Flora and Biodiversity	D	C	C	C	C	D	C	C
7	Protected Areas / sanctuaries	D	D	D	D	D	D	D	D
8	Landscape	D	D	D	D	D	D	D	D
9	Local Meteorological Conditions	D	D	D	D	D	D	D	D
10	Global Warming	D	D	D	D	D	D	D	D

Table 7.5: Scaling of Impacts on Natural environment due to DFC project

Sr. No.	Natural Environment Contents	Scaling	Reasons (during construction phase)	Reasons (after-construction phase)
1	Topography and Geology	C/ D-	C-During construction marginal changes in geology are likely to take place because of excavation, construction of bridges etc. 2) No significant change in Topography is expected.	D-: No significant change is expected.
2	Soil Erosion	C/D	C-During construction marginal effect on soil because of erosion is likely to take place due to the loss of upper crust of soil in the local area. The impact will be marginal only since the project is linear in nature.	D-: No significant change is expected. .
3	Ground water	D-	D- No significant impact is likely to occur	D- Only marginal impact is supposed to be felt.
4	Hydrological Condition	D-	D- It will have only marginal impact as no river or big water body is affected.	D-It is likely to have no significant impact.
5	Costal and Marine Environment	E	E- Non Existent	E Non Existent.
6	Fauna, Flora and bio diversity	D	1) Loss of marginal herbal cover is eminent so it will have impact	D- Only marginal impact is supposed to be felt.
7	Protected areas, Natural/ecological reserves and sanctuaries	D-	(1) D-: No Impact is likely to be felt as no such area is getting directly affected.	(1) D-: No Impact is likely to be felt.
8	Landscape	D-	(1) D-: No Impact is likely to be felt.	(1) D-: No Impact is likely to be felt.
9	Local meteorological condition	D-	D- No significant impact is likely to occur	D- No significant impact is likely to occur
10.	Global Warming	D/B-	D-No significant impact is likely to occur	Positive impact as shifting of freight transportation from road to rail will decrease the emission of greenhouse gaseous
11.	Air Pollution	B	B- Relatively significant positive impact	Positive impact due to shifting of freight transport from road to rail as rail transport requires six times less fuel as compared to road

7.7 ACCIDENT RISK AND SAFETY

1) Design & Planning Stage

Various safety aspects related with the project during design construction phase are (i) pedestrians safety (i) safety related with handling of machines, equipments (ii) rail safety at road intersections and (iii) safety to cattles and other wild animals; (iv) unsafe/hazardous traffic conditions due to construction vehicle movement.

2) Construction phase

During the construction phase due protection has be taken as the train operations are very close to the construction activity.

3) Operation Phase

Important issues related with safety during operational phase is monitoring of emergencies and establishing procedures to carry out rescues during sudden disasters such as , fires, high winds, and accidents. Accidents risks are higher in habitated areas particularly where children need to cross the track in absence of any pedestrian crossings.

7.8 IMPACT DUE TO CONSTRUCTION CAMP

Poor siting and improper management of construction camp may lead to several adverse impacts on environment land and water bodies.

7.9 RIGHT-OF-WAY MAINTENANCE

Unchecked growth of trees and plants can cover signals, fall onto the tracks and prevent workers from getting to places of safety when trains are passing. Regular maintenance of rights-of-way to control vegetation may involve the use of mechanical methods (e.g. mowing), manual methods (e.g. hand pruning), and use of herbicides. Vegetation maintenance beyond that which is necessary for safety may remove unnecessary amounts of vegetation, resulting in the continual replacement of succession species and an increased likelihood of the establishment of invasive species.

7.10 IMPACT DUE TO ELECTRICAL, SIGNALLING, COMMUNICATION FACILITIES

The electrical, signalling and communication facilities are unlikely to cause any significant impact since the corridor is proposed to be constructed largely along the existing electrified rail and majority of the stretches passes through agriculture field/open field. Some occupational health effect may occur which is defined under subsequent sections.

7.10 OCCUPATIONAL HEALTH AND SAFETY

7.11.1 Rail Operation

Train/Worker Accident

Workers near rail lines are always at risk of accidents due to moving trains. A set of following mitigative measures can be taken:

- Training to workers on personal track safety procedures
- Blocking train traffic on lines where maintenance is occurring. If blocking is not feasible, use of automatic warning system shall be installed.

7.11.2 Noise and Vibrations

Crewmembers are usually exposed to higher noise levels from locomotives, rolling stocks and machinery and repeated mechanical shocks and/or vibration.

- Reduction of internal venting of air brakes to a level that minimizes noise without compromising the crew's ability to judge brake operation.
- Use of PPE if engineering solutions are not feasible.
- Use of dampers at the seat post to reduce the vibration experienced by the operator.
- Installation of active vibration control system for locomotive suspension, cabs or seat post.

7.11.3 Fatigue

Locomotive engineers and other railway workers are often required to work irregular working hours resulting in fatigue. Fatigue, particularly of drivers, signallers, maintenance workers is critical to safe operation of Railways, which if not given proper attention may pose serious safety risk to workers/passengers and general public. Railway operators should schedule rest periods at regular intervals and during night hours, to the extent feasible, to maximize the effectiveness of rest breaks.

7.11.4 Electric and Magnetic Fields

Workers on electric railway systems may have a higher exposure to electric and magnetic fields (EMF) than the general public due to working in proximity to electric power lines. There is no conclusive link between occupational EMF exposure and adverse health effects.

7.11.5 Maintenance of Rolling Stock

Occupational hazards typically associated with locomotive and rail car maintenance activities may include physical, chemical, and biological hazards as well as confined space entry hazards. Physical hazards may be associated with work in proximity to moving equipment and machine safety, including work-portable tools, and electrical safety issues. Chemical hazards may include potential exposures to a variety of hazardous materials (e.g. asbestos, PCB, toxic paint, heavy metals, etc). Biological hazards may include potential exposures to pathogens present in sewage storage compartments. Confined spaces may include access to rail tank and grain cars during repair and maintenance.

7.11.6 Community Health and Safety

The impacts associated with community health and safety is

(i) general rail safety,
(ii) transport of dangerous goods,
(iii) level crossing safety and
(iv) pedestrian safety.

The impacts and mitigative measures of level crossing safety and pedestrian safety have already been discussed in previous sections. The other two have been described in following paragraphs.

7.11.7 General Rail Operational Safety

Any slippage in operation may cause threat of serious injury or the potential loss of life due to train collision with other trains or road vehicle and derailment. Recommended actions to avoid any such risk are:

- During construction the Regular inspection and maintenance of the rail lines and facilities to ensure track stability and integrity in accordance with national and international track-safety standards.
- Implementation of an overall safety management program that is equivalent to internationally recognized railway safety programs.
-

7.11.8 Transport of Dangerous Goods

- Proper screening, acceptance and transport of dangerous goods will be made in line with the international standard applicable for packaging, marking and labeling of containers.
- Use of tank cars and other rolling stocks that meets the national and international standards.
- Preparation of spill prevention and control and emergency preparedness and responsive plans based on an analysis of hazards, implementation of prevention and control measures.

7.11.9 Pedestrian Safety

Trespassers on rail lines and facilities may incur risks from moving trains, electrical lines and equipment, and hazardous substances. Measures to minimize, prevent or control trespassing include:

- Posting of clear and prominent warning signage at potential points of entry to track areas (e.g. stations and level crossing).
- Installation of fencing of other barriers at stations ends and other locations to prevent access to tracks by unauthorized persons.
- Local education, especially to young people, regarding the danger of trespassing.
- Designing stations to ensure the authorized route is safe, clearly indicated, and easy to use.
- Use of closed – circuits television to monitor rail stations and other areas where trespassing occurs frequently, with a voice alarm system to deter trespassers.

7.11.10 Chance Find

Any archaeological article or structure found during construction shall be as per the provision of relevant Act/ Rules.

7.11.11 Summary of Impacts

With implementation of proposed mitigation measures, the residual impact in most of cases is expected to be insignificant. The summary of impacts/ mitigation measures & residual impacts is given in **Table 7.13.**

Table 7.13: Summary of Environmental Impacts and Residual Impacts

Activity	Environmental Issue/Component	Nature of Impact	Remedial Measures	Residual Impacts Level after Mitigation Measures
Design And Construction Phase				
Climate	Cutting of trees may affect the local climate	Moderate	Compensatory Plantation	Insignificant
Natural Hazard	Earthquakes may cause failure of civil structure	Significant	Relevant IS codes for earthquake resistance while designing civil structures such as bridges, flyovers, underpasses, etc.	Insignificant
Air Quality	Air quality may get affected due to construction activities	Significant	• Certain dust and fugitive emission prevention and control measures • Plantations • Construction of ROBs/RUBs to prevent vehicular pollution	Moderate
Noise & Vibrations	Increase in ambient noise levels	Moderate	• Timely serviced and properly maintained equipments to minimize its operational noise • Stationary noise making equipment placed away from populated areas • Provision of temporary noise barrier • PPEs to workers • Soil compaction and sand pockets near vibration prone areas.	Insignificant
Land				
Land Use	Change in Land Use because of land acquisition and change in topography due to borrow areas	Moderate	• Minimization of land acquisition to the extent possible • Proper borrow area management	Moderate
Productive Soil and Soil Erosion	Loss of productive soil due to Borrow areas and erosion at River banks, embankment areas of detours, bridge approaches	Moderate	• Top soil preserved and reused for plantations • Repairing of River banks after construction • Cross drainage structures to prevent water logging and thus soil erosion • Turfing of embankment slopes • Surface slope stabilization prior to seeding	Insignificant
Quarrying	Impact on soil and land topography	Insignificant	• Borrow area management • Alternate material like GGBS and fly ash	Insignificant
Compaction and contamination of soil	Compaction due to movement of construction vehicles and machineries and contamination due to disposal of effluent, leaks and spills and waste	Moderate	• To prevent compaction movement of vehicles and machineries through designated haulage route • Fuel and lubricants to be stored at the predefined storage location • “Oil Interceptors” at the wash-down and re-fuelling areas to avoid soil contamination	Insignificant

Activity	Environmental Issue/Component	Nature of Impact	Remedial Measures	Residual Impacts Level after Mitigation Measures
			• Proper solid waste management at construction camps	
Water Resources				
Water quality (Surface and Ground)	Impact on surface and ground water quality, Depletion of ground water, Contamination of water due to construction waste & Contamination of water from fuel and lubricants	Significant	• Provision of Rainwater harvesting structures • Collection of rainwater in sumps • Septic tanks shall be provided to treat the domestic sewage from construction camps. • Construction work close to the channels or other water bodies to be avoided. • Construction camps to be located away from water bodies and habitated areas • All necessary precautions to be taken to construct temporary devices to prevent water pollution due to increased siltation and turbidity. • Oil and grease traps to be provided at fuelling locations, to prevent contamination of water. • Slopes of embankment leading to water bodies to be modified and screened so that contaminants do not enter the water channel/ water body. • Water quality to be monitored as envisaged in the environmental monitoring plan.	Insignificant
Drainage Pattern	Change in drainage pattern may result in water logging	Moderate	• Provision of adequate cross drainage structures as per drainage flow analysis made in the project design • Prevention of blockage of cross drainage structures	Insignificant
Terrestrial Ecology				
Disturbance to Vegetation	Cutting of 19013 trees in core zone during project intervention	Significant	• Minimization of tree cutting Compensatory tree plantation preferably on the basis of 3 trees plantation against each tree cut • Native species to be planted • Monitoring of survival rates of trees plant during afforestation programme	Insignificant
Forest fragmentation and destruction	There is diversion of protected forest land Protected Forest to the extent of 109 Ha.	Moderate	• Afforestation as per provisions of sanction • Monitoring of survival rates of trees planted during afforestation programme • Forest Land diversion proposal submission and necessary cost provision for compensatory afforestation and NPV.	Insignificant
Endangered species	Only one vulnerable species of Sarus crane	Insignificant	• Arboreal species so no remedial measures suggested	Insignificant
Aquatic Ecology				
Fish, plankton and aquatic avian diversity	Effect due to dumping of the mud, land, sand into the River water	Moderate	• Ensure the minimal deposition of mud, land, sand into the River water	Insignificant

Activity	Environmental Issue/Component	Nature of Impact	Remedial Measures	Residual Impacts Level after Mitigation Measures
	during the construction		• Minimizing the noise during the construction • Flow of water in the Rivers and canals shall be maintained	
Migratory Fishes	Disturbance	Moderate	• Flow of water in the Rivers and canals at least through one channel to be maintained to allow migration of fishes	Insignificant
Spawning and Breeding Grounds	Disturbance on breeding and spawning grounds	Moderate	• Restriction of construction activities near the identified breeding and spawning grounds during the breeding period of April to August	Insignificant
		Socio-Economic		
Socio-economic impact	Beneficial impact due to increased employment opportunities and traffic congestions reduced by RoBs/RuBs Impact on livelihood due to land acquisition	Significant	• Compensation planned. The resettlement Action plan has been prepared.	Positive Impact
Safety	Risk of accidents and safety near rail tracks and at crossings	Significant	• Adopt safe working practices, barricading along IR track • Restriction of heavy vehicular movement close to the track • Trainings to workers • Adequate lighting and fluorescent signage shall be provided at construction sites. • Signage in local language • Setting up of speed limits • Pedestrian passageways • PPEs to workers	Insignificant
Construction camp	Improper siting and management may lead to adverse effects on environment	Significant	• No productive land shall be utilised for setting up of construction camp • Proper Location of construction camp with minimum distance of 500 m from habitation, water bodies through traffic route and 1000m from forest areas. • Proper sanitary facilities at camps • LPG cylinders as fuel sources	Insignificant
Occupational Health & Safety	Risks of accidents due to moving trains, noise and vibrations, Fatigue	Significant	• Training to workers on personal track safety procedures • Blocking train traffic on lines where maintenance is occurring • Reduction of internal venting of air brakes to a level that minimizes noise • Use of PPE if engineering solutions are not feasible. • Railway operators should schedule rest periods at regular intervals and during night hours, to the extent feasible, to maximize the effectiveness of rest breaks.	Insignificant

Activity	Environmental Issue/Component	Nature of Impact	Remedial Measures	Residual Impacts Level after Mitigation Measures
Operation Phase				
Climate	Contribute positively in GHG Reduction	Significant Positive Impact	None Required	Significant Positive Impact
Natural Hazard	-	-	No Impact	-
Air Quality	Fugitive dust emissions due Loading and unloading of cargo	Moderate	• Guidelines shall be formulated for material handling practices (particularly for loading and unloading) • Covered areas used for loading and unloading • Covered vehicles for transportation • PPEs to Workers	Insignificant
Noise & Vibrations	Train movement – source of noise and vibrations	Moderate	• Thick tree plantation around the sensitive location • Noise Barrier if not avoidable due to public requirement	Insignificant
Land				
Soil Erosion	Due to unexpected rainfall and Near unstabilized areas and non-rehabilitated borrow areas	Significant	• Regular monitoring of side-drains and cross drainage structures will be done to check blockade • Monitoring of rehabilitation plan of borrow areas • Inventorization of soil erosion prone areas • Carrying out periodic check to assess effectiveness of stabilization measures viz. turfing, stone pitching measures	Moderate
Water Resources	Stress on Ground water as abstraction for domestic purpose	Insignificant	• Augmentation through rainwater harvesting • Rainwater collection sumps • Regular monitoring of cross drains to avid blockage	Insignificant
Drainage Pattern	No Impact	Insignificant	• Corrective action shall be taken to prevent larger accumulation of water if any water logging is noticed	Insignificant
Terrestrial Ecology				
Disturbance to Vegetation	Accidental damages or absence of tree management practices	Moderate	• Arrangement for effective tree management to ensure survival of the tree plantation • Selection of healthy sapling; selection of fertile land for plantation; provision of fertilizers (Bio-fertilizer or artificial-NPK); • provisioning of fencing in the plantation area; arrangement of watering facility after plantation • Tree survival audit	Insignificant
Disturbance to Fauna	Collision between the animals and rail cars	Moderate	Cross structures should be designed to allow safe passage for animals, promote habitat connectivity, be accessible, and encourage natural movements.	Insignificant
Aquatic Ecology				
Disturbance to aquatic ecology	None	Insignificant	None	Insignificant
Socio-economic	Employment opportunities and socio-economic development due to better connectivity	Positive	None	Positive

CHAPTER 8: MEASURES FOR THE MITIGATION OF ENVIRONMENTAL IMPACTS

8.1 DESCRIPTION OF MITIGATION MEASURES

The mitigation measures to mitigate the negative impacts due to the development of proposed DFC on various parameters of the environment during various phases of the project are described hereunder.

8.1.1 Mitigation Measures of Land Environment

Land acquisition, soil erosion and contamination of soil have emerged as major sources of land impact especially in urban areas and nearby watercourses. The proposed project aims at enhancing the efficiency of rail transport system, which will result in economic growth in the region over time. Mitigation measures of Land Environment are presented in **Table 8.1**.

Table 8.1: Mitigation Measures of Land Environment

Sr No.	Item	Impact	Impact (Reason)	Mitigation / Enhancement
1.	Change in topography	Marginal impact	• Due to embankment raising	• Balancing culverts will be provided
2.	Change in geology	Direct, long term, negative impact	• Extraction of materials (borrow earth, coarse & fine aggregates)	• No blasting is envisaged • Quarry redevelopment plan need to be enforced
3.	Change in seismology	No negative impact		• Cross drainage structures are checked and complied with the seismological settings of the region
4.	Change in land environment			
a.	Loss of land	Direct, long term negative impact	• Land acquisition change in land use pattern	• Land acquisition to be minimized with provision of retaining walls
b.	Generation of debris	Negative impact	• May contaminate air, water and land, if not disposed properly	Disposed properly to avoid contamination
c.	Soil erosion	Moderate, direct, long term negative impact	• Slopes and spoils near the bridges • Construction of new bridges and culverts • quarry and borrow areas	• Embankment protection • For Emb, ht.>3 m stone pitching, • Emb ht. < 3m. turfing • Residual spoil need to be disposed properly. • Silt fencing need to be provided, quarries need to be reclaimed.
5.	Contamination of soil	Direct, long term negative impact	• Scarified bitumen wastes • Oil & diesel spills • Emulsion sprayer and lying of hot mix • Production of hot mix and rejected materials	• Hazardous Waste (Management and Handling Rules, 1989) to be enforced. • Oil interceptor will be provided for accidental spill of oil and diesel

Sr No.	Item	Impact	Impact (Reason)	Mitigation / Enhancement
			• Residential facilities for the labor and officers • Routine and periodical maintenance	• Rejected material will be layed in village roads or as directed by Engineer • Septic tank will be constructed for waste disposal
6.	Soil quality monitoring		• Effectiveness / shortfall (if any) • Any unforeseen impact	• Measures will be revised & improved to mitigate / enhance environment due to any unforeseen impacts

Programme will be carried out to improve the aesthetic look of the construction area. Plantation all along the railway line will be considered based on land to improve aesthetic along the existing as well as detour locations.

8.1.2 Mitigation Measure for Borrow Area Management

Borrow areas will be identified by contractor. The finalization of locations identified by contractor depends upon the formal agreement between landowners and contractor and its suitability from civil engineering as well as environmental consideration. Meeting the guidelines/notifications as stipulated from time to time by the Ministry of Environment and Forests, Government of India, and local bodies, as applicable shall be the sole responsibility of the contractor. EC is to be obtained from SEIAA after approval of borrow area before starting earth excavation.

Besides this certain precautions have to be taken to restrict unauthorized borrowing by the contractor. No borrow area shall be opened without permission of the Engineer/EO. The Engineer in addition to the established practices, rules and regulation will also consider following criteria before approving the borrow areas.

To avoid any embankment slippage, the borrow areas will not be dug continuously, and the size and shape of borrow pits will be decided by the Engineer. Redevelopment of the borrow areas to mitigate the impacts will be the responsibility of the Contractor. The Contractor shall evolve site-specific redevelopment plans for each borrow area location, which shall be implemented after the approval of the Enginner-in-Charge.

To ensure that the spills, which might result from the transport of borrow and quarry materials do not impact the settlements, it will be ensured that the excavation and carrying of earth will be done during day-time only. The unpaved surfaces used for the haulage of borrow materials will be maintained properly. Borrowing of earth shall be carried out at locations recommended as follows:

Non-Cultivable Lands: Borrowing of earth will be carried out upto a depth of 2.0 m from the existing ground level.

Borrowing of earth shall not be done continuously. Ridges of not less than 8m width shall be left at intervals not exceeding 300 m. Small drains shall be cut through the ridges, if necessary, to facilitate drainage. Borrow pits shall have slopes not steeper than 1 vertical in 4 horizontal.

Productive Lands: Borrowing of earth shall be avoided on productive lands. However, in the event of borrowing from productive lands, under circumstances as described above, topsoil shall be preserved in stockpiles. The conservation of topsoil shall be carried out as described in section of this chapter. At such locations, the depth of borrow pits shall be minimum in consultation with the land owner.

Elevated Lands: At locations where private owners desire their fields to be leveled, the borrowing shall be done to a depth of not more than 2 m or up to the level of surrounding fields.

Borrow pits along Roadside/Railway: Borrow pits shall be located 50m away from the toe of the embankment. Depth of the pit should be such that the bottom of the pit shall not fall within an imaginary line of slope 1 vertical to 4 horizontal projected from the edge of the final section of the bank. Borrow pits should not be dug continuously. Ridges of not less than 8 m width should be left at intervals not exceeding 300 m. Small drains should be cut through the ridges to facilitate drainage.

Borrow pits on the riverside: The borrow pit should be located not less than 15m from the toe of the bank, distance depending on the magnitude and duration of flood to be withstood.

Community / Private Ponds: Borrowing can be carried out at locations, where the private owners (or in some cases, the community) desire to develop lands (mostly low-lying areas) for pisciculture purposes and for use as fishponds.

Borrow Areas near Settlements: Borrow pit location shall be preferably located at least 1.0 km from villages and settlements. If unavoidable, they should not be dug for more than 100 cm and should be drained.

After identification of borrow areas based on guidelines. Contractor will raise RFI to PMC for approval to the "Engineer" Once approved the contractor will apply to state Env. Dept for EC for each Borrow area contractor adhere to the recommendation/ conditions of EC for borrow area to the satisfaction of Engineer. Borrow area to be opened only after the completion of the regulatory formalities.

(1) In no case the depth of borrow area should exceed 2m from the existing ground level.
(2) Borrow pits slope should be maintained, no steeper than 1 Vertical: 2 Horizontal.
(3) Water pooling to be avoided/managed so that NO disease spread due to water stagnation.
(4) Precautionary measures as the covering of vehicles will be taken to avoid spillage during transportation of borrow area.
(5) The unpaved surfaces used for the haulage of borrow materials should be maintained properly for dust suppression.
(6) Haulage of material to embankments or other areas of fill shall proceed only when sufficient spreading and compaction facility is operating at the place of deposition, to minimize dust pollution.
(7) During rains appropriate measures to be taken to minimize soil erosion, silt fencing to be provided as directed by Engineer/EO.
(8) Closure of BA with approval of Engineer.

The Contractor will keep record of photographs of various stages i.e., before using materials from the location (pre-project), for the period borrowing activities construction Phase) and after rehabilitation (post development), to ascertain the pre and post borrowing status of the area.

8.1.3 Mitigation Measures to Minimize Soil Erosion

1) Construction Phase
- Suitable protection measures consisting of bio-engineering techniques such as plantation of grass and shrubs, may be provided to control erosion. The measures shall be applied along the slopes at high embankment where bridges will be constructed.
- Construction work may be avoided during rainy season to evade erosion and spreading of loose material.
- Top soil removed from agricultural land may be stored separately in bunded areas and utilized during plantation or refilling of excavated area.

2) Post-Construction Phase
- No impact is envisaged on soil during post implementation phase.

8.1.4 Mitigation Measures to Improve the Ambient Air Quality

1) Pre-Construction Phase
- The dust generation due to pre-construction activities will be temporary in nature and localized and will be effectively countered by sprinkling of water.

2) Construction Phase

During the construction stage, there are two major sources: the first one is construction activities at working zones, which cause primarily dust emission and second are from operation of the construction plant, equipment and machinery, which causes gaseous pollutants. The specific measures include:
- Locating Plant at a significant distance from nearest human settlement in the predominant down wind direction.
- D.G. Set shall be provided with acoustic enclosures having stack height as per CPCB norms.
- Vehicles delivering fine materials like soil and fine aggregates shall be covered to reduce spills on existing roads.
- Water will be sprayed on earthworks, temporary haulage, and diversions on a regular basis.
- Batch type hot mix plants fitted with the bag filter / cyclone and scrubber will be installed for the reduction of the air pollution.
- Pollution control systems like water sprinkling and dust extractors and cover on conveyors will be installed for the crushers.
- All vehicles, equipment and machinery used for construction will be regularly maintained to ensure that the emission levels conform to the SPCB/CPCB norms.
- Air pollution monitoring plan has been delineated for construction phase separately for checking the effectiveness of the mitigation measures adopted during the construction phase of the Contract
- Air quality monitoring shall be conducted during construction period as per CPCB norms. The location and frequency of air monitoring is covered in Chapter-10.
- Impact on air quality is likely to be temporary and reversible.

3) Operation Phase
- Air quality of the area is likely to be improved as reduction in emissions due to shifting of freight from road transportation to railway transportation.
- Plantation along the DFC is likely to improve the air quality of the area.

8.1.5 Mitigation Measures on Water Quality

Due to the proposed project there will be some direct and indirect long term impacts on the water resources. Table below presents the major adverse impacts on the water resources and the mitigation measures taken. Mitigation measures on Water Quality are presented in **Table 8.2**.

Table 8.2: Mitigation Measures on Water Quality

Sr. No.	Item	Impact	Impact (Reason)	Mitigation/Enhancement
1.	Loss of water bodies	Not significant as no major water bodies is fully affected	• Part or acquisition of source of water	• Land acquisition to be minimized with provision of retaining walls • Relocation of ground / surface water sources
2.	Alternation of cross drainage	Very low impact	• One major bridge over existing causeway • Widening of minor bridges and culverts	• Construction of new bridges and bridging of existing causeways, there will be an improvement in the drainage characteristics of the project area
3.	Runoff and drainage	Direct impact	• Siltation of water bodies • Reduction in ground recharge • Increased drainage discharge	• Silt fencing to be provided • Recharge well to be provided to compensate the loss of previous surface • Continuous drain is provided, unlined in rural area and lined in urban areas.
4.	Water requirement for project	Direct impact	• Water requirement for construction activity. • Water requirement of labour	• Contractor needs to obtain approvals for taking adequate quantities of water from surface and minimizing ground water sources. This is required to avoid depletion of ground water resources.
5.	Water Quality			
a.	Increased sedimentation	Direct impact	• Increased sediment laden run-off alter the nature & capacity of the watercourse	• Guidelines for sediment control to be enforced
b.	Contamination of water	Direct adverse impact	• Scarified bitumen wastes • Oil & diesel spills • Emulsion sprayer and laying of hot mix • Production of hot mix and rejected materials • Residential facilities for the labor and officers • Routine and periodical maintenance	• Hazardous Wastes (Management & Handling) Rules, 1989 to be enforced • Oil interceptor will be provided for accidental spill of oil and diesel and maintenance area • Rejected material will be layed in village roads or as directed by engineer • Septic tank will be constructed for waste disposal
6.	Water quality monitoring		• Effectiveness / shortfall (if any) • Any unforeseen impact	• Measures will be taken to mitigate / enhance environment due to any unforeseen impact

8.1.6 Mitigation against Contamination of Water

- Oil interceptor will be provided at plant site and material trucks lay byes.
- Construction work close to the streams or water bodies will be avoided during monsoon.
- The discharge standards promulgated under the Environmental Protection Act, 1986 will be strictly adhered to. All wastes arising from the project will be disposed off in a manner that is acceptable to the State Pollution Control Board (SPCB).
- All relevant provisions of the Factories Act, 1948 and the Building and other Construction Workers (regulation of Employment and Conditions of Service) Act, 1996 will be adhered to.
- Construction labourers' camps will be located at least 1 km away from the nearest habitation. Temporary tolets will be provided at site & waste water will be disposed at Municipal sewer line or separate septic tank/ soak pits.
- Unless otherwise authorized by the local sanitary authority, arrangements for proper disposal of excreta by incineration at the workplace suitably approved by the local medical health or municipal authorities will be made.
- Entry of construction vehicles should be restricted to all approach roads to rivers and other surface water bodies to avoid major pollution sources.
- Automotive service centers will be discouraged from establishing along the corridors with out installing preventive measures against petroleum and oil contamination.
- Water quality shall be monitored regularly near the construction site.

8.1.7 Noise Environment – Mitigation Measures

Environmental noise particularly railway noise, is a complex phenomenon because its intensity and characteristics vary with time depending upon the frequency and speed of the trains. Mitigation measures on Noise Environment are presented in **Table 8.3**.

Table 8.3: Mitigation Measures on Noise Environment

Sr. No.	Item	Impact	Impact (Reason)	Mitigation / Enhancement
1	Sensitive receptors (construction phase)	Direct impact	• Increase in noise pollution	• Noise barrier to be provided
2	Noise pollution (pre-construction)	Direct impact, short duration	• Man, material and machinery movements • Establishment of labor camps onsite offices, stock yards and construction plants	• Area specific and for short duration • Machinery to be checked & complied with noise pollution regulations. • Camps to be setup away from the settlements, in the down wind direction.
3	Noise Pollution (Construction Stage)	Marginal impact	• stone crushing, asphalt production plant and batching plants, diesel generators etc • Community residing near to the work zones	• Camps to be setup away from the settlements, in the down wind direction. • Noise pollution regulation to be monitored and enforced. • Temporary as the work zones will be changing with completion of construction
4	Noise Pollution	Marginal	• Due to increase in traffic	• It will be compensated with the

Sr. No.	Item	Impact	Impact (Reason)	Mitigation / Enhancement
	(Operation Stage)	impact	(due to improved facility)	uninterrupted movement of heavy and light vehicles till the facility reaches the level of service C.
5	Noise Pollution Monitoring		• Effectiveness / shortfall (if any) Any unforeseen impact	• Measures will be revised & improved to mitigate/ enhance environment due to any unforeseen impact.

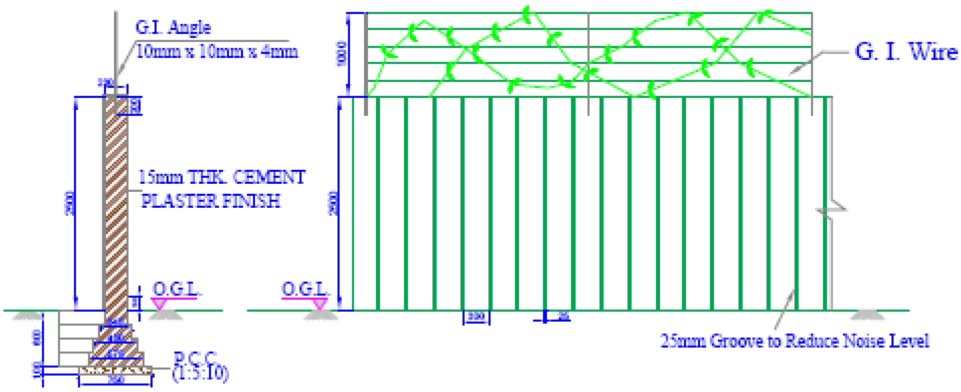
8.1.8 Sensitive Receptors – Mitigation Measures

All schools, hospitals and cultural properties have been identified and those that are close to the project roads ie within core zone will require noise control measures, Therefore, noise barriers shall be provided at these locations to reduce the noise level which is very much critical. The noise level may be reduced upto 10-15 dB (A) barrier to accommodate the long term impact of the improved road. List of sensitive receptors which will be impacted due to the proposed DFC Trains and required mitigation measures are presented in **Table 8.4**.

Table 8.4: List of sensitive receptors where noise barriers are proposed

Sr. No.	Name of Receptor	Latitude & Longitude	Distance from the proposed track (m.)	Impact	Mitigation / Enhancement
1.	Primary School	28 26.308N 77 49.765E	78	Direct impact, high noise level, predicted noise level is 66.6 dB(A)	Noise barrier shall be created of 70 m length. A conceptual drawing shown below.
2.	School	28 33.178N 77 47.811E	74	Direct impact, high noise level, predicted noise level is 67.05 dB(A)	Noise barrier shall be created of 80 m length. A conceptual drawing shown below.
3.	Star Public School	29 56.932N 77 33.503E	40	Direct impact, high noise level, predicted noise level is 72.39 dB(A)	Noise barrier shall be created of 100 m length. A conceptual drawing shown below.
4.	Saharanur Public School	29 56.929N 77 33.463E	80	Direct impact, high noise level, predicted noise level is 66.37 dB(A)	Noise barrier shall be created of 1200 m length. A conceptual drawing shown below.

A Typical Design of Noise Barrier



BOUNDARY WALL DETAIL FRONT ELEVATION

8.1.9 Mitigation Measures for Noise During Construction Phase

- Noise standards will be strictly enforced for all vehicles, plants, equipment, and construction machinery. All construction equipment used for an 8-hour shift will conform to a standard of less than 90dB(A). If required, high noise producing generators such as concrete mixers, generators, graders, etc. must be provided with noise shields.
- Machinery and vehicles will be maintained regularly, with particular attention to silencers and mufflers, to keep construction noise levels to minimum.
- Workers in the vicinity of high noise levels will be provided earplugs, helmets and will be engaged in diversified activities to prevent prolonged exposure to noise levels of more than 90dB(A) per 8 hour shift.
- During construction vibratory compactors will be used sparingly within the urban areas. In case of complaints from roadside residents, the engineer will ask the site engineer to take suitable steps of restricting the work hours even further or use an alternative roller.
- Proposed tree and shrub plantations planned for avenue plantation especially close to settlements, may form an effective sound buffer during the operation stage.
- People will be convinced / educated to prevent sensitive land uses from developing up adjacent to the project corridors.

8.1.10 Mitigation Measures for Hydrological Condition (Rivers and Lakes)

1) Construction Phase
- Provision of temporary drainage arrangement due to construction activities must be made by contractor and suitable and strict clause must be incorporated in general conditions of the contract document for its effective implementation.
- Silt fencing may be provided near water bodies.
- Proper drainage may be planned in the area to avoid water logging.

2) Implementation Phase
- Local drainage is likely to be affected due to formation of Railway Embankment.
- Cross drainage structures shall be provided at appropriate locations.

8.1.11 Mitigation Measures for Flora

1) Construction Phase

- Felling of trees must be undertaken only after obtaining clearance from the Forest Dept.-forest areas, Railway Dept and local bodies outside forest area.
- Trees falling outside the RoW should not be felled.
- Compensation must be provided before initiating construction activity.
- Fruit bearing trees shall be compensated including 5 years fruit yield.
- Labour camps and office site shall be located outside and away from the forest area.

2) Post Construction Phase

- No impact envisaged on flora during post construction phase however, development of green belt is suggested near stations and maintenance of plantation may be undertaken by Railway Dept. The plantation carried along alignment and as compensatory afforestation is likely to enhance the ecological condition of the area.

8.1.12 Mitigation Measures for Fauna

1) Construction Phase

- Crossing passages must be made for animal movement by provision of under pass followed with some plantation so that it resembles with the habitat.
- Water bodies may be developed inside forest areas, as the birds prefer water bodies.
- Borrow areas can be also developed as ponds with grasses and shrubs planted around it.
- Silt fencing may be used near water bodies to avoid runoff into the water bodies.
- Construction activity may be avoided during night hours in forest area.
- Poaching must be strictly banned in the forest area. It may be ensured by the contractor that no hunting or fishing is practiced at the site by any of the worker and that all site personnel are aware of the location., value and sensitivity of the wildlife resources.
- Awareness programme on Environment and Wildlife Conservation may be provided to the work force. Forest Act and Wildlife Act may be strictly adhered to.

2) Post Construction Phase

- Animal underpasses made for animals near forest area must be camouflaged to match the surrounding environment with plantation of shrubs and trees.
- Fencing may be provided along DFC in areas to avoid collision, wherever feasible.

8.1.13 Landscape

1) Construction Phase

- Landscaping Plan may be formulated for restoration, leveling and landscaping of the area once construction activities are over. This can involve the following:-
- The stockpiles may be designed such that the slope does not exceed 1:2 (vertical to horizontal) and the height of the pile to be restricted to 2 m.
- Stockpiled topsoil may be used to cover the disturbed areas and cut slopes. The top soil shall be utilized for redevelopment of borrow areas, landscaping along slopes, incidental spaces etc.
- Incorporation of suitable and effective contractual clauses for rehabilitation and restoration of borrow areas and other temporary works and landscaping it with surrounding area immediately after its use.
- Landscaping of surrounding area with plantation, ornamentals plants may be planted near station.

2) Post Construction Phase

- No impact envisaged on landscape in operation phase, however the green belt development is suggested.

8.1.14 Mitigation Measures for Vibration

In order to mitigate the negative impacts due to noise and vibration the impact area are divided in three broad categories;

- Areas identified in Reconnaissance Survey as sensitive residential, commercial, industrial or social sites.
- Areas identified as reference locations for carrying out measurements of vibrations along EDFC
- Areas having buildings and structures within existing or proposed railway land.
- Buildings and structures of importance for ASI or other similar agency

For all these target locations following scheme shall be applied.

1. Targets falling within the ROW – Pick out and exclude all such target locations from consideration of mitigation measures.
2. Targets located at distances falling in no impact zone are also isolated from the list of locations requiring mitigation measures. For this trend line of attenuation of vibrations with distance for each type of location has been established. Using this trend distance for permissible vibration level has been identified. All locations farther to this distance have been isolated from assessment of mitigation measures.
3. Targets that have special character due to their historical or archeological or communal importance. Such targets have to be considered in special manner irrespective of level of impacts assessed in their case.

The following general mitigation measures are recommended.

It has been found that the vibration levels originate at the interaction of rail and wheel because of various factors which include the following:

- The construction of Wagons
- Condition of Wagons, rails and wheels
- Design, engineering, superiority in terms of track support systems, soil conditions and embankment heights.

Efficient Track and wheel maintenance: Effective maintenance of track and wheel can reduce upto 10 dB(A) noise and vibration levels. The Condition of the rails and wheels- If not maintained in good condition. Some maintenance procedures that are particularly effective at avoiding increases in ground-borne vibration are:

- Rail grinding on a regular basis. Rail grinding is particularly important for rail that develops rail irregularities which in their turn cause impacts and low frequency excitation.
- Wheel truing to re-contour the wheel, provides a smooth running surface, and removes wheel flats. The most dramatic vibration reduction results from removing wheel flats and out of roundness.
- Implement vehicle reconditioning programs, particularly when components such as suspension system, brakes, wheels, and slip-slide detectors will be involved.
- Install wheel-flat detector systems to identify vehicles which are most in need of wheel truing. These systems are becoming more common on railroads and intercity passenger systems, but are relatively rare on transit systems.

- Install wheel geometry measurement devices (e.g. laser based systems installed at entrance of depot) with possibility of detecting out of soundness, difference of wheel diameter of wheels on the same axle, wheel wear.

Therefore a reduction of up to **7.5dB** Vibrations could be achieved as compared to highest Vibration level measured on existing tracks. Therefore

Predicted vibration levels will come down by around 7.5 dBs through maintenance efficiency and planning alone.

The DFCC has already designed to operate on elevated embankment of 2mtrs of more. This means that there will be at least 1 meter additional height all along the corridor due to embankment. Researches and studies have shown the height of embankment increases the attenuation rate by **1- 2 dBs** per meter height of embankment. Therefore at least **1- 2dBs** (for one meter additional height of embankment) will be reduced for entire corridor, In portions of track where there is no embankment currently this reduction will be for 2 meter height and will be around 2-3 dBs. Therefore taking a conservative. Estimate, this inbuilt measure will provide reduction of Vibration levels by **2dBs**.

As discussed earlier in the evaluation process maximum vibrations permissible on any site is
Plain route or detour upto: 70dB
Receptors: upto 65 dB

Resilient Fasteners: Indian Railways are already using Resilient Fastners to reduce vibration and DFCC project of EDFC will use better version of the same. They shall be replaced based on their lifecycle. Indicative sketch of the device is given along side. Sensitive receptors & houses/ structure along the alignment will be benefitted in the process. DFCCIL may consider use of improved versions of resilient fasteners at the locations of the sensitive receptors to reduce vibration levels further. Due care is to be taken at the design stage.

Resilient fasteners are very common fastening equipment used in modern track constructions. These become another existing resource that will help mitigation of the impact of vibration. These fasteners are used to fasten the rail to concrete track slabs. Standard resilient fasteners are rather stiff in the vertical direction, usually in the range of 40 kN/mm (dynamic stiffness), although they do provide vibration reduction compared to classical rigid fastening system. Special fasteners with vertical dynamic stiffness in the range of 8 kN/mm will reduce vibration by as much as 15 dB at frequencies above 30 Hz. (Conservatively these could **reduce vibrations by 5 to 10 dB)** . Rail and base plate pads for rail resilient rail fasteners are used on trams, subways, light rail and main line train.

Therefore, this resource alone will be able to provide balance mitigation of track vibration. Hence, it is felt that no additional mitigation measure is required to be considered.

8.1.5 **Mitigation Measures for Terrestrial Ecology**

Flora: About 38000 trees are to be planted against cutting of around 19013 trees on private, railway/ Govt. land and these will be planted by the contractor. Plantation will be done on available railway, DFCC land and plants/ saplings will be maintained by the Contractor for three years from the year of planting & thereafter by DFCCIL. In addition, Forest Dept. will plant almost 50000 trees in lieu of diversion of approx. 109 Ha. protected forest land. DFCCIL will deposit demanded money to the forest department towards tree cutting, compensatory afforestation as well as maintenance of the trees. A tree plantation plan is given at Annexure 10.5. Measure to be taken during the work as described below.

During Construction: During the construction the contractor will ensure that no tree or vegetation is disturbed other than those marked for felling. In order to minimise impacts on terrestrial ecology, the contractor will ensure that no construction waste is disposed off in open / grazing land /agriculture land. The environmental expert of PMC will conduct a training program for the construction workers for sensitization including not to hunt the animals and damage trees. The contractor will make available LPG or kerosene for cooking so that workers do not depend on fuel wood for cooking.

The compensatory plantation will be carried out and survival rate will be monitored and any short fall below 95 % will be made up before the onset of next monsoon.

During Operation: During the operation phase the DFCCIL either through the appointed contractor or through its own resources will monitor survival rate of trees for the first three years. By this time the plants will grow and will sustain through natural process.

Fauna: Necessary civil design features like an underpass to allow movement of animals across the tracks shall be ensured.

8.2 WATER MANAGEMENT PLAN

During construction, water requirement will be met by the Contractor mostly surface water with prior permission from Ground Water Board or Irrigation Dept. respectively. In case, water is sourced from privately owned bore well formal agreement will be done with bore well owner/ operator. Efforts will be made to use treated recycled water and rain water harvesting to recharge ground water. A water management plan for construction activities is given at Annexure 10.8. Contractor will develop its own plan for adoption during construction.

8.3 SEISMIC RISK MANAGEMENT

Earthquakes and earthquake damage are quantified by specifying magnitude and/or intensity. Magnitude is a measure of earthquake size based on the amplitude of seismic waves recorded instrumentally and is a characteristic of the earthquake at its source. Magnitude is stated as a decimal, typically to the nearest tenth. Intensity is a measure of the intensity of ground shaking at a particular location, determined according to criteria based on observations involving varying degrees of subjectivity. Several intensity scales have been formulated. In general the lower intensities are based on perceptions of ground motion and the higher intensities on the extent of damage. Intensities for an earthquake usually decrease, with increasing distance, from a maximum near the source to the minimum value in the scale.

Damage to the railway and adjacent areas include severe liquefaction and lateral spreading of embankments which are likely to result in vertical and horizontal track geometry issues, abutment movement caused by embankment liquefaction, severe track buckle.

A part of Khurja-Pilkhani alignment falls under Seismic Zone IV. Rules of Indian Railways. IRC 6, published by the Indian Road Congress, deals with highway bridges and its seismic loading provisions have been modified in 2006, to bring them in line with the IS 1893(Part 1):2002. Bureau of Indian Standards code, IS 1893(1984) has provisions for highway as well as railway bridges. Existing Bridge Rules of the Indian Railways has derived its seismic loading provisions from IS 1893. These rules have been revised by RDSO and circulated in January, 2015. Following Codes/ Rules/ Guidelines are followed:

Formation/ Embankment : It is designed as per RDSO-GE-0014 for heavy haul loading.
Ministry of Road Transport and Highways Specification for Bridge works, 4th edition.
Report on "Guidelines for use of Geosynthetics on Railway Formation including specifications" (Provisional) Report No. RDSO/2007/GE:G-0009 (D) July 2008.
Concept and Design of Reinforced Earth Structures Report No. GE:R-73 June-2005, Ministry of Railways guidelines for Earthwork in railway Projects, guidelines No. GE:G-1.

8.4 TRAFFIC MANAGEMENT

The project involves construction of 22 ROBs and total 409 RUBs which is likely to cause traffic congestion and idling of vehicles during the construction phase. The traffic is to be managed by providing suitable alternate routes to reduce the idling time in consultation with the local administration. It shall be done as per the railway guidelines. Suitable information dissemination campaign shall be taken up in the area to build awareness. Reference to Annexure 10.9.

8.5 MITIGATION MEASURES FOR CHANCE FINDS

There may be chance find in the form of coin or relics and some underground structure. In case of identification of any of the chance finds mentioned above, during excavation, the contractor will stop the work and will report to DFCC. The DFCC in turn will inform Department of ASI. Pending decision from ASI work will remain suspended.

8.6 GREEN INITIATIVES

Opportunity will be explored for energy conservation, rain water harvesting, and utilisation of solar energy.

- Harnessing of solar energy can be fruitfully implemented in staff quarters, station & substation buildings as well as for street lighting.
- Water conservation procedures will be adopted in staff quarters & stations.
- Rain water harvesting can be implemented in staff quarter complex, stations.
- Feasibility of such initiatives will be considered during design stage.

CHAPTER 9: PUBLIC CONSULTATION

9.1 GENERAL

Public consultation was carried out with various stakeholders where in the Environment Assessment Team carried out these consultations with the local communities of the villages/settlements through which the proposed DFCC corridor is traversing. These consultations were carried out in addition to the identification of the environment impacts being enlisted due to the project development. However there are extensive public consultations being carried out with all the stakeholders under the Social Impact Assessment studies being presently conducted by a separate team of specialists.

In accordance with the requirements and our Terms of Reference these consultations were carried out in 18 locations (villages/settlements).

9.2 OBJECTIVES

The main objective of the public consultations is to provide awareness about the project development and gather suggestions on any adverse or proposed developments for either avoiding or mitigation the adverse impacts through appropriate design. In addition to this the other objectives include:

- To provide a forum to the community and local project personnel in effectively implementing the project physical interventions;
- To create confidence amongst the community about the implementing agency, i.e., DFCC in this context;
- To acknowledge that DFCC needs the community's trust to gain a social license to operate
- To gather understanding of local environment and socio-cultural issues so that any adverse impact to these in particular are addressed under the project at both levels, one at the design level and the implementation level;
- To engage the community in receiving inputs from all participants at the consultations about the project; and
- Identify alternative design options in to either avoid or mitigate adverse environment and social issues.

9.3 SCOPE OF THE PUBLIC CONSULTATIONS

The issues that were discussed during the public consultations were in accordance with the defined objectives. The overall scope of the public consultations revolved around the following subject areas and issues that included:

- Specific Environmental issues;
- Extent of likely adverse impacts due to the project from both environment and social perspectives;
- Expectation of the people from the project;
- Identification and protection of culturally sensitive sites along the project corridor;

- Perception of the existing project corridor and usage;
- Benefits and problems faced if any from the existing corridor;
- Perception of the people on DFCC Corridor;
- Impact on environment and livelihood due to project;
- Type of environment enhancement; and
- Identification of environmental issues.

9.4 TARGET AREA

Village level consultations were held in the selected 18 locations along this DFCC Corridor. These villages/settlements are given in **Table 9.1**.

Table 9.1: Details of the Target Area

Sr. No.	Name of Village/Settlement	Tehsil	District
1.	Sunehra	Bulandshahar	Bulandhshahar
2.	Najampur	Khurja	Bulandshahar
3.	Khurja City Station Venue (Block Resource Coordinator, Education Department)	Khurja	Bulandshahar
4.	Hathmabad	Bulandshahar	Bulandshahar
5.	Gulawti	Bulandshahar	Bulandshahar
6.	Mursatpur	Hapur	Hapur
7.	Panchali khurd	Meerut	Meerut
8.	Validhpur	Meerut	Meerut
9.	Kilhoda	Modinagar	Ghaziabad
10.	Saidpur Husainpur Dilana	Modinagar	Ghaziabad
11.	Markimpura	Khataauli	Muzafarnagar
12.	Jhangirpur	Khatauli	Muzafarnagar
13.	Rankhandi	Deoband	Saharanpur
14.	Sakhankalana	Deoband	Saharanpur
15.	Manhorpur	Deoband	Saharanpur
16.	Sarsina	Deoband	Saharanpur
17.	Baseda	Deoband	Saharanpur
18.	Shekh pura	Deoband	Saharanpur

9.5 TARGET GROUP

The target group contacted during the public consultations included:

- Affected villagers;
- Local village residents; and
- Project impacted families due to loss of property or livelihood under the project;

The public consultation team included:

- The project implementing agency members – DFCC personnel; and
- The Environment Assessment Team.

9.6 METHODOLOGY

In accordance with the defined objectives and scope of the public consultations the activity on the public consultations was carried out through developing a time schedule being proposed by the Environment Assessment Team and the Implementing Agency (DFCC) Team. This time schedule and information on the agenda for the public consultations was provided to the identified villages for conducting the public consultations. This information was provided atleast 1-2 days prior to the date of the consultations. This advance notice of the date and timing of the public consultation enabled the community to be prepared for active participation and make themselves available for the public consultations.

It was also ensured that the responsible personnel from the implementing agency – DFCC were represented in all the public consultations.

The project team comprised of the Environment Expert, Social Development Expert and a Community Mobilisation Expert along with the other environment monitoring team from the ground to attend and conduct the public consultations.

Table 9.2: Outputs of Local level Consultations

Sr. No.	Name of the village	Date	Participants	Issues/Suggestion by local people of village	Remarks
1.	Sunehra	18.2.15	▪ Affected villagers, ▪ Local residents, ▪ Impacted families, ▪ DFCC personnel and ▪ EIA Team members	▪ The main issue brought forward by the local villagers was related to air pollution from smoke. ▪ Construction of the corridor will impact the Tube wells and irrigation system of the village. ▪ The villagers are requesting for proper compensation and job for each family who are affected by the project.	▪ The DFCC Representatives informed that the track will be electrified thus this issue is addressed. ▪ DFCC informed to provide new irrigation canal/system if affected by the construction of track.
2	Najampur	19.2,2015	▪ Affected villagers, ▪ Local residents, ▪ Impacted families, ▪ DFCC personnel and ▪ EIA Team members	▪ The villagers wanted water testing to be conducted from their village to check the quality of the water in the area. ▪ The participants told that there will be no impact on the village habitation from the proposed corridor. ▪ The villagers insisted upon the CSR activities to be carried out for development works in the village. CSR program may include street lights, sewerage system of the village, etc. ▪ The villagers want employment in the under the project or any other government jobs for the affected family members.	▪ The water and air sampling was carried out in the presence of the villagers. ▪ The DFCC and the EIA team informed that all the facilities and development works will be done as per the new Land Acquisition Act, 2013 that were being followed by DFCC presently.
3	KHURJA City Station Venue (Block Resource Coordinator, Education Dept)	19.2.2015	▪ Affected villagers, ▪ Local residents, ▪ Impacted families, ▪ DFCC personnel and ▪ EIA Team members	▪ The project development will increase traffic in the region. ▪ Safety wall near the corridor is proposed to avoid any adversaries to the people living in the villages along the corridor; ▪ This development may increase out-migration in this area , ▪ Special survey should be initiated to identify and enumerate adversaries to any endangered species in the area. ▪ Damage to vegetation to be minimum and	▪ The DFCC and EIA team ensured that appropriate be taken to mitigate any adverse impacts. In case of any property acquired the award for compensation will be carried out and then civil works initiated. ▪ No Endangered species was observed during EIA study and as per discussion with locals

Sr. No.	Name of the village	Date	Participants	Issues/Suggestion by local people of village	Remarks
				appropriate compensation should be provided in case of any damages caused in this regard.	
4	**Hathmabad**	**20.2.15**	▪ Affected villagers, ▪ Local residents, ▪ Impacted families, ▪ DFCC personnel and ▪ EIA Team members	▪ The villagers demanded for a Station near the village. ▪ The railway will affect the people and their cattle's due to high noise levels. ▪ Pollution due to waste water increase due to this development and pollution to surface and ground water anticipated by the people. ▪ Air pollution due to smoke due to railway movement.	▪ The EIA and DFCC Representatives informed that the track will be electrified track and thus noise will be lower and zero air pollution. ▪ However the railway operations will not create any waste water so along the track there is no water pollution anticipated. ▪ There could be minimum impact at stations where there would be extensive cargo movement.
5	**Gulawti**	**21.2.2015**	▪ Affected villagers, ▪ Local residents, ▪ Impacted families, ▪ DFCC personnel and ▪ EIA Team members	▪ Tree cutting along the corridor will impact environment. ▪ Sewerage management along track will be an issue to be addressed. ▪ The railway track near to habitation will affect the people and their cattle's due to high noise levels.	▪ The EIA and DFCC Representatives informed that the track will be electrified track and thus noise will be lower. ▪ Plantation will be carried as a vegetative noise barrier in the area. This was mentioned by the DFCC Representatives. ▪ For management of sewerage mobile toilets and septic tank/soak pit will be provided at site and construction camp site.
6	**Mursatpur**	**21.2.2015**	▪ Affected villagers, ▪ Local residents, ▪ Impacted families, ▪ DFCC personnel and ▪ EIA Team members	▪ As per villagers the main occupation in the village is agriculture and commercial activities. ▪ The villagers opined that noise will create problem to animals and people. ▪ Many farmers have Mangos plants in the village and anticipate that the construction of the track would impact due to tree cutting. This means it will have impact on	▪ The EIA and DFCC Representatives informed that the track will be electrified track and thus noise will be lower. ▪ All orchards or productive trees will be avoided to the extent possible. ▪ Compensation for fruit bearing trees will be provided as per

Sr. No.	Name of the village	Date	Participants	Issues/Suggestion by local people of village	Remarks
				income and loss of productive trees. This should be compensated appropriately.	calculation of loss of income
7	**Panchali khurd**	**26.2.2015**	▪ Affected villagers, ▪ Local residents, ▪ Impacted families, ▪ DFCC personnel and ▪ EIA Team members	▪ Villagers opined that the project will increase pollution of air and noise to the villagers. ▪ Many people are engaged in fisheries at the village as livelihood, they want to know the effect on fisheries due to new track and its adverse impacts ▪ Noise pollution will have impacts on their daily works and also on during the nights as per the opinion of villagers.	▪ The EIA and DFCC Representatives informed that the track will be electrified track and thus noise will be lower and zero air pollution. ▪ Pond in the village is very far away from the track, a visit was conducted to ensure this by the Environmental team along with DFCC. ▪ Since no garbage dumping or vehicle washing etc will be carried out in waterbodies along the track thus no impact on fisheries is anticipated
8	**Validhpur**	**26.2.2015**	▪ Affected villagers, ▪ Local residents, ▪ Impacted families, ▪ DFCC personnel and ▪ EIA Team members	▪ Villagers told that the quantity fluoride has increased in the water and caused deaths in the village. ▪ Tree falling for railway track will cause air pollution in the village. ▪ The non-stop railway will cause irritation.	▪ Water sampling was carried out from the water sources of village to check on the water quality issues. ▪ The EIA and DFCC Representatives informed that the track will be electrified track and thus noise will be lower and zero air pollution. ▪ Plantation will be carried as a vegetative noise barrier in the area. This was mentioned by the DFCC Representatives.
9	**Kilhoda**	**27.2.2015**	▪ Affected villagers, ▪ Local residents, ▪ Impacted families, ▪ DFCC personnel and ▪ EIA Team members	▪ Water logging in the area in anticipated after the construction of track. ▪ Air pollution will increase ,villagers told that it will produce smoke around the village. ▪ There is scope of accidents due to high	▪ The EIA and DFCC Representatives informed that the track will be electrified track and thus noise will be lower and zero air pollution.

Sr. No.	Name of the village	Date	Participants	Issues/Suggestion by local people of village	Remarks
				speed.	▪ Appropriate sewerage system will be provided along the track, thus no issue from this will be accrued. ▪ The EIA and DFCC Representatives informed that the track will be electrified track and thus noise will be lower and zero air pollution. ▪ Non-stop track so less chances of accidents as per the team and DFCC. People will also have to be careful during train movement.
10	**Saidpur Husainpur Dilana**	**27.2.2015**	▪ Affected villagers, ▪ Local residents, ▪ Impacted families, ▪ DFCC personnel and ▪ EIA Team members	▪ As per villagers opinion there is no adverse impact of new track. ▪ The villagers are only eager to talk to on Compensation award and rates. ▪ They want proper compensation in one instalment when the land is acquired by the DFCC is more than their need is only for one track.	▪ The compensation amount will be given as per the new rules of the LARRA 2013 and on time as mentioned by the DFCC officials during the consultations.
11	**Markimpura**	**2.3.2015**	▪ Affected villagers, ▪ Local residents, ▪ Impacted families, ▪ DFCC personnel and ▪ EIA Team members	▪ No problem due to track on environment. ▪ There is a water canal in the village, villagers do not want impact on it due to establishment of the track. ▪ Who will carried out the plantations if there will be tree falling due to project	▪ Team visited the water canal location and ensured that there would be no impact to the canal due to the track development. ▪ Plantation will be carried as a vegetative noise barrier in the area. This was mentioned by the DFCC Representatives.
12	**Jhangirpur**	**2.3.2015**	▪ Affected villagers, ▪ Local residents, ▪ Impacted families, ▪ DFCC personnel and ▪ EIA Team members	▪ Is there any adverse impact on water table due to new railway track. ▪ The vibration will be there due to new track. ▪ Circle rates should be discussed with the affected families before finalising the land rates.	▪ No adverse impact on water table due to new track. ▪ Vibration will be less as per design of the track. ▪ Rates for compensation of land will be by the SLAO Department.
13	**Rankhandi**	**3.3.2015**	▪ Affected villagers,	▪ The main question was compensation for	▪ The compensation amount will be

Sr. No.	Name of the village	Date	Participants	Issues/Suggestion by local people of village	Remarks
			▪ Local residents, ▪ Impacted families, ▪ DFCC personnel and ▪ EIA Team members	land acquisition. ▪ They told their environment is good there is no problem from this project. ▪ As per opinion of the villagers a few poplar trees are being felled due to the project. The villagers enquired about the compensatory plantation responsibility.	given as per the new rules of the LARRA 2013 and on time as mentioned by the DFCC officials during the consultations. ▪ Plantation will be carried as a vegetative noise barrier in the area. This was mentioned by the DFCC Representatives.
14	**Sakhankalana**	33.3.20 **3.3.2015**	▪ Affected villagers, ▪ Local residents, ▪ Impacted families, ▪ DFCC personnel and ▪ EIA Team members	▪ There is a pond near village which is used by villagers for the purpose of water for animals and irrigation. The villagers wanted to be sure that there would be no impact to this water body. ▪ Water canal in the village should not be impacted by the project works. ▪ Their main demand for a job for affected families.	▪ No impact on the water body – pond and the water canal in the village. ▪ All the benefits from the project will be given as per the new act LARRA 2013.
15	**Manhorpur**	**4.3.2015**	▪ Affected villagers, ▪ Local residents, ▪ Impacted families, ▪ DFCC personnel and ▪ EIA Team members	▪ Full compensation is needed for trees being cut. ▪ The environment of the village is good. ▪ Villagers are eager to know the rates of compensation only.	▪ All the rates and amount of Compensation will be given by the DM office and rates decided by the SLAO office.
16	**Sarsina**	**4.3.2015**	▪ Affected villagers, ▪ Local residents, ▪ Impacted families, ▪ DFCC personnel and ▪ EIA Team members	▪ As per villagers the main occupation in the village is agriculture and commercial activities. ▪ The villagers opined that noise will irritate animals and them ▪ Who will carry out the plantations in case of tree falling carried out due to project development.	▪ The EIA and DFCC Representatives informed that the track will be electrified track and thus noise will be lower and zero air pollution. ▪ Plantation will be carried as a vegetative noise barrier in the area. This was mentioned by the DFCC Representatives.
17	**Baseda**	**10.3.2015**	▪ Affected villagers, ▪ Local residents, ▪ Impacted families, ▪ DFCC personnel and	▪ Air pollution will increase, villagers told that it will produce smoke around the village. ▪ The villagers opined that noise will irritate animals and them.	▪ The EIA and DFCC Representatives informed that the track will be electrified track and thus noise will be lower and zero

Sr. No.	Name of the village	Date	Participants	Issues/Suggestion by local people of village	Remarks
			▪ EIA Team members	▪ Proper installation of sound free technology in the trains.	air pollution.
18	**Shekh pura**	**10.3.2015**	▪ Affected villagers, ▪ Local residents, ▪ Impacted families, ▪ DFCC personnel and ▪ EIA Team members	▪ The main demand at this village location was for construction of an ROB and RUB near the track. ▪ To construct a station at Shekhpura village. ▪ No impact on environment due to project.	▪ Provision was there for ROB/RUB under the project. This was confirmed by the DFCC representative. ▪ As the train is a Non-stop train, thus there cannot be any provision of a station under this project. This was conveyed by the DFCC team.

9.7 SUMMARY OBSERVATIONS & CONCLUSION

The concern of local communities and the affected people was mainly on the request for employment, appropriate and timely compensation as per new LARRA 2013 Act. All the meetings were held in the villages/settlements along the corridor where in all the stakeholders including the Gram panchayat representative and DFCC personnel. The villagers though expressed the concern of pollution – air, noise and water also expressed satisfaction after learning that the train was an electrified train and being a high speed cargo train impacts would be minimum from its operations. The issue of tree compensation was also conveyed which was answered with the option of 1:2 compensatory plantation and avoiding any productive or fruit bearing trees being impacted due to the project development.

Summary of views & concerned expressed during PCM are as follows:

- The concern of local communities and the affected people was mainly on the request for employment, appropriate and timely compensation as per new LARRA 2013 Act.
- Impact on environment, forest, national park/ wildlife sanctuary, afforestation policy.
- Air/ water / soil pollution and noise / vibration issues
- Access through level crossings, underpasses, FOB, traffic congestion, drainage
- Possibility of accident due to DFC alignment's close proximity to habitation
- Loss of livelihood due to land acquisition, job to landless families
- Land compensation, jobs in lieu of land.

During discussions, project proponent DFCCIL clarified and explained proposed measures to be taken in design stage, construction phase as well as operation phase to either eliminate or reduce the issues to acceptable level. Participants were satisfied with response of project authority & Consultants. The main point of concern of the villagers, residents in the encroached area was pertaining to compensation against loss of land and the mode of payment. People are looking forward for quick compensation and start of work. The Government regulators like Forest Department, Pollution Boards, Municipal Authorities and Local NGOs also supported and favored the project.

The attendance sheet and photographs of public consultations at different locations is provided in **Annexure 9.1** and **Annexure 9.2** respectively as part of the documentation.

ANNEXURE - 9.1: ATTENDANCE SHEET AND PHOTOGRAPHS OF PUBLIC CONSULTATIONS

आज दिन 20-2-15 को गाँव हाथमाबाद ग्राम पंचायत हाथमाबाद में सामाजिक एवं पर्यावरण संदर्भ में गाँव वासियों के साथ सामूहिक चर्चा हुयी जिस संदर्भ में गाँव वासियों ने अपने विचार रखे, गाँव के पास से गुजर रहे रेलवे ट्रैक पर अपने विचार रखें, रेलवे ट्रैक के गाँव के पास से गुजरने से होने वाले पर्यावरण पर प्रभाव पर चर्चा हुयी, सामूहिक चर्चा हेतु ग्राम वासियों को एक दिन पूर्व सूचित किया गया, चर्चा में ग्रामवासियों द्वारा अपने विचार रखे, गाँव वासियों का मुख्य मांग गाँव के स्टेशन बनना था, सामूहिक चर्चा बैठक के ग्राम के समस्त ग्रामवासियों द्वारा अपने विचार रखे गये,

1. श्री लखराज के अनुसार गाँव हाथमाबाद में रेलवे स्टेशन बनना चाहिए,
~~रेल के रुकने वाली~~
2. रेल के रुकने से बाजार बढ़ेगा लोगों को रोजगार मिलेगा,
3. किसानों को लाभ मिलेगा रोजगार के साधनों के बढ़ोतरी होगी.
4. रेलवे में योग्यता अनुसार उन लोगों को रोजगार मिले जिन की जमीन रेलवे ट्रैक में गयी है
5. साथ ही लोगों को उचित मुआवजा मिले,
6. गाँव में कुछ हैंडपंप और लगवाये जाए
7. गाँव के चौराहों पर स्ट्रीट लाइटों की व्यवस्था की जाए,
8. जोगेन्द्र के अनुसार रेलवे ट्रैक गुजरने व रेल की आवाज से जानवरों को नुकसान होगा,
9. रहीम के अनुसार इस से आस पास की गंदगी बढ़ेगी गन्दी गंदा होगा।
10. रेल से धुंआ निकलेगा जिस से पर्यावरण को नुकसान होगा।

लेखराज सिंह

21-2-15

क्र	नाम	ग्राम	सम्पर्क फोन नं०	व्यवसाय	हस्ताक्षर
1-	श्री प्रसादी लाल	गुलावठी [illegible]		खेती	
2-	नैनपाल सिंह	गुलावठी	9720116627	खेती	नैनपाल सिंह
3-	वीर सिंह	गुलावठी		व्यापार	वीरसिंह
4-	[illegible] सिंह	गुलावठी	7830027002	व्यापार	राजवीर सिंह
5-	जगवीर सिंह	गुलावठी		कृषि	जगवीर सिंह
6-	राजपाल सिंह	गुलावठी	9761395880	कृषि	राजपाल सिंह
7-	साहब सिंह	गुलावठी		कृषि	साहबसिंह
8-	सुरेश	गुलावठी		कृषि	
9-	जोगेन्द्र	गुलावठी		कृषि	[illegible]
10-	रामवीर सिंह	गुलावठी	9690777266	कृषि	रामवीर सिंह
11-	[illegible] सिंह	गुलावठी	8006538009	कृषि	[illegible]
12-	शेर सिंह	गुलावठी	8006363454	कृषि	SHER Sing
13-	सुरेन्द्र सिंह	गुलावठी	9927402742	कृषि	
14-	रोहताश सिंह	गुलावठी	9720522517	कृषि	[illegible]
15-	धर्मेन्द्र	गुलावठी	9897934626	व्यवसाय	धर्मेन्द्र
16	श्री गुलाम [illegible]	गुलावठी	9897159265	कृषि	[illegible]
17	सुभाष चौधरी	गुलावठी	9675486237	कृषि	[illegible]
18	[illegible]	गुलावठी	9690665828	कृषि	[illegible]
19	मोनू	गुलावठी	9152201165	कृषि	[illegible]
20	राधे सिंह	गुलावठी	9286338280	कृषि	[illegible]
21	[illegible] अवतार	गुलावठी	9411246073	टेचर	[illegible]
22-	[illegible] कुमार	गुलावठी	7500884686	कृषि	[illegible]
23-	[illegible] प्रकाश	गुलावठी	9719765101	टेचर	[illegible]
24	[illegible]	गुलावठी	9759886357	कृषि	[illegible]
	[illegible] यादव	गुलावठी		टेचर	

[illegible]

प्रधानाचार्य

[illegible]

21-2-15

आज दि० 21-2-2015 गुलावठी में पूर्व माध्यमिक विद्यालय कैलावाड़ गुलावठी में ग्राम वासियों के साथ सामुहिक परामर्श व चर्चा हुई। चर्चा के ग्राम के पास बनने वाले रेलवे लाइन से पर्यावरण व ग्राम को होने वाले प्रभाव पर चर्चा हुई।

सामुहिक चर्चा हेतु गाँव के लोगों को एक दिन पूर्व आमंत्रित किया गया था, बैठक के सामुहिक चर्चा के तहत ग्राम वासियों द्वारा पड़ने वाले प्रभावों पर विस्तार पूर्वक चर्चा की, गांव के लोगों को मुख्य मोड़ गाँव के रेलवे क्रासिंग का रास्ता दिया जाना था।

1. प्रकाशी लाल जी के अनुसार रेलवे क्रासिंग बनना चाहिए।
2- रोशनलाल सिंह जी के अनुसार रेलवे क्रासिंग के रास्ता दिया जाए, रास्ता दिया जाए
3- उपजिलाधिकारी बुलन्दशहर मौका को मुआवना किया जाना है।
4. नैन पाल सिंह जी के अनुसार ग्राम के हैंडपम्प लगने चाहिए।
5- श्री रामअवतार जी के अनुसार गाँव की बड़ी समस्या रास्ते की है बरसात के समय समस्या और बढ़ जाती है।
6 जय प्रकाश जी के अनुसार रेलवे ट्रैक की लाइन पर हरे भरे पेड़ों का कटान होगा जिससे पर्यावरण को नुकसान पहुंचेगा
7- रामअवतार जी के अनुसार रेलवे के आस पास गन्दगी होगी व पानी गंदा होगा

प्रधानाध्यापक
पूर्व मा० विद्यालय कैलावाड़ गुलावठी

[redacted]

क्र०सं०	नाम	फोन नं०	गाँव	व्यवसाय	हस्ता
1	सत्य प्रकाश	9456896181	बसेड़ा	कृषि	[illegible]
2	कौशलप्रधान		बनेड़ा	कृषि	कौशल
3	सुरेशदत्त		बनेड़ा	व्यापार	सुरेश
4	नरेन्द्र कुमार		बनेड़ा	कृषि	नरेन्द्र कु
5	शेरसिंह त्यागी	9759113081	बनेड़ा	कृषि	शेरसिंह
6	छोटे लाल	9675538729	बनेड़ा	व्यापार	छोटे ला
7	विजेन्द्र कुमार शर्मा	7880024651	बनेड़ा	व्यापार	विजेन्द्र
8	मदनलाल	—	बनेड़ा	कृषि	मदनलाल
9	सतीश त्यागी	9675676718	बनेड़ा	कृषि	सतीश त्या
10	प्रमोद कुमार	9675943867	बनेड़ा	कृषि	प्रमोद कु
11	रामपाल	—	बनेड़ा	कृषि	रामपाल
12	सतीश कुमार	9758349697	बनेड़ा	कृषि	सतीश
13	सत्यप्रकाश त्यागी	9456896181	बनेड़ा	सरकारी	[illegible]
14	राजवेल	9012157298	बनेड़ा	कृषि	राजवेल
15	रामपाल s/. बलीराम	—	बनेड़ा	कृषि	[illegible]
16	सतीश कुमार चन्द	9761047270	बनेड़ा	कृषि	सतीश
17	मनु मेहर सिंह		बनेड़ा	व्यापार	मेहर सिंह
18	अमित कुमार		बनेड़ा	कृषि	अमित कु
19	पुष्पा त्यागी				पुष्पा त्या

कौशल

गाँव के और लिए मुख्य रूप से आम लोगों का कहना था कि जमीन के बदले मुआवजा व नौकरी दी जाए।

गाँव के [illegible] जी के अनुसार जमीन के बदले नौकरी मिलनी चाहिए।

सभी गाँव वालों की मांग है कि जो [illegible] को भेजा जाय उसकी एक कॉपी ग्राम प्रधान को भी जाय।

गाँव वालों की मांग थी कि जो शौचालय बने हुए हैं रेल में बने हुए होते थी उनसे [illegible] लाइन पर जाती थी उससे पर्यावरण दूषित होता है तो कोई इस तरह का समाधान किया जाये जिससे इस तरह की समस्या का हल हो।

रेल से अगर ध्वनि प्रदूषण होता है तो ध्वनि शोधक यंत्र लगाये जायें जिससे ध्वनि प्रदूषण कम हो।

गाँव के लोगों का कहना था कि गाँव के रास्ते को पक्का कर दिया जाये जो रेलवे के पास गुजर रहा है।

गाँव के पास रेलवे के ऊपर पास बनाया जाये ब्रिज बनाया जाये।

काशम

10-3-15

आज दिनांक 10-3-15 को ग्राम पंचायत बहेड़ी जिला सहारनपुर में सामुदायिक चर्चा बैठक का आयोजन किया गया बैठक में गाँव के पास से बनने वाली खुर्जा पिलखानी रेल लाइन से पर्यावरण पर पड़ने वाले प्रभावों पर चर्चा की गयी बैठक व चर्चा के निम्न बिंदु व विचार गाँव वालों द्वारा व्यक्त किये गये।

1- गाँव के सत्यप्रकाश त्यागी के अनुसार रेल के चलने से धुआं लगेगा व आवाज लगेगी इन की समस्या का उत्तर दिया गया यह रेल विद्युत से चलने वाली है। इन के द्वारा नौकरी का प्रस्ताव रखा गया।

2- गाँव के नरेन्द्र कुमार जी का कहना था कि रेलवे ट्रैक बनने से हमारा रास्ता बन्द हो जायेगा। उत्तर दिया गया रास्ता पानी किसी के बन्द नहीं किये जायेंगे, रास्ते की जगह रास्ता दिया जायेगा।

3- गाँव के सत्य प्रकाश जी के अनुसार रेललाइन ट्यूबवैल के कोर के [illegible] इन मुद्दे को रखा गया है।

4- गाँव के लोगों का कहना था कि मुआवजा सर्किल रेट से चार गुना मिलना चाहिए।

5- गाँव वालों का कहना था गाँव के दरवाजे उन्हें जमीन के हासिल से बहुत पीछे [illegible]

कौशल

[illegible]

ग्राम बलिदपुर जिला - मेरठ उत्तर प्रदेश 26-2-

क्र०सं०	नाम	सम्पर्क फोन नं०	गाँव	व्यवसाय	हस्ताक्षर
1-	बाबू राम	9286338225	बलिदपुर	कृषि	बाबूराम
2-	[illegible] सिंह			नौकरी सरकारी	[illegible]
3-	[illegible]	9634986170		मजदूरी ड्राइवर	[illegible]
4-	मुकुन्द	9634354944		मजदूरी	[illegible]
5-	अरविन्द			डाक्टर	[illegible]
6-	अमरदास			खेती कृषि	अमर दास
7-	अनिल	9639465836		[illegible]	Anil
8-	राजकुमार	8979384477		खेती कृषि	[illegible]
9-	भंवर सिंह प्रधान	9259082402		कृषि	भंवर सिंह
10-	बहादुर			खेती	बहादुर
11-	रणजीत सिंह	8958464885		दुकान व्यापार	रणजीत [illegible]
12-	अंकित कुमार	9759785821		[illegible]	Ankit Kumar
13-	ओमपाल			मजदूरी	
14-	गोविन्द			खेती नौकरी	
15-	कंवर [illegible]			खेती	[illegible]
16-	कपिल कुमार			कृषि	[illegible]
17	वीर बहादुर	9720582598	बलिदपुर	कृषि	[illegible]
18	अरविन्द कोठ				अरविन्द
19	अमर [illegible]				अमर [illegible]
20	मैत्री देवी (प्रधान बलीदपुर)		ग्राम बलिदपुर		[illegible]
21	अर्जुन कुमार	8791765224			[illegible]
22	[illegible]				[illegible]

[illegible] 26/2/15

26/2/15 Arm[illegible]/[illegible] DFC

26/2/15 [illegible]

प्रधान
ग्राम पंचायत बलीदपुर
[illegible]

26/2/15 JP[illegible] Am/Engg/MTR

17- जो बिन्दु डा० असद ने उठाया था कि पानी में कैंसर की मात्रा अधिक है जिस से आस पास के क्षेत्र में 5 मृत्यु हो गयी है, चर्चा का उत्तर श्री जान अरोरा जी ने दिया कि पानी का प्रदूषण का स्रोत रेलवे नहीं है, इसका रेलवे से कोई सम्बन्ध नहीं है फिर भी वर्तमान को जानने हेतु पानी के सैम्पल लिये जा[illegible]

18- गाँव वालों के अनुसार पूर्व में NH 58 को बनाने पर जो पेड़ काटे गये उन की जगह [illegible] [illegible] के पेड़ ही लगाये गये जिस से हरियाली के अभाव से पर्यावरण/वायु प्रदूषण बढ़ा है। इसलिए गाँव वालों की चिन्ता है कि पूर्व की तरह यह स्थिति वर्तमान में न हो, जब पेड़ काटे जाएं तो पूर्ण रूप से उतने पौधों का रोपण किया जाए,

[signature]
26/[illegible]/15

[signature]
प्रधान
ग्राम पंचायत [illegible]
[illegible]

प्रधान
[illegible]

8- अरोड़ा जी द्वारा बताया गाँव के रास्तों का निर्माण किया जायेगा, जहाँ-2 से रेलवे लाइन गुजरेगी और जो प्रभावित होंगे

9- अरोड़ा जी के अनुसार गाँव वालों की जमीन का पूरा-2 मुआवजा दिया जायेगा। जो कि नये भूमि अधिग्रहण के नये नियम अनुसार होगा।

10- अरोड़ा जी के अनुसार नये एक्ट के अनुसार रेट दिये जायेंगे, जो कि एक्ट में उपलब्ध है

11- बहादुर जी ने जमीन के सर्किल रेट से कितना गुना पैसा मिलेगा।

12- अरोड़ा जी ने बताया कि पेड़ों का 4 गुना मुआवजा दिया जायेगा जो भी नियम के अनुसार हो

13- बहादुर जी ने मुआवजा कब तक मिल जायेगा, पूछा

14- अरोड़ा जी द्वारा बताया गया। भूमि के अतिरिक्त, पेड़ों का व जमीन का मुआवजा दिया जायेगा।

15- कामेश शर्मा जी द्वारा जिन लोगों की जमीन रेल लाइन में जायेगी उस परिवार को 3 हजार रुपये प्रतिमाह 1 वर्ष तक दिया जायेगा। ये नये एक्ट में दिखाया गया है

16. जिन काश्तकारों की जमीन जायेगी उनके परिवार के एक सदस्य को रेलवे में नौकरी हेतु प्राथमिकता दी जायेगी व नौकरी दी जायेगी, जो भी प्रावधान परियोजना में हो।

साक्षी
प्रधान

दि० 26-2-15 को ग्राम बलिपुर मे एक सामुहिक बैठक का आयोजन किया गया, जिस की अध्यक्षता गाँव के प्रधान भंवर सिंह जी द्वारा की गयी, बैठक मे पर्यावरण प्रभावों पर चर्चा हुयी, पर्यावरण पर रेलवे लाइन से प्रभावों के सम्बन्ध मे गाँव वासियों ने अपने विचार रखे, गाँव के लोगों की मुख्य समस्या गाँव के पानी के खराब होने से सम्बन्धित थी।

- कामेश शर्मा जी द्वारा पर्यावरण पर सर्व प्रथम होने वाले प्रभावों से सम्बन्धित चर्चा की।

:- डा० अजय कुमार जी के अनुसार पानी मे के फ्लोराइड की मात्रा पानी मे बहुत अधिक है इस का क्या समाधान है।

:- डा० अजय कुमार ~~[illegible]~~ जी के अनुसार रेलवे ट्रैक के आस पास कटने वाले पेड़ों से पर्यावरण प्रदूषण होगा जिस से आक्सीजन की कमी है.

:- ~~8~~ गोयल जी के अनुसार रेलवे लाइन ट्रैक के पास ~~[illegible]~~ कटने होने वाले पेड़ों की जगह पेड़ लगवाने जायेगे, जो की नियम या उचित अनुसार होंगे

:- कमल जी के अनुसार पौधारोपण किया जायेगा, रेलवे ट्रैक के पास दोनों तरह किया जायेगा, जो कि परियोजना मे दर्शाया गया होगा

:- [illegible] जी ने बताया की ट्रैक ~~मे~~ गाँव के पास ट्रैक के ~~[illegible]~~ ऊपर पास बनाये जायेगे, या के निचे से बनाए जाएंगे जैसे कि नियम होगा।

-- [illegible] जी के अनुसार L.C के पास से ऊपर या फ्लाई ओवर व अन्डर पास बनाये जायेगे, [illegible] अनुसार

[signature]
प्रधान
ग्राम पंचायत [illegible]
दौराला (मेरठ)

[signature]
26/2/15

गाँव हातिमाबाद, ग्राम पंचायत (हातिमाबाद) 2-2015

	नाम	गाँव	फोन नं०	व्यवसाय	हस्ताक्षर
1	लेखराज	हातिमाबाद	9759541094	प्रधान (सचिव)	लेखराज सिंह
2	विपिन	हातिमाबाद		कृषि	
3	दलबीर सिंह	हातिमाबाद	9837620750	कृषि	दलबीर सिंह
4	राजेश	हातिमाबाद		दुकान	राजेश
5	मंसूर अली	हातिमाबाद	7917955481	कृषि	मन्सुर
6	ताहिर	हातिमाबाद		व्यवसाय	
7	मुहम्मद मुनीफ	हातिमाबाद	9837983433	कृषि	मो० मुनीफ
8	अनवार	हातिमाबाद	9627564147	कृषि	अनवार
9	मुलबीर	हातिमाबाद	9837547961	मजदूरी	मुलबीर
10	कौसर	हातिमाबाद		व्यवसाय	कौसर
	अमर सिंह	हातिमाबाद		टीचर	अमर सिंह
12	गुलजारी	हातिमाबाद		टीचर	गुलजारी
13	शाकिर मास्टर	हातिमाबाद		व्यवसाय	
14	जाविद	हातिमाबाद	9690662860	व्यवसाय	
15	यामीन हाजी	हातिमाबाद		कृषि	
16	इलय	हातिमाबाद		व्यवसाय	बलकु
17	शकील	हातिमाबाद	9750634804	कृषि	शकील
18	कृष्णा	हातिमाबाद		कृषि	
19	अब्दुल	हातिमाबाद		कृषि	इलियास
20	चन्दी	हातिमाबाद	9536760874	कृषि	
21	अब्दुल रशीद	हातिमाबाद		कृषि	
22	मो० युसुफ	हातिमाबाद	9720420804	कृषि	बाले
23	बाला	हातिमाबाद		कृषि	
24	जतेस	हातिमाबाद		कृषि	
25	शमा	हातिमाबाद		व्यवसाय	
26	सुमन	हातिमाबाद			
27	रिजवा	हातिमाबाद	9720420804	कृषि	रिजवा
28	फमा	हातिमाबाद		कृषि	
29	शान्ती	हातिमाबाद	9536764210		लेखराज सिंह
30	रहीस बानो	हातिमाबाद			
31	रानी	हातिमाबाद			

आज दि० 4/3/2015 को ग्राम मनोहरपुर ग्रा
पंचायत उम्मोली मे सामुहिक चर्चा बैठक
आयोजन किया गया बैठक का उद्देश्य समी
लाइन बनने से पर्यावरण पर होने वाले प्रभाव
चर्चा हुयी।

1- विनोद कुमार जी के अनुसार इस रेल के
से हमारा रास्ता बन्द हो जायेगा उत्तर दिया
रास्ता बन्द नहीं होगा

2- दिनेश कुमार जी के अनुसार रेल के चलने
रास्ता फाटक बार-2 बन्द होगा, कुछ दूर
होगा उत्तर दिया गया गाँव के फाटक के
पुल प्रस्तावित है।

3- गाँव के पास मुरादपुर लकीपुर के आड़ रेल के
से रास्ता बन्द हो जायेगा कुछ का नया
को 130 व 131 न० का खाता है समाधान
बताया गया रास्ता व पानी बन्द होगा।

4- मुरादपुर लकील पुर गाँव के जो मुआवजा
पूर्व दिया गया है व निकल रहे है कम
गया है जो लगाया। 1 लाख 80 हजार के
आज पास किया गया है,

5- गाँव वालो का कहना था कि पेड़ो को पूर्ण मुआ
नहीं मिला, इसका कहना है गाँव के कुछ लिए
खसरा न० 125 पेड़ो का पूर्ण मुआवजा नहीं मिले

6- गाँव के निवासियो का कहना है कि मुआवजा
कानून के अन्दर मिलना चाहिए

प्रधान
ग्राम पंचायत - उम्मोली
वि०ख० - ... (सहारनपुर)

क्र०सं०	नाम	फोन न०	गाँव	व्यवसाय	हस्ताक्षर
32	राजेन्द्र सिंह		सिकन्दरा	खेती	राजेन्द्र
33	रुस्तम	7533931997	"	कुम्हार	रुस्तम
34	शंकर	9084499723	"	खेती	[illegible]
35	जय प्रकाश	8449963998	"	खेती	[illegible]
36	विरेन्द्र		"	"	[illegible]
37	बृजपाल	8057580078	"	ड्राइवर	B
38	देवि शरण सिंह	8937007819	"	खेती	[illegible]
39	जयवीर	9012383229	"	खेती	[illegible]
40	जगमोहन		"	खेती	[illegible]
41	सितेन्द्र		"	खेती	[illegible]
42	Sherry Singh			[illegible]	

Nishu IRG

22/2/15

IRG

ग्राम – किलहौड़ा जिला – गाजियाबाद

क्रमांक	नाम	सम्पर्क फोन नं०	गाँव	व्यवसाय	हस्ताक्षर
[illegible]	[illegible]	9756648071	किलहौड़ा	कृषि	[illegible]
[illegible]	[illegible]	9259335570	"	कृषि	[illegible]
[illegible]	हरवीर सिंह	9456678361	"	कृषि	[illegible]
[illegible]	लोकेन्द्र	9012143209	"	कृषि	लोकेन्द्र
[illegible]	वेद प्रकाश	No	"	कृषि	[illegible]
[illegible]	विजेन्द्र	No			[illegible]
[illegible]	मेहक सिंह	98377 [illegible]			[illegible]
[illegible]	रतन सिंह				[illegible]
[illegible]	धर्मेन्द्र	9012869894			[illegible]
[illegible]	शेरपाल	8449125711	"	कृषि	[illegible]
[illegible]	वीर सिंह	88393675	"	"	[illegible]
[illegible]	सचेन्द्र			"	[illegible]
[illegible]	लहरी	84264763		"	Lahari
[illegible]	सुखवीर	89264663		"	[illegible]
[illegible]	सतपाल	95567020		"	Satpal
[illegible]	S/o ओमकार	902736 [illegible] 35		"	[illegible]
[illegible]	राजवीर			"	Rajbeer
[illegible]	बहादुर			"	[illegible]
[illegible]	[illegible]				
[illegible]	[illegible]	9690768484		खेती	[illegible]
[illegible]	अनिल			"	Anil
[illegible]	[illegible]				[illegible]
[illegible]	[illegible] प्रकाश			[illegible]	
[illegible]	[illegible]	8957053632		"	[illegible]
[illegible]	[illegible]	9761349332	किलहौड़ा	किलहौड़ा	[illegible]
[illegible]	[illegible] राम			"	[illegible]
[illegible]	[illegible]			"	
28	[illegible]	7500949318		खेती	[illegible]
29	[illegible]	9927856645		खेती	[illegible]
30	[illegible]	No	किलहौड़ा	खेती	[illegible]
31	[illegible]	9139518006	किलहौड़ा	खेती	[illegible]

5- नरेश भाई जी ने पूछा कि रेलवे गाड़ी धुआँ करेगी है जिसका जवाब दिया गया के आधुनिक बिजली से चलने वाली होगी इसमें से धुआँ नहीं होगा। उन्होंने यह कहा कि इंजन प्रदूषण भी होगा जिसका जवाब दिया गया ज्यादातर ट्रैक खेतों के बीच से जा रहा है अगर कोई प्रदूषण होगा तो उसके पास पेड़ लगाए जाएँगे जो इस प्रदूषण को कम करेंगे,

7- गाँव वासियों के अधिकांश प्रश्न जमीन के मुआवजे के सम्बन्ध में था, जिसका उत्तर श्री ओमप्रकाश और श्री डी० पी० गोयल जी ने दिया कि जमीन का मुआवजा नये एक्ट के हिसाब से दिया जायेगा।

8- रतन सिंह जी ने पूछा कि खेत के टुकड़े हो जायेंगे तो पानी इधर कौन से कैसे किया जायेगा। जिसका उत्तर दिया गया अगर टुकड़ा छोटा हुआ तो कानून के हिसाब से और जमींदार की मर्जी से वो जमीन भी ले ली जायेगी और अगर बड़ा टुकड़ा हुआ तो पाइप लाइन डाली जा सकती है

दि० 27-2-2015 को ग्राम किल्हौड़ा जिला गाजीयाबाद के गाँव वासियों के साथ पर्यावरण संदर्भ में सामुहिक परामर्श बैठक का आयोजन किया गया, बैठक में रेलवे लाइन के गुजरने से पर्यावरण पर पड़ने वाले प्रभावों पर विस्तार पूर्वक चर्चा हुयी, नयी रेलवे लाइन निकलने से होने वाले प्रभावों व अन्य मुद्दों पर ग्राम वासियों द्वारा निम्न विचार रखे।

- गाँव के रतन जी पूछा इस ट्रैक में मालगाड़ी चलेगी या सवारी गाड़ी जिस का उत्तर दिया गया कि सिर्फ मालगाड़ी जायेगी।

2. गाँव वालों का कहना था इन पर सवारी गाड़ी भी चलने चाहिए जिस का उत्तर दिया गया कि जो वर्तमान रेलवे ट्रैक है, उन की मालगाड़ी इन नये ट्रैक पर चलेगी तो उन ट्रैक पर सवारी गाड़ियाँ बढ़ाई जायेंगी

3. ओमकार सिंह जी ने पूछा कोई मार्ग आ रहा है या नहीं। उत्तर दिया गया नहीं आ रहा, उन्होंने यह भी पूछा कि पानी की निकासी तो नहीं रुकेगी जिस का उत्तर दिया गया कि कोई भी नाला नहीं रोका जायेगा या तो पुल बनेगा या अन्डर भूमिगत मार्ग बनेगा

4. हड़ौड़े के एक निवासी ने पूछा कि कितनी जमीन ली जायेगी जिस का उत्तर दिया गया ट्रैक के 50 मी ट्रैक के लिए और 70 मी. स्टेशन के लिए ली जायेगी, उन्होंने ये भी पूछा कि जितना सिलसिला पेपर में दिया गया है उतना ही लिया जायेगा जिस का जवाब दिया गया जमीन का मार्केट या सर्किल के ही दिया जायेगा।

(खुर्जा सिटी स्टेशन)

Name नाम	गाँव	फोन नं०	हस्ताक्षर	व्यवसाय
1 सुरेश कुमार	खुर्जा (सिटी स्टेशन)	8923493164	[illegible]	[illegible]
2 दुर्गा भारती	खुर्जा	8532005877	दुर्गा भारती	[illegible]
3 सुचा शर्मा	खुरजा नगर क्षेत्र	9319096155	[illegible]	इ० प्र०अ०
4 [illegible] शर्मा	खुर्जा	9927484362	[illegible]	नौकरी
5 [illegible] सिंह	खुर्जा नगर स्टेशन	8445439357	[illegible]	नौकरी
6 [illegible]	खुरजा नगर स्टेशन	9411963321	[illegible]	नौकरी
7 अमित कुमार पाण्डेय	खुर्जा	8115858061	[illegible]	नौकरी
9 राहुल कुमार राघव	अलीगढ़	9897397994	[illegible]	नौकरी
10. राहुल कुमार सैनी	बुलन्दशहर	9720216796	[illegible]	नौकरी
11. Yogesh Kumar Bhati	Khurja	9058336644.	[illegible]	Service
12. Naresh Kumar.	Khurja.	4012101920	[illegible]	Service.
13 [illegible] dutt Sharma.	Khurja	8923361251	[illegible]	Service
14 अमरजीत	Khurja.	9639809130	[illegible]	Driver
15 [illegible]	खुर्जा	9411686381	[illegible]	Service
16 Yashwant Singh	खुर्जा	9058260068	यशपाल सिंह	Business
17 Pradamsingh	Khurja	8445112990	[illegible]	Service
18 Sudesh Babu	Khurja	9536082099		
19. जितेन्द्र	खुर्जा	9058842223	[illegible]	Service
20 पवन	खुर्जा	8533858415	[illegible]	Job
21 भगवती	खुर्जा	9568426806	[illegible]	नौकरी
22. विनोद	खुर्जा	9536760874	[illegible]	नौकरी
23 [illegible]	खुर्जा	9720420804	[illegible]	[illegible]
24 [illegible]	खुर्जा	9720420809	[illegible]	

आज दिनांक 19.2.2015 को खण्ड शिक्षा अधिकारी खुर्जा के कार्यालय मे सामूहिक परामर्श हुआ जिसकी अध्यक्षता श्री नरेश कुमार उप खण्ड शिक्षा अधिकारी की अध्यक्षता मे हुआ जिसमें निम्न बिन्दुओ पर चर्चा हुई पब्लिक कनसलटेशन हेतु यहां पर सभी लोगो को पहले सूचित किया गया था। निम्नलिखित बिन्दुओ पर स्थानिय लोगो का परामर्श लिया गया है।

(i) श्री नरेश कुमार जी ने कहा कि यातायात प्रभावित होगा एवम प्रदूषण बढ़ेगा (Block Resource Coordinator)

(ii) योगेश कुमार भाटी ने कहा कि आबादी वाले क्षेत्र के जो भी घर है। जो निम्न तबके के है, उन्हे मुआवजा और भी उसी तरह का घर जमीन सहित मुहैया करवाये।

(iii) रेलवे लाईन के साथ बैरीकेटिंग (सुरक्षा दिवार) बनाई जाये ताकि लोगो एवम पशुओ के लिए सुरक्षित रहे।

(iv) नरेश कुमार जी ने कहा कि जलस्तर बढ़ोतरी एवम आवाजाही बढ़ेगी

(v) जानवरोंपर का प्रभाव

(vii) जीवो एवम वनस्पति की विलुप्त हो रही प्रजातीयो के आवासो के अभाव को रखते हुऐ उनका Survey एवं उचित रख रखाव हो

(viii) पानी के स्त्रोत जिसमे (ट्यूबवेल्स आदि) का उचित मुआवजा।

IX वनस्पती का उचित रख रखाव (योगेश कुमार)

(X) लोगो के लिए सुविधाये होगी,

XI उपजाऊ भूमि पर उपजाने वाली अच्छी फसले

XII आजीविका पर प्रभाव पड़ेगा (खाद्यान्न उत्पादन)

XIII कृषि पर प्रभाव

खण्ड शिक्षा अधिकारी
खुर्जा
बुलन्दशहर

[redacted]

ग्राम जहाँगीरपुर

2/3

नाम	गाँव	फोन नं०	व्यवसाय	हस्ताक्षर
प्रकाश कुमार	जहाँगीरपुर	8650696983	कृषि	[illegible]
सोनू भाई	जहाँगीरपुर	8864869929 2	"	सोनू
गंगाराम	जहाँगीरपुर		"	गंगाराम
पुष्पेन्द्र	जहाँगीरपुर		"	पुष्पेन्द्र
रणजीत	जहाँगीरपुर		"	रणजीत
प्रवीण	जहाँगीरपुर		"	प्रवीण
सुनील	जहाँगीरपुर		"	[illegible]
[illegible]	जहाँगीरपुर		"	[illegible]
[illegible]	जहाँगीरपुर		"	[illegible]
[illegible]	जहाँगीरपुर		"	[illegible]
किशनपाल	जहाँगीरपुर		"	[illegible]
रमेश चन्द	जहाँगीरपुर		"	रमेश चन्द
श्याम लाल	जहाँगीरपुर		"	श्याम लाल
जयदेव	जहाँगीरपुर	9612532133	"	जयदेव
सुनील	जहाँगीरपुर	8954569726	"	सुनील
[illegible]	जहाँगीरपुर			[illegible]
[illegible]	जहाँगीरपुर	8958254589		[illegible]
Sunil Kumar	Jahangirpur	9027409712		S.Kumar
Pinky Rana	Jahangirpur	8954100R4		P. Rana
Pankaj Rathi	Sonta	98379467[illegible]	Chemist	पंकज कुमार
Pushpendra Rathi	Sonta			
Kusil Kumar	Sonta	9761979162		Kusil Kumar
Love Kumar	Sonta	"		Love Kumar
रवि	[illegible]	—	Student	Ravi
मोहनपाल	जोहरा	—	विद्यार्थी	Mohanpal
कृष्णपाल	[illegible]	—	[illegible]	K.Pal
				[illegible]
नरेन्द्र	Sonta	—	कृषि	Narendra [illegible]
मदन पाल	Sonta	—	कृषि	मदनपाल

[illegible] 2/3/15

Pushpender Rathi जी ने बताया कि यहाँ आपत्ति सही नहीं है उन्होंने यहाँ भी यहाँ की तरह रेल की पटरी से उन्हें कोई आपत्ति नहीं है

Pushpender Singh जी ने पूछा कि यहाँ पर फाटक से जो ओवर ब्रिज बनेगा तो उन्हें आपत्ति [illegible] जहाँ पर Under pass Sanction किया जाये। (Railway Board)

[signature] 2/3/15

आज दिनांक 21.3.15 को गांव जहांगीरपुर में Public Con
हुई जिसमें प्रभावितों से सम्बन्धित चर्चा की गई यह
बैठक राजकीय प्राथमिक पाठशाला जहांगीरपुर के प्र
के साथ सम्पन्न हुई इस बैठक में निम्नलिखित विषय
पर विस्तार से चर्चा की गई

(i) पंकज राठी जी ने कहा की पर्यावरण ठीक है

(ii) गंगा राम जी ने बोला कि क्या नई रेल की पटरी
आने से पानी का स्तर नीचे चला जायेगा उनके सन्तुष्टि
हेतु उत्तर दिया गया की इस परियोजना से पानी के
स्तर पर कोई प्रभाव नहीं पड़ेगा।
गंगाराम जी का कहना था कि नई पटरी आने से
शोर बढ़ेगा, जिसके उत्तर में कहा गया कि यह
वर्तमान पटरी के साथ-2 लगेगी तो शोर नहीं
पड़ेगा, परन्तु कोई मन्दिर, स्कूल या अस्पताल
होंगे, तो वहां पर पेड़ लगाये जा सकते हैं जो
आवाज नियन्त्रित करेंगे।

(iii) महकसिंह जी ने कहा की Train की आवाजाही से
कोई परेशानी नहीं होगी।

(iv) सुशील जी (अध्यापक) ने कहा की Train जाने
कम्पन बढ़ेगी जिसका जवाब दिया गया, कि कम्पन
बढ़ेगी, परन्तु नई पटरी पुरानी पटरी के ही साथ
आने से अवश्य कम्पन कम होगी।

(v) रिंकी राणा (अध्यापक) ने इसका समर्थन किया।

(vi) Pankaj Rathi ने जमीन जा रही है इसीलिए उन्हें
Circle rates की जानकारी चाहिए जिसका उत्तर
दिया गया, उन्हें ये जानकारी ADM LA से
मिलेगी
21/3/15

Date
Page

7- गाँव के प्रभावित रामकली के अनुसार मेरी ट्यूबवेल लाइन के जा रही है उस को बना हो उखाड़ दिया गया उसके अनुसार ट्यूबवेल का निर्माण का मुआवजा दिया जायेगा जो उचित न होगा।

प्रधान
ग्राम पंचायत – अम्बोली
वि०ख० – [illegible] (सहारनपुर)

ग्राम - पाँचलीखुर्द जिला - मेरठ 26-2-15

	नाम	सम्पर्क	गाँव	व्यवसाय	हस्ताक्षर
1-	सुमित कुमार	7417788037	पाँचली खुर्द	हाला	सुमित कुमार
2-	[illegible] कुमार	805772864	पाँचली खुर्द	प्राइवेट जाब	कुलदीप कुमार
3-	[illegible] सिंह पूर्व प्रधान		पाँचली खुर्द	कृषि	[illegible]
4-	[illegible]	8979988281	पाँचली खुर्द	प्राइवेट जाब	
5-	[illegible] कुमार	8881818241	पाँचली खुर्द	हाला	विनीत कुमार
6-	अमित कुमार	9528324171	पाँचली खुर्द	पढाई हाला	अमित कुमार
7-	[illegible]		पाँचली खुर्द	पढाई	[illegible]
8-	[illegible] सिंह		पाँचली खुर्द	कृषि	[illegible]
9-	करन सिंह			कृषि	करन सिंह
	सुरेन्द्र सिंह पूर्व प्रधान				Surendra Si
	[illegible] सिंह	9997467382			
	ओमपाल सिंह	9012974971		कृषि	ओमपाल सिंह
	अरविन्द कुमार	7830528208		कृषि	Arvind Kum
	अनिल कुमार	7830783283		कृषि	Anil Kumar
	विपिन कुमार	"		कृषि	विपिन कुमार
	अभिनन्दन	—		कृषि	अभिनन्दन
	[illegible]	9927032322	पाँचलीखुर्द	[illegible]	[illegible]
	सुनील कुमार		पाँचलीखुर्द	कृषि	सुनील कुमार
	[illegible] कुमार	9927287981	"		[illegible]
20	[illegible] सिंह		पाँचलीखुर्द	कृषि	श्रीपाल
21.	[illegible]		पाँचलीखुर्द	कृषि	Jaipal
22.	[illegible]			कृषि	[illegible]
23.	[illegible]			कृषि	[illegible]
24.	[illegible]			कृषि	[illegible]
25.	[illegible] सिंह			कृषि	Charan Si
26.	[illegible]			कृषि	[illegible]
27.	[illegible] सिंह			कृषि	
28.	[illegible] सिंह			कृषि	[illegible]
29.	[illegible]	9927142952		कृषि	[illegible]
30-	[illegible]	8859989870			

ग्राम पंचायत पाँचली खुर्द (मेरठ)

26/2/15

12- अरोड़ा साहब के अनुसार जिन परिवारों की जमीन रेलवे के अन्तर्गत आयेगी उन्हें, 36000 ~~प्रति वर्ष~~ रकम दिया जायेगा।

13- पाँच लाख रुपया नौकरी के एवज में या 2 हजार रुपये प्रति माह के आधार पर दिया जायेगा।

14- अरोड़ा जी के अनुसार मुआवजा पूर्ण व पूर्व की तरह मिलेगा।

15- रेलवे लाइन की चौड़ाई 40 मीटर बतायी गयी।

16- सोबन सिंह जी द्वारा लाइन में आ रहे पेड़ों के मुआवजे के बारे में पूछा गया। उन्हें अवगत कराया गया की पूरा मुआवजा पेड़ों का भी मिलेगा।

17- मुआवजे की किस्त एक मुश्त दी जानी चाहिए।

18- पेड़ों का मुआवजा जमीन की तरह चार गुना मिलेगा।

19- गाँव वालों द्वारा रेलवे स्टेशन की माँग की गाँव में रेलवे स्टेशन बनना चाहिए।

20- आज की बैठक में उपरोक्त बिन्दुओं पर विचार विमर्श हुआ तथा निम्नलिखित परियोजना के बारे में चर्चा हुयी। यह चर्चा सुबह 12 बजे से लेकर 2 बजे तक चली, परामर्शदाता का समापन सकुशल पूर्ण रूप से किया गया, इस बैठक में D.F.C.C की तरफ से श्री जे. पी. [illegible] जी एवं श्री ओमनाथ अरोड़ा जी उपस्थित थे ने अपने सुझाव एवं ग्राम पंचायत पीपली खुर्द

आज दिन 26-8-5 को ग्राम पाँचली खुर्द में एक सामुहिक
[illegible] बैठक का आयोजन किया गया, जिस की
[illegible] ग्राम की प्रधान श्रीमति पूनम देवी जी ने
बैठक में पर्यावरण से सम्बन्धित वार्तालाप किया
व यहाँ से गुजर रही फ्रेट रेलवे लाइन के निर्माण से
होने वाले पर्यावरण प्रभावों के बारे में विस्तार से
चर्चा हुयी। चर्चा में पर्यावरण से सम्बन्धित सुझाव
व परामर्श तथा इनके प्रश्नों के उत्तर दिये गये,
[illegible] बिन्दुओं पर चर्चा हुयी
- प्रधान जी के अनुसार रेल चलने से ध्वनि प्रदूषण होगा।
- गाँव के पटवारी जी के अनुसार रेल के चलने से वायु प्रदूषण होगा रेल धुँआ देगी।
- गाँव वालों के अनुसार जमीन का उचित मुआवजा दिया जाए,
- [illegible] जी द्वारा भूमि का मुआवजा नये भूमि अधिग्रहण
5- कानून शर्मा जी द्वारा
- [illegible] सिंह जी के अनुसार गाँव के समीप एक तालाब है जहाँ लोग मछली पालन करते हैं, और जानवर पानी पीते हैं, रेल के गुजरने से तालाब में प्रदूषण होगा।
- महेन्द्र सिंह जी के अनुसार गुजरने ~~[illegible]~~ वाली रेल लाइन से कीमती जमीन का नुकसान होगा।
- सुरेन्द्र जी के अनुसार रेल लाइन की आवाज से [illegible] नहीं आयेगी
- प्रधान जी के अनुसार रेल लाइन गुजरने से पानी [illegible] निकासी की व्यवस्था हो,
- गाँव वालों के अनुसार रेल की [illegible]
- [illegible] मुआवजे के अनुसार गाँव वाले जमीन नहीं देंगे, नये मुआवजे के अनुसार ही जमीन दी जायेगी

[illegible]

ग्राम – नवीनपुरा बुलन्दशहर सिकन्दराबाद

नाम	पिता का नाम	गांव	हस्ताक्षर
	संजीव कुमार	नवीनपुरा	संजीव कुमार
	सुमित	"	Sumit
	अल्लादु	"	
	जगत सिंह	"	अल्लादु
	राजेन्द्र सिंह	" राजेन्द्र सिंह	जगत सिंह
	वीरपाल सिंह	" वीर पाल	प्रताप सिंह
	प्रताप सिंह	"	
	सुनील	"	Anil Kumar
	मोनू	"	
	राहुल	"	
	अजीतपाल (प्रधानपति)	"	राहुल
		"	अजीतपाल
	नीरज		नीरज
	चौरवा		चौरवा
	किशन सिंह		
	अमित		किशन सिंह
	Rohit Kumar		अमित
	राकेश		Rohit Kumar
	गुड्डन		Rakesh
	~~सोमवीर~~		Guddan
	लोकेन्द्र		सोमवीर
	नवल चन्द		नवल
	प्रमोद		प्रमोद

आज दि० 19-2-2015 को गाँव निजामपुर पंचायत घर में यहाँ के स्थानीय लोगों के साथ सामुहिक चर्चा हुई जिसमें इस गाँव के पास से निकल रहे रेलवे लाईन के होने वाले सामाजिक एवं पर्यावरण पर पड़ने वाले प्रभाव पर चर्चा हुई।

1 - लाईन पटरी के किनारे सड़क का निर्माण हो
2 - गाँव में लाईट की व्यवस्था हो
3 - गाँव की अच्छी कालोनियों का निर्माण
4 - गाँव में पानी निकासी निकास की व्यवस्था की जाए।
5 - गाँव के प्रत्येक व्यक्ति को रोजगार मिले
6 - रेलवे लाईन में जिन की जमीन गई उन्हे नौकरी मिलनी चाहिए
7 - गाँव में स्ट्रीट लाईट लगनी चाहिए।
8 - गाँव के पानी का परीक्षण हो।

आजी ...
प्रधान
ग्राम
निजामपुर

नाम	संपर्क फोन नं०	गाँव	व्यवसाय	हस्ताक्षर
1. जमाल मुहम्मद	9055423252	मुरसदपुर	कृषि	[illegible]
(2)- मुहम्मद शाहिद	9568473737	मुरसदपुर	कृषि	MSKhan
(3)- मामनुद्दीन	9690277561	मुरसदपुर	कृषि	
(4)- अनवार अहमद	9568474350	मुरसदपुर	ड्राइवर	अनवार
(5- रफीक अहमद		मुरसदपुर	कृषि	
6 - मुहम्मद शाहिदल	991738576	मुरसदपुर	कृषि	Shahid Khan
7 - मुहम्मद सालिम	9837822932	मुरसदपुर	कृषि	मौ० सालिम
8 - मुहम्मद कासिम	9756675271	मुरसदपुर	कृषि	KAsim
9 - मुहम्मद असद	9690190576	मुरसदपुर	कृषि	मो० असद
10 - मो० यूनस	8449926186	मुरसदपुर	ड्राइवर	मो० यूनस
11 - जुबैर आलम	8650975170	मुरसदपुर	टेलर	जुबैर आलम
12 - मो० मुजाहिद	9568605881	मुरसदपुर	कृषि	मो० मुजाहिद
13 - मो० उस्मान	8909500545	मुरसदपुर	ड्राइवर	उस्मान
14 - मो० आसिफ	9012742026	मुरसदपुर	कृषि	आसिफ
15 मो० दानिश		मुरसदपुर	कृषि	दानिश
16 इकबाल अहमद	9690367154	मुरसदपुर	कृषि	इकबाल अहमद
17 - जाहिद अहमद प्रधान	9690976132	मुरसदपुर	व्यापार	जाहिद अहमद
18 -				

जाहिद अहमद

जाहिद अहमद
ग्राम प्रधान
ग्राम पंचायत मुरसदपुर
वि० ख० [illegible] जिला [illegible]

आज दि० 21-2-15 को मुरादपुर ग्राम पंचायत मुरादपुर गाँव में ग्राम प्रधान जहीर अहमद की अध्यक्षता में गाँव के पास से गुजर रही रेलवे ट्रैक के निर्माण के सम्बन्ध में परामर्श हुआ। सामूहिक परामर्श हेतु इस पंचायत के लोगों को एक दिन पूर्व सूचित किया गया, गाँव के ग्रामवासियों द्वारा बनने वाले ट्रैक से होने वाले नुकसान से पर्यावरण को होने वाले नुकसान पर चर्चा हुई।

सामूहिक चर्चा में ग्राम पंचायत वासियों ने निम्न बातें कहीं। गाँव के लोगों की मुख्य माँग मुआवजे पर केन्द्रित थी।

प्रधान श्री जहीर अहमद के अनुसार के ग्रामपंचायत की जमीन का मुआवजा ग्राम पंचायत को मिले।

2- मुहम्मद शाहिद के अनुसार के अनुसार जमीन जाने के कारण बेरोजगारी व भुखमरी हो जायेगी।

3- रेलवे ट्रैक बनने से जानवरों को परेशानी होगी। रेल की आवाज से जानवर डरेंगे।

4- लोग रेल के आस पास गन्दगी करेंगे।

5- जाफर मुहम्मद के अनुसार रास्ते की व्यवस्था हो।

6- शाहआलम के अनुसार गाँव में स्टेशन बनना चाहिए।

7- अण्डर ब्रिज बनना चाहिए।

8- ट्रैक पर पेड़ लगने चाहिए।

9- ट्रैक बनने से पहले धूल व गन्दगी की पूरी व्यवस्था हो।

10- गाँव के अन्दर लाइट की व्यवस्था हो।

11- गाँव के आम के बागों का नुकसान हो रहा है जिससे गाँव की समस्या व रोजगार की समस्या।

ग्राम प्रधान
जहीर अहमद
ग्राम प्रधान
ग्राम पंचायत मुरादपुर

मदकरीमपुर

	नाम	गाँव	व्यवसाय	हस्ताक्षर
(1)	करनैल	मदकरीमपुर	खेती	9997800156
(2)	धर्मेन्द्र	मदकरीमपुर	खेती	8650008406 धर्मेन्द्र
(3)	सुरेन्द्र	"	"	9927765346 सुरेन्द्र
(4)	लोकेश	"	"	8923357006 लोकेश
(5)	अनिल	"	"	9927337244 [illegible]
(6)	अमरजीत	"	मजदूरी	9045243088 अमरजीत
(7)	वीर सिंह	"	मजदूरी	[illegible]
8	नेत्रपाल	"	[illegible]	8979118491 [illegible]
(9)	रतनपाल	"	मजदूरी	[illegible]
10	अजयपाल सिंह	"	मजदूरी	[illegible]
11	रमेश	"	मजदूरी	रमेश
12	जयपाल	"	खेती	जयपाल
13	कृष्ण	"		कृष्ण
14	[illegible]	"	"	[illegible]
15	[illegible]	"	"	
16	रामवीर	"	"	
17	रामवीर	"	"	
18	अनिल	"	"	
19	[illegible]	"	"	
20	राकेश	"	"	
21	राकेश कुमार	"	"	
22	देवेन्द्र	"	"	
23	[illegible]	"	"	
24	ओमपाल	"		
25	[illegible]	"	"	

प्रधान

[illegible]

2/3/17

AGM/I/[illegible]

ग्राम मदकरीमपुर

8979112[illegible]

[redacted]

मदकिमपुरा

आज दिनांक 2-3-2015 को मदकिमपुरा मे आम बैठक हुई जिसमें निम्नलिखित विषय पर चर्चा हुई इसमें प्रभावित से सम्बन्धित विचार विमर्श हुआ

1) श्री मूल चन्द जी ने कहा कि उनका मुख्य मुद्दा मुआवजे से सम्बन्धित है

2) पर्यावरण से सम्बन्धित कोई समस्या नही है यदि रेलवे लाईन बनती है

3) रशीद जी ने कहा कि पर्यावरण क्या होता है इसको उत्तर उन्हे दिया गया

4) मूल चन्द जी ने कहा कि प्लांट के पास से पानी की जाली खेतों को नहर से आता है जिसे कोई हानि नही होनी चाहिये उन्हे कहा गया कि ऐसा नही होगा

— अजब सिंह जी ने कहा कि बिजली की लाईन डायरेक्ट नही हो बीतार ऊपर या under ground direct village आनी चाहिये

5 अजब सिंह जी को प्रश्न है कि यदि पेड कटेगा तो कौन लगाएगा उन्हे बताया गया कि भरपूर मात्रा मे पेड लगाए जाऐगे

प्रधान

शकील
मदकरीमपुर

2/3/2015

8979118491

4/3/2015 ग्राम - मनोहरपुर

क्र०सं०	नाम	गाँव	फोन नं०	व्यवसाय
1	धूम सिंह	मनोहरपुर	8954434554	कृषि
2	मुकेश	मनोहरपुर	"	"
3	नरेन्द्र	मनोहरपुर	8006861818	कृषि
4.	विपिन कुमार	मनोहरपुर	9759224264	"
5.	मोहित कुमार	मनोहरपुर	9675667654	कृषि
6	सचिन कुमार	मनोहरपुर	8954616977	कृषि
7	कमलसिंह [illegible]	"	9760157171	"
8	कामेन्द्र सिंह	मनोहरपुर	8954131013	कृषि
9	नितिन कुमार	मनोहरपुर	9634345420	कृषि
10	गोवर्धन सिंह	[illegible]	9675133577	"
11	विजेन्द्र सिंह	मनोहरपुर	9410249081	कृषि
12	नरेन्द्र सिंह (पूर्व प्रधान)	"	9412648275	"
13	आनन्द कुमार	"	9719913164	कृषि
14	[illegible]	मनोहरपुर	—	"
15	राजू सिंह	"		कृषि
16	हिमांशु कुमार	"	9536543122	"
17	लखमेन्द्र सिंह	"	9536543114	कृषि
18	अजेन्द्र सिंह	"	8650679904	"
19	रघुवीर सिंह	"	9758733307	कृषि
20	[illegible] सिंह	"	9719960397	कृषि
21	अमनवीर	"	—	"

प्रधान
ग्राम पंचायत – कम्बोही
वि०ख० – [illegible] (सहारनपुर)

4/3/15

4/3/15
APM/JT/DME

ARM/2/MRC/DFCCIL

3(4)

आज दिनांक 3/4/15 को ग्राम पंचायत रणखण्डी में ग्राम सभा बैठक सामूहिक चर्चा बैठक का आयोजन किया गया बैठक में खुर्जा पिलखनी रेलवे लाइन बनने से पर्यावरण प्रभावों पर चर्चा हुई।

1- गाँव के अशोक कुमार जी का प्रश्न था कि इससे न तो हवा पर प्रभाव पड़ेगा और न पानी पर इसके मुआवजा कितना मिलेगा उत्तर दिया गया नए एक्ट के जो प्रावधान होगा उसके तहत ही मुआवजा दिया जायेगा, कुछ सुविधाएं दी जायेगी।

2- गाँव वालों का प्रश्न था इससे धुआं उत्पन्न होगा जिससे पर्यावरण पर प्रभाव पड़ेगा जिसका उत्तर दिया गया यह बिजली से चलने वाली रेल है जो धुआं नहीं छोड़ती इससे ~~वायु~~ प्रदूषण नहीं होगा।

3- श्रीमान् रामू जी के अनुसार पैमाइश अनुसार पेड़ों के कटने पर वातावरण प्रभावित होगा उसका क्या होगा उत्तर दिया गया कि कटे हुए पेड़ों की जगह पौधे लगाये जायेंगे।

6- नक्शे के अनुसार रास्ते बंद होंगे उनका क्या समाधान होगा, जिसका उत्तर दिया गया रास्ते पानी बंद नहीं होंगे, रास्तों का नुकसान नहीं पहुंचाया जायेगा।

प्रधान
ग्राम पंचायत रणखण्डी
ब्लॉक देवबन्द (सहारनपुर)

	नाम	फोन नं०	गाँव		हस्ताक्षर
32-	परवीन कुमार	8958808984	रतनपुर	मजदूर	[illegible]
33-	रितेश चौधरी	9690660588	"	ड्राइवर	रितेश
34	विनोद चौधरी	8958782203	"	व्यापारी	विनोद
35	विनित मलिक	7055458045		"	विनित
36-	विनित चौधरी	8171354226		"	विनित
37-	विपिन चौधरी	9917677168	"	विद्यार्थी	[illegible]
38	अशोक [illegible]	No	"	कृषि	[illegible]
39	राम भरोसे	No	"	"	राम [illegible]
40	सोहन पाल	9639557750	"	कृषि	सोहन
41	पुनेश	9012577752	"	बेरोजगार	[illegible]
42	अनुज मलिक राठी	9690813298	"	खेती	
43					
44					
45-					
46					
47-					
48					
49-					
50					

ग्राम पंचायत

27/2/15

ABM/R/mnz

2712

क्र०	नाम	फोन नं०	गांव	व्यवसाय	ह०
1	[illegible] पाल	9927242366	सैदपुर	कृषि	[illegible]
2	[illegible] सिंह	9997637590	"	"	[illegible]
3	[illegible] पुत्र [illegible]	9654012134	सैदपुर	कृषि	[illegible]
4	सतेन्द्र पाल	9528349538	"	"	[illegible]
5	दिनेश कुमार	9634422453	"	कृषि	[illegible]
6	जितेन्द्र	7351150530	"	"	[illegible]
7	अमर सिंह	9997608168	"	"	[illegible]
8	मेसाराम	No	"	"	
9	सुकरमपाल	9997905653	"	"	[illegible]
10	राजपाल	9897240436	"	"	
11	Jawahar Singh	8958005089	"	"	[illegible]
12	कमल सिंह	No	"	"	[illegible]
13	[illegible] सिंह	9760256327	"	"	[illegible]
14	जय पाल सिंह	—	"	"	
15	Anand Pal Singh	9760803678	"	"	[illegible]
16	[illegible] कुमार शर्मा	9219038174	"	"	[illegible]
17	[illegible] सिंह	9368704309	"	"	[illegible]
18	प्रमोद कुमार	9758442522	"	"	[illegible]
19	S. Sunil	9411254650			[illegible]
20	[illegible]	8057643737	"	"	
21	[illegible] Kumar	9837117440	"	"	[illegible]
22	[illegible] सिंह				
23		9997314144	"	"	
24	[illegible] कुमार शर्मा	8979865812	"	"	[illegible]
25	[illegible] SINGH	9319617609	—	कृषि	[illegible]
26	[illegible]	8126488817		कृषि	[illegible]
27	[illegible]			कृषि	[illegible]
28	[illegible]	9636979197	"	"	[illegible]
29	[illegible]		"	"	[illegible]
30	[illegible]	7535819354		[illegible]	
31	[illegible]	9917258128		कृषि	[illegible]
32					

प्रधान
ग्राम पंचायत सैदपुर हुसैनपुर डौलनी
वि०ख० भोजपुर, गाजियाबाद

बाहर से लागी जायेगी

वीर सिंह जी ने कहा कृषक किसान को को विरोध करने का अधिकार है उत्तर दिया गया कि किसान की जमीन है उसकी सहमति के बाद ही आगे काम होगा

दिनेश कुमार जी 9634422453

प्रधान
ग्राम पंचायत सैदपुर हुसैनपुर डीलना
वि0ख0 भोजपुर, गाजियाबाद

15 जगबीर सिंह जी ने पूछा चक रोड़ के ऊपर क्या होगा
उद्धार किया गया रेल ऊपर से जायेगा जवाब
सिंह जी जानना चाहते हैं कि यह परियोजना
कब प्रारम्भ होगी उन्हें बताया गया कि
जमीन लेने की प्रक्रिया पहला करीब
डेढ़ से 1 वर्ष लगेगा इस के बाद रेल
बनने में 2 वर्ष लगेगा इस कार्य को जमीन
लेने से 1 महीने पहले जानकारी देंगे
जवाब सिंह जी ने यह भी कहा कि
लिंक रोड़ दी या नहीं उन्हें बताया
गया। कोई रास्ता बन्द नहीं होगा और
आवश्यकता पर लिंक रोड दी जायेगी।

16 मास्टर रामचन्द्र और जवाहर सिंह जी कहा
चिन्तित हूँ कि उन के बच्चों का क्या
होगा उन्हें आश्वासित किया गया कि
दोबारा यहां आयेगा और आप की
इन चिन्ता का विचार विमर्श करेंगे
और इन कार्यवाही करेगा A.D.M.L.A.
[illegible] जी को साथ में ले के आयेंगे।

17- जवाब सिंह जी ने पूछा कमल रेल
के लिए आधी जमीन ले रहे हैं कल
दोहरी करोगे जमीन चली जायेगी तब
D.F.C. ने आश्वासन दिया कि उन्हें
से दूसरी डाहरी नहीं होगी।

18 मास्टर रामचन्द्र जी ने कहा कि
कहाँ है आबादी ऊपर के लिए
उद्धार किया गया जो नियम निर्धारित
रकबा से दो चार वे 5 5 बाकी

प्रधान ग्राम पंचायत हुसैनपुर गाजियाबाद

सोमपाल जी ने पूछा मुआवजा कितना मिलेगा, उत्तर दिया गया A.D.M.L गाजियाबाद जमीन का के मुआवजे की उचित दर बताओ,

- दिनेश जी का मुआवजा चार गुना मिलेगा या मिलना चाहिए पर कुछ लोगों का कहना है कि 2 गुना मिलेगा जिस का उत्तर दिया मुआवजा कम नहीं उचित दर पर मिलेगा।

- उप प्रधान जी अतर सिंह जी ने पूछा सर्किल रेट बताए, जिस का उत्तर दिया गया D.M.L.A गाजियाबाद भूमि जांच कर जमीन के भाव हमें मुआवजा वह दिया जायेगा

- ज्वार सिंह जी का प्रश्न दिनेश जी वाला था।

मास्टर रामचन्द्र जी का कहना था कि अगर आप को रेट की पूर्ण जानकारी नहीं है तो आप यहाँ क्या आये हो, हम सारा के सहमत नहीं है हम आन्दोलन करेंगे। हम पूरी जानकारी दी, उन को चिन्ता को जायज बताते हुए कहा हम पहली बार आये है आप के विचार जानने हमें हमारी दूसरी टीम आपकी जमीन के बारे में पूर्ण जानकारी देगी और A.D.M.L आप को सर्किल रेट बताओ,

- मास्टर रामचन्द्र ने रास्ते और नालियों के बन्द होने पर चिन्ता बताई हुई आश्वासन दिया गया की ऐसा नहीं है

प्रधान
ग्राम पंचायत सैदपुर हुसैनपुर डौलना
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5- प्रधान सुदरी वाल्मीकि जी का कहना था कि लोग Compensation का मूल्य जानना चाहते हैं ज़मीन का उतार दिया की यह पर्यावरण सम्बन्धित बैठक है, आगामी होने हितविपन पर चर्चा करेगी और आप की गारंटी ज़मीन सम्बन्धित प्रश्न का उत्तर देगा, आप का पूर्ण मोलभाव दिया जायेगा, रेलवे किसी का पैसा नहीं लेगा।

6- ज्वार सिंह जी ने पूछा रेल ज़मीन से मिलने ऊपर कितना ज़मीन का उतार दिया जाना ज़मीन के आधार पर क्या रोड के अनुसार 3½ m व 6 m तक ही निकली है ज्वार सिंह जी ने यह भी पूछा कि स्कूल के सामने की रोड पर रेलवे के माल का चलना है, यह कैसे होगा ज़मीन का उतार दिया गया यहाँ पर पुल बनेगा।

7- सुभाष पालराणी जिनकी सारी ज़मीन जा रही है उनका कहना था क्या होगा उतार दिया गया Compensation मिलेगा पूर्ण मुआवजा मिलेगा और अगर थोड़ी भी ज़मीन बचेगी तो उस को भी ले लिया जायेगा या
8- रेट का 25% दिया जायेगा जो ज़मीनदार की इच्छा है।

9- किशोर जी ने पूछा पैसा एक बार मिलेगा या कितनी बार मिलेगा। C.P. भट्ट ने बताया एक बार मिलेगा।

प्रधान
ग्राम पंचायत ...

आज दि० 27-2-15 को ग्राम सैदपुर हुसैनपुर डासना विधानसभा भोजपुर गाजियाबाद के सामूहिक चर्चा बैठक का आयोजन किया गया। बैठक की अध्यक्षता प्रधान जी द्वारा की। बैठक में गाँव के पास से गुजर रही रेलवे लाइन नई लाइन से पर्यावरण पर पड़ने वाले प्रभावों पर विस्तृत चर्चा हुई।

1. प्रधान मीरपुर का कहना था कि इतनी जमीन क्यों ली जा रही है। परियोजना तो Single लाइन की है। ऊपर यह बिजली लाइन है और हर जगह रास्ते कर रहे हैं। जिस की वजह से धरती जमीन पर नहीं बिछाई जा सकती इसलिए इसे ऊँचा करना होगा अधिक जमीन की आवश्यकता होगी

2- पूर्व प्रधान अतर सिंह का कहना था कि क्या उन्हें जमीन के बदले कुछ मिलेगा या नहीं जिस का उत्तर दिया गया कि जमीनों का मुआवजा नये रेट के आधार पर दिया जाएगा

3- रामनिवास जी का कहना था वह चिन्ता के कि उन की जमीन का क्या भाव मिलेगा जिस का उत्तर C.P.M. DFCCIL ने दिया कि यह परियोजना देश का है और इन अनुसार किसी को हानि और पर्यावरण को हानि नहीं पहुँचनी चाहिए,

4- प्रधान मीरपुर का कहना था जिनकी जमीन जाएगी उन को नौकरी मिलनी चाहिए जिस का उत्तर दिया गया यह उच्च स्तर पर निर्णय होगा अगर कोई पालिसी आएगी तो लागू करने में हम खुश होंगे

प्रधान
ग्राम पंचायत सैदपुर हुसैनपुर
वि०ख० भोजपुर, गाजियाबाद

3/4/15

नाम	गाँव	फोन नं०	व्यवसाय	हस्ताक्षर
1 जगदीश राणा	रोशनपुर	08923684	कृषि	जगदीश
2 - गौरव राणा	,,	8533840404	कृषि	गौरव
3 - जयकुमार	,,	9675524950	कृषि	Jay Ku[illegible]
4 - [illegible] सिंह	,,			
5 - [illegible] सिंह	,,			[illegible]
6 - [illegible]	,,	9837277230		[illegible]
7 - [illegible] सिंह	,,	9917629766		[illegible]
8 - [illegible] सिंह	,,	9457296793	खेती	[illegible]
9 - जयवीर सिंह	रोशनपुर	9837117092	खेती	जयवीर
10 - महेन्द्र सिंह	,,	9012609266		महेन्द्र
11 - राजपाल सिंह	,,	9760056444		राजपा[illegible]
12 - रविन्द्र कुमार	,,	9012161575		
13 - मनोज कुमार	,,	99175621[illegible]		
14 - Shubham Rana	,,	8791533032		S.Ra[illegible]
15 - Lalit Kumar	,,	7909417737		[illegible]
16 - पदम सिंह	,,	9639208792		पदम सि[illegible]
17 - RINKU	,,	8791533032		RIN[illegible]
18 - AAZAD KUMAR	,,	9045710092		AAZ[illegible]
19 - Ajay Singh	,,	9897890686		A.[illegible]
20 - Vinod Singh	,,			Vinod
21 - Neeraj Rana	,,			Neer[illegible]
22 -				
23 - [illegible] कुमार	,,	4568402929		[illegible]
24 - [illegible] कुमार	,,	88689675	[illegible]	[illegible]
25 - [illegible]		8058835927	-	[illegible]
27 - [illegible]				[illegible]
28 -				
29 - [illegible]				
30 Rampal Singh	Khatauli	9745844964		[illegible]
31 रामपाल सिंह	रोशनपुर	9719615350		

प्रधान
ग्राम पंचायत रोशनपुर

[redacted]

11- गाँव में कुछ सामान्य रास्ते और पानी बन्द होने की शंका जिस का समाधान बताया गया रास्ते पानी बन्द नहीं होंगे उन के लिए पूरे पानी को निकासी व रास्तों के लिए अण्डर पास बनाये जायेंगे

12- नक्शे के अनुसार गाँव के स्टेशन बनना चाहिए जिस से गाँव वालों को फायदा मिले।

13- गाँव के कुछ लोगों का कहना था रेलवे लाइन के लिए मिट्टी वहाँ से लायी जायेगी हम अपने खेतों की मिट्टी नहीं देंगे उत्तर दिया गया आप के खेतों की मिट्टी आप से पूछे बिना नहीं ली जायेगी अगर ली गयी तो आप के अनुसार उस का मुआवजा दिया जायेगा।

प्रधान
[illegible]
ब्लॉ० देवबन्द, सहारनपुर

7- गाँव वालों का कहना था रेल आवाज करेगी उस का क्या होगा, उत्तर दिया गया उस के लिए साउन्ड शोषक लगाये जायेंगे।

8- मदन जी के अनुसार बाँध बना जा रहा है रेलवे का रेलवे लाइन से पानी रुक रहा है उस का क्या समाधान है उत्तर दिया गया पानी नहीं रुकेगा। उस की पूरी व्यवस्था पाइप लाइन डाल कर की जायेगी।

9- कुछ गाँव के वालों का कहना है कि रेलवे लाइन देश हित के लिए है इस के बनने से हम को कोई समस्या नहीं है। (प्रधान राजपाल सिंह जी)

10- नत्थू जी के अनुसार 10 बीघा जमीन जा रही है और 1 बीघा बच रही है तो उस का मतलब वह हमारे किसी काम की नहीं है जिस का उत्तर दिया गया उस को उसके लिए SDO कार्यालय में प्रार्थना पत्र देना होगा। आपकी इच्छा अनुसार वो जमीन को रेलवे को दे दी जायेगी और उस का अच्छा मुआवजा मिलेगा।

आज दि० ४/8/10 को ग्राम नरसेना के सामुदायिक चर्चा बैठक का आयोजन किया गया बैठक की अध्यक्षता प्रधान गजला जी द्वारा की गयी बैठक में गाँव के पास से जाने वाली रेलवे लाइन से पर्यावरण पर होने वाले प्रभाव पर चर्चा हुयी।

1- गाँव के जैनी त्यागी के अनुसार इस रेल के बनने से रास्ते की समस्या आ सकती है उन का कहना था कि इस के लिए हमें पूर्ण रास्ता दिया जाए।

2- गाँव के भरतपुर से नरसेना के बीच का रास्ता बन्द होगा जिस के लिए रेलवे रास्ते की व्यवस्था कर के दे।

3- गाँव वालों का कहना था कि रेल के चलने से होने वाली आवाज से हमें कोई परेशानी नहीं होगी।

4- गाँव के यशपाल जी के अनुसार परिवार के एक सदस्य को रेलवे में नौकरी मिलनी चाहिए, जिन काश्तकारों की जमीन गयी है उन किसानों को मुआवजा व नौकरी दोनों मिलनी चाहिए।

5- गाँव के अन्य ग्रामीणों का कहना था नयी रेलवे लाइन बनने से उन के पर्यावरण को अधिक नुकसान नहीं होगा।

6- मुआवजा चार गुना व नौकरी मिलनी चाहिए, गाँव के अधिकांश लोगों की यह माँग था।

[illegible]

आज दि० 18-7-15 को ग्राम पंचायत नुनहरा के सामूहिक चर्चा बैठक का आयोजन किया गया बैठक की अध्यक्षता गंगा राम जी द्वारा की गई बैठक में ग्राम वासियों द्वारा निम्न विचार व्यक्त किये गये,

1- गंगाराम जी का कहना था रेललाइन बनने से रेल के चलने से धुँआ होगा हमारे पर्यावरण पर इस का प्रभाव पड़ेगा। उन के सवाल का उत्तर दिया गया, यह विद्युत से चलने वाली ट्रेन है धुँआ नही करती,

2- गाँव के इरफान का कहना था कि जिन काश्तकारों की जमीन इस से प्रभावित हो रही है उन्हें पूर्ण मुआवजा मिलना चाहिए तथा प्रत्येक परिवार को नौकरी मिलनी चाहिए,

3- गाँव के रमेश चन्द्र जी का कहना था ट्रैक के बनने से हमारे रास्ते टूट जायेंगे। उत्तर दिया गया जो रास्ते टूटेंगे उन्हें बना कर दिया जायेगा,

4- कुछ गाँव वालों का कहना था हमारे ट्यूबवेल इस से टूटेंगे उत्तर दिया गया जो ट्यूबवेल टूटेंगे उन्हें बनाकर दिया जायेगा,

5- गाँव के अधिकांश लोगों की माँग नौकरी व उचित मुआवजा मिलने का था,

6-

श्री

नाम	गाँव	फोन न०	व्यवसाय	हस्ता
पूरन पहलवान	साखन कला	9690202143	कृषि	—
विजेन्द्र	"	7895916674	"	विजेन्द्र
अयूबखान	"	—	कृषि	अयूब
विरेन्द्र सिंह	"	8273208583	कृषि	विरेन्द्र
वेदप्रकाश	"	—	व्यापार	वेदप्र
	"		कृषि	
सुदेश कुमार	"	9760029588	व्यापार	सुदेश
शिवपाल	"	—	कृषि	शिवपा
चतरसिंह	"	8006694028	कृषि	चतर
सुशील	"	9627104605	कृषि	सुशील
बागेश्वर	"	8126788338	नौकरी	बागेश्व
वेदपाल	"		ड्राइवर नौकरी	वेदपाल
कुलदीप सिंह	"	8445281866	कृषि	कुलदी
अरविन्द शर्मा	"	7417617507	कृषि	अरविन्द
ममता देवी		9917821738	कृषि	Mamta

Mamta Devi
प्रधान
ग्राम पंचायत साखन कला
वि०ख० - देवबन्द (सहारनपुर)

आज दि० 3/7/15 को साखन कला के एक सामूहिक चर्चा बैठक का आयोजन किया गया। बैठक में गाँव के लोगों ने रेलवे लाइन बनने से होने वाले पर्यावरण/प्रभाव पर चर्चा की

1- गाँव के लोगों का कहना था हमारे रास्ते बन्द नहीं होंगे जिसका उत्तर दिया गया रास्ते बन्द नहीं होगा

2- गाँव वालों का कहना था कि गाँव में एक रेलवे स्टेशन बनना चाहिए,

3- गाँव के पास के तालाब को रेलवे लाइन से नुकसान होगा हमारे पशुओं के पानी का नुकसान होगा

4- जानवरों पक्षियों के पानी पीने का नुकसान है

5- गाँव वासियों के कहने का था कि गाँव वालों

6- गाँव के पास नहर से एक गुलाब (नाली) जा रही तालाब के पानी के लिए उस के टूटने टूटने पर उसी तरह की पूरी नाली बना के दी जाए

7- इस के अतिरिक्त गाँव के लोगों ने मुआवजा उचित मिलने नौकरी मिलने की माँग की,

Mamta Devi
प्रधान
ग्राम पंचायत साखन कला
वि० ख० देवबन्द (सहारनपुर)

नाम	फोन नं०	गाँव	हस्ताक्षर
श्री राव मुरसलीम खान	9927092356	शेखपुरा कदीम	[illegible]
	9639210002	शेखपुरा कदीम	[illegible]
हाजी रफ आदिल		शेखपुरा कदीम	
राव फैसल	9917996929	शेखपुरा कदीम	Rao [illegible]
राव मजहर खाँ	9412410076	शेखपुरा कदीम	Rao [illegible]
जुल्फकार	9927655127	शेखपुरा कदीम	[illegible]
इब्राहिम	8171222113	शेखपुरा कदीम	इब्राहिम
[illegible]	9690834479	शेखपुरा कदीम	[illegible]
राकेश कुमार [illegible]	[illegible]	शेखपुरा कदीम	[illegible]
इमरान	9353211523	शेखपुरा कदीम	
मोहर सिंह		शेखपुरा कदीम	मोहर सि
[illegible]	8881912621	शेखपुरा कदीम	[illegible]
सुरेन्द्र		शेखपुरा कदीम	[illegible]
मुकेश	9759228706	शेखपुरा कदीम	[illegible]
आशा [illegible]	9935346595	शेखपुरा कदीम	[illegible]
[illegible]	7830580188	शेखपुरा कदीम	[illegible]
[illegible]	7897075998	शेखपुरा कदीम	[illegible]
[illegible] कुमार	9758708812	शेखपुरा कदीम	[illegible]
[illegible]	8392882294	शेखपुरा कदीम	[illegible]
SL Gupta	[illegible]	शेखपुरा कदीम	[illegible]
Suresh [illegible]		शेखपुरा कदीम	[illegible]

[illegible]

ग्राम पंचायत [illegible] पुरा कदीम

[illegible]

या रखना ~~सुभाष~~ ~~कैलाश~~ के नाम पर रखा जाना चाहिए,
सुभाष बलराम

8- गाँव के भूमिहीन लोगों का क्या होगा, उन के लिए उचित मुआवजा व नौकरी का प्रावधान

प्रधान
ग्राम पंचायत ... खुर्द ...
विकास खं. ...खेड़ी
जनपद ... रामपुर

Date 10-3-15

आज दिनांक 10-3-15 को ग्राम सभा सरवपुरा कदीम के सामूहिक चर्चा बैठक का आयोजन किया गया। बैठक में निम्न बातें व समस्यायें सामने आयें। बैठक में ग्राम सभा सरवपुरा कदीम के निम्न लोगों ने विचार रखे, उन की अधिकांश जायज सुझावों से सम्बन्धित थी।

1- राकेश कुमार बिन्दल जी का कहना था कि रास्ते और पानी बन्द होगा, जिसका उत्तर दिया गया कि रास्ता और पानी किसी के बन्द नहीं होगा।

2- गाँव वासियों का कहना था कि रेल लाइन का गोदाम टेलीफोन बनना चाहिए जिस से गाँव वालों को फायदा मिलेगा।

3- गाँव वालों का कहना था कि जमीन का मुआवजा सर्किल से अधिक सर्किल रेट के अनुसार मिलना चाहिए।

4- गाँव वालों के अनुसार वर्तमान पर्यावरण पर कोई प्रभाव नहीं पड़ेगा।

5- गाँव वालों के अनुसार गोदाम गाँव के पास में बनना चाहिए।

6- गाँव के रेलवे क्रासिंग पर अन्डर ब्रिज व ओवर ब्रिज बनने चाहिए ताकि लोगों की समस्या का समाधान हो।

7- गाँव के पास का स्टेशन सरवपुरा कदीम में बनना चाहिए उस का नाम सरवपुरा कदीम के नाम पर होना चाहिए।

ग्राम पंचायत सरवपुरा कदीम

[redacted]

क्र०सं०	नाम	गाँव	फोन नं०	व्यवसाय	हस्ताक्षर
1	अतर सिंह	सरधना	—	मजदूरी	[illegible]
2	तेलूराम	"	9997747950	कृषि	[illegible]
3	यशपाल	"	9557417963	कृषि	[illegible]
4	जोगिन्दर	"	—	कृषि	जोगिन्दर
5	कपिल कुमार	"	9634057419	मजदूरी	कपिल
6	अनुज कुमार	"	9761233182	मजदूरी	अनुज
7	अमित त्यागी	"	8449456090	job	[illegible]
8	बृजपाल	"	81672751	मजदूरी	बृज
9	उमा[illegible]	"	8941[illegible]408335	[illegible]	[illegible]
10	[illegible]	"			
11	सिंह	"	—	कृषि	—
12	जोनी त्यागी	"	9634533184	कृषि	[illegible]
13	सुनील त्यागी	"	9927809371	"	[illegible]
14	[illegible]	"			[illegible]
15	शेर सिंह	"			शेर सिंह
16	महेन्द्र	"			महेन्द्र
17	सहीराम	"			[illegible]
18	अनुज त्यागी	"	9758641891	कृषि	अनुज
19	ओमप्रकाश	"	8126408532	कृषि	[illegible]
20	विनोद कुमार पाल	"	8439420982	कृषि	विनोद
21					

1-8-2015

क्र०सं०	नाम	गाँव	व्यवसाय	हस्ताक्षर
1-	जीलू	सुनहरा	कृषि	जीलू
2-	इरफान	सुनहरा	कृषि	इरफान
3-	समुति	सुनहरा	नाई	समुति
4-	मंगल सिंह	सुनहरा	व्यवसाय (दुकान)	मंगल सिंह
5-	सुनील कुमार	सुनहरा	कृषि	सुनील कुमार
6-	भूपेन्द्र	सुनहरा	कृषि	
7-	प्रेमचन्द्र	सुनहरा	कृषि	प्रेमचन्द्र
8-	टिकम	सुनहरा	कृषि	टिकम
9-	खेमचन्द्र	सुनहरा	व्यवसाय	खेमचन्द्र
10-	गंगाराम	सुनहरा	कृषि	गंगाराम
11-	इरफान	सुनहरा	कृषि	इरफान
12-	[illegible]		कृषि	इकरार
13-	इकरार मुहम्मद	सुनहरा	कृषि	इकरार
14-	रोशन	सुनहरा	कृषि	रोशन
15-	आलमगिर	सुनहरा	कृषि	आलमगिर
16-	नूर मुहम्मद	सुनहरा	कृषि	
17-	रजिया	सुनहरा	कृषि	रजिया
18-	गुन्नो		कृषि	गुन्नो

संपर्क आसलम ड्राइवर
9637809130

ANNEXURE-9.2: PUBLIC CONSULTATION

Balitpur Village – Public Consultation

Baseda Village – Public Consultation

Gulauti Village – Public Consultation

Hatmabadh Village – Public Consultation

Khilhoda Village – Public Consultation

Khurja City Station- Public Consultation

Manoharpur – Public Consultation

Murshadpur – Public Consultation

Nizampur – Public Consultation

Panchalikhurd – Publi Consultation

Rankhandi – Public Consultation

Saidpur-Hussainpur – Public Consultation

Sakhankala – Public Consultation

Sarsina – Public Consultation

Shekhpura – Public Consultation

Sunehara – Public Consultation

CHAPTER 10: ENVIRONMENT MANAGEMENT PLAN (EMP)

10.1 INTRODUCTION

Environmental Management Plan is an implementation plan to mitigate and offset the potential adverse environmental impacts of the project and enhance its positive impacts. Based on the environmental baseline conditions, planned project activities and impacts assessed earlier, this section enumerates the set of measures to be adopted in order to minimize adverse impacts. The process of implementing mitigation and compensatory measures, execution of these measures, agencies responsible for the implementation of these measures and indicative costs are discussed in this chapter.

The project has overall positive impacts by providing a competitive, cost effective, congestion free reliable mode of dedicated bulk freight service through electrified tracks. It will reduce the goods transportation load on the roads and facilitate fast transfer of goods. They being an eco-friendly mode will also enhance the environmental quality.

The development of Eastern Dedicated Freight Corridor (EDFC) entails civil work, including excavation, filling, construction of RUB/ROB, bridge and cross drainage structures, and utility shifting etc., which are likely to cause adverse impacts on natural and social environment. The impacts cannot be fully avoided; however, appropriate mitigation measures are suggested to minimize and compensate the potential adverse impacts and enhance positive impacts. Most of the impacts are temporary in nature and are limited to the construction phase. These impacts can potentially be minimized and managed by proper planning and execution. The environmental management plans includes activities for pre-construction phase, construction phase and operation phase.

10.2 ENVIRONMENTAL MANAGEMENT PROCESS

Environmental management is based on the potential impacts assessed for the project. Assessment of potential impacts is based on the review of secondary data substantiated by site visits, environmental monitoring, public consultation, with stake-holders, and discussion with concerned Govt. Dept. The implementation of Environmental Management Plan (EMP) has the following:

- An organizational structure of DFCCIL
- Assigned responsibilities
- Defined timing of implementation
- Defined monitoring responsibilities

10.3 EMP DURING CONSTRUCTION & OPERATION

The project activities will be executed in a phased manner, i.e, pre-construction, construction, and finally operation phase. The major activities to be undertaken are described below.

10.3.1 Pre-construction Phase

In this phase issues concerning environment management like statutory clearances for forest land division, tree cutting permission, and land acquisition are undertaken by DFCCIL. In this project too, the similar actions are taken.

10.3.2 Construction Phase

The environmental issues during construction stage generally involve equity, safety and public health issue. The contractor is required to comply with the laws with respect to environment protection, pollution prevention, forest conservation, resettlement, and safety and any other applicable law. Environmental pollution during the construction phase will be less but control of pollution during this phase is of considerable importance. The EMP is an executable part of project, and the activities are to be guided, controlled, monitored, and managed as per the provision provided. The Contractor would obtain ISO/OSHAS certification for the contract being executed. Following activities require attention during construction phase.

1. Land Acquisition / Diversion Plan

Acquisition of land is indispensable for construction of DFC. The proposed alignment traverses through settlement and agricultural areas. Total land requirement for the project is 829.08 Ha and most of the land likely to be acquired for the project is agricultural land.

- At the outset as a part of the Land Acquisition Plan, the Right of Way (RoW) along the entire DFC alignment has to be established and confirmed from the State Forest, Agriculture and Land Revenue Departments.
- Diversion of approx. 109 ha. forest land will be carried in compliance to Forest Conservation Act, 1980 and DFCCIL will make payment towards tree cutting in forest land, compensatory afforestation land and plantation to Forest Dept. as per Forest Clearance condition.
- The acquisition of land and private property shall be carried out in accordance to the Resettlement Action Plan (RAP). DFCCIL will bear cost of land acquisition, R&R payments as per Entitlement Matrix.

It has to be ensured that all R & R activities including the payment of the compensation may be reasonably completed before construction activities starts, on any section of the DFC. Contractor can not start construction work will start before land is made available to the contractor by DFCCIL.

2. Utility Shifting Plan

There are some utility/borewell services along the proposed DFC alignment such as electric lines, telephone lines, Borewell, cable line, pipe lines etc which may be shifted on consultation with the concerned department before commencement of construction activity. There are road crossing with the DFC. Construction of bridges will be required to maintain their utility. These structures will be shifted in consultation with the concerned departments.

3. Construction / Labour Camp Management

During the construction phase, the construction / labor camp will be located along the project area. Large numbers of labour are likely to move into the project area. A proper Construction Camp Development Plan has to be formulated to control degradation of the surrounding landscape due to the location of the proposed construction camp. The contractor must provide, construct, and maintain necessary living condition and ancillary facilities. These must be included in contract documents provided to the contractor.

- Sufficient supply of potable water must be provided at camps and working sites. If the drinking water is obtained from the intermittent public water supply, then storage tanks must be provided. All water supply storage may be at least 15 m away from the toilets or drains.
- Adequate and clean washing and bathing facilities must be provided that also have sufficient drainage.
- Adequate sanitary facilities may be provided within every camp. The place must be cleaned daily and maintain strict sanitary conditions. Separate latrine must be provided for women. Adequate supply of water must also be provided.
- The contactor must ensure that there is proper drainage system to avoid creation of stagnant water bodies.
- Periodic health check ups may be conducted. These activities may be provided by the construction contractor in consultation with State Public Health Department.
- At every camp, first aid facilities with suitable transport must be provided to take injured or ill person to the nearest hospital.
- Adequate supply of fuel in the form of kerosene or LPG may be provided to construction labourers, to avoid felling of trees for cooking and other household activities. No open fires may be allowed in camps.
- The sites should be secured by fencing and proper lighting.
- The construction contractor may ensure that all construction equipment and vehicle machinery may be stored at a separate place / yard. Fuel storage and refilling areas may be located 500 m away from the water bodies and from other cross drainage structures.
- All the construction workers should be provided with proper training to handle potential occupation hazards and on safety and health which include the following:-
  - Environmental awareness programme
  - Medical surveillance
  - Engineering controls, work practices and protective equipment
  - Handling of raw and processed material
  - Emergency response
- Construction / labour camps may be located away from forest areas, settlements, cultural heritage and historical sites and water bodies and dry river beds.
- It should be ensured by the construction contractor that the camp area is cleared of the debris and other wastes after the completion of construction. On completion of construction, the land should be restored back to its original form. The provisions for selection and management of construction camp shall be followed as given in **Annexure-10.1.**

4. Borrow Area Management Plan

An appropriate Borrow Area Management Plan will be formulated to control the degradation of the surrounding landscape due to the excavation work. The national standard which applies to the manual borrowing of earth is the IRC-10:1961. The guidelines for borrow area management shall be followed as per **Annexure-10.2.** The contractor shall obtain necessary clearances including environmental clearances from SEIAA (State Environment Impact Assessment Authority) before opening Borrow area.

- Borrowing of earth shall not be done continuously. Slopes of edges shall be maintained not steeper than 1:4.
- Top soil (15 cm) from all areas may be preserved in stockpiles and utilized for redevelopment of borrow/quarry areas.
- Borrow pit should be developed as far as possible from the river side, where the inner edge of any borrow pit should be not less than 15 m away from the toe bank. As per as the borrow pits on the rear on landside are considered, it is to be avoided. Where it is unavoidable a berm, at least 25 m wide should be left between borrow pits and toe bank. The toe of the bank on the rear side should have a cover of 0.75 m to 1.25 m over the saturation line drawn at a slope of 1:6 from the high flood level on the river side.
- Borrow area should not be developed close to existing IR trucks or DFC alignment.
- Borrowing of earth shall not be carried out on productive land. In the event that such an occasion arises, the contractor has to obtain permission from the supervising engineer.
- Sources of borrow areas will be identified by the construction contractors.
- No borrow area will be opened without approval of PMC/Engineer, agreement of land owner and environment clearance from SEIAA.
- Proper closure of Borrow area to be done with permission of PMC.
- Reclamation of borrow area should be mandatory and must be included in the agreement made with the construction contractor.
- Borrow pits may be located at least 1 km away from the villages and settlements.
- All borrow pits may be reclaimed: -
  - The quarry and borrow area should be reclaimed back. The pits formed should be backfilled by construction waste and site should be stabilized.
  - Spoils may be dumped with an overlay of stocked piled top soil with respect to MOEF&CC/SPCB guidelines.
  - Borrow and quarry pits can be also be developed as ponds and be used for aquaculture as per local requirement. These can also serve as perk or picnic spots.
  - Landscaping of borrow and quarry area may be done, and the grasses, shrubs and tree species may be planted around the reclaimed area. Ornamental plants can also be planted on the access route.
  - Reclamation of borrow area may included in the agreement of the construction contractor.

5. Locating Quarries, Rehabilitating Quarries and Guidelines for Stone Crushers

The contractor will finalized the locations as per guideline provided in **Annexure-10.3** and follow the operation, rehabilitation as per the referred guidelines.

6. Public Health and Safety

The contractor is required to comply with all the precautions required for the safety of the workmen. The contractor must comply with all regulation regarding scaffolding, ladders, working platform, excavation, etc.

- The contractor must supply safety goggles, helmets, earplugs and masks etc. to the workers and staff.
- Adequate precaution must be taken to prevent dander from electrical equipment. Necessary light and fencing must be provided to protect the public.
- All machines and equipment used for construction purposes must conform to relevant Indian Standards (IS) codes. This equipment must be free from patent defects, in good working condition, regularly inspected, and properly maintained as per IS provisions.
- All labor working on mixing of asphaltic material, cement, lime mortars, concrete etc should be provided with protective footwear and protective goggles. Workers involved in welding work should be provided with welder's protective eye shields.

No men below the age of 18 years or women of any age will be employed to work with paint products containing lead in any form. Face masks must be supplied to workers when they use any form of spray paint or work with surfaces that have been dry rubbed and scrapped with lead paint.

- All reasonable measures must be taken to prevent any damage to the public from fire, floods, etc.
- All necessary steps must be taken to prompt first aid treatment for injuries that may be sustained during the course of work.
- The contractor must conform to all anti malarial instructions, including filling up of borrow pits.
- Work that affects the use of side roads and existing accesses must not be taken without providing adequate provision.
- On completion of the works, all the temporary structures may be cleared away, all rubbish disposed, excreta and disposal pits or trenches filled in and effectively sealed off and the entire site left clean and tidy.
- To control dust in working area regular water sprinkling shall be done to avoid dust related deceases such as silicosis. **The silicosis reduction strategy is given in Annexure 10.4.** Mask shall be provided to workers who are engaged in in stone ballast preparation.
- Details are given in DFCCIL's Safety, Health & Environment (SHE) manual.

7. Compensatory Plantation and Green Belt Development

Protected Forest area is being diverted for the project and involves cutting of around 19013 trees and it will be proposed to plant minimum 38026 trees to compensate the same. Actual number of trees will be finalised after joint survey with forest dept. To compensate the loss of trees development of a green belt in the vacant spaces of the yards, crossing stations and the junction points has been recommended as one of the major components of the EMP. Forest Department will undertake compensatory afforestation. A tree plantation plan is provided as **Annexure 10.5**. The plantation plan will further enhance the environmental quality through:

1. Mitigation of air pollution problems
2. Attenuation of noise level
3. Maintain the Green area and improve aesthetics.

It is most important to chalk out a long-term approach to keep the air in the area clean. One such measure is using the plants for absorbing and trapping the air pollutants. The hypothesis that trees are important particulate sinks is supported by evidence obtained from studies dealing with diverse particulate matter including pollen, salt, precipitation, dust and other unspecified particles. As far as gaseous pollutants are concerned, substantial evidence is available to support the fact that plants in general, and trees in particular, function as sinks for gaseous pollutants. This is achieved through various physiological processes occurring within the plant system.

10.3.3 Operation Phase

During operation phase, the noise and vibration control along the sensitive and residential area is most important. Regular monitoring will be done for these parameters, and appropriate measures as suggested in the report shall be implemented.

10.4 ENVIRONMENTAL MANAGEMENT PLAN & RESPONSIBILITIES

Table 10.1 presents summary of Environmental Management Plan (EMP) with the objective to minimize adverse environmental impacts as discussed. The table covers all possible environmental issues involved in the project and the necessary mitigation measures. Taking appropriate mitigation measures for the construction phase is the responsibility of the contractor, and of the contractor's Environmental Engineer who will supervise the implementation of the EMP. The DFFCIL will also appoint a supervision consultant/Independent Engineer to check the quality.

The mitigation measures during the operation phase will be implemented by Social and Environmental Management Unit (SEMU) of DFCCIL. The SEMU is headed by General Manager. Overall responsibility of the implementation of mitigation measures during construction stage will be with the Contractor and with the DFFCIL –SEMU unit during operation phase. The details of Environmental Management Programme are discussed in the subsequent paragraphs.

Table 10.1: Environmental Management Plan

Sr. No.	Environmental Issue	Action to be Taken	Implementation By	Supervision By
Pre-construction phase				
1.	Permission for Removal of Trees	Around 19013 Trees will be felled in the existing and acquired area for the proposed corridor. Compensation for fruit bearing trees felled will be paid as per Entitlement Matrix. Approx. 109 ha protected forest land along the existing rail line along the railway line will be diverted for the project. Trees cut in PF will be compensated by providing value of land as per Net Present Value (NPV) as per clearance condition according to FCA. Required area of land may be identified in consultation with Forest Dept. for compensatory.	DFCCIL	DFCCIL
2.	Land Acquisition /Division	829.08 ha. Land will be acquired. Ownership of land within the RoW and at crossing stations, Detours should be confirmed 31526 Nos. of Project Affected Persons (PAPs) identified Resettlement Action Plan to be prepared for the PAPs and provide compensation as per RAP	DFCCIL	State Revenue Dept / DFCCIL
3.	Relocation of CPRs	Relocation of 110 CPRs will be done after public consensus. Relocation shall be completed before construction work is taken up.	Construction Contractor	DFCCIL
4.	Impacts of Vibrations on structures	Vibration control measures will be taken in design stage and resilient features.will be	DFCCIL/ Construction	DFCCIL

Sr. No.	Environmental Issue	Action to be Taken	Implementation By	Supervision By
		provided to reduce vibration level.	Contractor	
Construction Phase				
1.	Soil	Suitable protection measures consisting of bio-engineering techniques such as plantation of grasses and shrubs & check dams, may be provided to control erosion. Borrow areas may be finalized in concern with ecological sensitivity of the area. Agriculture land may not be used as borrow area. Priority may be given to degraded area for excavation of borrow material. Rehabilitation of borrow area may be taken under the project. Construction work may be avoided during rainy season to evade erosion and spreading of loose material. Top soil removed from agricultural land may be stored separately in bunded areas and utilized during plantation or refilling of excavated area. Guideline for soil erosion and sedimentation control practices are given in Annexure-10.7.	Construction Contractor	DFCCIL through Engineer
2.	Water Requirement	Surface water to the extent possible will be used to meet water requirements during construction. The contractor will prepare water management plan based on the guidelines provided at **Annexure 10.8** focussing utilisation of maximum surface water and minimum use of ground water yield for industrial purposes to be checked & permission to be obtained from Ground water Board. The ground water can be extracted only with prior permission and adequate provision of rain water harvesting.	-do-	-do-
3.	Water Bodies	Provision of temporary drainage arrangement due to construction activities must be made by Contractor. No blockage of any channel/ water course shall be done during the construction. Silt fencing may be provided near water bodies particularly for important bridge work. Proper cross drainage structure may be planned at the crossing of the canal in consultation with Irrigation Department/ local people. Proper drainage may be planned in the area to avoid water logging. The guidelines for construction water management plan are enclosed as Annexure-10.8.	-do-	-do-
4.	Flora	Felling of trees must be undertaken only after obtaining clearance from the Forest Dept. Forest areas, Railway Dept and local bodies outside forest areas. Compensatory planting as per statute for trees felled in other than forest area needs to be done as per Tree Plantation Plan given at **Annexure 10.5**. Trees falling outside the RoW should not be felled. Compensation must be provided before initiating construction activity. Fruit bearing trees may be compensated including 5 years fruit yield. Labour Camps and office site may be located outside & at least 1 km away from Forest area	-do-	-do-

Sr. No.	Environmental Issue	Action to be Taken	Implementation By	Supervision By
		Green belt development may be undertaken in the wasteland near railway line to enhance aesthetic and ecological value. Social forestry may be practiced for success of the plantation. Local people can be involved in plantation and maintenance of plantation as part of the project in consultation with Forest Department/DFCCIL.		
5.	Fauna	Borrow areas can be also developed as ponds with grasses and shrubs planted around it. Silt fencing may be used near water bodies to avoid runoff into the water bodies. Construction activity may be avoided during night hours in forest area. All construction workers shall be sensitised for protection of Peafowl which is in Sch 1of WLF Act 1972. No poaching is allowed. It may be ensured by the Contractor that no hunting or fishing is practiced at the site by any of the worker and that all site personnel are aware of the location, value and sensitivity of the wildlife resources. Awareness program on Environment and Wildlife Conservation may be provided to the work force. Forest Act, 1980 and Wildlife Act may be strictly adhered. Design features will include allowing crossover of animals.	Construction Contractor	DFCCIL through Engineer
6.	Archaeological structure/ article	There is no archaeological structure affected, directly or indirectly, on the alignment. However, 'chance find' if any during construction stage along the alignment, shall be dealt with as per the Act and procedure detailed in Environmental Management Framework.	Construction Contractor /ASI	-do-
Pollution monitoring				
1.	Air	Adequate dust suppression measures such as regular water sprinkling on construction sites, haul & unpaved roads particularly near habitation must be undertaken to control fugitive dust. Plantation activity may be undertaken at the construction sites Workers may be provided with mask to prevent breathing problems Trucks carrying soil, sand and stone may be duly covered to avoid spilling. Low emission construction equipment, vehicles and generator sets may be used Plants, machinery, and equipment shall be handled to minimize generation of dust. All crusher used in construction should conform to relative dust emission devices. Air quality monitoring maybe conducted at construction sites as per monitoring plan.	Construction Contractor	DFCCIL through Engineer
2.	Water	Silt fencing may be provided near water bodies to avoid spillage of construction material. Discharge of waste from construction / labour camp into water bodies may be strictly prohibited. Construction methodologies with minimum or no impact on water quality may be adopted, disposal of construction wastes at designated sites and adequate drainage system may be provided.	-do-	-do-

Sr. No.	Environmental Issue	Action to be Taken	Implementation By	Supervision By
		Project design takes care of irrigational canal and proper culverts may be proved so that irrigation setup is not disturbed		
3.	Soil	Asphalt emulsifier must be handled with caution and any leakage detected must be immediately rectified. Construction work should not be done during rainy season to avoid erosion and spreading of loose material Top soil removed during excavation work shall be utilized stored separately in bunded area and shall be utilized during plantation or refilling of excavated area.	-do-	-do-
4.	Solid Waste, Debris & wastes	Construction work shall be carried in such a way that minimum or no solid waste is generated at construction site. Extra earth material produced may be utilized for refilling of borrow areas. Rainy season may be avoided to minimize spreading of loose materials. Solid waste management will follow relevant rules. Dustbins may be provided in the Camps. The Contractor must provide proper sanitation facilities in Camp and ensure proper disposal of wastes. Construction Debris/ wastes will be handled/ disposed as per guidelines given at **Annexure 10.6.**	-do-	-do-
5.	Noise & Vibration	Modern technologies producing low noise may be used during construction. Construction equipment and vehicles must be in good working condition, properly lubricated and maintained to keep noise within permissible limits. Temporary noise barriers installed at settlements and forest area, if required Noise barrier/ relocation shall be provided at 4 noise sensitive locations mentioned at **Table 8.4**. This is because noise levels are exceeding the limits at these noise sensitive receptors. Plantation may be carried at the work site. Headphones, ear-plugs shall be provided to the workers at construction site with noise high noise levels. Noise level monitoring shall be conducted during construction phase. All vehicles, equipment and machinery used in construction should be fitted by exhaust silencers. Equipment shall be maintained regularly and soundproof gadgets shall be used. Temporary sound barriers shall be installed near sensitive locations near settlements and Forest area, if required Provision of ear-plugs to heavy machinery operators Plantation along the DFC shall be maintained.	Construction Contractor	DFCCIL through Engineer
6.	Land Subsidence	No excavation to be done in are porne to subsidence. Plantation must be carried to control erosion. Guidelines given at Annexure-10.7 is to be referred.	-do-	-do-
7.	Bottom Sediment	Silt fencing will be provided to avoid runoff into the River. Construction activity shall be taken in dry	-do-	-do-

Sr. No.	Environmental Issue	Action to be Taken	Implementation By	Supervision By
		season to avoid spreading of construction material and minimize impact on water quality. Guidelines given at **Annexure 10.7** will be referred.		
Operation Phase				
1.	Maintenance Plantation	Provision for maintenance of plantation must be made for at least three years. Plantation may be taken to replace dead sapling. Survey of survival of plants may be taken annually. Any fresh plantation for lost may be taken up during monsoon season. Lopping of branches may be undertaken to remove obstruction, if any	DFCCIL	DFCCIL
2.	Air Quality	Plantation should be carried out and maintained along EDFC. Green belt development with proper specifies shall be undertaken on priority basis. AAQ monitoring shall be carried out at all locations identified in monitoring plan.	DFCCIL	SPCB / DFCCIL
3.	Water Quality	Waste Collection facility shall be provided at all Junction station Proper drainage system should be provided at all Junction station Water quality monitoring at all locations specified in the monitoring plan	DFCCIL	SPCB / DFCCIL
4.	Noise & Vibration	Noise and Vibration monitoring may be conducted in operation phase at Sensitive Receptors (SRs) mentioned in **Table-8.4.** On receiving any complaint comparison will be made with the baseline data generated during pre-construction phase.	DFCCIL	SPCB / DFCCIL

10.5 ENVIRONMENTAL MONITORING

The environmental monitoring shall be undertaken during construction and operation phases as per the following details:

Table 10.2: Proposed Monitoring Programme

Construction Phase

Sr. No.	Environmental Component	Parameter	Standards	Location	Frequency	Implementation	Supervision
1	Air Quality	PM2.5, RPM, CO, Nox, Sox	CPCB standards	Stretch of DFC in progress near settlements and junctions stations. Minimum 10 locations covering the following: Nizampur, Gulhoti, Murshidpur, Anwarpur, Walidpur, Khatoli, Sarisna, Saharanpur & 2 locations in construction camp	3 times in a year (once in every season except monsoon) during construction period	Construction contractor	DFCCIL through Engineer
2	Water Quality	As per IS:10500 standards	CPCB standards	Near water bodies and construction camps covering the following: Irrigation canal at Gulhoti, Sarisna, Walidpur, Nangal, Murshidpur, Kali & Hindon River and 3 Locations in construction camp	Once in three months during construction period	-do-	-do-
3	Noise	Noise level on dB (A) scale	CPCB standards	Along DFC. Minimum 10 locations where air quality has been monitored and 4 locations of SR as per table 8.4	4 times in a year (once in every season during construction period	-do-	-do-
4	Soil Quality	Parameters are NPK, Sodium Absorption Ratio, Oil & Grease	CPCB Standards	Junction & stations and settlements along DFC covering the following: Nizampur, Gulhoti, Murshidpur, Anwarpur, Walidpur, Khatoli, Sarisna, Saharanpur, Mirapur and Murshadpur	Once in a year during construction period	-do-	-do-
Operation Phase							
1	Noise	Noise level on dB(A) scale	CPCB standards	Junction & stations and SR along DFC. Minimum ten appropriate locations shall be covered along Nizampur, Gulhoti, Murshidpur,	1.0 times in a year (once in three months for initial 3 years)	CPM/DFCCIL office through Accredited Laboratory	DFCCIL

Sr. No.	Environmental Component	Parameter	Standards	Location	Frequency	Implementation	Supervision
				Anwarpur, Walidpur, Khatoli, Sarisna, and Murshadpur the alignment and 4 SR locations as per table 8.4			
2	Vibration level	Vibration on dB scale respectively	-	Junction & stations and 12location covering the following: Khurja, Gulhoti, Murshidpur, Khatoli, Jahangirpur, Sarsina and Baseda, Sakhankalan and 4 SR locations as per table 8.4	2.0 times in a year (once in three months for initial 3 years)	-do-	-do-
3	Plantation	Survival rate	Survival rate may be calculated annually	At compensatory afforestation site and along DFC	Annually for 3 years	-do-	-do-

10.6 ORGANIZATIONAL FRAMEWORK

The proposed project will be implemented by DFCC through its Environmental Management Unit (DFCCIL). The DFCCIL will be coordinating with the field level implementing agencies such as the Engineer (Supervision Consultant), Contractor and field level DFCC officials. Role and responsibilities of important officials is mentioned below.

Table 10.3: Roles and Responsibilities of Officers

Officer	Responsibility
General Manager (SEMU)	• Overview of the project implementation • Ensure timely budget for the EMP. • Coordination with different state level committee, to obtain regulatory clearances. • Participate in state level meetings • Monthly review of the progress. • Reporting to various stakeholders (World Bank, Regulatory bodies) on status of EMP implementation
Chief Project Manager (DFCC)	• Overall responsible for EMP implementation • Coordination with PIU Staff . • Assisting GM (SEMU) to reporting various stakeholders (World Bank, Regulatory bodies) on status of EMP implementation • Responsible for obtaining regulatory Clearances • Review of the progress made by contractors • Ensure that BOQ items mentioned in EMP are executed as per Contract provisions..
Dy.CPM	• Assisting CPM in overall implementation of EMP • Review of periodic reports on EMP implementation and advising CPM in taking corrective measure. • Preparing environmental training program and conducting the same for field officers and engineers of contractor. • Conducting need-based site inspection and preparing compliance reports and forwarding the same to the Environmental Management Unit (DFCCIL)
Engineer (PMC)	• Act as an "Engineer" for supervising EMP implementation • Responsible for maintaining quality of EMP envisioned in detail Project Report • Maintaining progress reports on EMP implementation • Periodic reporting to PIU-DFCC about the status of EMP implementation • Work in close coordination with Asst. Project Manager (package unit) and contractor.
Asst. Project Manager (Env)	• Working as site-representative of CPM • Conducting regular site inspection to all onsite and offsite works • Maintaining records of all necessary statutory compliance, to be obtained from contractor. • Maintaining records of EMP implementation including photographic records • Attending environmental and social training programs • Preparing periodic reports on EMP implementation and forwarding to CPM
Environment & Safety Manager of Contractor	• As detailed below

For ensuring that EMP is implemented as per provision in the document, Contractor shall nominate along with all necessary staff a qualified and experienced Manager from the commencement to completion of the project.

The responsibilities of Environment & Safety Manager of Contractor will include the following:

- Directly reporting to the Project Manager of the Contractor;
- Discussing various environmental/social issues and environmental/social mitigation, enhancement and monitoring actions with all concerned directly or indirectly;
- Prepare Contractor's Checklist, traffic management plan and safety plan as part of their Work Program;

- Ensure Contractor's compliance with the EMF/EMP stipulations and conditions of statutory bodies;
- Assist the Project Manager to ensure social and environmentally sound and safe construction practices;
- Conducting periodic environmental and safety training for contractor's engineers, supervisors and workers along with sensitization on social issues that may be arising during the construction stage of the project;
- Preparing a registers for material sources, labour, pollution monitoring results, public complaint/grievance redress, and as directed by the Engineer;
- Assisting the DFCC on various environmental monitoring and control activities including pollution monitoring; and
- Preparing and submitting monthly/bio-monthly reports to DFCC on status of implementation safeguard measures.
- Will be responsible for getting and maintaining the approvals or clearance for various departments and Environmental officer.

The organisation chart for EMP implementation has been given below:

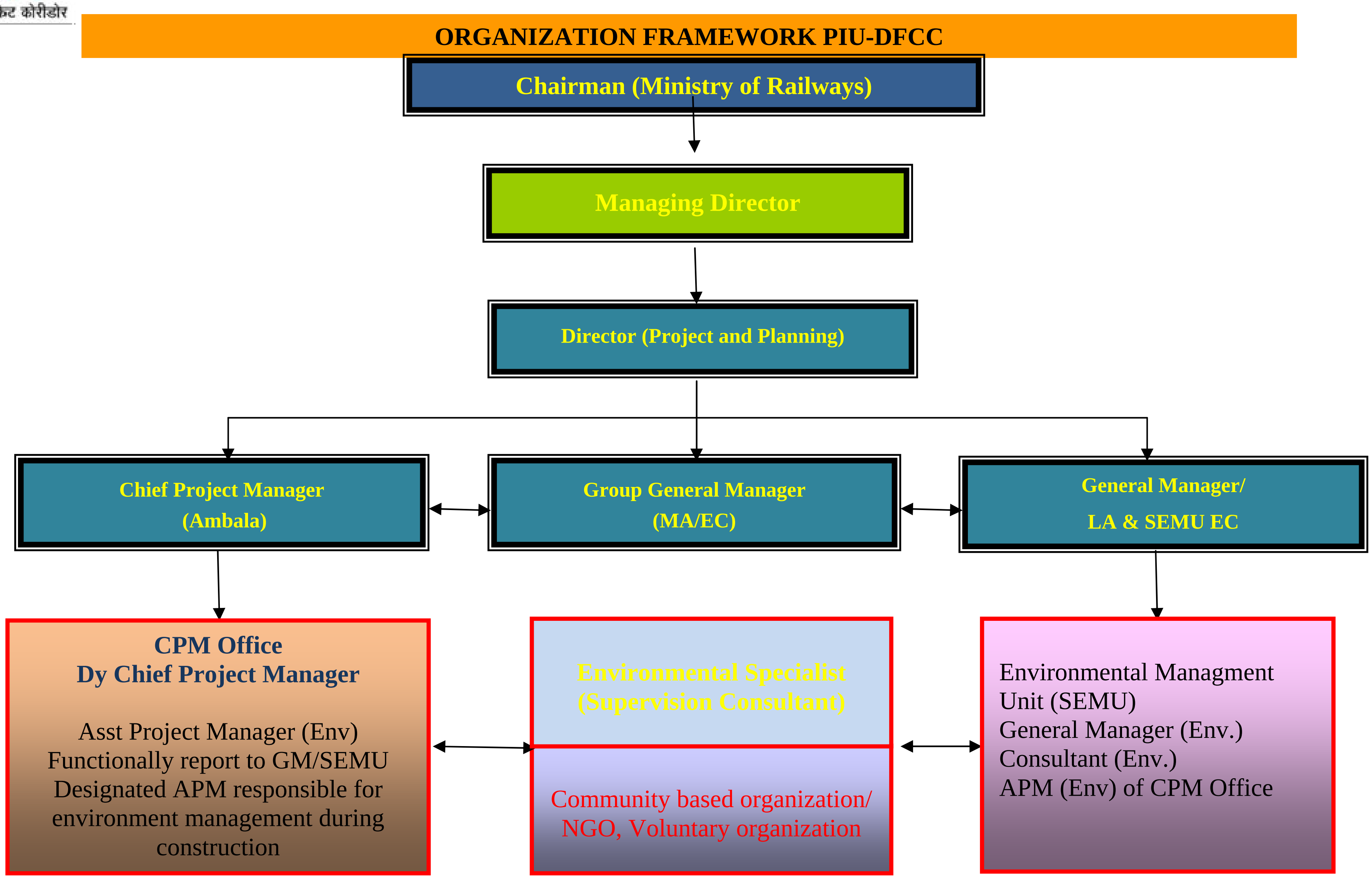

Figure 10.1: Organizational Structure

10.7 ENVIRONMENTAL BUDGET

The cost of compliance of environmental issues must be included in the Bill of Quantity for the implementation of EMP, although most of the aspects will be covered under the head engineer such as: -

- Embankment
- Shine boards along construction sites
- Noise barrier
- Underpass for animals
- Culverts for irrigation canals

However, there are issues that are independently covered under the Environmental Budget such as plantation along DFC, monitoring, enhancement measures, noise barrier, sanitation facility at labour camp, and solid waste disposal at site. The shifting and enhancement cost of sensitive receptors such as temple, majar, school, hospital etc shall be covered in R & R under community development. Mitigation measures proposed in the EMP will be implemented by the contractor. The works to be undertaken by the contractor have been quantified and the quantities included in the respective BOQ items such as earth works, slope protection, noise barriers, road safety features and shrub plantation.

Provisional quantities have also been included for additional measures that may be identified during construction and for site fencing, which will depend on the contractors work methods and site locations. Items and quantities have also been included for enhancement measures.
More general environmental management measures to be followed by the contractor have been included in the specifications and in this EMP. These cannot be quantified and are to be included in the contract rates.

The budgetary provisions for the implementation of the environmental management plan of the project are presented in **Table 10.4**.

Table 10.4: Cost Estimates for Environmental Management (review these based on actual recommendations and finalize)

Sr. No.	Item	Unit	Rate (in INR)	Quantity	Cost (in INR)	Remarks
A. PRE-CONSTRUCTION PHASE						
1.	Tree Felling Permission	Number	100	19013	19,01,300	Covered under regulatory clearances
2.	Protected Forest Clearance and land diversion cost	ha	220000	109	2,39,80,000	Covered under forest clearances
Sub-total for A					**2,58,81,300**	
B. CONSTRUCTION PHASE						
1.	**Mitigation Measures other than Good Engineering practices**					
1.1	Oil interceptors at camps (Minimum 5 camps, per camp 2 oil interceptors at vehicle parking and washing areas)	Number	20,000	10	2,00,000	Will be provided near storage, vehicle repair section in construction camp by the contractor
1.2	Silt Fencing at 7 bridge locations across Rivers and Canals	Number	1,50,000	7	10,50,000	By the contractor at bridge construction locations
1.3	Soak pits for construction camp @ 2 soak pits at each camp	Number	20,000	10	2,00,000	-do-
	Sub-total				***14,50,000***	
2.	**Tree Plantation and Protection**					
2.1	**Avenue plantation including compensatory plantation**					
2.1.1	Plantation, protection and maintenance of saplings for 3 years compensatory plantation of 38026 trees	Number	2000	38026	7,60,52,000	
2.1.2	Permanent protective tree guard	Number	1750	38026	6,65,45,500	
2.1.3	Conservation plan for	-	-	LS	10,60,000	

Sr. No.	Item	Unit	Rate (in INR)	Quantity	Cost (in INR)	Remarks
	schedule-I, Fauna (Peacock)					
	Sub-total				***14,36,57,500***	
3.	**Monitoring of Environmental Attributes during Construction Phase**					
3.1	Monitoring of Air Quality	Per sample	10,000	144	14,40,000	
3.2	Monitoring of Water Quality	Per sample	6,000	150	9,00,000	
3.3	Monitoring of Noise Level	Per sample	3,000	150	4,50,000	
3.4	Monitoring of Soil Quality	Per sample	6,000	40	2,40,000	
	Sub-total				***30,30,000***	
Sub-total for B					**14,81,37,500**	
C. OPERATION PHASE						
1.	Monitoring of Noise Level	Per sample	5,000	144	7,20,000	Initial Three years Monitoring
2.	Monitoring of vibration Level	Per sample	10,000	144	14,40,000	Initial 3 years Monitoring
3.	Noise mitigation measures in form of noise barrier at sensitive receptors (Construction of barrier of length 370 meter.	m	10,000	370	37,00,000	
Sub-total for C					**58,60,000**	
D. GOOD ENGINEERING PRACTICES						
1.	Dust suppression			LS	18,25,000	Covered under contractors quoted rate under construction cost
2.	Erosion control measures (Turfing / Pitching / Seeding & Mulching)			LS	17,00,000	
3.	Provision of cross drainage & side drainage structures			LS	18,50,000	
4.	General borrow area management and			LS	67,00,000	

Sr. No.	Item	Unit	Rate (in INR)	Quantity	Cost (in INR)	Remarks
	maintenance of haul road related to borrow areas					
5.	Air / noise pollution control measures in construction equipment			LS	1,05,000	
7.	Provision of informatory signs			LS	6,50,000	
8.	Cattle crossings			LS	8,20,000	
9.	Management of quarries			LS	2,50,00,000	
10.	Redevelopment of borrow area			LS	20,00,000	
11.	Construction camp management cost			LS	82,00,000	
12.	Safety measures for workers			LS	12,00,000	
Sub-total for D					**5,00,50,000**	
E. TRAINING & MANPOWER						
1.	Training	Number	5,00,000	4	20,00,000	Twice in a year during construction period
2.	Provision of environmental expert	Number	2,00,000	12	24,00,000	
Sub-total for E					**44,00,000**	
Total EMP Budget					**INR 23,43,28,800/-** **Say, Rupees 234.328 Million Plus Land cost Rs. 9500 Million**	

ANNEXURE-10.1: SELECTION AND MANAGEMENT OF CONSTRUCTION/LABOUR CAMP

1. Selection and layout of construction camp

The construction camps for labour, accommodation, offices and construction plant sites shall be identified based on the following guidelines. The construction site shall be located.

- At a minimum distance of 1km away from any major settlement or village.
- At a minimum distance of 1000m of any major surface water course or body

If this is not possible the base camps should be located away from the settlements with the following precautions.

- Base camp should be enclosed with boundary wall.
- Movement of the workers should be registered during the nighttime.
- There should not be any disturbance to the local community.
- Operation of the plant and machinery should be restricted to 6 am to 10 am
- Care should be taken while starting and moving the heavy vehicles, there is a possibility that children of near settlement may be playing with machinery parked outside the camps.

2. Facilities at workers camps

During the construction stage of the project, the construction contractor will construct and maintain necessary (temporary) living accommodation and ancillary facilities for labour. It will be ensured that all the temporary accommodation will be provided with uncontaminated water for drinking, cooking and washing. Adequate washing and bathing places shall be provided, and kept in clean and drained condition. Construction camps will be sited away from vulnerable people and adequate health care will be provided for the work force.

- General requirements include availability of:
- Potable water supply in quantity and quality,
- Requirement of power supply for heating as well as for cooking. Firewood shall not be used for cooking and heating purposes. Contractor must provide LPG gas / Kerosene for the construction camps.
- Safe access road is required at camps
- Waste (all kind of solid and liquid wastes) generated need to be disposed off smoothly.

2.1 Sanitation Facilities

Construction camps shall be provided with sanitary latrines and urinals. Closed drainage systems and the proper treatment systems according to the local conditions should be constructed for the proper flow and effective treatment. The sewage system built for the camp will be operated properly to avoid health hazard, ground water and soil pollution. Compost pits will be constructed for the disposal of the garbage and other biodegradable wastes generated from the camps. Proper collection, transportation and disposal of the wastes will be ensured.

3. Shelter at work place:

At such work places where the duration of the works will prevail for more than one month some form of shelters will be provided for meals, resting, change of clothes and for keeping the tools of the work and personal protective equipment. The height of shelter shall not less than 3m from floor level to lowest part of the roof. Sheds shall be kept clean and the space provided shall be on the basis of at least 1.0 Sq.m per head.

4. Canteen Facilities:

A cooked food canteen on a moderate scale shall be provided for the benefit of workers wherever it is considered necessary. All the wastes generated from the canteen will be treated / disposed of as detailed in the other sections of the waste disposal.

5. Health care Facilities:

Health problems of the workers should be taken care of by providing basic health care facilities through a health centre set up at the construction camps. The health centre will have at least a doctor (part time), nurses, duty staff, medicines and minimum medical facilities to tackle first-aid requirements for minor accidental cases. Some arrangements will be made with the nearest hospital to refer patients of major illnesses or critical cases.

The health centre will carry out quarterly awareness programme of HIV – AIDS with the help of AIDS control society. Posters will be exhibited in the health care clinic.

6. Day crèche facilities

At construction sites where women with very young children are employed, provision of a day crèche shall be provided. At construction sites where 20 or more women are ordinarily employed, a hut for children under the age of 6 years shall be provided.
For ensuring the implementation of effective pollution control measures at the construction base camps and construction plant sites, redevelopment/ closure plans for the closure of these sites will be made part of the EMP of the construction contract.

7. Construction workers Camp

In all over India, road construction works are in peak stage. With several local / regional/ national and international contractors in place, the road construction work recently started showing seriousness towards this issue. The contractor recently started providing required legal and contractual facilities for the unskilled labour, hired from the local villages or are brought to the place of work from outside the State.

Even now the Contractor camps and other facilities are set up in worst conditions even when the contract documents are clearly specifying the required standards. The associated issues are as follows.

Forest resources could be encroached up on in all possible ways by the labour force.

Unauthorized tree felling to get fuel-wood both for cooking as well as heating even when alternative fuel is made available, Poaching of edible animals and birds of the locality in spite of prohibition,

Poor sanitation arrangement and improper methods used for disposal of solid wastes and effluent,
Indigenous people getting invaded by imported construction labour-force, due to lack of discipline,
Transmission of communicable diseases to the local people by the construction workers due to inappropriate health monitoring facilities, and

Creating hazardous traffic flow at construction site due to lack of concern about the local needs and provision for pedestrian.

No Contractor's Establishments zones

Contractor shall not establish any construction camp, crushers, hot mix plant and WWM plant in the identified locations (No Contractor's Establishment Zone). These locations will be treated as eco-sensitive. No construction campsite areas also include settlement areas provided below. These are the major settlements along the corridor. Campsites should be a minimum of 500m away from settlements.

DFCCIL's SHE Manual may be referred for for camps.

ANNEXURE-10.2: BORROW AREAS MANAGEMENT

Borrow areas will be finalized as identified by Contractor as agreed by the PMC and DFCCIL as per the requirements of the contract. Agreement is not reached between the Contractor and landowners for the identified borrow areas sites. In such cases arrangement for locating the source of supply of material for embankment and sub-grade as well as compliance to environment requirements in respect of excavation and borrow areas as stipulated from time to time by the Ministry of Environment and Forests, Government of India, and local bodies, as applicable shall be the sole responsibility of the Contractor.

The Contractor in addition to the established practices, rules and regulation will also consider following criteria before finalizing the locations.

1) The borrow area should not be located in agriculture field unless unavoidable i.e. barren land is not available.
2) The borrow pits should not be located along the roads, close to DFC alignment or existing IR tracks.
3) The loss of productive and agricultural land should be minimum.
4) The loss of vegetation is almost nil or minimum.
5) Sufficient quality of soil is available.
6) The Contractor will ensure the availability of suitable earth.

The Contractor shall obtain representative samples from each of the identified borrow areas and have these tested at the site laboratory following a testing programme as approved by the concerned Engineer. It shall be ensured that the fill material compacted to the required density
The Contractor shall submit the following information to the Engineer for approval at least 7 working days before commencement of compaction.

- The values of maximum dry density and optimum moisture content obtained in accordance with IS: 2720 (Part 7) or (Part 8), as the case may be, appropriate for each of the fill materials he intends to use.
- A graph of density plotted against content from which, each of the values in (i) above of maximum dry density and optimum moisture content are determined.

After identification of borrow areas based on guidelines and full filling the following requirements (a.) Quantification of Earth (b.) Land Agreement (c.) Clearance from local authorities (d.) Environmental Clearances from SEIAA. Contractor will submit the same for approval of the "Engineer" through RFI. All EC conditions are to be followed.

After receiving the approval Contractor will begin operations keeping in mind following;

1) Haulage of material to the areas of fill shall proceed only when sufficient spreading and compaction plants is operating at the place of deposition.
2) No excavated acceptable material other than surplus to requirements of the Contract shall be removed from the site. Contractor should be permitted to remove acceptable material form the site to suit his operational procedure, then be shall make good any consequent deficit of material arising there from.
3) Where the excavation reveals a combination of acceptable and un-acceptable materials, the Contractor shall, unless otherwise agreed by the Engineer, carryout the excavation in such a

manner that the acceptable materials are excavated separately for use in the permanent works without contamination by the un-acceptable materials. The acceptable material shall be stockpiled separately.

4) The Contractor shall ensure that he does not adversely affect the stability of excavation or fills by the methods of stockpiling materials, use of plants or siting of temporary buildings or structures.

Borrow Areas located in Agricultural Lands

(i) The preservation of topsoil will be carried out in stockpile.
(ii) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).
(iii) Borrowing of earth will be carried out up to a depth of 1.5m from the existing ground level.
(iv) Borrowing of earth will not be done continuously through out the stretch.
(v) Ridges of not less than 8m widths will be left at intervals not exceeding 300m.
(vi) Small drains will be cut through the ridges, if necessary, to facilitate drainage.
(vii) The slope of the edges will be maintained not steeper then 1:4 (Vertical: Horizontal).

Borrow Areas located in Agriculture Land in un-avoidable Circumstances:

(i) The preservation of topsoil will be carried out in stockpile.
(ii) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).
(iii) The depth of borrow pits will not be more than 30 cm after stripping the 15 cm topsoil aside.

Borrow Areas located on Elevated Lands

(i) The preservation of topsoil will be carried out in stockpile
(ii) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).
(iii) At location where private owners desire their fields to be leveled, the borrowing shall be done to a depth of not more than 1.5m or up to the level of surrounding fields.

Borrow Areas near Riverside

(i) The preservation of topsoil will be carried out in stockpile
(ii) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).
(iii) Borrow area near to any surface water body will be at least at a distance of 15m from the toe of the bank or high flood level, whichever is maximum.

Borrow Areas near Settlements

(i) The preservation of topsoil will be carried out in stockpile
(ii) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).
(iii) Borrow pit location will be located at least 0.75 km from villages and settlements. If un-avoidable, the pit will not be dug for more then 30 cm and drains will be cut to facilitate drainage.

(iv) Borrow pits located in such location will be re-developed immediately after borrowing is completed. If spoils are dumped, that will be covered with a layers of stockpiled topsoil in accordance with compliance requirements with respect MOEF&CC/PPCB guidelines.

Borrow Pits along the Road / Railway

(i) The preservation of topsoil will be carried out in stockpile

(ii) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).

(iii) Borrow pits along the road shall be discouraged.

(iv) It permitted by the Engineer; these shall not be dug continuously.

(v) Ridges of not less than 8m widths should be left at intervals not exceeding 300m.

(vi) Small drains shall be cut through the ridges of facilitate drainage.

(vii) The depth of the pits shall be so regulated that there bottom does not cut an imaginary line having a slope of 1 vertical to 4 horizontal projected from the edge of the final section of bank, the maximum depth of any case being limited to 1.5m.

(viii) Also, no pit shall be dug within the offset width from the toe of the embankment required as per the consideration of stability with a minimum width of 10m.

(ix) Minimum distance from road/ railway will be 50 metres.

Re-development of Borrow Areas

The objective of the rehabilitation programme is to return the borrow pit sites to a safe and secure area, which the general public should be able to safely enter and enjoy. Securing borrow pits in a stable condition is fundamental requirement of the rehabilitation process. This could be achieved by filling the borrow pit approximately to the road level.

Re-development plan will be prepared by the Contractor before the start of work inline with the owner's will and to the satisfaction of owner.

The Borrow Areas will be rehabilitated as follows;

- Borrow pits will be backfilled with rejected construction wastes (unserviceable materials) compacted and will be given a turfing or vegetative cover on the surface. If this is not possible, then excavation slope should be smoothened and depression is filled in such a way that it looks more or less like the original ground surface.
- Borrow areas might be used for aquaculture in case landowner wants such development. In that case, such borrow area will be photographed after their post-use restoration and Environment Expert of Supervision Consultant will certify the post-use redevelopment.

The Contractor will keep record of photographs of various stages i.e. before using materials form the location (pre-project), for the period borrowing activities (Construction Phase) and after rehabilitation (post development), to ascertain the pre and post borrowing status of the area.

ANNEXURE - 10.3: LOCATING QUARRIES, REHABILITATING QUARRIES AND GUIDELINES FOR STONE CRUSHERS

Locating Quarries

The Contractor will finalize the locations in consultation with PMC. The Contractor shall establish a new quarry with the prior consent of the DFCCIL only in cases when:

i) Lead from existing quarries is uneconomical and
ii) Alternative material sources are not available.

The Contractor shall prepare a redevelopment plan for the quarry site and get approved by the PMC.

The construction schedule and operation plans to be submitted to the PMC prior to commencement of work shall contain a detailed work plan for procuring materials that includes procurement, transportation and storage of quarry materials. In case New or existing quarry or outsourced from a distance contractor shall ensure the quarry has all requisite permissions & valid EC. EC conditions will have to be followed.

Operation & redevelopment plan (if a new quarry is opened)

- Photograph of the quarry site prior to commencement
- The quarry boundaries as well as location of the material deposits, working equipment, stockpiling, access roads and final shape of the pit.
- Drainage and erosion control measures at site.
- Safety measures during quarry operation.
- Design for redevelopment of exhaust site.

Option-A: Revegetating the quarry to merge with surrounding landscape: This is done by conserving and reapplying the topsoil for the vegetative growth.

Option-B: Developing exhausted quarries as water bodies: The pit shall be reshaped and developed into pond, for harvesting rainwater. This option shall only be considered where the location of quarry is at the lowest point, i.e. surrounding areas/ natural drainage slopes towards it.

Construction stage:

Development of site:

To minimize the adverse impact during excavation of material following measures are need to be undertaken

i) Adequate drainage system shall be provided to prevent the flooding of the excavated area
ii) At the stockpiling locations, the Contractor shall construct sediment barriers to prevent the erosion of excavated material due to runoff
iii) Construction of offices, laboratory, workshop and rest places shall be done in the up-wind of the plant to minimize the adverse impact due to dust and noise.

iv) The access road to the plant shall be constructed taking into consideration location of units and also slope of the ground to regulate the vehicle movement within the plant.

v) In case of storage of blasting materials, all precautions shall be taken as per The Explosive Rules, 1983.

Quarry operations including safety:

i) Overburden shall be removed and disposed inline with Guidelines of Disposal Management.

ii) During excavation, slopes shall be flatter than 20 degrees to prevent their sliding. In cases where quarry strata are good and where chances of sliding are less this restriction can be ignored.

iii) In case of blasting, procedure and safety measures shall be taken as per The Explosive Rules, 1983.

iv) The Contractor shall ensure that all workers related safety measures shall be done as per guidelines for workers and Safety attached as Annexure-8

v) The contractor shall ensure maintenance of crushers regularly as per manufacture's recommendation.

Topsoil will be excavated and preserved during transportation of the materials measures shall be taken to minimize the generation of dust and prevent accidents.

The PIU and the PMC shall review the quarry site for the management measures during quarry operation, including the compliance to pollution norms.

Post construction stage:

The Contractor shall restore all haul roads constructed for transporting the material from the quarries to construction site to their original state.

The PIU and the PMC shall be entrusted the responsibility of reviewing the quarry site for the progress of implementation of Redevelopment plan. These shall include the following two cases;

- Redevelopment of quarries opened by the contractor for the project
- Redevelopment of existing quarries operated by other agencies

In the first case, the Contractor shall be responsible for the Redevelopment plan prior to completion after five years, during the defect liability period. The PMC and PIU shall be responsible for reviewing this case of redevelopment prior to the issuing the defect liability certificate.

In the second case, the redevelopment of exhaust quarry shall be the responsibility of the agency providing the permit to ensure the implementation of Redevelopment Plan.

Geological and Geomorphologic considerations:

i) No mining shall be allowed where the slope angles are more than 45 degree from horizontal and in case of mid slope mining, the foot wall should be of hard strata.

ii) No mining lease shall be granted where the ore to overburden ratio is not economical i.e. 1:0.2 that is the waste generation should not be more than 20%

iii) Proper appraisal of the deposit for its qualitative and quantitative assessment shall be made in the form of Geological and topographical plans.

Technical consideration:

i) The area should not be highly jointed, fractured on consisting of weak planes.
ii) Relation of slope angle to angle of repose should be within mining parameters where 6x6 m benches by keeping overall angle of repose as 45degree can be made.
iii) No mining shall be allowed where subsidence of rocks is likely due to steep angle of slope.
iv) No overhangs shall be allowed to be formed during the course of mining.
v) The gradient of approach roads shall be gentle with hill-ward slope, side drains and parapet walls. Adequate number of waiting and crossing points shall be provided for safe plying of vehicles.
vi) No blasting shall be resorted to without taking proper license under Explosive Act.

General conditions:

i) Mining site shall only be handed over to the leaseholder, after it is duly demarcated by permanent boundary pillars and certified by concerned mining officer.
ii) Junction at take off point of approach road with main road shall be developed with proper width and geometric required for safe movement of traffic by crusher owner at his own cost in consultation with Executive Engineer, of PWD.
iii) No leaseholder shall store/ stack any material in the acquired width of PWD road without the specific permission of the competent authority.
iv) In addition to above the mining operation shall be subjected to provisions of various Acts and Rules in force.
v) Dumping of waste shall be done in earmarked places as per the working plans.

Table: Parameters for new stone crushers to be set up in future

Sr. No.	Parameters	Distance
i	Minimum distance from NH/SH	150m
ii	Minimum distance from link roads / other District roads	75m
iii	Minimum distance from District Head - Quarters	1.5 km
iv	Minimum distance from town / Notified area by the committee	1 km
v	Minimum distance from village	500 m
vi	Minimum distance from Hospital/Education Institution	1 km
vii	Minimum distance from Natural water springs	500 m
viii	Minimum distance from Notified parks	2 km
ix	Minimum distance from Sanctuaries	1 km
x	Minimum distance from Bridge sites	200 m Upstream
xi	Minimum distance from Notified Lakes and Wetlands	300 m

ANNEXURE-10.4: SPECIFICATION ADDENDUM SILICA EXPOSURE REDUCTION STRATEGIES FOR DEDICATED FREIGHT CORRIDOR

PART 1 – GENERAL APPLICATION

1.1 DESCRIPTION

i) This addendum specifies minimum environmental health and safety equipment, practices and procedures to minimize exposures to airborne silica dust during quarry operations, stone crushing, transport, and site construction. The scope of this section is limited to dust controls and employee protection in these environments.

ii) This addendum shall take precedence over overlapping requirements in the Technical Specification unless otherwise stated.

iii) This document is an integral part of the contract and the contractor has the responsibility to fully implement it. Any request to deviate from any specified requirement shall be made in writing to the project sponsor.

iv) This addendum supplements all local, regional and national laws and regulations concerning the location, environmental emissions, and occupational safety in these operations. If regulatory requirements are more stringent, or require more frequent verification than outlined in this standard, then the regulatory provisions shall take precedence and become the de facto requirement in that jurisdiction.

v) Contractor(s) shall provide a copy of the licensing documentation (NOC/ Consent to Establish) for each facility from where they purchase crushed stone including each quarry, stone crusher mill, and hot mix plant indicating they meet all applicable requirements.

1.2 GENERAL SITE REQUIREMENTS QUARRIE

- Operator must establish a reliable source of water with adequate capacity and pressure to run all dust suppression systems at the quarry site;
- Operator must establish a reliable source of power for all mechanical equipment at the stone quarry site;
- Residential areas and temporary employee housing must be located a minimum of 100 meters from any quarrying operations;

- Stone drilling, cutting and conveying operations shall be equipped with either continuous wet suppression system or dry dust collectors designed and operated per minimum requirements below.
- Dust controls in quarries must include water fed compressed air drilling equipment, enclosed screens; enclosed transfer points, covered conveyors, and chutes.
- Wet the surface of rock materials with a hose before blasting operations.

1.3 GENERAL SITE REQUIREMENTS STONE CRUSHER MILLS AND HOT MIX PLANTS

i) Contractor shall submit a detailed plan for any temporary stone crusher or hot mix plant sites intended to be utilized for this project. The plan shall show adjacent areas within 100 meters and depict all structures and roadways. All temporary sites must meet all requirements specified in this addendum and must obtain a Consent to Establish/ (NOC) from the applicable authorities.

ii) Temporary or permanent stone crusher sites or hot mix plants must meet all of the following requirements:

- Site must be at least 250 meters from National and State Highways and 500 meters from schools, educational institutions and religious places.
- Establish green belt zone as required by applicable local requirements;
- Residential areas and temporary employee housing must be located a minimum of 200 meters from any stone crushing equipment or operations;
- Operator must establish a reliable source of water with adequate capacity and pressure to run all dust suppression systems installed at the stone crusher site;
- Operator must establish a reliable source of electricity for powering all mechanical equipment and pollution controls installed at the stone crusher site;
- Crushing, screening, and conveying operations shall be equipped with either continuous wet suppression system or dry dust collectors designed and operated per minimum requirements below.
- Crushing, screening, and conveying operations must be enclosed with sheet metal or other rigid material. Do not use cloth or plastic enclosures.
- Roadways inside the crusher mill shall be metalled, paved or otherwise treated with chemical suppressants for dust suppression.
- Waste dust materials from stone crushing operations shall be stored in closed containers or closed structures.

- Lorries exiting the site must be cleaned with shovel and broom to minimize dust being tracked off site.
- Minimize drop heights to storage piles;
- Windbreak walls that are at least six times longer than its height shall be in place.
- Regularly remove and safely dispose of waste materials (rock dust) from the plant site in covered lorries;
- Fugitive emissions including emissions from stockpiles, conveyors and other areas shall be minimized as far as practicable. Emissions from these sources shall be substantially free from visible dust emission.

1.4 GENERAL SITE REQUIREMENTS CONSTRUCTION SITES:

The following requirements shall be implemented during the following operations:

- Stockpiling;
- Earth moving/ earth works, grading, and leveling;
- Transfer from stock pile to work site;
- Final placement; and
- Laying the track.
- Operator must establish a reliable source of water with adequate capacity and for all dust suppression required at the construction site;
- Regularly remove and safely disposing of waste materials (rock dust) from the site in covered lorries;
- Waste dust materials from stone crushing operations if used for fill shall be covered within 4 hours;

- Minimize spillage of raw materials. Promptly clean up all spillage and accumulations of dust.
- Fugitive emissions including emissions from stockpiles and other areas shall be minimized as far as practicable. Emissions from these sources shall be substantially free from visible dust emission.

1.5 GENERAL ENVIRONMENTAL PROTECTION:

The Contractor shall take steps to protect the environment and surrounding populations from silica dust hazards. Ensure that the water required for dust suppression operations is sourced from a supply that will not impact the quality or availability of water in the surrounding environment. Follow all State requirements for siting criteria and obtain consent from applicable state pollution control board. Ensure that emissions, surface discharges and site closure practices shall comply with all applicable laws including but not limited to:

- The water (prevention and control of pollution) act 1974; no. 6 of 1974.
- The air (prevention and control of pollution) act, 1981; no. 14 of 1981.

PART 2 - TECHNICAL REQUIREMENTS TO MINIMIZE AIRBORNE DUST EMISSIONS

2.1 GENERAL

The handling of raw materials, products, wastes or by-products should be carried out as to minimize the release of airborne dust. Use Table 1 below for guidance in employing dust suppression methods.

Table 1: Feasible Control Measures for Open Dust Sources

Fugitive Emission Control Measure

Source	Enclosures	Wet Suppression	Chemical Stabilization	Green Belt	Surface Cleaning	Wind Break Walls
Unpaved roadways and staging areas		X	X			
Storage piles	X	X	X			X
Stone crushing operations	X	X		X	X	X
Paved roadways and staging areas					X	
Exposed areas	X	X	X	X		X
Batch drop operations	X	X				X
Continuous drop operations	X	X				X

2.2 WET METHODS: WATER SPRAY DUST SUPPRESSION SYSTEMS FOR STONE CRUSHING MILLS

Details of system components for all stone crusher facilities:

A. Minimum number and locations of pressure spray nozzles:
- 1 nozzle on the top of the crusher
- 2 nozzles at the delivery point of crushing material
- 1 nozzle on the bottom of the vibrator screen or rotary screen
- 2 nozzles within the storage hopper
- 1 nozzle at the delivery point of raw materials
- 1 nozzle at the bottom of the dust hopper

B. A water pump with adequate motor horsepower and discharge pressure as required for optimal performance of spray nozzles.

C. Covered water storage tank, with a manhole type maintenance provision. The cover should prevent atmospheric dust from entering the tank. The tank can be located at the ground level. Water from a bore well or other source could be pumped to fill the tank periodically.

D. Centrifugal monoblock type self-priming pump capable of delivering 3 to 5 kg/cm^2 pressure and 72 liters per minute.

E. 100 stainless steel mesh online water filter with two parallel cells. Parallel cells should be set up in order for to allow connections to be reversed such that one cell undergoes backwash cleaning while the other cell is in operation. Only filtered water should be supplied to the spray nozzles.

F. Chemical surfactants or wetting agents may be added to water used in the spraying systems.

G. All spraying systems used for dust suppression shall be maintained in good condition. The flow rate and operating pressure of the spraying liquid/solution shall be sufficient to suppress dust emissions from the corresponding sources. The spraying system shall be able to cover the areas of emission points concerned.

H. All water spray equipment shall be operational during all stone crushing operations at the site.

I. No domestic showers, sprinklers, or other general water spray devices may be substituted for pressure misting nozzles. Nozzles may be hollow cone, solid cone or fan type.

2.3 DRY METHODS: DUST EXTRACTION SYSTEMS FOR STONE CRUSHER MILLS/ HOT MIX PLANTS

Details of system components:

A. Minimum requirements for dry dust capture and collection systems:
- Hood or enclosure to capture emissions;
- Dust collector that separates particulates (e.g. centrifugal dust collectors); and
- Duct to transport particulates in air stream from dust collector to air pollution control device (e.g. bag house).

B. Capture hoods shall be installed over all crusher units and screens. Enclosures shall surround all sources of dust to the extent possible.

C. Dust collector shall be connected in-line via an enclosed duct to a cyclone and bag house for dust removal.

D. Air handling system shall be a suitable size to prevent the escape of untreated airborne dust. Maintain minimum airflow as per design. A minimum draft velocity of 1 meter/ second shall be maintained through all open hoods.

E. Inspect bag filters routinely and at least once per month for damage and clean, repair or replace as needed.

2.4 DUST CONTAINMENT ENCLOSURES FOR STONE CRUSHER MILLS AND HOT MIX PLANTS

Particulate emissions shall be controlled by installing dust containment enclosures at the following locations:

A. Primary crusher discharge area
Enclosure shall cover discharge areas to all conveyor belts or secondary crusher.

B. Vibratory screen
All vibratory screens shall be totally enclosed. Screen houses shall be rigid and reasonably dust tight with self-closing doors or close-fitted entrances and exits for

access. Where conveyors pass through the screen house, flexible covers should be installed at entries and exits of the conveyors to the housing.

C. Conveyor belts (optional)
The enclosures should be complete from all the four sides and roof. There should not be any open windows/openings etc. Any opening should be kept closed during operation. The gaps should be sealed using gaskets or wool type packing etc. Crusher enclosures shall be rigid and be fitted with self-closing doors and close-fitting entrances and exits. Where conveyors pass through the crusher enclosures, flexible covers should be installed at entries and exits of the conveyors to the enclosure.

D. Inlet hopper
The inlet hopper shall be enclosed on three sides.

E. Rotary dryer
The plant rotary dryer in a hot mix plant.

Malfunctioning or breakdown of equipment leading to abnormal emissions shall be dealt with promptly. In any case, the abnormal emission due to equipment failure shall be stopped as soon as practicable. The dust collection system shall be routinely inspected and maintained in good condition and shall be used as required. The owner shall conduct an inspection of the dust control system at least once per month.

2.5 MINIMIZE FUGITIVE DUST FROM ROADWAYS AND STOCK PILES

Minimize fugitive dust emissions from all sites where crushed rock is stored. Particulate emissions from unpaved roads and stock piles shall be controlled with the application of suitable compounds to minimize the control of dust. Petroleum-based products, waste oils or other waste products shall never be used for this purpose. Acceptable compounds for this purpose include:

- Acrylic polymers;
- Solid recycled asphalt;
- Chloride compounds (calcium chloride and magnesium chloride);
- Lignin compounds (lignin sulfate and lignin sulfonate powders);
- Natural oil resins (soybean oil); and
- Organic resin emulsions.

Contractor shall provide a product information sheet prepared by the manufacturer or distributor indicating the chemical composition, application instructions, and other environmental, safety and health considerations 30 days in advance of its intended application to Engineer's Representative. The product information shall be reviewed and approved in writing before the contractor proceeds to apply it on the project site.

2.6 MINIMIZE FUGITIVE DUST FROM HEAVY EQUIPMENT AND ROAD TRANSPORT VEHICLES

Minimize fugitive dust emissions from all vehicles when loading, unloading and operating vehicles on project sites, staging areas, or stone crusher mills. Settled dust and particulate emissions from lorries used to transport stone or waste products generated in stone crushing operations, and other heavy construction vehicles, shall be minimized in accordance with the following practices:

Lorries shall be filled with the material using wet methods. Load waste fine materials and powders onto tankers or closed trucks through a lengthy sleeve attached to the spout to minimize drop height and dust release.

Lorries once filled with stone or other waste materials shall be covered before leaving the site. A single layer impermeable tarp shall be placed over the entire load and secured with rope or other tension bar.

Designate a decontamination area that is required to be used by all vehicles before exiting the site. This area shall be covered with an impervious tarp. Use wet methods to wipe all accessible exterior surfaces of vehicles and tires.

Impose strict speed limits for all vehicles operating on service roads, loading areas, or staging areas.

2.7 MINIMIZE FUGITIVE DUST DURING ROCK QUARRY OPERATIONS

Particulate emissions shall be controlled during drilling, blasting, loading, and hauling with wet methods using surfactants applied in either water or foam spray.

Dust controls for stone drilling shall use water fed into the compressed air to suppress the dust.

2.8 WORK PRACTICES FOR REDUCING EMPLOYEE EXPOSURES

This section pertains to all activities with potential for dust exposure to workers employed in quarries, stone crusher units, hot mix plants, and construction sites.

Use wet methods where feasible to reduce dust emissions from working surface or equipment.

Use a gentle spray or mist to moisten settled dust particles. When washing large quantities of dust from a surface, increase the water force only after pre-wetting all the dust with a gentle spray. Use only the minimum amount of water needed to get the job done without creating runoff.

Rewet surfaces as necessary to control dust.

PART-3: TECHNICAL REQUIREMENTS FOR WORKER MEDICAL SURVEILLANCE

3.1 GENERAL

This section pertains to workers employed in quarries, stone crusher units, and hot mix plants.

3.2 MEDICAL MONITORING

Medical monitoring shall be conducted for each worker before the start of work and at least at annually thereafter. Examination shall as a minimum meet requirements as set forth below:

Examination

1. The employer shall ensure that all medical examinations and procedures are performed by a licensed physician, and are provided at no cost to the employee and at a reasonable time and place.
2. Persons employed under the licensed physicians may administer the pulmonary function testing, chest x-ray or other testing procedures required by this section if adequately trained by an appropriate academic or professional institution.
3. A physical examination directed to the pulmonary system, including a chest x-ray to be administered and pulmonary function tests of forced vital capacity (FVC) and forced

expiratory volume at one second (FEV(1)). Interpretation and classification of chest roentgenograms shall be conducted in accordance with ILO classification system. Interpretation of the chest x-ray shall be conducted under the ILO Classification of Radiographs of Pneumoconiosis by a reader trained under this protocol. Evaluate chest x-ray for possible tuberculosis because people exposed to silica have increased susceptibility.
Report from Medical Examination: A report must be submitted from all medical examinations conducted within the last 12 months to document compliance with this medical surveillance requirement for each worker employed in quarries and stone crusher units. Submit, at a minimum, for each worker the following:
Name and Employee Identification Number

Physician's Written Opinion from examining physician including at a minimum the following:

- Whether worker has any detected medical conditions that would place the worker at an increased risk of material health impairment from exposure to silica.
- A statement that the worker may wear a negative pressure respirator or any recommended limitations on the worker or on the use of personal protective equipment such as respirators.
- Statement that the worker has been informed by the physician of the results of the medical examination and of any medical conditions that may result from dust exposure.

3.3 RECORD KEEPING

1. The employer shall establish and maintain accurate records of medical surveillance to include the physician's written opinion on each employee's health status.
2. Records shall be maintained for at least the duration of the contract period.
3. A copy of the each employee's records must be provided to the affected employee who has undergone the medical surveillance stipulated above within 30 days of the date of the examination.

PART 4 - REQUIREMENTS FOR EMPLOYEE TRAINING

4.1 GENERAL

A. This section pertains to all workers employed in quarries, stone crusher units, hot mix plants, and any construction workers using powered tools or equipment to cut, grind, core, or drill concrete or masonry materials. The training provided under this section shall be provided to workers at no cost to these employees and in a language understood by workers at each training program. The course shall be taught by an environmental health and safety specialist with adequate education, experience, and training.

B. Incorporate general information about silica dust hazards in all orientation and site training sessions covering health or safety aspects.

4.2 TRAINING TOPICS

The employer shall provide training on the following topics to all employees prior to their assignment to jobs where the employer will be conducting these operations during this project:

A. The potential health hazards of exposure to airborne silica dust including silicosis, tuberculosis, lung cancer, chronic obstructive lung disease (COPD) and decreased lung function.

B. Methods used by the employer to control employee exposures to airborne silica dust including wet or dry methods for stone crushing, drilling, cutting, local exhaust ventilation systems, and isolation of the process from employees by means of distance, enclosure, or other means, as applicable.
C. Proper use and maintenance of dust reduction systems, including the safe handling and disposal of waste materials.
D. The importance of good personal hygiene and housekeeping practices when working in proximity to silica dust including:

- Not smoking tobacco products; appropriate methods of cleaning up before eating, and appropriate methods of cleaning clothes.
- Avoiding, to the extent practical, activities that would contribute significantly to exposure to airborne dusts.

PART 5 – WORKER PROTECTION

5.1 GENERAL

Contractors shall supply respirators and other specified safety equipment to all workers employed in quarries, stone crusher units, hot mix plants, and any construction workers using powered tools or equipment to cut, grind, core, or drill concrete or masonry materials as described below:

A. Do not eat, drink, smoke, chew gum or smoke tobacco in the work area. To eat, drink, chew, or smoke, workers shall follow the procedures described below and leave the work area.

B. Provide workers with a clean source of water for a facility to wash hands and face with soap and water. This should be done before eating, smoking or drinking and at the end of the day before going home. Hand washing facilities shall be set up adjacent to the work area.

C. Engineering and work practice controls must be used whenever the possibility exists that employees may be exposed to silica including during stone crushing and construction operations.

D. The use of compressed air, dry sweeping, or any cleaning method that would cause elevated silica dust air concentrations are prohibited.

5.2 RESPIRATORY PROTECTION

Minimum Respiratory Protection: Require that the minimum level of respiratory protection used be Respirator Class FFP3 under European standard EN 143 or N99 under the U.S. National Institute for Occupational Safety and Health (NIOSH) classification. Respirators shall be single use disposal respirators for dusts or reusable half-face air-purifying respirators with high efficiency particulate air filters.

Require that a respirator be worn by anyone in a Work Area at all times during any operation. Do not allow the use of surgical masks or other types of disposable respirators not specified above for any purpose.

Fit testing shall be conducted on any reusable air-purifying respirator assigned to the worker.

Only assign respirators to workers medically approved to wear negative pressure respirators as per the physicians written opinion following an annual medical examination as per the requirements in Part 3 of this addendum.

5.3 PROTECTIVE EQUIPMENT

Do not allow workers to leave the work place wearing any clothing or equipment worn during the work shift. Provide the following:

A. Eye Protection: Provide eye protection as needed for the type of work being performed.
B. Shoes: Provide shoes to all workers and require that they be worn at all times in the Work Area.
C. Hearing protection: Provide all workers at all quarries, stone crushing sites, and hot mix plants and all other workers exposed to loud noise with ear plugs or other suitable hearing protection.

Part 6 - EMISSION AND AMBIENT AIR LIMITS

6.1 GENERAL

Contractors shall conduct all required emissions monitoring as required to prove compliance with all applicable State Pollution Control Board Regulations and the limits specified within this section. This section applies to all permanent and temporary stone crushing mills and hot mix plants.

6.2 SUSPENDED PARTICULATE MATTER (SPM)

The Suspended Particulate Matter (SPM) at a distance of 40 meters from a stone crusher unit in a cluster should be less than 600 microgrammes per cubic metre (ug/Nm^3).

The concentration of total particulate matter in any contained emissions to air, for example the bag filter exhaust air outlet, shall not exceed 150 microgrammes per cubic meter (150 ug/Nm^3). The introduction of dilution air to achieve the emission concentration limits shall not be permitted.

Monitoring of the 24-hour average concentration of the total suspended particulate and/or respirable suspended particulate in ambient air shall be conducted at the site boundary and/or any other locations to be agreed by the Authority. SPM sampling shall conform to the United State Environmental Protection Agency's Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere (High-volume Method) and shall be conducted at a frequency of not less than once every 6 months.

PART 7 – CHAIN-OF-CUSTODY FOR CRUSHED STONE

7.1 GENERAL

Contractor shall maintain records of suppliers for each load of crushed stone brought to the construction site with the procedures as outlined below. Such records shall be collected at a central location at least monthly during the duration of the project and be available for inspection by Engineer's Representative.

7.2 SUPPLIER VALIDATION

Contractor shall maintain records of all suppliers and all internally sourced supplies of crushed stone brought to the construction site to include:

- Name of supplier;
- Location of stone crusher operation;
- Location and name of the quarry;
- Proof of registration and consent from the applicable Mining Department;
- Proof of registration and consent for operation from applicable Pollution Control Board;
- The supplied material size and quantity (by weight or volume);
- Date and specific location material was brought to site.

PART 8 – RESTORATION OF TEMPORARY STONE CRUSHER SITES

8.1 GENERAL

This section applies to the removal of any temporary stone crusher sites established and used during the duration of the project. During operation all temporary operations shall meet the requirements specified in Parts 1 and 2 above.

8.2 EQUIPMENT REMOVAL

Temporary equipment shall be cleaned before being taken down and prepared for off site transport. Clear off all temporary structures and garbage.

8.3 SITE RESTORATION

Remove all debris and visible accumulations of dust from ground surfaces. Cover all bare soil surfaces with vegetation or pavement to reduce exposure to residual silica dust.

ANNEXURE-10.5: TREE PLANTATION PLAN

REGULATORY FRAMEWORK

The tree cutting permission for has been obtained from the concerned authority in whose jurisdiction the project stretch falls. The linear plantation declared as protected forest area along the existing track in Uttar Pradesh, tree cutting will be carried out by the concerned state forest department and forest land diversion and cutting are under the provisions of The Forest (Conservation) Act, 1980.

Compensatory plantation in lieu of trees to be cut from the private land and non-forest lands will be undertaken as per the statutory conditions imposed by the state governments in the vacant space of project land. For trees to be cut from the declared protected forest, the compensatory afforestation shall be taken up by the State Forest Department as per the provisions of the Forest (Conservation) Act, 1980.

FUNDING MECHANISM FOR COMPENSATORY PLANTATION

- *Forest lands:* The Ministry of Environment, Forests and Climate Change (MOEF&CC) under their order dt. the 24th, April, 2004 have constituted an authority known as Compensatory Afforestation Fund Management and Planning Authority (CAMPA) for the purpose of management of money received from user agencies for compensatory afforestation. DFFCIL, being the user agency in this project will be required to deposit the money as estimated by the State Forest Department to the CAMPA for the compensatory plantation. CAMPA shall release funds to the State in predetermined installments through the State Level Management Committee as per the Annual Plan of Operations drawn by the State Forest Department
- *Other areas:* The compensatory plantation for the trees on private land and non-forest land will be taken up as part of project cost. This cost will be built part of EMP cost in the overall project cost. The plantation work will be taken up by the civil contractor as part of the project work.

COMPENSATORY AFFORESTATION BY FOREST DEPARTMENT

The compensatory afforestation scheme would be implemented by the State Governments once the final approval for the diversion of forest land is granted by the Government of India. State Governments obtain funds from the Government of India into their CAMPA account based on their annual plan of operations. All districts include their proposals for taking up compensatory afforestation in the annual plan of operations. Once the plan is approved by the Regional and State level of the CAMPA authorities, plantation is taken up.

Plantation activity shall be taken up by the concerned forest department on approx.. 318 ha in as per the norms.

DFCCIL would actively pursue the case with the forest department for early plantation in the areas identified for the purpose. The tree species to be planted by the forest department outside project area will be finalised by the Forest Authorities based on local site conditions. The areas will be monitored by the concerned forest department and the MoEF through its regional offices to ensure the compliance of conditions for diversion of the forest land.

COMPENSATORY PLANTATION BY DFCCIL

In lieu of the around 19013 trees compensatory plantation will be taken up DFCCIL through the contractor in compliance with the conditions of permission for felling of the trees. The total compensatory plantation of about 33000 trees shall be taken up along the RoW, suitable government land and at other project facilities. Planatation in RoW shall be taken up along the alignment immediately after physical completion of embankment construction as part of the civil works. Plantation activity can be also taken up at the stations, yards etc once the detailed plans for the same are finalised. Plantation of about 5000 trees shall be done by the Forest department and the rest shall be done by the contractor.

SELECTION OF TREE SPECIES FOR COMPENSATORY PLANTATION

The civil contractor in consulatation with DFCCIL will decide on the type of species to be planted. The following points shall be considered while selecting the species.

- Trees to be selected for planting shall be site-specific taking into account the type of soil, features of the planting site e.g. for saline and alkaline soils and water logged area will require special attention.
- Browse hardiness, good growth rate, resistance to insects/pests disease and biotic interference etc shall be given appropriate weightage in selection of species.
- Evergreen / semi-evergreen species shall be preferred to deciduous species.
- In urban /semi-urban stretches of road, flowering trees shall be preferred to add to aesthetics of the surround.
- Trees having large tomentose leaves may be included in stretches where particulates are likely to be high.
- In the matter of selection of species for planting, stakeholders need be consulted and their views accommodated keeping view the site- specifics.
- Some trees species of economic importance suggested are

S No.	Trees Name	Characteristics
1	Azardiracta indica (Neem)	The leaves, barks are used for medicinal purposes, and the seeds yield valuable oil. It can grow on alkaline usar soil
2	Madhuca indica (Mahua)	The fruit is edible and seeds yields oil. It is also ornamental
3	Tamarindus indica (Imli)	A beautiful tree, which stands the dust of roads very well. Its fruit and timber are also valuable; suitable for dry area. This species is most common along project road.
4	Dalbergia sisoo (Shisham)	Yields excellent timber
5	Mangifera indica (Mango) Tamil Name: Maa	Yield valuable fruit
6	Safed siris	A quick growing beautiful tree. Because of the light yellow colour of the trunk, it reflects even weak light. This is an excellent roadside tree.

PLANTING PATTERN FOR VACANT LAND IN DFFCIL RIGHT OF WAY/DFFCIL LAND

- Monoculture planting shall be avoided. Mixed culture of shade-giving, flowering and fruit-bearing species shall be preferred.
- Where sufficient land exists plantation shall be undertaken in three rows.
  - The first row may be composed of a mix of species of flowering trees; such mix may consist of trees coming into flowers in different seasons.
  - The second row may have representation of middle-sized evergreen and fruit-bearing species.
  - The third row wherever feasible should be of broad-leaved evergreen species; the species should be so chosen as to make sure that they grow taller than tress planted in the first and second rows.

MANAGEMENT, MAINTENANCE AND MONITORING

- Strip plantations should be properly fenced to prevent damages by biotic interference.
- Wherever possible live-hedges may be provided; in such stretches live-hedges need be grown a year ahead of actual planting; such hedges may be reinforced by weaving with split bamboos.
- It may also be explored as to whether communities along the DFCCIL corridor can be involved in protection and maintenance of such plantations through a mechanism of sharing of fruits and products.
- Local voluntary organizations, sports/youth clubs may also be encouraged for protection of such plantations through provision of incentives.
- The maintenance of saplings within the DFFCIL land shall be done by DFCCIL once the civil contractor completes his period. The contractor should be handing over the project with a 95% survival percentage of the number of trees to be planted.

SUGGESTED PLANTING MODEL

A. Preparation of the Plantation Area

- Plantation site should be cleared from all wild vegetation. Suitable soil and water conservation measures will be adopted, if required. The planting arrangement and size should be based on the optimum use of the available land and quantum of irrigation water.
- A tree requires sufficient space below and above the ground to spread its roots and branches. However, spacing varies with the type of trees, soil fertility, available moisture and purpose of plantation.

B. Preparation of Pits and Sapling Transplantation

The location of each pit shall be marked according to the design and distance of the plantation. The size of the pits may vary with the type of trees. While digging the pit, care shall be taken to place the topsoil on one side and bottom soil on the other side. Dug-out soil and pit shall be exposed to weather for two to three months. After exposing to the weather, the pit should be filled two-third to three-fourth height with a mixture of topsoil and decayed farmyard manure.

Planting of the tree shall be done with a suitable between each. While planting the trees, care shall be taken that the installation structure shall be difficult to see through the foliage when seen from a point outside the green envelop. For preventing the horizontal dispersion of the pollutants, the trees shall be planted in alternate rows in a straight line. Tree trunks are free from foliage up to a height of 2 –3 meters, it is advisable to grow shrubs in front of tree so as to provide coverage to the open portion.

C. Time of Plantation

- Plantation shall be done two weeks after the rain starts, as the trees benefit from the seasonal rains. It is advisable to avoid planting during the dry season, as this will require watering. It is advantageous to plant trees on cloudy days.

D. Protection of Greenbelt

- No pruning or lopping of branches shall be done within the greenbelt for at least 10 – 15 years
- Gap filling in the greenbelt shall be done in the same season to avoid future gaps.
- Protection of young plants from the ravages of cattle, sheep and goat and other animals.
- Timely replacements of damaged plant and thereafter care is important.

E. **Selection of Tree Species**

- Plants possess a large surface area and their leaves exhibit an efficient pollutant trapping mechanism. The effectiveness of plants to control pollution depends upon the physiological, morphological traits such as leaf epidermis, size, leaf orientation, internal enzyme system, etc. Systematic screening of plants for their ability to tolerate pollutant need be undertaken. For pollution abatement purposes tree species should be fast growing, wind firm, unpalatable to animals, hardy and pollutants tolerant/resistant. List of some plant species for greenbelt plantation purpose is given below:

Recommended List of Tree Species for Green Belt Plantation

Sr. No.	Botanical Name	Common Name
1	*Alstonia scholaris*	Chattivan
2	*Mimusops elengi*	Bakul
3	*Cassia fistula*	Amaltas
4	*Bauhinia purpurea*	Khairwal
5	*Zizyphus mauaritiana*	Ber
6	*Cassia siamea*	Senna
7	*Ficus religiosa*	Peepal
8	*Albizia lebbeck*	Siris
9	*Pongamia pinnata*	Karanj
10	*Polyalthia longifolia*	Ashok
11	*Diospyros melanoxylon*	Tendu
12	*Ailanthus excelsa*	Mar Maharakha
13	*Melia azedarach*	Bakain
14	*Tamarindus indica*	Imli
15	*Terminalia arjuna*	Arjuna
16	*Azadirachta Indica*	Neem
17	*Grevillea robusta*	Savukkamaram
	Shrubs & Grasses	Akand
1	*Calotropis gigantea*	Harsighar
2	*Nyctanthus arboriristis*	Kaner
	Nerium indicum	

It is recommended to use local species for better survival rate

F. Plantation for Noise Pollution Control

Trees having thick and fleshy leaves with petioles flexible and capacity to withstand vibration are suitable. Heavier branches and trunks of the trees also deflect or refract the sound waves. The density, height and width are critical factors in designing adequate noise screen with vegetation.
Combination of trees and shrubs together appears to be the best system for combating pollution. The following species are suggested for noise pollution:

- *Alstonia scholaris*
- *Azadirachta indica*
- *Melia azedarach*
- *Grevillea robusta*
- *Tamrindus indica*
- *Terminalia arjuna*

Varied plantation techniques and types will reduce noise unequally. In addition to this, it is also relies on categories of plant to block noise. Some type of trees with varying heights block noise better than trees forming a straight line, which can reduce noise up to 3.48%. The formation of plant of different heights planted such that they stand highest to lowest in straight line will have best noise blocking. Port line can reduce noise up to 4.39%. The formation of plant from the highest to lowest in alternate formation will have the best noise reduction in the fifth line which is 7.63% (Chakree, 1989).

ANNEXURE-10.6: CONSTRUTION DEBRIS/ WASTE HANDLING STORAGE & DISPOSAL

SELECTION OF DISPOSAL SITES:

The locations of Disposal sites have to be selected such that:

- Disposal sites are located at least 1000 m away from sensitive locations like Settlements, Water body notified forest areas, Sanctuaries or any other sensitive locations.
- Disposal sites shall not contaminate any water sources, rivers etc so the site should be located away from water body and disposal site should be lined properly to prevent infiltration of water.
- Public perception about the location of debris disposal site has to be obtained before finalizing the location.
- Permission from the Village/local community is to be obtained for the Disposal site selected.
- Environment Engineer of PMC and Executive Engineer of Contract Management Unit must approve the Plan before commencement of work.

PRECAUTIONS TO BE ADOPTED DURING DISPOSAL OF DEBRIS / WASTE MATERIAL

The Contractor shall take the following precautions while disposing off the waste material.

- During the site clearance and disposal of debris, the Contractor will take full care to ensure that public or private properties are not affected, there is no dwellings around the dumpsite and that the traffic is not interrupted.
- The Contractor will dispose off debris only to the identified places or at other places only with prior permission of Engineer-in-Charge of works.
- In the event of any spoil or debris from the sites being deposited on any adjacent land, the Contractor will immediately remove all such spoil debris and restore the affected area to its original state to the satisfaction of the Engineer-in-Charge of works.
- The Contractor will at all times ensure that the entire existing canal and drains within and adjacent to the site are kept safe and free from any debris.
- Contractor will utilize effective water sprays during the delivery and handling of materials when dust is likely to be created and to dampen stored materials during dry and windy weather.
- Materials having the potential to produce dust will not the loaded to a level higher than the side and tail boards and will be covered with a tarpaulin in good condition.
- Any diversion required for traffic during disposal of debris shall be provided with traffic control signals and barriers after the discussion with local people and with the permission of Engineer-in-Charge of works.
- During the debris disposal, Contractor will take care of surrounding features and avoid any damage to it. The debris should not be disposed along the bridges & culverts and near the water bodies.

While disposing debris / waste material, the Contractor will take into account the wind direction and location of settlements to ensure against any dust problems.

GUIDELINES FOR REHABILITATION OF DISPOSAL SITES

The dumpsites filled only up to the ground level could be rehabilitated as per guidelines below and to be decided by the Engineer and the supervision consultant.

- The dumpsites have to be suitably rehabilitated by planting local species of shrubs and other plants. Local species of trees has also to be planted so that the landscape is coherent and is in harmony with its various components.
- In cases where a dumpsite is near to the local village community settlements, it could be converted into a play field by spreading the dump material evenly on the ground. Such playground could be made coherent with the landscape by planting trees all along the periphery of the playground.
- Some of the dumpsites could be used either for plantation or for growing agricultural produce such as ginger, turmeric or oranges etc.
- Care should always be taken to maintain the hydrological flow in the area.

Identification of Disposal Areas

The Contractor should also try to make use of all disposal areas identified during the project preparation stage. If the road execution is approaching hilly area, rolling terrain, mountainous area or rocky area then importance should be given to screening i.e., to screen the debris into useful materials. Useful stones can be utilized as construction material and non-useful can be used as development of the public, social and cultural properties as already written above such as parking places, school playground, bus bays, ground near any temple and Mosque so that people participation can be assured in the implementation of the project. So it would be good if NGOs are introduced to perform this task more efficiently.

Disposal methods and its limitations:

There are several constraints in the disposal of materials in the identified locations. They are:

- Disposal areas are uneven and irregular in shape in the hilly terrain
- Most of the disposal areas would require construction of retaining walls
- Disposal areas would require compaction
- Disposal areas would require plantation
- No overloading and should be in small trucks or dumpers
- Need to transport safely with covered trucks using tarpaulin
- Consultation with all concerned
- Written permission from all concerned
- To transport through difficult haul roads- may require maintenance

Local community Groups

At each identified debris disposal locations, it is necessary to form local community groups. Entrust the duty of the supervision and all other assistance to dumping process. Ultimately the disposed area should be compacted using road rollers.

Information display boards

The capacity of the disposal locations, name of the location etc shall be written in an information board at each identified disposal locations.

Proposed design:

Contractor needs to plan the disposal in the following way

- Identify the disposal area
- Need to photograph the present land use and condition of the area
- Consult with all stakeholders
- Get written agreement from all concerned
- Prepare a suitable design for the safe disposal
- Construct all required structures (e.g. retaining wall)
- Planting of fast growing popular trees on the outer potion of the retaining wall in the form of a linear wall parallel to the retaining wall
- Compact of the materials after disposal
- Prepare a Contractors debris disposal plan with design drawings for each identified area
- With regards to plan, there would be only one disposal plan with small changes for each location. Contractors need to get approvals for specific design for each identified disposal area.

Penalties:

Stringent action & penalties for dumping of materials in locations other than the pre-identified locations is to be worked out to avoid clandestine disposal in the midnight hours. There are several cases of dumping of material randomly in many locations.

ANNEXURE-10.7: SOIL EROSION AND SEDIMENTATION CONTROL

Prior to the start of the relevant construction, the Contractor shall submit to the Engineer for approval, his schedules for carrying out temporary and permanent erosion/sedimentation control works as are applicable for the items of clearing and grubbing, road way and drainage excavation, embankment/sub-grade construction, bridges and other structures across water courses, pavement courses and shoulders. He shall also submit for approval his proposed method of erosion/sedimentation control on service road and borrow pits and his plan for disposal of waste materials. Work shall not be started until the erosion/sedimentation control schedules are prepared and the Engineer has approved methods of operations for the applicable construction.

The surface area of erodible earth material exposed by clearing and grubbing, borrow and fill operations shall be limited to the extent practicable. The Contractor may be directed to provide immediate control measures to prevent soil erosion and sedimentation that will adversely affect construction operations, damage adjacent properties, or cause contamination of nearby streams or other watercourses. Such work may involve the construction of temporary berms, dikes sediment basins, slope drains and use of temporary mulches, fabrics, mats, seedling, or other control devices or methods as necessary to control erosion and sedimentation.

The Contractor shall be required to incorporate all permanent erosion and sedimentation control features into the project at the earliest practicable time as outlined in his accepted schedule to minimize the need for temporary erosion and sedimentation control measures.

Temporary erosion/sedimentation and pollution control measures will be used to control the phenomenon of erosion, sedimentation and pollution that may develop during normal construction practices, but may neither be foreseen during design stage for associated with permanent control features on the Project.

Where erosion or sedimentation is likely to be a problem, clearing and grubbing operations should be so scheduled and performed that grading operations and permanent erosion or sedimentation control features can follow immediately thereafter if the project conditions permit; otherwise temporary erosion or sedimentation control measures may be required between successive construction stages. Under no conditions shall a large surface area of credible earth material be exposed at one time by clearing and grubbing or excavation without prior approval of the Engineer.

The Engineer may limit the area of excavation, borrow and embankment operations in progress, commensurate with the Contractor's capability and progress in keeping the finish grading, mulching, seedling and other such permanent erosion, sedimentation and pollution control measures, in accordance with the accepted schedule. Temporary erosion is sometimes caused due to the Contractor's negligence, carelessness or failure to install permanent controls. Sedimentation and pollution control measures then become necessary as a part of the work as scheduled or ordered by the Engineer, and these shall be carried out at the Contractor's own expense. Temporary erosion, sedimentation and pollution control work required, which is not attributed to the Contractor's negligence, carelessness or failure to install permanent controls, will be performed as ordered by the Engineer.

Temporary erosion, sedimentation and pollution control may include construction work outside the right of way where such work is necessary as a result of road construction such as borrow pit operations, service roads and equipment storage sites.

The temporary erosion, sedimentation and pollution control features installed by the Contractor shall be maintained by him till these are needed, unless otherwise agreed by the Engineer.

ANNEXURE-10.8: SPECIFIC GUIDELINES FOR CONTRACTOR'S CONSTRUCTION WATER MANAGEMENT PLAN

A. OVERVIEW

Water Management Plan' will be prepared by the contractor to conserve the water during the construction and to maximise use of recycled water. The plan will indicate the requirement of water, the various sources and all measures to be taken at the time of drawl and at end of the construction of the project. This water management plan will be approved by DFCCIL or its representatives.

B. IDENTIFICATION OF WATER SOURCES FOR CONSTRUCTION

The contractor will identify the water resources (surface or ground water) to be used for construction in each of the construction package. The extraction of ground water from various sources, shall as far as possible be avoided in Bulandshahr & Hapur blocks where ground water is in 'semi-critical' or 'critical' stage. Use of surface water should be priority and ground water can be used minimum possible because of scarcity.

C. RECOMMENDED SOURCES OF WATER FOR CONSTRUCTION

The ground water availability is not an issue in many blocks in 6 districts of U.P. through which Khurja-Pilkhani alignment is passing. For the purpose of drinking water requirements boreholes may be operated at the workers camp and construction camp. Due permissions, where required as per statute from the concerned authority shall be obtained. However, effort should be to use surface water to maximum extent and ground water can be used to minimum possible, with prior permission of the authority.

The other alternative is that the contractor may obtain water from the municipal authorities close to the project site for the drinking water purposes.

D. RECOMMENDED WATER CONSERVATION MEASURES DURING CONSTRUCTION AND OPERATION

Run-off from the construction camp/workers' camp is to be utilized for artificial recharge to ground water unless risk of contamination exists or area is water logged.

The runoff from the construction camp/workers camp after sedimentation shall be utilized for harvesting/storage also, apart from recharge;

The project design for parallel and cross stations and other project related structures shall have provisions for rain water harvesting and ground water recharge;

As part of DPR, water balance shall be prepared and necessary budget for ground water recharge shall be made in overall project cost;

All building complexes will have waste water treatment facilities and treated water shall be recycled for green areas and for sanitation purposes; and

The suggestion of State Ground Water Authority shall be incorporated in project design for the water conservation and recharge.

E. PERMISSIONS REQUIRED FOR GROUND WATER ABSTRACTION AND FOR WATER WITHRAWAL FROM SURFACE WATER SOURCES

During the construction phase, DFFCIL will facilitate permissions and No Objection Certificates (NOCs) from River and canal authorities, central and State authorities for use of surface water.

F DOS AND DON'TS FOR THE CONTRACTOR

There are a number of dos and don'ts for the contractor as provided below:

- Contractor's vehicles shall not be allowed to wash in the river or stream. This is to avoid potential pollution from oil residues.
- Contractors shall not use water from the community drinking water sources such as;
  - Public water supply schemes
  - Community spring water sources
  - Community hand pumps
  - Community bore wells / shallow tube wells
  - Location of the streams from which the Community takes drinking water
- Contractor shall obtain all legal approvals and clearances from the concerned departments.
- Contractor shall consult the local communities where the water source has been identified.
- If the source is a spring – check discharge, dependency in consultation with local communities.
- If the source is river/stream- discharge data for the past several years need to be analyzed, whether source is perennial, or non-perennial, any irrigation scheme is running over it or not, if IPH* department is using it, or local people are using it or not. NOC* from all concerned authorities will be required.
- If the source is Major River - In addition to the local permission, Contractor may require obtaining written permission from State Level Authorities.
- If the sources is groundwater (a hand pump/bore well or open deep well)- then its chemical composition and water related tests are required to be obtained from the competent authority and an NOC* is obtained from the competent authority.

G POST CONSTRUCTION STAGE

Once the Contractor finishes his job, this can be handed over to the local panchayath or for local communities. The possible alternate uses of this structure would be:

- Local communities of this area can use the same source to meet their water needs
- If track passes through a plain water scarcity prone area and if no nearby water source has been identified, transportation is uneconomic, then contractor should go for Underground water option. If it is feasible and will not lead to a serious depletion of the ground water.

*IPH = Irrigation and Public Health Department.
*NOC = No Objection Certificate.

ANNEXURE- 10.9: TRAFFIC MANAGEMENT PLAN

The railway network connecting the four metros of Delhi, Mumbai, Kolkata and Chennai carries more than 55% of the freight and passenger traffic of and is known as 'Golden Quadrilateral' of IR. To cater the growing traffic needs of Indian Railways (IR) corridor and ensure efficient transportation of freight, DFCCIL is proposing to develop Dedicated Freight Corridors (DFC) along this network and it will substantially lesion the load on IR.

Based on the planned project activities and impact envisage, this section enumerates the set of measures to be adopted in order to minimize adverse impact during construction & operation phases. Construction activities may result in a significant increase in movement of heavy vehicles for the transport of construction materials and equipment increasing the risk of traffic-related accidents , injuries to workers and local communities.

During construction stage:

The project involves construction of 22 ROBs and 409 RUBs which is likely to cause traffic congestion and idling of vehicle during the construction phase.

The traffic is to be manged by providing suitable alternate route to reduce the idling time in consultation with the local administration .it shall be done as per the railway guidelines. During transportation of materials to construction site, vehicles engaged by the Contractor shall comply with Safety requirements and operate on the road network enroute to site without causing nuisance/ disturbance.

Construction of alternate access routes which would create minimum impact on local accessibility and traffic if desired.

The road markings, Lane markings, Signs and Signage are clearly indicted in advance.
All gates will be manned with efficient security who can guide the entry and exit of vehicles at satelite offices/construction camp/batching plant.

Clearance of Engineer for Traffic Management Plan for each section of the route after it has been handed over for construction.

All precautionary measures are ensured for the safety of construction laborers while working at the site.

The incidence of road accidents involving project vehicles during construction will be minimized through a combination of education and awareness raising, and the adoption of procedures.

The responsibilities for making Traffic management plan will be assigned to the Environment & Safety Manager of the Contractor