

Initial Environmental Examination

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India: Rajasthan Urban Sector Development Investment Program-Alwar Urban Transport and Roads Sub Project (Tr-02)

Prepared by Local Self Government Department

For the Government of Rajasthan
Rajasthan Urban Infrastructure Development Project

The initial environmental examination is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

ABBREVIATION

ADB	-	Asian Development Bank
DSC	-	Design and Supervision Consultancy
EA	-	Executing Agency
EAC	-	Expert Appraisal Committee
GLSR	-	Ground Level Service Reservoir
GoI	-	Government of India
GoR	-	Government of Rajasthan
GSI	-	Geological Survey of India
IA	-	Implementing Agency
IEE	-	Initial Environmental Examination
IPMC	-	Investment Programme Management Consultancy
IPMU	-	Investment Programme Management Unit
JNNURM	-	Jawaharlal Nehru National Urban Renewal Mission
LSGD	-	Local Self-Government Department
MFF	-	Multitranchise Financing Facility
MoEF	-	Ministry of Environment and Forests
NAAQS	-	National Ambient Air Quality Standards
OHSR	-	Over Head Service Reservoir
OM	-	Operations Manual
PHED	-	Public Health Engineering Department
PM	-	Particulate Matter
PMU	-	Project Management Unit
RCC	-	Reinforced Cement Concrete
ROW	-	Right of Way
RPCB	-	Rajasthan State Pollution Control Board
RUIDP	-	Rajasthan Urban Infrastructure Development Project
RUSDIP	-	Rajasthan Urban Sector Development Investment Program
SPM	-	Suspended Particulate Matter
STP	-	Sewerage Treatment Plant
ToR	-	Terms of Reference
UIDSSMT	-	Urban Infrastructure Development Scheme for Small and Medium Towns
USEPA	-	United States Environmental Protection Agency

WEIGHTS AND MEASURES

lakh	–	100 thousand = 100,000
crore	–	100 lakhs = 10,000,000
$\mu\text{g}/\text{m}^3$	–	micrograms per cubic meter
km	–	kilometer
lpd	–	liters per day
m	–	meter
mg/l	–	milligrams per liter
mm	–	millimeter
ppm	–	parts per million

NOTE{S}

- (i) In this report, "\$" refers to US dollars.
- (ii) "INR" and "Rs" refer to Indian rupees

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EXECUTIVE SUMMARY

1. **Introduction and Regulatory Framework:** Rajasthan Urban Sector Development Investment Program (RUSDIP) is intended to optimize social and economic development in 15 selected towns in the State, particularly district headquarters and towns with significant tourism potential. RUSDIP Phase II to be implemented over a seven year period beginning in 2008, and will be funded by a loan via the Multitranchise Financing Facility (MFF) of the ADB. RUSDIP will improve infrastructure through the design and implementation of a series of subprojects, each providing improvements in a particular sector (water supply, sewerage, drainage, road, solid waste etc) in one town.

2. The impacts of subprojects prepared according to ADB Environment Policy (2002) and Indian National Law. Projects are screened for their expected environmental impacts and are assigned to Category A, B, C and F1. RUSDIP has been classified by ADB as environmental assessment category B (some negative impacts but less significant than category A). The only type of infrastructure provided by the RUSDIP that is specified in the EIA Notification (2006) of Govt. of India is solid waste management, where Environmental Clearance (EC) is required for all Common Municipal Solid Waste Management Facilities. EC is thus not required for the Alwar road & transport sector sub-project which is the subject of this Environmental Examination. This is the Initial Environmental Examination (IEE) report for the Alwar road and transport (ROB) sector. It discusses the generic environmental impacts and mitigation measures relating to the location, design, construction and operation of physical works proposed under this subproject.

3. **Project Description:** The sub-project is located in Alwar, the headquarters town of Alwar district, in the north-east of Rajasthan in north-western India. The main component of the sub-project is construction of Railway Over Bridge (ROB) on railway level crossing no. 115A on Jai Marg (SH-25). Type of construction involve the construction of Box Culvert by adopting box-pushing technology beneath the existing surface infra structure (railway line), construction of service road at both sides of ROB approaches, and provision of footpath, provision of drain, utility space, crash barrier, road appurtenances.

4. **Description of Environment:** Alwar lies between the East latitude 76° 35' to 76° 40', and latitudes of 27° 30' 20" to 27° 36' 30" North. The town is in the foothills of the Aravali Mountain range, at an altitude of 268 m above sea level, and is 160 km south of the national capital Delhi and 150 km north-east of the state capital Jaipur.

5. Alwar town lies in high earthquake risk (Zone IV). Although Rajasthan has not experienced a major earthquake in the recent past. The climate is semi-arid and mostly dry, with a hot summer period in April to July, followed by a short monsoon in July to September, and a cool dry winter period between October and March. Average daily temperatures peak at around 41 °C in June (when the minimum is 28 °C at night), and in January the temperature falls to an average of 23 °C during the day and 8 °C at night. The long term average annual rainfall is 638 mm, of which around 85% falls during the monsoon. However rainfall is highly variable, and has been generally low in most recent years Relative humidity is around 70% during the monsoon, but is much lower throughout the rest of the year, falling to 20-25% in the summer. Winds are generally light and variable during the cool winter period, and mainly from the north and north-west, and the strongest winds are the south-westerlies that bring the monsoon in June and July. The soil is mainly alluvial and non-calcareous, semi-consolidated to consolidated, brown in colour, and loamy sand to sandy loam in texture. Alwar is moderately rich in mineral wealth. It produces marble, granite, felspar, dolomite, quartz, lime stone, soap stone, barites.

6. Traffic and industries are the main sources of air pollution. Ambient air quality monitoring at different locations of Alwar shows that particulate matter (PM₁₀ & PM_{2.5}) in

ambient air are exceeding from the limits prescribed by GOI but other chemical pollutant (oxides of sulphur, nitrogen & CO) are below national standards. The endemic taxa or species found in the district are represented by pipal, bad or banyan tree, bael, dhak, kaith, datura, indrokdhav. There is no forest plantation or any other sensitive location nearby the project site.

7. Economic base of a town reflects its prosperity. Alwar being district headquarter, has been functioning as administrative city with sustained growth in tertiary economic activities. The major economic activities are trade and commerce, thus it offers a number of wholesale and retail markets which act as a distribution center for nearby towns and villages. Tourism income is also contributing very much towards economic generation of the town on the contrary major industries play a big role in providing employment and income generation. The raw material found nearby areas of the Alwar town accelerated the growth and development of Commercial and Industrial activities.

8. Alwar has an important place in Agriculture production in Rajasthan. Total geographical area of the district is 7,83,281 hectares which is about 2.5 percent of the State.

9. At present there are twenty two industrial areas developed by RIICO at Alwar district and 87 large and medium scale industrial units in the district. The export industry of Alwar district is also very large and exporting wide range of products.

10. The existing drainage system in Alwar is piecemeal construction of open *nallah* as per local and temporary requirements without proper designs. There are mainly open drains in the town. The total waste generation in the town is about 22 T/day out of which 15 T/day is collected by Municipal Board.

11. Alwar is connected with Delhi, Jodhpur, Mumbai and other important tourist cities of India. Alwar can be easily reached by road as well. There are well-maintained roads linking it to tourism destinations like Delhi, Sariska, Bharatpur, Deeg and Jaipur.

12. As per the Census of India Population for the year 2001 was 96,028 with a Municipal Area of 41.76 Sq. km and a population density of 2299.52 person per Sq.km. There are good educational facilities in Alwar town, which serve both towns people and inhabitants of surrounding villages and towns in the hinterland. Alwar has rich heritage sites. The mammoth Alwar Fort is one of its kinds. It stands 150 meters above plain ground and is 5 km long encompassing 690 acres of land. The Historical Fort and other historical places like Nagar Dwar Prasad, Vijay Stambh Temples are full of Heritage and Architecture and attract inland and foreign tourist in large numbers.

13. **Potential environmental impacts and mitigation measure:** All pre-construction (design), construction, and operation activities that are likely to cause environmental impacts were identified, and evaluated to assess their magnitude, duration, and potential receptors in consultation with the stakeholders. Most of the individual elements of the subproject are relatively small and involve straightforward construction and operation, so impacts will be mainly localised and not greatly significant during design phase.

14. No protected areas and cultural heritage site will be affected due to construction of ROB.

15. During project implementation the impacts are considered on physical environment like water, air, soil, noise; on biological environment, like flora and socio-economic environment (which is positive in some extent). All the impacts are temporary and for short duration. In all the cases mitigation measures i.e. control of air, dust pollution, checking of water and noise pollution, protection of biological environment (through compensatory

afforestation) and minimize the social impacts are taken care. Safety measures, both occupational and social are considered and those are depicted in IEE. Traffic management plan will be considered as per the requirement. During operation phases, few positive socio-economic impacts will be anticipated.

16. Institutional responsibility and Environmental management and monitoring plan: LSGD is the Executing Agency (EA) responsible for management, coordination and execution of all activities funded under the loan. Environmental issues will be coordinated by an Environmental Specialist within the IPMU/ IPMC, who will ensure that all subprojects comply with environmental safeguards. An Environmental Expert, who is part of the DSC team will implement the Environmental Monitoring Plan from each IEE, to ensure that mitigation measures are provided and protect the environment as intended. An Environmental Safeguard Officer, who is nominated in IPIU, shall monitor day to day activities and ensure compliance of EMP during the construction phase.

17. Implementation of Environmental management plan and monitoring frequency will be taken care during construction phase. Most of the mitigation activities are the responsibility of the Construction Contractors (CC) employed to build the infrastructure during the construction stage, or the O&M Contractors employed to conduct maintenance or repair work when the system is operating. Responsibility for the relevant measures will be assigned to the Contractors via the contracts through which they are appointed (prepared by the DSC during the detailed design stage), so they will be legally required to take the necessary action. There are also some actions that need to be taken by LSGD in their role as project proponent, and some actions related to the design that will be implemented by the DSC. Mitigation measures are fairly standard methods of minimising disturbance from construction works in urban areas (maintaining access, planning work to avoid sensitive times, finding uses for waste material, etc), and experienced Contractors should be familiar with most of the requirements. Monitoring of such measures normally involves making observations in the course of site visits, although some require more formal checking of records and other aspects. There will also be some surveys of road users nearby communities, as most of the measures are aimed at preventing impacts on people and the human environment. Environmental management and monitoring cost for the sub-project has been estimated as 0.72 million Rupees.

18. Public consultation, information disclosure and grievance redress mechanism: Public consultation with primary and secondary stakeholders has been conducted to understanding the local issues and public views regarding the possible impact. The group discussion meeting was conducted by RUIDP with local administration, local leaders and politician under the Chairmanship of District Collector in City Level Committee. The issues like, awareness and extent of the project and development components, benefits of project for the economic and social upliftment of community, labour availability in the project area or requirement of outside labour involvement, local disturbances due to project construction work, necessity of tree felling etc. at project sites, water logging and drainage problem if any, drinking water problem, forest and sensitive area nearby the project site etc. On the basis of outcome of consultation the action plan has been developed. LSGD will extend and expand the consultation and disclosure process significantly during implementation of RUSDIP. They will appoint an experienced NGO to handle this key aspect of the programme.

19. The project authority has established a Grievances Redressal Mechanism to receive and facilitate resolution of affected persons' concerns, complaints and grievances about the project's environmental performance.

20. Recommendation and Conclusion: There are two straightforward but essential recommendations that need to be followed to ensure that the environmental impacts of the project are successfully mitigated. These are that LSGD should ensure that, all mitigation,

compensation and enhancement measures proposed in this IEE report and in the Resettlement Framework for the RUSDIP are implemented in full, as described in this document and the Environmental Monitoring Plan proposed in IEE and the internal and external monitoring proposed in the Resettlement Framework are also implemented in full.

21. This initial environmental examination (IEE) ascertains that the subproject is unlikely to cause any significant environmental impacts. Few impacts were identified attributable to the proposed subproject, all of which are localized and temporary in nature and can be easily mitigated with minor to negligible residual impacts. There are no uncertainties in the analysis, and no further studies are required to comply with ADB procedure or national law.

I. INTRODUCTION

A. Purpose of the report

1. Rajasthan Urban Sector Development Investment Program (RUSDIP) is intended to optimize social and economic development in 15 selected towns in the State, particularly district headquarters and towns with significant tourism potential. This will be achieved through investments in urban infrastructure (water supply; sewerage and sanitation; solid waste management; urban drainage; urban transport and roads), urban community upgrading (community infrastructure; livelihood promotion) and civic infrastructure (art, culture, heritage and tourism; medical services and health; fire services; and other services). RUSDIP will also provide policy reforms to strengthen urban governance, management, and support for urban infrastructure and services. The assistance will be based on the State-level framework for urban reforms, and institutional and governance reforms recommended by the Government of India (GoI) through the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) and Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT).

2. RUSDIP Phase II to be implemented over a seven year period beginning in 2008, and will be funded by a loan via the Multi-tranche Financing Facility (MFF) of the ADB. The Executing Agency (EA) is the Local Self-Government Department (LSGD) of the Government of Rajasthan (GoR); and the Implementing Agency (IA) is the Project Management Unit (PMU) of the Rajasthan Urban Infrastructure Development Project (RUIDP), which is currently in the construction stage.

3. RUSDIP will improve infrastructure through the design and implementation of a series of subprojects, each providing improvements in a particular sector (water supply, sewerage, solid waste etc) in one town. RUSDIP has been classified by ADB as environmental assessment category B (some negative impacts but less significant than category A). The impacts of subprojects prepared according to ADB Environment Policy (2002) and Environmental Assessment Guidelines (2003).

B. Extent of the IEE study

4. Indian law and ADB Environment policy (2002) require that the environmental impacts of development projects are identified and assessed as part of the planning and design process, and that action is taken to reduce those impacts to acceptable levels. This is done through the environmental assessment process, which has become an integral part of lending operations and project development and implementation worldwide.

1 ADB Policy

5. ADB's Environment Policy (2002) requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for Environmental Assessment are described in Operations Manual (OM) 20: Section F1/BP (2006) Environmental Considerations in ADB Operations. This states that ADB requires environmental assessment of all project loans, programme loans, sector loans, sector development programme loans, financial intermediation loans and private sector investment operations.

6. The nature of the assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project, the sensitivity, scale, nature and magnitude of its potential impacts, and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental impacts and are assigned to one of the following categories:

- Category A: Projects that could have significant environmental impacts. An Environmental Impact Assessment (EIA) is required.
- Category B: Projects that could have some adverse environmental impacts, but of less significance than those for category A. An Initial Environmental Examination (IEE) is required to determine whether significant impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.
- Category C: Projects those are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.
- Category FI: Projects that involve a credit line through a financial intermediary (FI) or an equity investment in a FI. The FI must apply an environmental management system, unless all subprojects will result in insignificant impacts.

7. The Bank has categorised this program as Category B and following normal procedure for MFF loans has determined that one Environmental Examination will be conducted for each subproject, with a subproject being the infrastructure improvements in a particular sector (water supply, sewerage, etc) in one town.

2 National Law

8. The GoI EIA Notification of 2006 as amended in 2009 (replacing the EIA Notification of 1994), sets out the requirement for Environmental Assessment in India. This states that Environmental Clearance (EC) is required for specified activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorised as A or B depending on the scale of the project and the nature of its impacts.

9. Categories A projects require Environmental Clearance from the National Ministry of Environment and Forests (MoEF). The proponent is required to provide preliminary details of the project in the form of a Notification, after which an Expert Appraisal Committee (EAC) of the MoEF prepares comprehensive Terms of Reference (ToR) for the EIA study, which are finalized within 60 days. On completion of the study and review of the report by the EAC, MoEF considers the recommendation of the EAC and provides the EC if appropriate.

10. Category B projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA). The State level EAC categorizes the project as either B1 (requiring EIA study) or B2 (no EIA study), and prepares TOR for B1 projects within 60 days. On completion of the study and review of the report by the EAC, the SEIAA issues the EC based on the EAC recommendation. The Notification also provides that any project or activity classified as category B will be treated as category A if it is located in whole or in part within 10 km from the boundary of protected areas, notified areas or inter-state or international boundaries.

11. The only type of infrastructure provided by the RUSDIP that is specified in the EIA Notification is Common Municipal Solid Waste Management facility (CMSWMF)¹, where EC

¹ For the purpose of EIA Notification, common municipal solid waste management facilities may be referred as centralized MSW facility for an given town, city, region. It is further to mention a common facility need not have surrounding ULBs included.(Technical EIA Guidance Manual for CMSWMF)

is required. Thus Environmental Clearance (EC) is not required for the road/ bridge sub-project that is the subject of this Environmental Examination.

12. The summary of environmental regulations and mandatory requirements for the proposed subproject is shown in **Table 1.1**

Table 1: Applicable Environmental Regulations & Legislations and its applicability

Acts/Guidelines	Purpose	Applicability to subproject
The EIA notification, 2006 (and its subsequent amendments in 2009) provides for categorization of projects into category A and B, based on extent of impact	This states that Environmental Clearance (EC) is required for specified activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorized as A or B depending on the scale of the project and the nature of its impacts. Categories A projects require Environmental Clearance from the National Ministry of Environment and Forests (MoEF). Category B projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA).	Not applicable The sub project is not included in schedule of environmental impact assessment notification 2006 and its subsequent amendments till dates so it is not categories as either Category A or Category B. As a result, environmental clearance is not required, either from the state or the central Government.
The Wildlife Conservation Act, 1972,	Clearance from state and national wildlife boards, Central Empowered Committee of Hon'ble Supreme Court of India and the State Wildlife Department, as applicable.	Not Applicable
Rajasthan Forest (Conservation) Act, 1953	Clearance from Forest department for cutting of trees, if any.	Applicable
The Ancient Monuments and Archaeological Sites and Remains Act, 1958, and the rules, 1959 provide guidance for carrying out activities, including conservation, construction and reuse in and around the protected monuments.	Permission from the Archaeological Survey of India for carrying out any construction activities within the prohibited and regulated areas of the ancient monuments and archaeologically protected sites.	Not Applicable
Water (Prevention and control of pollution) Act, 1974, as amended Air (prevention and control of pollution) Act, 1981, as amended	Consent to Establish (CTE) and Consent to Operate (CTO) from the RSPCB for setting up of hot mix plants, wet mix plants, stone crushers and diesel generators (if installed for construction). To be obtained by the Contractor, prior to construction.	Applicable
Water (Prevention and Control of Pollution) Cess Act, 1977 including Rules	Applicable to all activities, which discharge effluents as a result of process or operations	Applicable
Public Liability and Insurance Act 1991	Protection form hazardous materials and accidents.	Applicable
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 should be provided with acoustics enclosures.	Applicable
Central Motor Vehicle Act 1988 and Central Motor	To check vehicular air and noise pollution. All vehicles in Use shall obtain Pollution Under	Applicable

Vehicle Rules 1989	Control (PUC) certificates by the contractor	
Child Labour Act 1986	No child shall be employed or permitted to work in any of the scheduled occupations	Applicable

3 Review and Approval Procedure

13. For Category B projects the Draft Environmental Status report and its summary (SIEE) are reviewed by ADB's Regional Department sector division and Environment and Social Safeguards Division, and by the Executing Agency, and additional comments may be sought from project affected people and other stakeholders. All comments are incorporated in preparing the final documents, which are reviewed by the Executing Agency. The EA then officially submits the IEE and SIEE reports to ADB for consideration by the Board of Directors. Completed SIEE reports are made available worldwide by ADB, via the depository library system and the ADB website.

4 Scope of Study

14. This is the IEE for the Alwar road and bridge sector. It discusses the generic environmental impacts and mitigation measures relating to the location, design, construction and operation of physical works proposed under this subproject.

II. DESCRIPTION OF THE PROJECT

A. Type, Category and Need

15. This is a transportation sub-project, and as explained above it has been classified by ADB as Category B, because it is not expected to have major negative environmental impacts. Under ADB procedures such projects require an IEE to identify and mitigate the impacts, and to determine whether further study or a more detailed EIA may be required. The sub-project is needed to help alleviate road congestion in the town, where the capacity of the network has not expanded to cope with increased traffic demand. Railway Level crossing No. 115 A at Alwar Mathura broad gauge Railway line of North Central Railway intersects Jai Marg (SH-25) which is one of the major links to Alwar town. Considerable increase in the vehicular and pedestrian traffic over the years necessitates the need to increase the traffic capacity of existing ROB from two lanes to four lanes. This is one of a series of subprojects designed by the RUSDP that are intended to raise the standards of the municipal infrastructure and services of Alwar.

B. Location, Size and Implementation Schedule

16. The sub-project is located in Alwar, the headquarters town of Alwar district, in the north-east of Rajasthan. The infrastructure will consist of Railway Over Bridge (ROB) on railway level crossing no 115A on Jai Marg (SH-25) between Bhagat singh circle and Agrasen Circle.

17. Detailed design started in December 2011 and construction will be started after finalization of proposal and completed within 21 months after start of construction.

18. Photographs of the project area are attached as **Annexure- I**

C. Sub- project Description including detailed scope

19. **Table 2.1** shows the nature of the subproject. The main elements are; widening of existing 2-lane ROB to 4-lane on railway level crossing no 115A, and construction of approach roads on both side. The descriptions shown in **Table 2.1** are based on the present proposals, which can be changed in due course of time and are expected to be substantially correct, although certain details may change as development of the subproject progresses.

Table 2.1: Improvements in transportation infrastructure proposed in Alwar

Infrastructure	Function	Description	Location
ROB in Alwar	To make ease of traffic movement, especially during prolonged closure of railway crossing	At present, one 2-lane ROB exists on railway level crossing no. 115A. widening of existing 2-lane ROB to 4-lane is proposed	ROB is located on Jai Marg (SH-25) between Bhagat singh circle and Agrasen Circle.

Scope and components of the works consist of construction of ROB span, both-side approach road, footpath, provision of drain & utility etc. **Figure 2.2** shows plan and layout of the proposed project components.

20. The expected subproject outputs for the proposed ROB are given below

- a. Construction of one 31.50m ROB span
- b. Construction of 6 x 22.0m + 1 x 16.0m +1 x 17.0m viaduct span on Alwar city side 10 x 22.0m on Alwar By-pass side of Railway portion.
- c. Construction of nearly 150m length of RCC retaining wall of varying height on one side of embankment and on both sides of ROB.
- d. Construction of 5.5m wide Service road on both sides of ROB approaches.
- e. Provision of footpath, provision of drain, utility space, crash barrier, Road appurtenances

21. The geometry of ROB along with its approaches is planned in such a way that no acquisition of land & structures are involved. Besides the above, two side service roads of minimum 5.5m width are also planned on both sides of ROB to facilitate the existing shops & residential areas. The following design criteria are adopted for planning the geometry of ROB.

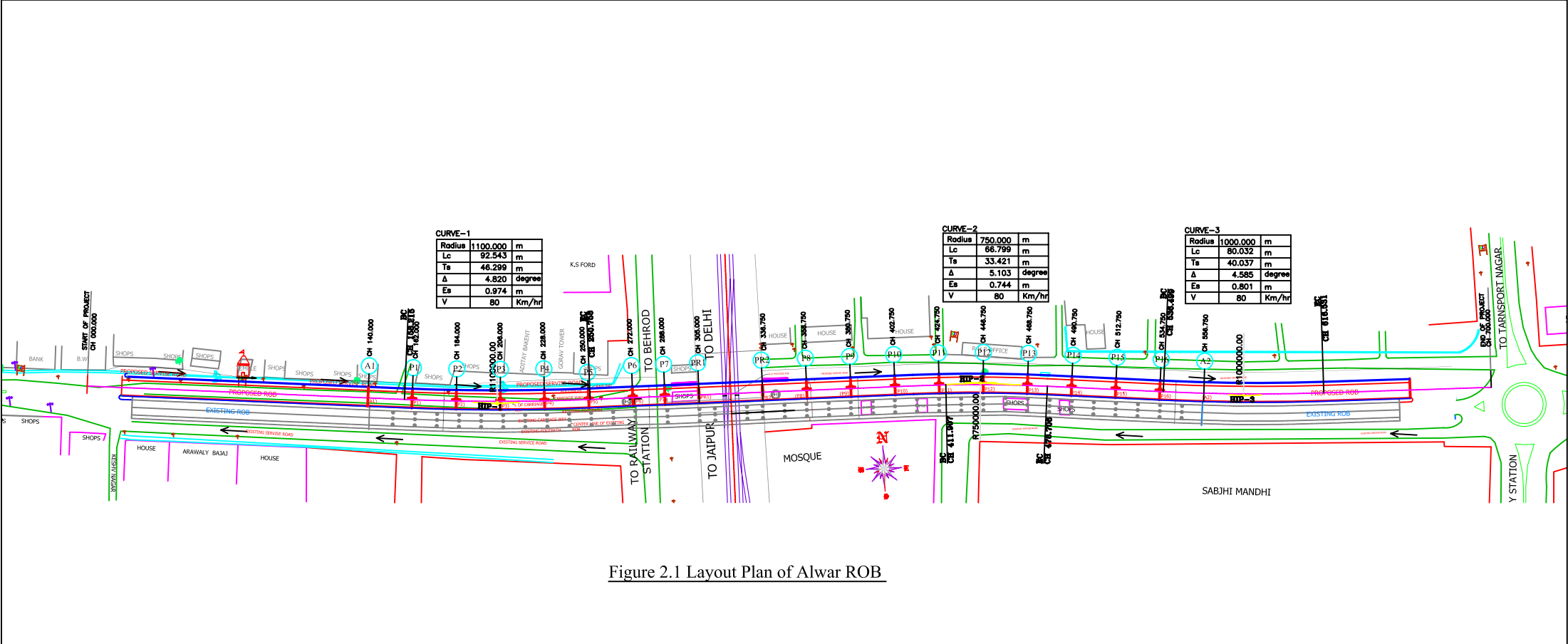
- i) Minimum design speed has been achieved 65 kmph.
- ii) Skew angle of ROB span is 0 degree.
- iii) Vertical clearance is 6.55m over railway track.
- iv) Vertical Gradient is limited to 3.33%

22. *Salient Details of proposed ROB works:* The salient details of ROB, viaducts, embankment with RE walls, service roads etc. are presented in **Table 2.2** below:-

Table 2.2: Salient Details of ROB & Viaduct

Sl. No.	Items	Details
1	ROB portion	1 No.x 31.50m
2	Viaducts spans on Alwar city end	6 Nos x 22.0m + 1Nos x 16.0m + 1nos x 17.0m
3	Viaducts spans on Tijara end	10 Nos x22.0m
4	Approach embankment with RCC retaining walls along Alwar city end	150.61 m
5	Approach embankment with RCC retaining walls along Alwar Bypass end	169.31 m
6	Total length of ROB including Railway portion, viaducts span and Approach embankment etc	736.70 m
7	Total length of the Project including , Tapering, merging length etc.	736.70 m
8	Vertical clearance over the railway tracks	6.55 m
9	Gradient	3.333%
10	Width of Carriageway / Total width of ROB, viaducts and Approach embankment	7.5m/9.9m for main spans incl. ROB 7.5m/9.9m for viaducts & Approach embankment with RCC walls
11	Footpath	1.5 m on one side for entire length
12	Crash Barriers	Standard as per MORTH Drawings.

Sl. No.	Items	Details
13	Approaches	Approach embankment beyond viaduct spans with RCC retaining walls
14	Specification for Embankment Earth fill Sub-grade 500 mm G.S.B. WMM DBM BC	Soil shall have fines of 75 micron not exceeding 10%. Sub- grade fill shall have CBR of 10% 250mm 250mm 115mm(65+50) 40mm
15	Wearing coat over concrete decking	40 mm B.C + 25 mm mastic asphalt.
16	Structural details of Railway portion & viaduct spans. (i) Railway Portion (Super-structure) Composite Girder (ii) Via duct spans (Super-structure) RCC T- Beam and RCC cast in-situ Deck slab (iii) Sub-structure for Railway Portion and viaduct spans (iv) Foundations (v) Reference IRC Codes (vi) Seismic Zone (vii) Bearings (viii) Expansion joints	31.50m span 6 Nos x 22.0m + 1Nos x 16.0m + 1nos x 17.0m + 10 Nos x22.0m Solid Circular piers with and rectangular pier cap 1200mm, dia piles of 20m depth with 1800mm thick pile cap. a) IRC – 5 – 1998 b) IRC – 6 – 2000 c) IRC – 18 – 2000 d) IRC – 21 – 2000 e) IRC – 37 - 2001 f) IRC – 78 – 2000 ZONE – IV Elastomeric Bearings. Strip seal expansion joints
17	Service Roads	5.5 m wide service roads are proposed all along the length of ROBs on either side except railway track portion.
18	Electrification	Provision for electrification has been made during night time to facilitate proper movement of traffic.
19	Shifting of utilities	Electric Post, and Telephone Post have to be shifted to suitable location.
20	Diversion road	Not required
21	Drainage	Drainage spouts, drain pipes to be provided in ROB, viaduct & RCC wall portion and box/pipe drains to be provided below footpath



III. DESCRIPTION OF THE ENVIRONMENT

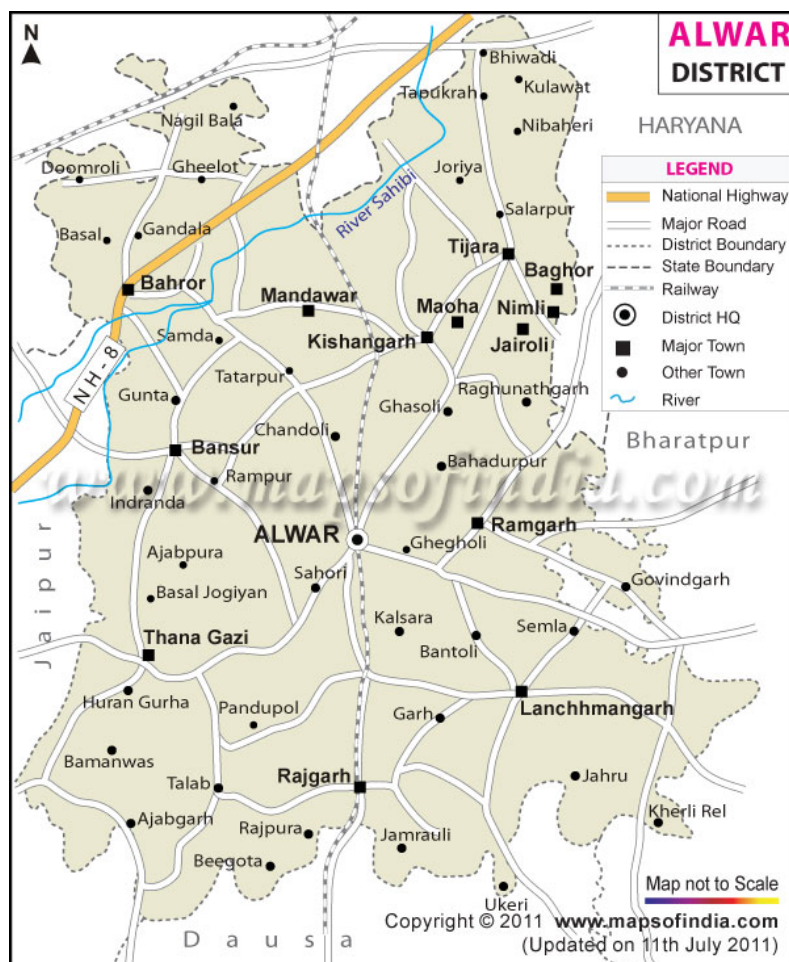
A. Physical Resources

1 Location

23. Alwar is located in the north-eastern part of Rajasthan, between the longitudes of 76° 35' to 76° 40' East, and latitudes of 27° 30' 20" to 27° 36' 30" North (Figure 1). The town is in the foothills of the Aravali Mountain range, at an altitude of 268 m above sea level, and is 160 km south of the national capital Delhi and 150 km north-east of the state capital Jaipur. Alwar is one of the fastest growing towns in Rajasthan, and is an important trading centre, with good road and rail links. The municipal area covers 49.3 km², and the population is 260,000.

24. The railway network connects Alwar with Delhi, Jodhpur, Mumbai and other important tourist cities of India. Alwar can be easily reached by road as well. There are well-maintained roads linking it to tourism destinations like Delhi, Sariska, Bharatpur, Deeg and Jaipur. **Figure 3.1** shows district map of Alwar.

Figure 3.1: District map of Alwar



2 Topography, soil and geology

25. Alwar township is relatively flat, located in the alluvial plain beneath the Arvali Mountains in the west. The soil is mainly alluvial and non-calcareous, semi-consolidated to consolidated, brown in colour, and loamy sand to sandy loam in texture. Exposed rocks belong to the Delhi Super-group of lower proterozoic age, consisting of schist, quartzites, slates and gneisses. Sub-surface layers of unconsolidated quaternary formations form the principal aquifer system.

26. According to the Vulnerability Atlas of India, part of Alwar District, including Alwar Town, is in an area of high earthquake risk (Zone IV). Although Rajasthan has not experienced a major earthquake in the recent past, there have been 37 events with a magnitude of 5-7 since 1720, with the most recent occurring in 2001. This measured 6.9 on the Richter Scale, but because the epicentre was in neighbouring Gujarat, no major damage was reported in Alwar. **Figure 3.2** depicts the earthquake zones of Rajasthan.

3 Climate

27. The climate is semi-arid and mostly dry, with a hot summer period in April to July, followed by a short monsoon in July to September, and a cool dry winter period between October and March. Average daily temperatures peak at around 41 °C in June (when the minimum is 28 °C at night), and in January the temperature falls to an average of 23 °C during the day and 8 °C at night. The long term average annual rainfall is 638 mm, of which around 85% falls during the monsoon. However rainfall is highly variable, and has been generally low in most recent years (Figure 4).

28. Relative humidity is around 70% during the monsoon, but is much lower throughout the rest of the year, falling to 20-25% in the summer. Winds are generally light and variable during the cool winter period, and mainly from the north and north-west, and the strongest winds are the south-westerlies that bring the monsoon in June and July.

Figure 3.2: Earthquake zones of Rajasthan

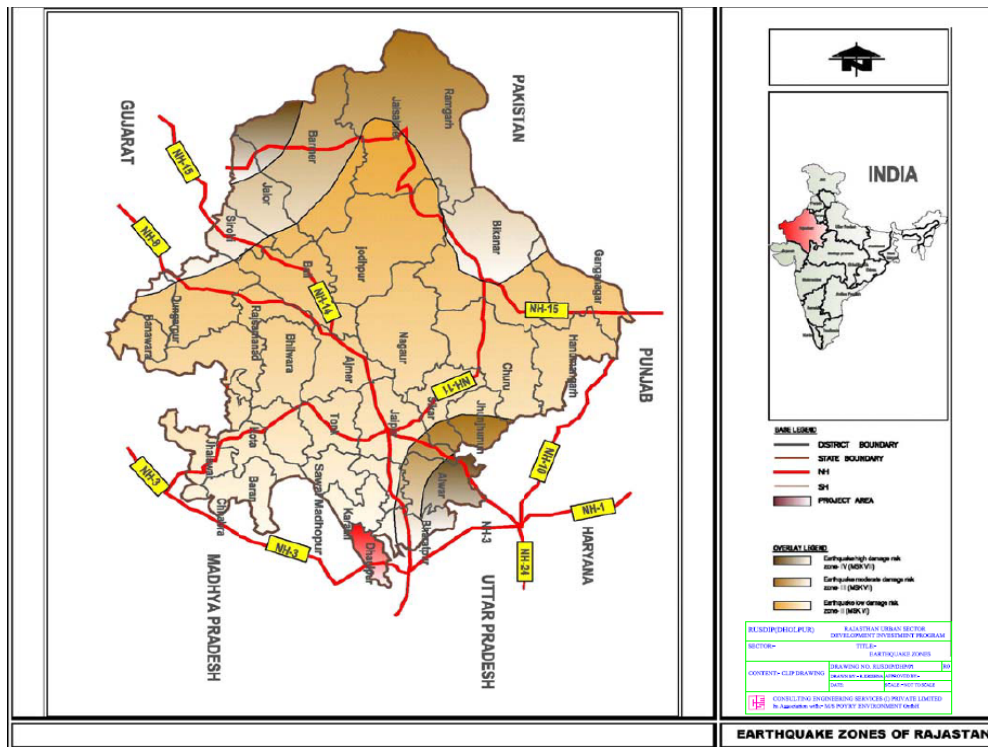
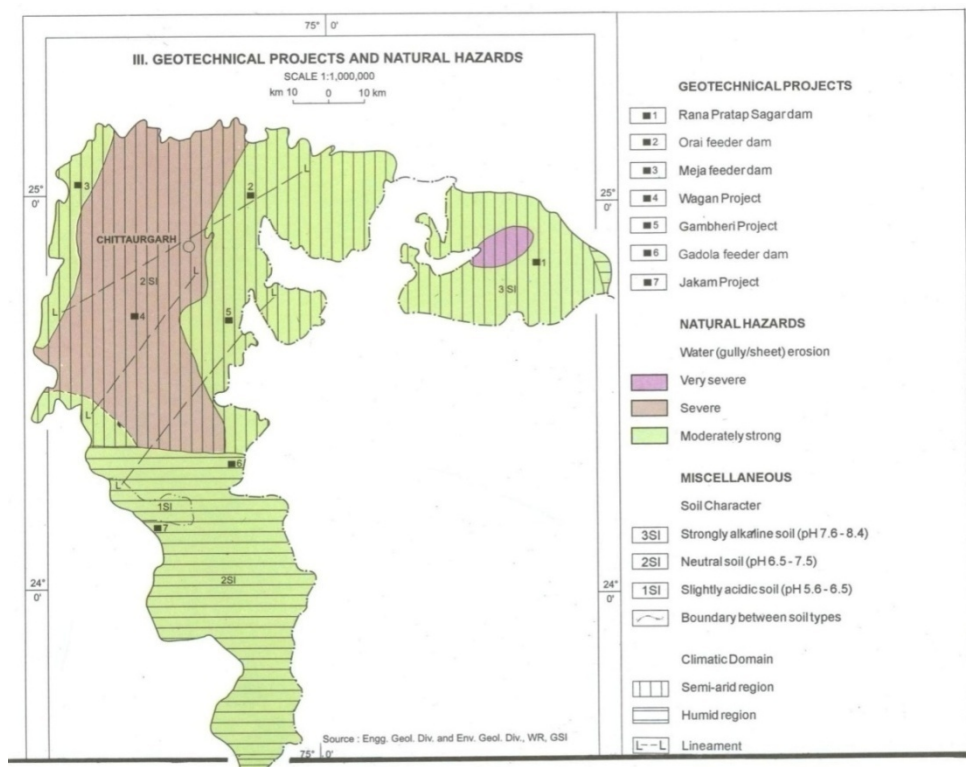


Figure 3.3: Natural Hazard map of Alwar (GSI Resource map)



4 Climate

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30. Relative humidity is around 70% during the monsoon, but is much lower throughout the rest of the year, falling to 20-25% in the summer. Winds are generally light and variable during the cool winter period, and mainly from the north and north-west, and the strongest winds are the south-westerlies that bring the monsoon in June and July.

31. The rainfall over Alwar is scanty and is concentrated over four month i.e. from June to September. The rains are erratic and so is the distribution of the rainfall. However agriculture and the animal wealth are dependent on rains to large extent. Seasonal Rainfall data for the recent year (2011) is shown in **Table 3.1**.

32.

Table 3.1: Rainfall at Alwar in the year 2011

S. No.	Months	Rainfall (mm)
1	January	0.0
2	February	43.0
3	March	0.0
4	April	0.0
5	May	21.0
6	June	80.0
7	July	127
8	August	259
9	September	283
10	October	0
11	November	0
12	December	0
13	Monsoon Rainfall	770
14	Non monsoon rainfall	43
15	Annual Rainfall	813

5 Air and Noise Quality

33. The air quality monitoring has been carried out at three locations in Alwar town. The air monitoring results are shown in **Table 3.2**. The results shows that Respirable Suspended Particulate Matter (RSPM: particles < 10µm) and PM_{2.5} (particles < 2.5µm) frequently exceed National Ambient Air Quality Standards. In contrast, levels of chemical pollutants (oxides of sulphur, nitrogen & CO) are below national standards, presumably because of the limited development of heavy industry. The noise monitoring results are shown in **Table 3.3**.

Table 3.2: Ambient Air Quality in Alwar (Average, April 2012) units in $\mu\text{g}/\text{m}^3$

Monitoring Station	Aerial Distance from Site (Approx.)	RSPM ($\mu\text{g}/\text{m}^3$)	PM _{2.5} ($\mu\text{g}/\text{m}^3$)	Sox ($\mu\text{g}/\text{m}^3$)	NOx ($\mu\text{g}/\text{m}^3$)	CO (mg/m^3)
Fruit & Veg. Market	0.2 Km	184.49	106.6	9.74	13.7	0.34
UIT Office	0.9 Km	138.22	47.29	10.4	14.04	0.19
PHED Office	1.0 Km	181.15	103.3	11.41	15.4	0.35
NAAQ Standard		100	60	80	80	04

RSPM: Respirable Suspended Particulate Matter;

Source: on site monitoring by RUIDP in April 2012

Table 3.3: Noise Level in Alwar (Average, April 2012)

Monitoring Station	Land Use	L Day Time dB(A)	L Night Time dB(A)
Near Proposed ROB site	Commercial	59.14	47.02
UIT Office	Residential	60.50	47.12
Standard Limits	Commercial	65	55
Standard Limits	Residential	55	45

Source: on site monitoring by RUIDP in April 2012

6 Surface Water

34. The State of Rajasthan is predominantly dry, except for some parts of the south and south-east, and Chambal is the only perennial river. There are certain seasonal rivers in Alwar District, including the Ruparel, Sabi, Chuhar, Sidh and Landoha, which carry monsoon drainage from upland areas. Several of these have been impounded, to provide water for irrigation. Ruparel is the nearest seasonal river to Alwar, and passes through the Sariska Tiger Reserve and the village of Bara 19 km south of Alwar. This feeds Jaysamandh Lake through an 8 km long manmade feeder canal from Bara Weir.

35. There are no natural lakes in Alwar District, although there are a number of artificial lakes formed from water retained by manmade bunds, of which Jaysamandh and Siliserh are the largest. Jaysamandh Dam is 6 km south of the town between the villages of Ballana and Liwari, and is an earth and concrete structure built in 1910. The lake has a maximum capacity of 34 ML, but rarely fills to that level. Siliserh Lake is 13 km south-west of the town and is retained behind an earth embankment and masonry wall built in 1845 across a tributary of the Ruparel. The capacity of the lake is 14 ML, and water for irrigation feeds into two masonry canals running from the dam.

36. Hans Sarovar is another small lake 5 km south-east of the town, near Agyara village. It is formed behind an earth embankment built in 1910, and the water is used for pumped irrigation in nearby farms, although as the lake rarely fills to capacity, such usage is limited. The lake receives untreated and partially treated effluent from the nearby Matsya Industrial Area (MIA), where there are several chemical plants and other industries. In March 2010 water sample of Hans Sarovar has been tested. The results show that water was very low in volume and bright pink in colour, presumably from the discharge of dye and/or other chemicals.

Table 3.4: Surface Water Quality at Hans Sarovar at Alwar

Parameters	Results
pH	7.38
TSS (mg/l)	1260

Oil & Grease(mg/l)	48
COD(mg/l)	600
BOD(mg/l)	250

7 Geohydrology and Groundwater

37. The main aquifer around Alwar is contained within unconsolidated quaternary formations of silt, sand kankar and boulder, and is reported to have a potential yield of 20-30 m³/h. According to the GoI Central Ground Water Board (CGWB 2006²), groundwater occurs under unconfined conditions at shallow depth (18-28 m below ground level) and in a semi-confined condition at deeper levels (around 65 m), and is tapped by a number of tube-wells, which discharge at a rate of between 25 and 68 m³/h.

38. Seasonally the aquifer declines between November and May and recharge begins with the monsoon rains in mid-June. However there has been an alarming decline over the past 20 years from over-extraction and low rainfall, and CGWB reports that the water table in Alwar town has fallen from 9 m in 1984 to 27 m in 2004, at an average rate of 0.91 m per year. Agriculture accounts for more than 80% of the use, and major reductions occur during *Rabi* crop irrigation in October-April.

39. Groundwater quality has also declined as a result of urbanization, disposal of untreated domestic and industrial wastewater and excessive usage of fertilizers. Recent analyses by the Public Health Engineering Dept (PHED) shows high levels of nitrate and iron in water from existing tube-wells.

40. The monitoring has been carried out by Rajasthan Pollution Control Board at various locations at Alwar during year 2009-2010. The data on DO, pH, BOD and MPN is given in **Table 3.5**. During 2009 to 2010 pH and BOD ranged from 7.21 to 7.55 mg/l and 4 to 9 mg/l respectively.

Table 3.5: Groundwater quality in Alwar (2009-2010)

SL	Location	Dissolved Oxygen (mg/l)		pH		BOD (mg/l) (3 days at 27° C)		Total Coliforms, MPN/100ml	
1	RIICO Pump House	3.10	3.30	7.41	7.55	4	7	0.21	0.04
2	MACI Borewell, MIA Alwar	1.94	2.10	7.40	7.21	4	4	0.34	0.63
3	Kothi Vala Kuva, Village Bagar Rajput, Alwar	2.13	2.70	7.28	7.54	9	9	0.26	0.59

(Annual Report Pollution Control Board 2009-2010)

B. Ecological Resources

41. **FLORA & FAUNA**: Alwar Town is an urban area surrounded by land that was converted for agricultural use many years ago. There is no remaining natural habitat in the town, and the flora is limited to artificially planted trees and shrubs, and the fauna comprises

² CGWB Western Region, Micro Level Studies, Ground Water Scenario, Alwar Urban Area, July 2007.

domesticated animals (cows, goats, pigs and chickens), plus other species able to live close to man (urban birds, rodents and some insects).

42. There are 03 Reserved Forests (RF) to the west of the city (Bhurasid RF, Alwar RF and Dholdhup RF), where hill slopes feature scrub vegetation and mixed dry deciduous forest. Although there are no rare species or important timber trees, the vegetation is reported to be important for soil conservation

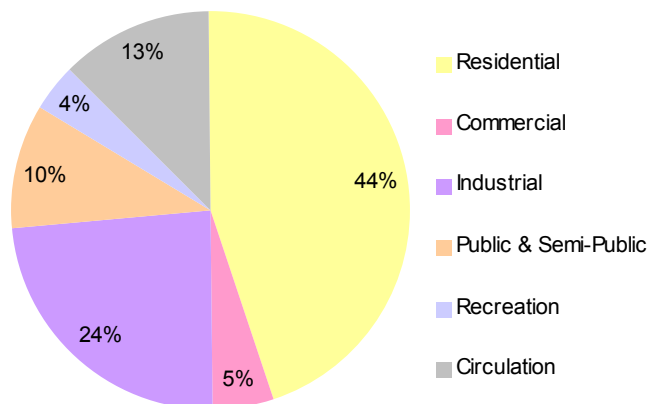
43. The closest protected area to Alwar is the Sariska Tiger Reserve, 40 km to the southwest, which was designated as a sanctuary in 1955 and a tiger reserve in 1979. The reserve covers 900 km² of forested hills and plateaux, although habitat has been degraded by agriculture and the fauna depleted by poaching, and there are reportedly now no tigers remaining.

44. There is no forest area nearby the project location.

C Economic Development

1 Land use

45. Located close to the national capital, Alwar was traditionally a services and administrative town, with little industrial development. However as Delhi has grown, so Alwar has benefited from its trade, infrastructure and prosperity, and has experienced rapid economic growth over the past 20 years. Alwar was recently selected as a regional town under the National Capital Plan for integrated development of the area around Delhi. The urban area of Alwar covers 49 km², and although almost half of this is in residential use there is also a significant amount of industry, occupying 24% of the total land.



Source: Alwar Urban Improvement Trust

Figure 3.4: Current land use in Alwar Town

2 Commerce, Industry and Agriculture

46. There are two industrial areas: the Old Industrial Area covers 88 ha and houses 42 units, mostly small-scale engineering such as stone polishing because of the ready availability of decorative stone from quarries in the surrounding hillsides. The Matsya Industrial Area (MIA) was established more recently by the Rajasthan Industrial Infrastructure Corporation (RIICO) and covers over 1,000 ha in the west of the town. Currently there are 213 operating industries in MIA, mostly mineral-based (88 units) and

chemical (61). Of these, 28 operations are of large or medium scale and the remainder are small-scale.

47. There are also many households engaged in handicrafts in the town, such as the manufacture of cotton and wool products, and there are large numbers of small shops and businesses alongside the roads, particularly in the centre of the town.

48. Agriculture is easily the most important industry, both in Alwar District (where 65% of the total area is cultivated) and outside the headquarters town. Over 80% of the cultivated area is irrigated, mostly by groundwater. Many areas practice double cropping and the main seasons are *Kharif* (April-September: maize, cotton, etc) and *Rabi* (October-March: wheat, barley, mustard, etc).

Table 3.6: Crop production in and around Alwar

Type of Crops	Under Rabi Crops (in Tonnes)	Under Kharif Crops (in Tonnes)
Cereals	445321	411155
Pulses	16775	1865
Food Grains	462096	413020
Oilseeds	275495	3252
Others	56452	71756
Total	794043	488038

(Rajasthan Agricultural Statistics at a glance 2009-10)

3 Infrastructure

49. PHED provides a piped municipal water supply to the whole city, which is entirely groundwater-based because of the lack of a dependable surface water source. The present usage is 26.8 MLD, extracted by 170 tube-wells located in and around the town. However water is only available for 1-2 hours per day, mainly because of system losses (estimated at 40%) and low and unequal network pressure.

50. Only two newly developed colonies (Shivaji Park and Ambedkar Colony, housing 10,000 people each) have an underground piped sewerage system, and as there is no treatment facility, raw sewage is discharged into natural drainage channels. Most households depend on pit latrines and septic tanks, and some have made illegal connections through which sewage enters open storm water drains, polluting both surface and ground water.

51. There are 51 km of concrete storm water drains in the main city area, but these cover only 13% of the total road network and the contents (which frequently include raw sewage) are discharged untreated into a *nallah* (natural or man-made drainage channel).

52. There is no proper solid waste management system in the town, and although the Alwar Municipal Council (AMC) has provided dustbins in a few areas, in the rest of the town garbage is dumped in the streets and drains, and on vacant plots of land. Alwar generates an estimated 90 tons of solid waste per day and AMC collects around 57 tons from its manual street sweeping operation (conducted in the main city only), and removes other waste from open dumpsites irregularly. This is transported on open vehicles to the outskirts of the town, where it is dumped on open ground as there is no landfill.

53. Thermal power is the main source of energy in Rajasthan, contributing 89% of the electricity, compared to hydropower, which produces the remainder. State-level companies (Rajya Vidyut Utpadan Nigam Ltd, RVUN; and Rajya Vidyut Prasaran Nigam Ltd, RVPN) are responsible for power generation and transmission respectively, and distribution is

provided by a regional company, the Jaipur Vidyut Vitran Nigam Ltd (JVVNL). Power is supplied from the central grid by overhead cables carried on metal and concrete poles, mainly located in public areas alongside roads. The power supply is erratic and there are frequent outages in warmer months, and large fluctuations in voltage.

4 Transportation

54. Alwar is provided with a relatively good transportation system, particularly in the outer parts of the town, where streets are wide and not heavily utilised by traffic. The situation is different in the centre of the town however where roads are narrower and more congested (with both traffic and pedestrians), and the smaller roads are surfaced with concrete. The total road network is 421km in length, of which 70% are surfaced with bitumen/tar, 23% are concrete and 7% are WBM (Water-borne Macadam). The majority of roads (48%) are maintained by UIT, 38% by the Public Works Department (PWD) and 24% by AMC, and the condition is generally poor, with many roads in need of repairs and resurfacing.

55. Transport in the town is mainly by personal vehicles (bicycles and motor cycles) or auto- and bicycle-rickshaws, and privately owned mini-vans provide a form of intermediate public transport system. There are good road links between Alwar and surrounding towns, and a good quality road to the State capital Jaipur in the south-west and the national capital Delhi in the north-east. The national railway also runs through Alwar, and there are daily services through Rewari and Delhi in the north and Dausa and Jaipur in the south. The nearest airports are at Jaipur (150 km away) and Delhi (160 km).

D. Social and Cultural Resources

1 Demography

56. According to the national census the population of Alwar was 0.2 million in 1991 and 0.27 million in 2001, which shows an annual increase of 3.5% over the decade. The local authority however estimates that there are now 350,000 people in the town, which is occupied at an average population density of 6420 persons per km².

57. Overall literacy is 82.8%, reported at 91.4% for males and 72.9% for females, which is considerably better than literacy in the state as a whole, which is 60.4% overall, and 75.7% for males and 44.0% for females. The sex ratio is however significantly below the natural 1:1 ratio, being 853 females per 1000 males, lower than both the state and national averages (879 and 929 respectively).

58. According to the census, in 2001 only 28.8% of the population was in paid employment, significantly lower than both the state and national averages (42.1 and 39.1% respectively). This indicates that most of the townspeople are engaged in the informal sector, earning a living where they can, from small trading, casual labour, etc. Of those that are employed, almost all (98%) are involved in the service and industrial sectors, with the remainder being engaged in agricultural activities.

59. Between 85-90% of people are Hindus and the remainder are mainly Muslims, Sikhs and Jains. The main local languages are Khariboli and Mewati, although almost all people speak the national language of Hindi and a few also speak English. Other languages spoken include Sindhi, Punjabi and Urdu, because Rajasthan borders Pakistan. About 3% of the population are from Scheduled Tribes (ST), but these are all part of the mainstream population; around 16% of the population belong to scheduled castes (SC).

Table 3.7: Population Growth in Alwar town (1901-2001)

Year	Population (Alwar town)	Percentage Variation (%)
1901	853,044	-
1911	813,456	-4.64
1921	720,770	-11.39
1931	770,215	+6.86
1941	845,391	+9.76
1951	861,993	+1.96
1961	1,090,026	+26.45
1991	1,996,580	
2001	2,990,862	+30.23

Source: Census of India, 2001.

2 Health and educational facilities

60. There are good educational facilities in Alwar district, which serve both townspeople and inhabitants of surrounding villages and towns. There are 3885 primary and middle schools, 356 secondary and senior higher secondary schools, 38 general degree colleges in the district.

61. As the district headquarters town, Alwar is the main centre for health facilities in the area and there are six hospitals, plus a special TB hospital, 42 clinics, two family welfare centres, and three homeopathic hospitals in the city.

Table 3.8: Educational facility of Alwar District

Educational Facilities	No.
Primary and Middle Schools	3885
Secondary and Sr. Higher Secondary Schools	356
Colleges	38
Agricultural Research Centre	1
Polytechnic	1
Rajiv Gandhi Pathshala	553
ITI	8

(Source: Official website of Rajasthan)

3 History, culture and tourism

62. Legend suggests that the town of Alwar was founded in 1049 by Maharaja Alaghraj. In the mediaeval period it was ruled by the Yadu dynasty in the 11th century, Shamsuddin Altamash the Sultan of Delhi in the 12th century, the Chauhans in the 13th century, followed by Mewatis, Mughals, Marathas and Jats, until finally it was captured by the Kachhwaha Rajputs in the late 1600's.

63. Alwar Fort, known locally as Bala Quila, was built in 1550 by Hasan Khan Mewati, and is one of the few forts in Rajasthan to pre-date the rise of the Mughals. It stands on a hill and rises 330 m above the city (Photo 12), and measures 5 km by 1.5 km. There are six entrances to the fort and 5 km of ramparts.

64. Tourism has risen in importance in Alwar over the past 20 years, and in 2005 there were 85,000 visitors, 90% from within India and 10% from abroad. Alwar Fort and Sariska Tiger Reserve 40 km away are the main attractions, but there are other interesting locations in and around the town including:

- o The City Palace complex, which lies immediately below the fort, and was once the home of the maharajah. It has an impressive architecture (Photo 13), with many intricate ghats (staircases) and pavilions. The palace now houses government offices, and there is a museum and a large ornate pond (known as Sagar), surrounded by 12 chhatris or cenotaphs of red marble;
- o Siliserh Lake, provides a dam, lake and four-storey palace dating from the mid-19th century, which has now been converted to a hotel and restaurant. The lake is both functional and attractive, set amongst low wooded hills, and attracts tourists from Alwar and beyond;
- o Jaisamandh Dam is in a more remote location and reached by a narrow rural road, and its architecture and the surrounding landscape (Photo 2) make it a further attraction for increasing numbers of tourists.

IV. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

65. ADB Environmental Assessment Guidelines require that an IEE should evaluate impacts due to the location, design, construction and operation of the project. Construction and operation are the two activities in which the project interacts physically with the environment, so they are the two activities during which the environmental impacts occur. In assessing the effects of these processes therefore, all potential impacts of the project are identified, and mitigation is devised for any negative impacts. From the descriptions given in Section II.D it is clear that implementation of the subproject should not have major negative impacts because it will affect only one site, at which all construction will be conducted within a relatively small area, measuring around 1 km by 25 m.

66. As per ADB Environment Policy (2002) the important consideration in preparing environmental assessment include assessing induced, direct and cumulative impacts, examining alternatives, achieving environmental standards, designing least cost mitigation measures, developing environmental management plans and monitoring requirements, formulating institutional arrangements and ensuring meaningful public consultations. This section of the IEE reviews possible subproject-related impacts, in order to identify issues requiring further attention and screen out issues of no relevance. As defined previously, the primary impact areas are (i) within the 50-m zone from both sides and 100-m length from both approaches of the existing bridges; (ii) main routes/intersections which will be traversed by construction vehicles; and (iii) quarries and borrow pits as sources of construction materials. The secondary impact areas are: (i) entire Alwar town outside of the delineated primary impact area; and (ii) entire Alwar district in terms of over-all environmental improvement.

67. The ADB REA Checklist for Roads and Highways found in http://www.adb.org/documents/guidelines/environmental_assessment/eaguidelines002.asp was used to screen the subproject for environmental impacts and to determine the scope of the IEE. The completed checklist is found in **Annexure-2**. Results of the rapid assessment show all the subproject components will interact physically with the environment.

68. However in the case of this subproject it is not considered that there are any impacts that can clearly be said to result from either the design or location. This is because:

- Most of the individual elements of the subproject are relatively small and involve straightforward construction and operation, so impacts will be mainly localized and not greatly significant;
- Most of the predicted impacts are associated with the construction process, and are produced because that process is invasive, involving digging and other small excavation. However the routine nature of the impacts means that most can be easily mitigated;
- In one of the major fields in which there could be significant impacts (archaeology), those impacts are clearly a result of the construction process rather than the project design or location, as they would not occur if this did not involve trenching or other ground disturbance.

A. Pre-construction

69. **Screening out areas of no significant impact** From the descriptions given in Section II.C, it is clear that implementation of the subproject should not have major negative impacts because it will affect only one site, at which all construction will be conducted within a relatively small area.

70. Because of this there are several aspects of the environment that are not expected to be affected by the construction process and these can be screened out of the assessment at this stage as required by ADB procedure. These are shown in **Table 4.1**, with an explanation of the reasoning in each case.

Table 4.1: Fields in which construction is not expected to have significant impacts

Field	Rationale
Climate	Short-term production of dust is the only effect on atmosphere
Geology and seismology	Excavation will not be large enough to affect these features
Fisheries & aquatic biology	No rivers or lakes will be affected by the construction work
Wildlife and rare or endangered species	No wildlife and endangered species nearby the ROB
Coastal resources	Alwar is not located in a coastal area
Development of minerals and tourism	There are none of these developments near the site
Population and communities	Construction will not affect population numbers, location or composition

71. These environmental factors have thus been screened out presently but will be assessed again before starting of the work.

72. **Environmentally-sensitive Areas.** Location impacts are not significant as there are no environmentally sensitive areas within the subproject area. A few trees will be cut and vegetation (mostly shrubs and grasses) will be cleared during the project execution. Prior to construction, the Design and Supervision Consultants (DSC) in close coordination with the Alwar Investment Project Implementation Unit (IPIU) will (i) inventory the trees to be cut; (ii) obtain tree-cutting permit from Municipal Corporation and/or District Collector; and (iii) include in the bid documents provisions on replacement of 3 trees for every one tree cut during construction.

73. **Utilities.** Telephone lines (railway), electric lines (HT and LT) with poles and wires, within the existing bridge right-of-way (ROW) will be affected and need to be shifted or preserved. To mitigate the adverse impacts due to relocation of the utilities, DSC will (i) integrate utility ducts to the proposed bridge designs; (ii) identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and (iii) require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.

74. **Social and Cultural Resources.** Rajasthan is an area of rich and varied cultural heritage which includes many forts and palaces from the Rajput and Mughal periods, and large numbers of temples and other religious sites, so there is a risk that any work involving ground disturbance can uncover and damage archaeological and historical remains. For this subproject, there is least possibility to affect these features as there are no any historical and archaeological monuments present within 500 mtrs area. Nevertheless the Contractor during conducting any excavation work, have to ensure that when any chance finds are recognized, immediate measures are taken to ensure they are protected and conserved.

75. **Site selection of construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.** Priority is to locate these within or nearest possible vacant space in the subproject sites to avoid disturbance to pedestrians and vehicular traffic. However, if it is deemed necessary to locate elsewhere, sites to be considered will not promote instability and result in destruction of property, vegetation, irrigation, and drinking

water supply systems. Residential areas will not be considered to protect the human environment (i.e., to curb accident risks, health risks due to air and water pollution and dust, and noise, and to prevent social conflicts, shortages of amenities, and crime). Extreme care will be taken to avoid direct disposal to nearby nallah or in areas which will inconvenience the community. All locations will be determined by IPIU and DSC prior to award of construction contracts.

76. Site selection of sources of materials. Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution. To mitigate the potential environmental impacts, priority will be sites already permitted by the Mining Department. If other sites are necessary, it will be the construction contractor's responsibility to verify the suitability of all material sources and to obtain the approval of IPIU. If additional quarries will be required after construction is started, then the construction contractor shall obtain a written approval from PMU.

B. Construction

1. Screening of No Significant Impacts

77. The construction work is expected not to cause major negative environmental impacts, mainly because:

- Major activities of ROB will be on the existing rail ROW and approach roads in land allotted by Municipal Corporation of the town thus could be constructed without causing major environmental impacts;
- The site will be located on an government-owned land which will not be occupied or used for any other purpose;
- Overall construction program will be relatively short and is expected to be completed in 6 months, with activities to be conducted by small teams working on short lengths at a time so most impacts will be localized and short in duration; and
- Environmental impacts during construction are generic construction-related impacts associated with (i) road construction and (ii) removal and relocation of utility lines. These impacts are not expected to be significant, and can be managed through adoption of good engineering practices and undertaking specific mitigation measures.

78. As a result, there are several aspects of the environment which are not expected to be affected by the construction process and these can be screened out of the assessment at this stage as required by ADB procedures. These are shown in Table 4.2. These environmental factors are screened out presently but will be assessed again before starting of the construction activities.

Table 4.2: Fields in which Construction is not expected to have Significant Impacts

Field	Rationale
Topography, Drainage, and Natural Hazards	Activities are not large enough to affect these features.
Geology, Geomorphology, Mineral Resources, and Soils	Activities are not large enough to affect these features. No mineral resources in the subproject sites.
Climate	Activities are not large enough to affect this feature.
Air Quality	Short-term production of dust is the only effect on atmosphere
Protected Areas	There are no protected areas within 5 kms radius of the proposed site
Flora and Fauna	No rare or endangered species are found in the project area.

Economic Development	Activities are not large enough to permanently affect this feature.
Commerce and Industry	Activities are not large enough to affect these features, the access road shall be beneficial for nearby industries
Population	Activities are not large enough to affect this feature.
Health and education facilities	No any health and education facilities exist near the proposed site
Religious, historical or archaeological sites	No historical or archaeological sites near the subproject site one temple is there out of the ROW which will not be affected

• Construction method

As explained above, this subproject will involve construction of the following elements at the project site:

- A flyover, 8 m high, 10 m wide and 50 m long, supported on a series of RCC piers, forming an elevated right-angled bend between Station and Iterana roads;
- Two 375 m ramps (with a tarmac surface and side safety barriers) to raise the level of the two approach roads;
- Resurfacing of both roads beyond the ramps, and widening of Iterana Road by adding a 1-2 m wide strip of tarmac and a paved footpath on each side.

79. 59. A series of RCC box-sections (10 m wide and around 30 m long) will then be built, each slightly higher than the preceding one, to form the approach ramps. Foundations will be dug to about 1 m depth, and metal reinforcing bars will be added to form the floor and sides of each box. Portions of these will be encased in wooden shuttering, and concrete (mixed on site) will be poured in and allowed to set. This will be repeated to gradually create each RCC box, which will then be filled with sand and stone, imported on trucks and tipped into each structure. Once each is filled a layer of RCC will be added to the top, with a slight incline, so that the upper surface rises gradually to the 8 m height of the RoB.

80. At the same time the foundations for the bridge piers will be excavated by backhoe diggers, and deeper portions will be dug by a drilling machine. Heavy-duty metal reinforcing rods will be placed into the voids, followed by a concrete and aggregate mix. The reinforcing rods will extend out of the foundations to create the structure of each pier, and these will then be encased in shuttering, into which more concrete will be poured to form each pillar. The pre-cast RCC bridge sections will then be brought in from the manufacturing plant on large vehicles, placed into position by cranes and attached to the piers by heavy-duty bolts and concrete. The pre-cast safety barriers will also be positioned by crane at the edges of the bridge and ramps, after which the tarmac surface will be applied by road-laying machine and roller vehicles, with gravel layers tipped out from trucks.

81. The road laying will then be extended beyond each embankment to refurbish and level the surface of the approach roads, and an additional 1-2 m strip will be added along each side of Iterana Road to widen the carriageway. The edge of the road will be formed by hand-placed kerbstones, and another kerb will be placed 2 m away to form the inner edge of the footpath. Concrete and sand will be poured in to raise the level towards the top of the kerb and paving slabs will be added by hand at the surface. Finally the road markings and roadside signs will be added.

82. The operation will be conducted by a team of around one hundred men, roughly 50% unskilled labour and 50% with various skills including truck drivers, vehicle and machine operatives, surveyors, foremen and supervisors, etc. The operation should be completed in around 18 months.

2 Anticipated Environmental Impacts and Mitigation Measures

83. All works will be conducted at relatively small sites but will involve a moderate deal of excavation and earth-moving over a period of approximately six months. However these physical environmental impacts are generic construction-related impacts associated with (i) road/bridge construction and (ii) removal and relocation of utility lines. These impacts are not expected to be significant and permanent, and can be managed through adoption of good engineering practices and undertaking specific mitigation measures.

84. **Sources of Materials.** Significant amount of gravel, sand, and cement will be required for this subproject. Extraction of rocks and material from nearby quarries may cause continuous degradation of the regime. The construction contractor will be required to:

- (i) Use quarry sites and sources permitted by government;
- (ii) Verify suitability of all material sources and obtain approval of Investment Program Implementation Unit (IPIU);
- (iii) If additional quarries will be required after construction has started, obtain written approval from PMU; and
- (iv) Submit to DSC on a monthly basis documentation of sources of materials.

85. **Air Quality.** Emissions from construction vehicles, equipment, and machinery used for excavation and construction will induce impacts on the air quality in the construction sites as well on the road users (pedestrians and vehicles). Anticipated impacts include dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons) but temporary and during construction activities only. To mitigate the impacts, construction contractors will be required to:

- (i) Consult with IPIU/DSC on the designated areas for stockpiling of clay, soils, gravel, and other construction materials;
- (i) Excavate the area at the same time as the access roads are built so that dug material is used immediately, avoiding the need to stockpile on site;
- (ii) Damp down exposed soil and any stockpiled on site by spraying with water when necessary during dry weather;
- (iii) Use tarpaulins to cover sand and other loose material when transported by trucks; and
- (iv) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly.

86. **Surface Water Quality.** There are no surface water sources near the project site. There are domestic drains which may be affected due to mobilization of settled silt materials, run-off from stockpiled materials during construction activities. These potential impacts are temporary and short-term duration only and to ensure these are mitigated, construction contractor will be required to:

- (ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
- (iii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with IPIU/DSC on designated disposal areas;
- (iv) Install temporary silt traps or sedimentation basins along the drainage leading to the drains to protect from silting;
- (v) Dispose any wastes generated by construction activities in designated sites; and

87. **Noise Levels.** There are no adjacent settlements, health facilities, scheduled or unscheduled historical, archaeological, paleontological, or architectural sites near the construction sites. Increased noise due the project activities may affect the workers engaged in the construction and adjoining habitation. Increase in noise level may be caused by earth-moving and excavation equipment, and the transportation of equipment, materials, and people. Impact is negative, short-term, and reversible by mitigation measures. The construction contractor will be required to:

- (i) Plan activities in consultation with IPIU/DSC so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance;
- (ii) Require horns not be used unless it is necessary to warn other road users or animals of the vehicle's approach;
- (iii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and
- (iv) Maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at a distance of 10 m or more from the vehicle/s.

88. **Existing Infrastructure and Facilities.** Telephone lines, electric poles and wires and Drains within the existing bridge ROW will be affected thus there is anticipated disruption of service during construction. To mitigate disturbance it is therefore required to finalize the list of affected utilities and their service providers by survey and prepare a mitigation plan to least disturb the utilities. Telephone lines and OFC cables are lying on one side of railway track and belongs to the Railway, whereas the HT and LT lines, passing through the access road and a transformer needs to be shifted prior to start of the work. Concerned authorities are required to be consulted prior to start of the work for shifting of utilities.

89. **Flora and Fauna.** There are no protected areas in or within of the subproject sites. A few trees, shrubs, and grasses are vegetation noted in the area. There are some trees at the site that need to be removed. During survey it was found that one neem, one Pipal tree and 2-3 trees of other species may be removed. Therefore mitigation measures are to be taken care of. As per applicable RUIDP policy contractor needs to obtain tree-cutting permit from the Municipal Board or District Collector and plant 3 new trees for each 1 cut trees to compensate the ecological loss. Potential impacts are negative but reversible by mitigation measures

90. **Landscape and Aesthetics.** The construction activities will produce solid wastes as well as excess construction materials. Such waste could include removed concrete, wood, trees and plants, packaging material, empty containers, spoiled soil, sludge, oils, lubricants, paints, chemicals, worn-out spares, remnants of construction materials, and other similar items. These impacts are negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

- (i) Prepare and implement Waste Management Plan;
- (ii) Recover used oil and lubricants and reuse or remove from the sites;
- (iii) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- (iv) Remove all wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and
- (v) Request IPIU/DSC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.

91. **Transportation – Accessibility.** Hauling of construction materials and operation of equipment on-site can cause traffic problems and conflicts in ROW. Potential impact is negative but short term and reversible by mitigation measures. The construction contractor will be required to:

- (i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
- (ii) Schedule transport and hauling activities during non-peak hours;
- (iii) Locate entry and exit points in areas where there is low potential for traffic congestion;
- (iv) Keep the site free from all unnecessary obstructions;
- (v) Drive vehicles in a considerate manner;
- (vi) Notify affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.

92. **Socio-Economic** Although much of main ROB work will be conducted within the ROW of the railway and available lands (to be acquired by Municipal Corporation). ADB policy on Involuntary Resettlement requires that no-one should be worse-off as a result of the project, so a Resettlement Plan and Resettlement Framework have been prepared to examine these issues. Therefore no resettlement issue may arise for this project but Short Resettlement Plan (SRP) shall be prepared for the project.

93. Transportation is the other principal economic activity that will be impeded by this work, as the trains will have to travel slowly in the vicinity of the site, and when work is conducted close to the line, the train service may need to be interrupted temporarily. These impacts could be significant given the amount of traffic using this crossing and the frequency of the train service. These impacts will need to be mitigated by careful planning of the construction program, in conjunction with the road, rail and municipal authorities, in order to:

- Maintain safe passage for vehicles and pedestrians throughout the construction period;
- Provide effective, well signposted diversions and alternative routes when required;
- Conduct work that requires the closure/diversion of roads at times of low traffic volume;
- Conduct work on or close to the railway line at times when there are fewer trains;
- Schedule truck deliveries of soil to the site for periods of low traffic volume.

94. Excavation and construction works could also damage existing infrastructure (such as electricity pylons, telecommunication cables and lines etc) located alongside the road and railway line. It will be important therefore to avoid these impacts by obtaining details from the Municipal Council and Railway authority of the nature and location of all existing infrastructure, and planning excavation carefully to avoid any such sites if possible.

95. Finally, there could be some short-term socio-economic benefits from the construction work if local people are able to gain employment in the construction workforce. To direct these benefits to the communities directly affected by the work, the Contractor should be required to employ at least 50% of his labour force from communities in the vicinity of the site. This will have the added benefit of avoiding social problems that sometimes occur when workers are imported into host communities, and avoiding environmental and social problems from workers housed in poorly serviced camp accommodation.

96. **Occupational Health and Safety.** Workers need to be mindful of the occupational hazards which can arise from working in infrastructures like roads and bridges. Potential impacts are negative and long-term but reversible by mitigation measures. The construction contractor will be required to:

- (i) Develop and implement site-specific Health and Safety (H&S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use Personal Protective Equipment; (c) H&S Training³ for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;
- (ii) Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;
- (iii) Provide medical insurance coverage for workers;
- (iv) Secure all installations from unauthorized intrusion and accident risks;
- (v) Provide supplies of potable drinking water;
- (vi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances;
- (vii) Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers;
- (viii) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted;
- (ix) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
- (x) Ensure moving equipment is outfitted with audible back-up alarms;
- (xi) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and
- (xii) Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.

97. **Community Health and Safety.** Hazards posed to the public; specifically in high-pedestrian areas may include traffic accidents and vehicle collision with pedestrians. Potential impact is negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

- (i) Plan routes to avoid times of peak-pedestrian activities.
- (ii) Liaise with IPIU/DSC in identifying high-risk areas on route cards/maps.
- (iii) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.
- (iv) Provide road signs and flag persons to warn of dangerous conditions.

³ Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

98. **Work Camps.** Operation of work camps can cause temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants. Potential impacts are negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

- (i) Consult with IPIU/DSC before locating project offices, sheds, and construction plants;
- (ii) Minimize removal of vegetation and disallow cutting of trees;
- (iii) Provide water and sanitation facilities for employees;
- (iv) Train employees in the storage and handling of materials which can potentially cause soil contamination;
- (v) Recover used oil and lubricants and reuse or remove from the site;
- (vi) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- (vii) Remove all wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and
- (viii) Request IPIU/DSC to report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.

99. **Social and Cultural Resources.** Rajasthan is an area with a rich and varied cultural heritage that includes many forts and palaces from the Rajput and Mughal periods, and large numbers of temples and other religious sites, so there is a risk that any work involving ground disturbance could uncover and damage archaeological and historical remains. In this case the excavation will occur in and around an existing railway track, agriculture and industrial land and existing road so there is a minimum risk of such impacts. There is no any historical or archaeological site within or near the project site. Nevertheless the Contractor during conducting any excavation work, have to ensure that when any chance finds are recognized, immediate measures are taken to ensure they are protected and conserved. This should involve:

- Having excavation observed by a person with archaeological field training;
- Stopping work immediately to allow further investigation if any finds are suspected;
- Calling in the state archaeological authority if a find is suspected, and taking any action they require ensuring its removal or protection in situ.

100. Apart from one religious structure situated out of right of way, there are no other modern-day social and cultural resources (such as schools and hospitals) nearby the site so there is no risk of other impacts on such community assets. It should be insured during construction that there will be no hindrance and disturbance for devotees.

101. There is invariably a safety risk when substantial construction such as this is conducted in an urban area, and precautions will thus be needed to ensure the safety of both workers and citizens. The Contractor will be required to produce and implement a site Health and Safety Plan, and this should include such measures as:

- Excluding the public from the site;
- Ensuring that all workers are provided with and use appropriate Personal Protective Equipment;
- Health and Safety Training for all site personnel;
- Documented procedures to be followed for all site activities;
- Accident reports and records; etc.

C. Operation and Maintenance

102. O&M of the bridge will be the responsibility of the Municipal Corporation. The bridge have a design life of 30 years, during which shall not require major repairs or refurbishments. The stability and integrity of the bridge will be monitored periodically to detect any problems and allow remedial action if required. Routine maintenance will include:

- Small scale *ad hoc* repairs of surface damage caused by traffic use or accidents;
- Repairs and replacement of damaged safety barriers and signs; and
- Regular unblocking of drains to prevent damage from flooding in the monsoon.

1. Screening out areas of no significant impact

103. Because roads and bridges generally operate without the need for major repair and maintenance, there are several environmental factors that should be unaffected once the new ROB begins to function. These are identified in **Table 5.3** below, with an explanation of the reasoning in each case. These factors are thus screened out of the impact assessment and will not be mentioned further.

Table 4.3: Fields in which operation and maintenance of the ROB and roads not expected to have significant impacts

Field	Rationale
Climate	Exhaust gases affect air quality but a new road does not alter climate
Fisheries & aquatic biology	There are no rivers or lakes close to the ROB site
Wildlife, forests, rare species, protected areas	No wildlife and forest near location of ROB
Coastal resources	Alwar is not located in a coastal area

2. Environmental impacts and mitigation measures

104. **Air Quality.** Once the bridges are completed and operating it will improve the physical environment by removing the current severe traffic congestion in the areas. This will indirectly result to less air pollution in the area. The potential impact is positive and long-term.

105. **Noise Level.** As expected of any road/bridge infrastructures, noise levels tend to increase with vehicular traffic. To mitigate this impact, Municipal Corporation will put signage and caution boards

106. **Accessibility.** Portions of the roads and bridge may be affected during routine repairs. However, the works will be very small in scale, and will be conducted manually by small teams of men with simple equipment (shovels, wheelbarrows, tarmac blender, etc.). Even if larger vehicles will be used to refurbish larger portions of the roads, the work will be very short in duration. The potential impacts are negative although will not cause significant physical impacts.

107. **Ecological Resources.** This is to be noted that there are no any important ecological resources near the project site. Therefore the operation of the bridge and the routine maintenance and repair of the roads and surroundings will have no ecological impacts. There would be some small ecological gain from the planting of replacement trees. It shall be responsibility of the Municipal Council for the continuous care of the planted trees.

108. **Economic Development.** The ROB will improve the infrastructure of the town by providing a more efficient and effective transportation route, and this should have positive impacts on the overall economy by reducing time spent idle in stationary traffic by delivery vehicles, employees and customers. It may also make further positive contributions to the development of particular sectors, for example allowing the more efficient transportation of agricultural produce and other goods to and from the town.

109. Traffic may be interrupted temporarily if the road or bridge is repaired and maintained, but this work will be very small in scale, infrequent, and short in duration, so there should be no economic or other implications. To maintain the safety of workers and road-users, such work should be coordinated with the local police department so that adequate warning signs and traffic diversions can be set up when necessary.

110. **Social and Cultural Resources.** Effects of the operating ROB on social and cultural resources in the town will be relatively small in scale and intangible in nature, and are thus difficult to assess and quantify.

111. The citizens of the town will benefit from a more effective transportation route as they will spend less time in stationary traffic exposed to noise, pollution and the associated physical and psychological stresses. Social and cultural resources may also benefit in a small way as it will be easier for people to reach schools, hospitals, temples, museums. People may also benefit from an improvement in the economy of the town, although it would require much larger improvements in transportation and other infrastructure for this to be recordable.

112. Repairs to the road and bridge will not be physically invasive so there will be no risk to historical remains, and as there are no areas or resources of social or cultural importance in the vicinity there will be any risk to such features.

V. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Project Stakeholders

133. The primary stakeholders are:

- (i) Residents, shopkeepers and businesspeople who live and work alongside the roads in which improvements will be provided and near sites where facilities will be built
- (ii) Railway Department
- (iii) State and local authorities responsible for the protection and conservation of archaeological relics, historical sites and artifacts; and
- (iv) State and local tourism authorities.

113. The secondary stakeholders are:

- (i) LSGD as the Executing Agency;
- (ii) Other government institutions whose remit includes areas or issues affected by the subproject (state and local planning authorities such as Public Health Engineering Department, Local Government Department, Ministry of Environment and Forests, Roads and Highways Division);
- (iii) Non-government organizations (NGOs) and community-based organizations (CBOs) working in the affected communities;
- (iv) Other community representatives (prominent citizens, religious leaders, elders, women's groups);
- (v) The beneficiary community in general; and
- (vi) ADB, Gol, and Ministry of Finance.

B. Consultations and Disclosures Conducted

114. Public consultations and group discussion meeting was conducted by RUIDP on 07 December 2011 in City Level Committee (CLC) meeting under the chairmanship of District Collector. Members present were- Hon. MLA, Chairman of Municipal Council, Executive Engineers and Assistant Engineer of various government departments and municipal body, RUIDP and representatives of NGOs and CAPP. The objectives were to appraise the stakeholders about the program's environmental and social impacts and present safeguards to mitigate any potential significant impacts. Public Consultation was also done by DSC Environmental Expert during preliminary survey with the nearby people. Records of public consultations are attached as **Annexure 3**. The major issues raised are related to traffic interferences and possible dust and noise problems during construction phase. Other comments include construction vehicles creating some disturbances to the local people daily activities, necessity of proper safety arrangements, and widening of roads prior to construction activities. The issues and comments have been considered and incorporated in the design of the bridges and mitigation measures for the potential environmental impacts raised during the public consultations.

115. Informal discussions were held with the local people during site visits for the preparation of this IEE. Issues discussed were:

- (i) Awareness and extent of the subproject and its components;
- (ii) Benefits of the subproject for the economic and social upliftment of the community;

- (iii) Labour availability in the subproject sites or requirement of outside labour involvement;
- (iv) Local disturbances due to the construction activities;
- (v) Necessity of tree felling and vegetation clearing at the subproject sites;
- (vi) Water logging and drainage problems, if any;
- (vii) Drinking water problem; and
- (viii) Forest and sensitive area within or nearby the subproject site.

137. Hindi versions of the Environmental Framework were provided during workshops to ensure stakeholders understood the objectives, policy, principles, and procedures. Likewise, English and Hindi versions of the Environmental Framework have been placed in Urban Local Body (ULB) offices, Investment Program Project Management Unit (IPMU) and IPIU offices, and the town library.

C. Future Consultation and Disclosure

138. LSGD extended and expanded the consultation and disclosure process significantly during implementation of RUSDIP. They have appointed an experienced NGO (Community Action and Participation Program; CAPP) to handle this key aspect of the program. The CAPP continuously (i) conducts a wide range of activities in relation to all subprojects in each town; and (ii) ensures the needs and concerns of stakeholders are registered and are addressed in subproject design. For this subproject, the CAPP will develop, in close coordination with IPIU and DSC, a public consultation and disclosure program which is likely to include the following:

- (i) Consultation during detailed design:
 - Focus-group discussions with affected persons and other stakeholders (including women's groups, NGOs and CBOs) to hear their views and concerns, so that these can be addressed in subproject design where necessary; and
 - Structured consultation meetings with the institutional stakeholders (government bodies and NGOs) to discuss and approve key aspects of the project.
- (ii) Consultation during construction:
 - Public meetings with affected communities to discuss and plan work programs and allow issues to be raised and addressed once construction has started; and
 - Smaller-scale meetings to discuss and plan construction work with individual communities to reduce disturbance and other impacts, and provide a mechanism through which stakeholders can participate in subproject monitoring and evaluation;
- (iii) Project disclosure:
 - (a) Public information campaigns (via newspaper, TV and radio) to explain the project to the wider town population and prepare them for disruption they may experience once the construction program is underway;
 - (b) Public disclosure meetings at key project stages to inform the public of progress and future plans, and to provide copies of summary documents in Hindi; and

- (c) Formal disclosure of completed project reports by making copies available at convenient locations in the study town, informing the public of their availability, and providing a mechanism through which comments can be made.

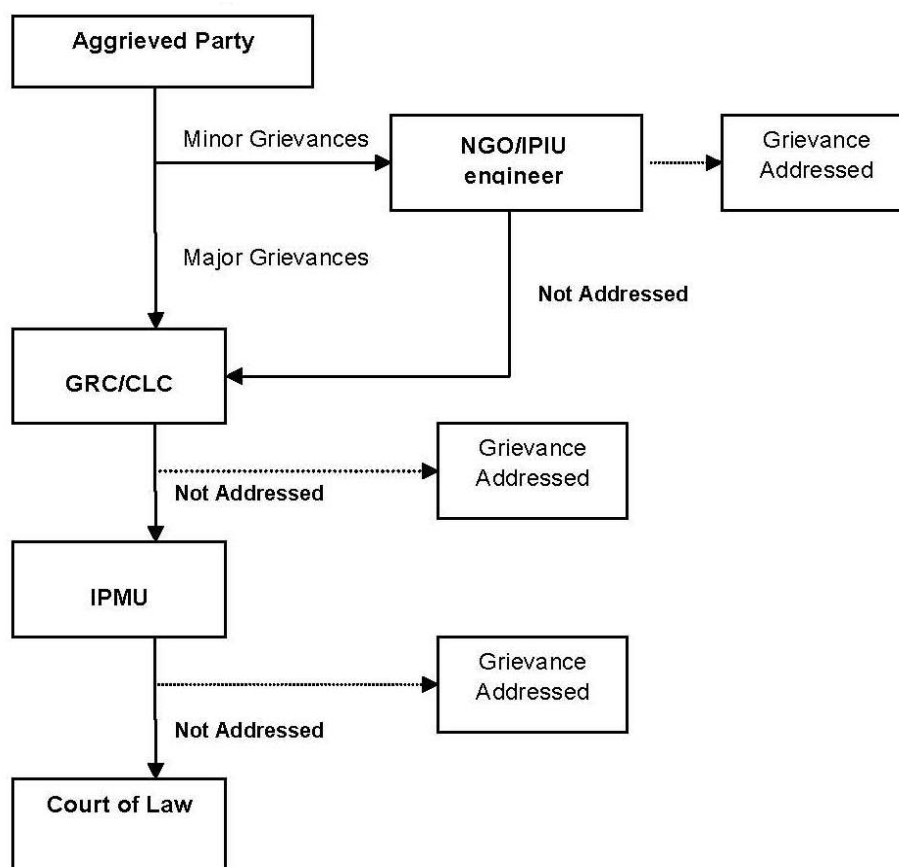
139. Based on ADB Environment Policy (2002) requirements, the environmental assessment reports of ADB projects are intended to be accessible to interested parties, and the general public. The summary IEE/EIA reports are required to be circulated worldwide, through the depository library system and are placed on the ADB website. The full IEE/EIA reports are also made available to the interested parties upon request.

VI. GRIEVANCE REDRESS MECHANISM

140. Grievances of affected persons will first be brought to the attention of the implementing NGO or IPIU engineer. Grievances not redressed by the NGO or IPIU will be brought to the City Level Committees (CLC) set up to monitor project implementation in each town. The CLC, acting as a grievance redress committee (GRC) is chaired by the District Collector with representatives from the ULB, state government agencies, IPIU, community-based organizations (CBOs) and non-government organizations (NGOs). As GRC, the CLC will meet every month. The GRC will determine the merit of each grievance, and resolve grievances within a month of receiving the complaint, failing which the grievance will be addressed by the inter-ministerial Empowered Committee. The Committee will be chaired by the Minister of Urban Development and LSGD, and members will include Ministers, Directors and/or representatives of other relevant Government Ministries and Departments. Grievance not redressed by the GRC will be referred to the IPMU for action, failure at this level will be referred to the appropriate courts of law. The IPIU will keep records of all grievances received including: contact details of complainant, date that the complaint was received, nature of grievance, agreed corrective actions and the date these were effected, and final outcome. The grievance redress process is shown in **Figure 6.1**.

141. All costs involved in resolving the complaints will be borne by the IPMU. The GRCs will continue to function throughout the project duration.

Figure 6.1: Grievance Redress Mechanism – RUSDIP



CLC = City Level Committee, GRC = Grievance Redress Committee, IPIU=Investment Program Implementation Unit, IPMU = Investment Program Management Unit, NGO = nongovernmental organization,

VII. ENVIRONMENTAL MANAGEMENT PLAN

A. Institutional Arrangements

142. The main agencies involved in managing and implementing the subproject are:

- (i) LSGD is responsible for management, coordination, and execution of all activities funded under the loan;
- (ii) IPMU is responsible for coordinating construction of subprojects across all towns, and for ensuring consistency of approach and performance;
- (iii) IPMC assists IPMU in managing the program and assures technical quality of design and construction;
- (iv) DSCs design the infrastructure, manage tendering of Contractors and supervise the construction process;
- (v) IPIUs appoint and manage Construction Contractors to build elements of the infrastructure in a particular town.
- (vi) An inter-ministerial Empowered Committee⁴ (EC) assists LSGD in providing policy guidance and coordination across all towns and subprojects.; and
- (vii) City Level Committees⁵ (CLCs) have also been established in each town to monitor project implementation in the town and provide recommendations to the IPIU where necessary.

143. **Figure 7.1** shows institutional responsibility for implementation of environmental safeguard at different level.

1. Responsible for carrying out mitigation measures

144. During construction stage, implementation of mitigation measures is the construction contractor's responsibility while during operation stage, Municipal Corporation and Railway will be responsible for the conduct of maintenance or repair works.

145. To ensure implementation of mitigation measures during the construction period, contract clauses (**Annexure 4**) for environmental provisions will be part of the civil works contracts. Contractors' conformity with contract procedures and specifications during construction will be carefully monitored by Investment Program Management Unit (IPIU).

2. Responsible for carrying out monitoring measures

146. During construction, DSC's Environmental Expert and the designated representative (Environment Safeguards Officer) of IPIU will monitor the construction contractor's environmental performance.

147. During the operation stage, monitoring will be the responsibility of Municipal Corporation.

3. Responsible for reporting

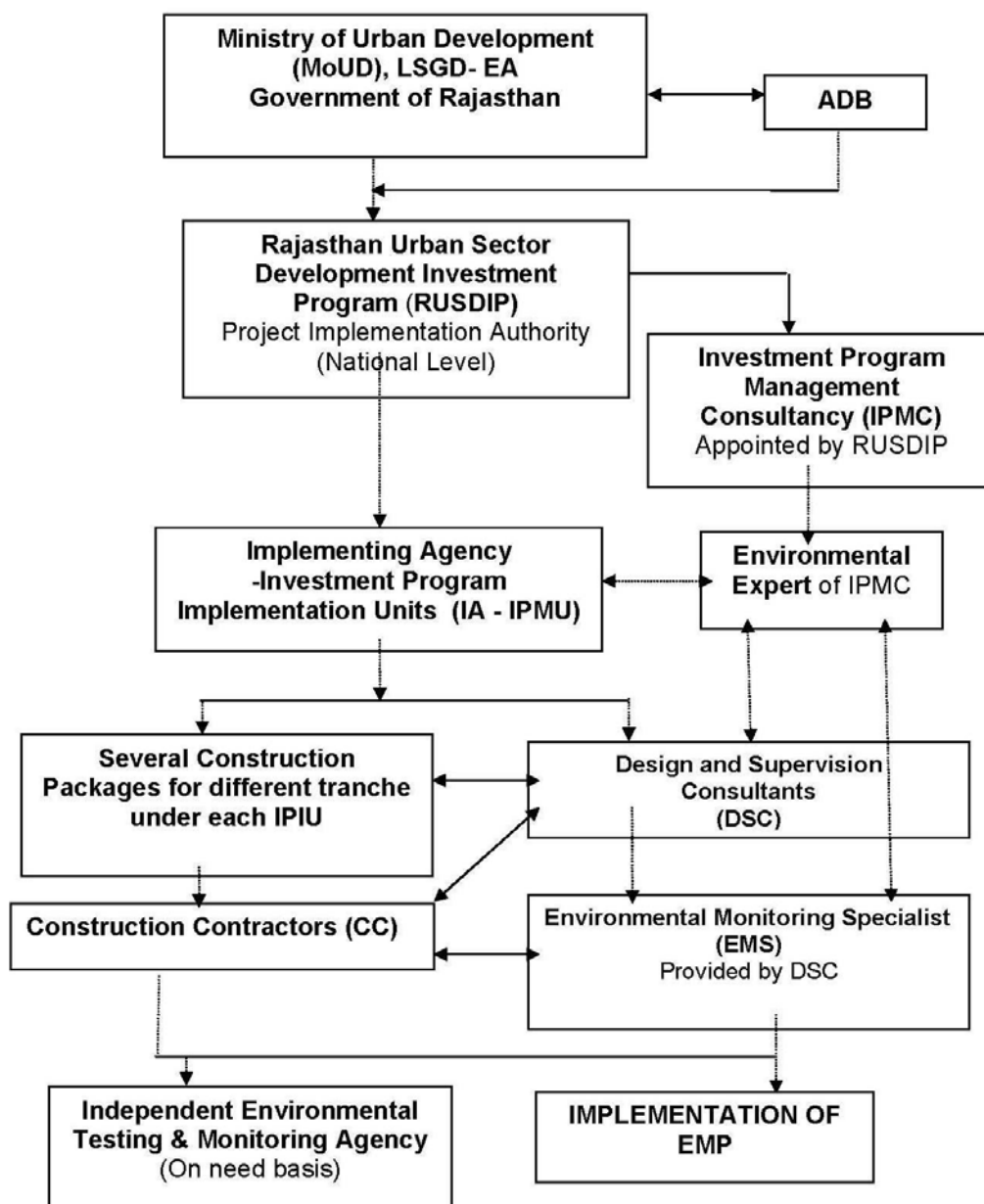
147. LSGD will submit to ADB quarterly reports on implementation of the EMP and will permit ADB to field annual environmental review missions which will review in detail the

⁴ The EC is chaired by the Minister of Urban Development and LSG, and members include Ministers, Directors and/or representatives of other relevant Government Ministries and Departments.

⁵ CLCs are chaired by District Collector, with members including officials of the ULB, local representatives of state government agencies, the IPIU, and local NGOs and CBOs.

environmental aspects of the Project. Any major accidents having serious environmental consequences will be reported immediately.

Figure 7.1: Institutional Responsibility- RUSDIP



B. Environmental Mitigation Plan

148. **Tables 7.1 to 7.3** show the potential adverse environmental impacts, proposed mitigation measures, responsible parties, and estimated cost of implementation. This EMP will be included in the bid documents and will be further reviewed and updated during implementation.

C. Environmental Monitoring Program

149. **Tables 7.4 to 7.6** show the proposed environmental monitoring program for this subproject. It includes all relevant environmental parameters, description of sampling

stations, frequency of monitoring, applicable standards, responsible parties, and estimated cost. Monitoring activities during the detailed engineering design stage will form part of the baseline conditions of the subproject sites and will be used as the reference for acceptance of restoration works by the construction contractors.

Table 7.1: Anticipated Impacts and Mitigation Measures – Pre-construction Environmental Mitigation Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
Environmentally-sensitive Areas	Some trees will be cut and vegetation (mostly shrubs and grasses) will be cleared in the sub-project area	Avoid to cut any tree and if necessary obtain permission from town authority and plant 3 trees for each cut tree	Design and Supervision Consultants (DSC) in close coordination with the Municipal Board/ Council Investment Program Implementation Unit (IPIU)	(i) Inventory of trees; (ii) Tree-cutting permit; (iii) Location and number of trees replaced for every one tree cut
Utilities	Telephone lines, electric poles and wires, OFC cable within the existing bridge right-of-way (ROW) will be removed.	(i) Integrate utility ducts to the proposed bridge designs; (ii) Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and (iii) Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.	DSC) in close coordination with the Municipal Board/ Council Investment Program Implementation Unit (IPIU)	(i) design specification showing utility ducts if necessary; (ii) list of affected utilities and operators; (iii) bid document to include requirement for a contingency plan for service interruptions
Access Roads	Disruption to traffic flow and sensitive receptors	(i) Include entry and exit points in plan drawings; and (ii) Consult affected communities prior to finalizing subproject lay-out and design.	DSC and Non-government Organization in charge of public consultation and disclosure	(i) plan drawings showing entry and exit points; (ii) records of public consultations
Social and Cultural Resources	Ground disturbance can uncover and damage archaeological and historical remains	(i) Consult Archaeological Survey of India (ASI) to obtain an expert assessment of the archaeological potential of the	IPIU and DSC	Chance Finds Protocol

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		site; (ii) Consider alternatives if the site is found to be of medium or high risk; (iii) Include state and local archaeological, cultural and historical authorities, and interest groups in consultation forums as project stakeholders so that their expertise can be made available; and (iv) Develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognised and measures are taken to ensure they are protected and conserved.		
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Disruption to traffic flow and sensitive receptors	(i) Prioritize areas within or nearest possible vacant space in the subproject sites; (ii) If it is deemed necessary to locate elsewhere, consider sites that will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems; (iii) Do not consider residential areas; (iv) Take extreme care in selecting sites to avoid direct	IPIU and DSC to determine locations prior to award of construction contracts.	List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		disposal to <i>nallah/water body</i> or in areas which will inconvenience the community.		
Sources of Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution.	(i) Prioritize sites already permitted by the Mining Department; (ii) If other sites are necessary, inform construction contractor that it is their responsibility to verify the suitability of all material sources and to obtain the approval of IPIU; and (iii) If additional quarries will be required after construction is started, inform construction contractor to obtain a written approval from IPMU.	IPIU and DSC to prepare list of approved quarry sites and sources of materials	(i) list of approved quarry sites and sources of materials; (ii) bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.

Table 7.2: Anticipated Impacts and Mitigation Measures – Construction Environmental Mitigation Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
Sources of Materials	Extraction of rocks and material from quarry sites may cause degradation of the regime	(i) Use quarry sites and sources permitted by government; (ii) Verify suitability of all material sources and obtain approval of investment Program Implementation Unit (IPIU); (iii) If additional quarries will be required after construction has started, obtain written approval from PMU; and; (iv) Submit to DSC on a monthly basis documentation of sources of materials.	Construction Contractor	Construction Contractor documentation
Air Quality	Emissions from construction vehicles, equipment, and	(i) Consult with IPIU/DSC on the designated areas for stockpiling of clay,	Construction Contractor	(i) Location of stockpiles; (ii) complaints from

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
	machinery used for excavation and construction resulting to dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons)	soils, gravel, and other construction materials; (ii) Excavate the required area at the same time as the access roads are built so that dug material is used immediately, avoiding the need to stockpile on site; (iii) Damp down exposed soil and any stockpiled on site by spraying with water when necessary during dry weather; (iv) Use tarpaulins to cover sand and other loose material when transported by trucks; and (v) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly. (vi) Ambient air quality monitoring for SO _x , NO _x , CO, PM ₁₀ and PM _{2.5} as per NAAQ standards		sensitive receptors; (iii) heavy equipment and machinery with air pollution control devices (iii) ambient air monitoring for particulate matters- PM 10 PM 2.5 and other pollutants; (iv) vehicular emissions such as sulphur dioxide (SO ₂), nitrous oxides (NO _x), carbon monoxide (CO), and hydrocarbons
Surface water quality	Mobilization of settled silt materials, run-off from stockpiled materials, and chemical contamination from fuels and lubricants during construction works can contaminate downstream surface water quality.	(i) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets; (ii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with IPIU/DSC on designated disposal areas; (iii) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; (iv) Place storage areas for fuels and lubricants away from any drainage leading to water bodies; (v) Dispose any wastes generated by construction activities in designated sites; and (vi) Conduct surface quality inspection according to the Environmental Management Plan (EMP).	Construction Contractor	(i) Areas for stockpiles, storage of fuels and lubricants and waste materials; (ii) number of silt traps installed along drainages leading to water bodies; (iii) records of surface water quality inspection; (iv) effectiveness of water management measures; (v) for inland water: suspended solids, oil and grease, biological oxygen demand (BOD), and coliforms.
Noise Levels	Increase in noise level due to	(i) Plan activities in consultation with	Construction	(i) Complaints from

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
	earth-moving and excavation equipment, and the transportation of equipment, materials, and people	IPIU/DSC so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance; (ii) Require horns not be used unless it is necessary to warn other road users or animals of the vehicle's approach; (iii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and (iv) Maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at a distance of 10 m or more from the vehicle/s.	Contractor	sensitive receptors; (ii) use of silencers in noise-producing equipment and sound barriers; (iii) equivalent day and night time levels
Existing Infrastructure and Facilities	Disruption of service and damage to existing infrastructure located alongside roads, in particular water supply pipes and sewer lines.	(i) Obtain from IPIU and/or DSC the list of affected utilities and operators; (ii) Prepare a contingency plan to include actions to be done in case of unintentional interruption of services; and	Construction Contractor	(i) Existing Utilities Contingency Plan; (ii) Asbestos Cement Pipes Management Plan
Flora and Fauna	Land-clearing activities and presence of workers in the sites can damage or cause loss of existing flora	(i) Minimize removal of vegetation and disallow cutting of trees if not required for the construction activities; (ii) If tree-removal will be required, obtain tree-cutting permit from the Municipal Council or District Collector; (iii) Require to plant three native trees for every one that is removed; and (v) Prohibit employees from cutting of trees for firewood.	Construction Contractor	(i) tree-cutting permit for affected trees; (ii) number of replanted trees
Landscape and Aesthetics	solid wastes as well as excess construction materials may change landscape and aesthetic appearance of the area	(i) Prepare and implement Waste Management Plan; (ii) Recover used oil and lubricants and reuse or remove from the sites; (iii) Manage solid waste according to the	Construction Contractor	(i) Waste Management Plan; (ii) complaints from sensitive receptors; (iii) IPIU/DSC to report in writing that the necessary

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		following preference hierarchy: reuse, recycling and disposal to designated areas; (iv) Remove all wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and (v) Request IPIU/DSC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.		environmental restoration work has been adequately performed before acceptance of work.
Transportation – Accessibility	traffic problems and conflicts in right-of-way (ROW)	(i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites; (ii) Schedule transport and hauling activities during non-peak hours; (iii) Locate entry and exit points in areas where there is low potential for traffic congestion; (iv) Keep the site free from all unnecessary obstructions; (v) Drive vehicles in a considerate manner; (vi) Coordinate with Municipal Traffic Office for temporary road diversions and for provision of traffic aids if transportation activities cannot be avoided during peak hours; and (vii) Notify affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.	Construction Contractor	(i) Traffic Management Plan; (ii) complaints from sensitive receptors; (iii) number of signages placed at subproject sites.
Socio-Economic	generation of contractual employment and increase in local revenue	(i) Employ at least 50% of the labour force, or to the maximum extent, local persons within the 2-km immediate area if manpower is available; and	Construction Contractor	(i) employment records; (ii) records of sources of materials

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		(ii) Secure construction materials from local market.		
Occupational Health and Safety	occupational hazards which can arise from working in infrastructures like roads and bridges	(i) Develop and implement site-specific Health and Safety (H&S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use Personal Protective Equipment; (c) H&S Training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents; (ii) Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site; (iii) Provide medical insurance coverage for workers; (iv) Secure all installations from unauthorized intrusion and accident risks; (v) Provide supplies of potable drinking water; (vi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances; (vii) Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; (viii) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; (ix) Ensure the visibility of workers	Construction Contractor	(i) site-specific Health and Safety (H&S) Plan; (ii) Equipped first-aid stations; (iii) Medical insurance coverage for workers; (iv) Number of accidents; (v) Supplies of potable drinking water; (vi) Clean eating areas where workers are not exposed to hazardous or noxious substances; (vii) record of H&S orientation trainings (viii) personal protective equipments; (ix) % of moving equipment outfitted with audible back-up alarms; (xi) sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		through their use of high visibility vests when working in or walking through heavy equipment operating areas; (x) Ensure moving equipment is outfitted with audible back-up alarms; (xi) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and (xii) Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.		
Community Health and Safety.	traffic accidents and vehicle collision with pedestrians	(i) Plan routes to avoid times of peak-pedestrian activities. (ii) Liaise with IPIU/DSC in identifying high-risk areas on route cards/maps. (iii) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure. (iv) Provide road signs and flag persons to warn of dangerous conditions.	Construction Contractor	(i) Traffic Management Plan; (ii) complaints from sensitive receptors
Work Camps	temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants	(i) Consult with IPIU/DSC before locating project offices, sheds, and construction plants; (ii) Minimize removal of vegetation and disallow cutting of trees; (iii) Provide water and sanitation facilities for employees;	Construction Contractor	(i) complaints from sensitive receptors; (ii) water and sanitation facilities for employees; and (iii) IPIU/DSC report in writing that the camp has been vacated and restored

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		(iv) Prohibit employees from poaching wildlife and cutting of trees for firewood; (v) Train employees in the storage and handling of materials which can potentially cause soil contamination; (vi) Recover used oil and lubricants and reuse or remove from the site; (vii) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; (viii) Remove all wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and (ix) Request IPIU/DSC to report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.		to pre-project conditions
Social and Cultural Resources	risk of archaeological chance finds	(i) Strictly follow the protocol for chance finds in any excavation work; (ii) Request IPIU/DSC or any authorized person with archaeological field training to observe excavation; (iii) Stop work immediately to allow further investigation if any finds are suspected; and (iv) Inform IPIU/DSC if a find is suspected, and take any action they require ensuring its removal or protection in situ. (v) Avoid any hindrance and disturbance to any religious structure	Construction Contractor	(i) records of chance finds

Table 7.3: Anticipated Impacts and Mitigation Measures – Operation and Maintenance Environmental Mitigation Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for	Monitoring of Mitigation
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			Mitigation	
Noise Level	noise levels tend to increase with vehicular traffic	Put signage and implement “no blowing of horns” zones where there are sensitive receptors	Municipal Highway Department (MHD)	complaints from sensitive receptors
Accessibility	Portions of the roads and bridges may be affected during routine repairs	Coordinate with the Municipal Police Department so that warning signs and traffic diversions can be set up when necessary	MHD	complaints from sensitive receptors
Ecological Resources	ecological gain from the planting of replacement trees	Coordinate with the Municipal Council for the continuous care of the planted trees.	MHD	% survival of planted trees

Table 7.4: Pre-construction Environmental Monitoring Program

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Permits – Trees and Vegetation	Access roads	Design and Supervision Consultants (DSC) in close coordination with the town Investment Project Implementation Unit (IPIU)	(i) Inventory of trees; (ii) Tree-cutting permit; (iii) Location and number of trees replaced for every one tree cut	checking of records	(i) Inventory of trees prepared; (ii) Tree-cutting permit obtained from Municipal Council or District Collector; (iii) Location identified and number of trees estimated	once	IPMU
Utilities	ROW of ROB site	DSC	(i) design specification showing utility ducts if necessary; (ii) list of affected	checking of records	(i) utility ducts included in the design; (ii) list of affected utilities and operators prepared; (iii) requirement for	once	IPMU

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
			utilities and operators; (iii) bid document to include requirement for a contingency plan for service interruptions		a contingency plan for service interruptions included in bid documents		
Access Roads	ROW of site	DSC and Non-government Organization in charge of public consultation and disclosure	(i) plan drawings showing entry and exit points; (ii) records of public consultations	checking of records	(i) plan drawings include entry and exit points; (ii) stakeholders consulted; (iii) updated IEE and EMP disclosed	once	IPMU
Social and Cultural Resources	ROW of site	IPIU and DSC	Chance Finds Protocol	checking of records	Chance Finds Protocol provided to construction contractors prior to commencement of activities	once	IPMU
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	IPIU and DSC to determine locations prior to award of construction contracts.	List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	checking of records	List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas provided to construction contractors prior to commencement of works.	once	IPMU
Sources of Materials	Quarry sites	IPIU and DSC to prepare list of approved quarry sites and sources of materials	(i) list of approved quarry sites and sources of materials; (ii) bid document to	checking of records	(i) list of approved quarry sites and sources of materials provided to construction contractors	once	IPMU

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
			include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.		(ii) bid document included requirement for verification of suitability of sources and permit for additional quarry sites if necessary.		
Baseline Environmental Condition – Ambient Air Quality	Subproject sites	DSC	Establish baseline values of particulate matters (PM 10 and PM 2.5) and other pollutants	Air sample collection and analyses by accredited 3rd party laboratory	GOI Ambient Air Quality Standards	Once prior to start of construction	IPMU
Baseline Environmental Condition - Water Quality	Subproject sites	DSC	Establish baseline values of suspended solids (TSS), (iii) pH (iv) biological oxygen demand (BOD), (v) fecal coliform	Air sample collection and analyses by accredited 3rd party laboratory	GOI Water Quality Standards	Once prior to start of construction	IPMU

Table 7.5: Construction Environmental Monitoring Program

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Sources of Materials	quarries and sources of materials	Construction Contractor	Construction Contractor documentation	(i) checking of records; (ii) visual inspection of sites	(i) sites are permitted; (ii) report submitted by construction contractor monthly (until such time there is	Monthly submission for construction contractor as needed for DSC	DSC

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
					excavation work)		
Air Quality	construction sites and areas designated for stockpiling of materials	Construction Contractor	(i) Location of stockpiles; (ii) complaints from sensitive receptors; (iii) heavy equipment and machinery with air pollution control devices (iii) particulate matters (PM 10 and PM 2.5) and other pollutants as per Annexure-4 (iv) vehicular emissions such as sulphur dioxide (SO ₂), nitrous oxides (NO _x), carbon monoxide (CO), and hydrocarbons (HC)	(i) checking of records; (ii) analysis of generated air monitoring results	(i) stockpiles on designated areas only; (ii) complaints from sensitive receptors satisfactorily addressed; (iii) air pollution control devices working properly; (iv) GOI Ambient Quality Standards for ambient air quality; (iv) GOI Vehicular Emission Standards for SO ₂ , NO _x , CO and HC.	monthly for checking records	DSC
Water Quality	(i) construction sites; (ii) areas for stockpiles, storage of fuels and lubricants and waste materials;	Construction Contractor	(i) Areas for stockpiles, storage of fuels and lubricants and waste materials; (ii) number of silt traps installed along drainages leading to water bodies; (iii)	analysis of generated water monitoring results (not required as there is no water body exist near project influence area)	(i) designated areas only; (ii) silt traps installed and functioning; (iii) no noticeable increase in suspended solids and silt from construction activities (iv) GOI	monthly	DSC

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
			records of surface water quality inspection; (iv) effectiveness of water management measures; (v) for inland water: suspended solids, oil and grease, biological oxygen demand (BOD), and coliforms.		Standards for Water Discharges to Inland Waters and Land for Irrigation		
Noise Levels	(i) construction sites; (ii) areas for stockpiles, storage of fuels and lubricants and waste materials; (iii) work camps	Construction Contractor	(i) Complaints from sensitive receptors; (ii) use of silencers in noise-producing equipment and sound barriers; (iii) equivalent day and night time levels as per Annexure-4	(i) checking of records; (ii) analysis of generated noise monitoring results	(i) complaints from sensitive receptors satisfactorily addressed; and (ii) silencers in noise-producing equipment functioning as design; and (iii) sound barriers installed where necessary	Monthly	DSC
Existing Infrastructure and Facilities	(i) construction sites; (ii) alignment of affected utilities	Construction Contractor	Existing Utilities Contingency Plan	(i) checking of records; (ii) visual inspection	implementation according to Utilities Contingency Plan	as needed	DSC
Flora and Fauna	(i) construction sites; (ii) location where replacement	Construction Contractor	(i) tree-cutting permit for affected trees; (ii) number of replanted trees	(i) checking of records; (ii) visual inspection	number of trees cut, replanted and location according to the tree-cutting permit	as needed	DSC

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
	trees will be planted						
Landscape and Aesthetics	(i) construction sites; (ii) areas for stockpiles, storage of fuels and lubricants and waste materials; (iii) work camps	Construction Contractor	(i) Waste Management Plan; (ii) complaints from sensitive receptors; (iii) IPIU/DSC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.	(i) checking of records; (ii) visual inspection	(i) no accumulation of solid wastes on-site; (ii) implementation of Waste Management Plan; (iii) Complaints from sensitive receptors satisfactorily addressed.	Monthly	DSC
Transportation – Accessibility	(i) construction sites; (ii) traffic routes	Construction Contractor	(i) Traffic Management Plan; (ii) complaints from sensitive receptors; (iii) number of signage placed at subproject sites.	visual inspection	(i) implementation of Traffic Management Plan; (ii) complaints from sensitive receptors satisfactorily addressed; (iii) signage visible and located in designated areas	Monthly	DSC
Socio-Economic	construction sites	Construction Contractor	(i) employment records; (ii) records of sources of materials	checking of records	number of employees from town equal or greater than 50% of total workforce	Quarterly	DSC
Occupational	construction	Construction	(i) site-specific	(i) checking of	(i) implementation	Quarterly	DSC

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Health and Safety	sites	Contractor	Health and Safety (H&S) Plan; (ii) Equipped first-aid stations; (iii) Medical insurance coverage for workers; (iv) Number of accidents; (v) Supplies of potable drinking water; (vi) Clean eating areas where workers are not exposed to hazardous or noxious substances; (vii) record of H&S orientation trainings (viii) personal protective equipments; (ix) % of moving equipment outfitted with audible back-up alarms; (xi) sign boards for hazardous areas such as	records; (ii) visual inspection	of H & S plan; (ii) number of work-related accidents; (iii) % usage of personal protective equipment; (iv) number of first-aid stations, frequency of potable water delivery, provision of clean eating area, and number of sign boards are according to approved plan; (v) % of moving equipment outfitted with audible back-up alarms		

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
			energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal.				
Community Health and Safety.	construction sites	Construction Contractor	(i) Traffic Management Plan; (ii) complaints from sensitive receptors	visual inspection	(i) implementation of Traffic Management Plan; (ii) complaints from sensitive receptors satisfactorily addressed	Quarterly	DSC
Work Camps	work camps	Construction Contractor	(i) complaints from sensitive receptors; (ii) water and sanitation facilities for employees; and (iii) IPIU/DSC report in writing that the camp has been vacated and restored to pre-project conditions	visual inspection	(i) designated areas only; (ii) complaints from sensitive receptors satisfactorily addressed	Quarterly	DSC
Social and Cultural Resources	construction sites	Construction Contractor	records of chance finds	checking of records	Implementation of Chance Finds Protocol	as needed	DSC

Table 7.6: Operation and Maintenance Environmental Monitoring Program

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Noise Levels	subproject sites	Municipal Highway Department (MHD)	complaints from sensitive receptors	checking of records	complaints from sensitive receptors satisfactorily addressed	as needed	PMU
Accessibility	subproject sites	MHD	complaints from sensitive receptors	checking of records	complaints from sensitive receptors satisfactorily addressed	as needed	PMU
Ecological Resources	subproject sites	MHD	% survival of planted trees	checking of records	at least 80% survival rate	quarterly	PMU

D. Environmental Management Costs

150. Most of the mitigation measures require the Construction Contractors to adopt good site practice, which should be part of their normal procedures already, so there are unlikely to be major costs associated with compliance. Regardless of this, any cost of mitigation by the construction contractors or DSC are included in the budgets for the civil works and do not need to be estimated separately here. Mitigation that is the responsibility of LSGD will be provided as part of their management of the project, so this also does not need to be duplicated here.

151. The remaining actions in the Environmental Management Plan are the various environmental monitoring activities. These have not been budgeted elsewhere, and their costs are shown in **Table 7.7**. The figures show that the total cost of environmental management and monitoring for this subproject as a whole (covering design and construction) is INR 0.728 million.

Table 7.7: Estimated Environmental management and monitoring costs (INR)

Item	Quantity	Unit Cost	Total Cost	Sub-total	Source of Funds
1. Implementation of EMP (2 years)					
Environmental Monitoring Specialist of DSC	1 x 3 month	140,000 ⁶	420,000		DSC
Survey and monitoring expenses - air and noise quality					DSC
Air Quality Monitoring	12	6000	72,000		
Noise Monitoring	12	3000	36,000	528,000	
2. Improvement of aesthetics along the bridge including plantation	Lump Sum	200,000	200,000	200,000	Contractor
TOTAL				728,000	

(Air Quality- Once in a week for 2 weeks 2 locations , semi-annually for the parameters like PM 10, PM 2.5, SO₂ NO_x, CO, H₂S; Noise level- Once (6 times in a day in 6 working hours for 2 days at 2 locations, measurement semi-annually)

⁶ Unit costs of domestic consultants include fee, travel, accommodation and subsistence

VIII. FINDINGS AND RECOMMENDATIONS

152. The process described in this document has assessed the environmental impacts of the infrastructure proposed under the Alwar Urban Transport and Roads Subproject. Potential negative impacts were identified in relation to construction and operation of the improved infrastructures. No impacts were identified as being due to either the project design or location.

153. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. These were discussed with specialists responsible for the engineering aspects and as a result some measures have already been included in the designs of the bridges. This means that the number of impacts and their significance has already been reduced by amending the design.

154. Regardless of these and various other actions taken during the IEE process and in developing the project, there will be some residual impacts on the environment when the ROB will built and when it is operating. This is mainly because of the sizes of the structures, location at busy roads, and the fact that the work involves some excavation so there could be a risk of uncovering historical remains from the rich cultural history of Rajasthan. Because of these factors the most impacts are on the physical environment, the human environment, and the cultural heritage. One field in which impacts are much less routine is archaeology, and here a series of specific measures have been developed to avoid damaging important remains.

155. It is proposed that the subproject will employ in the workforce people who live in the vicinity of the construction sites to provide them with a short-term economic gain.

156. There will be some ecological gain when three trees shall be planted *in lieu of* each tree that will be required to cut.

157. Once the bridges are completed, it will operate with routine maintenance (such as occasional repairs of the road, safety barriers and signs), which will be small-scale, infrequent and short in duration and should not affect the environment. The only mitigation required in this period is to plan any maintenance work with the municipal authorities and police to ensure precautions are taken to maintain the safety of workers and road users.

158. The main impacts of the operating bridges will be beneficial in improving the infrastructure of the town by providing a more efficient and effective transport route, which should improve the overall economy by reducing time spent idle in traffic by delivery vehicles, employees and customers. The general environment will also be improved at this location as the daily concentration of vehicular noise and pollution from exhaust gases will be removed.

159. Mitigation will be assured by a program of environmental monitoring conducted during construction and operation to ensure that all measures in the EMP are implemented and to determine whether the environment is protected as intended. This will include observations on and off site, document checks, and interviews with workers and beneficiaries, and any requirements for remedial action will be reported to the IPMU.

160. The stakeholders were involved in developing the IEE through face-to-face discussions on site and a large public meeting held in the town, after which views expressed were incorporated into the IEE and the planning and development of the project. The IEE will be made available at public locations in the town and will be disclosed to a wider audience via the ADB website. The consultation process will be continued and expanded during project implementation, when a nationally-recognized NGO will be appointed to handle this key element to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation.

IX. CONCLUSIONS

161. The subproject is unlikely to cause significant adverse impacts. The potential adverse impacts that are associated with design, construction, and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures.

162. Based on the findings of the IEE, the classification of the Project as Category “B” is confirmed, and no further special study or detailed EIA needs to be undertaken to comply with ADB Environment Policy (2002) or GoI EIA Notification (2006).

Annexure – 1

Photograph of Project Area



Annexure 2

Rapid Environmental Assessment (REA) Checklist

Instructions:

- (i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES), for endorsement by Director, RSES and for approval by the Chief Compliance Officer.
- (ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.
- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: India/Rajasthan Urban Infrastructure Development Project

Sector Division: Road/Bridge (ROB), Alwar

SCREENING QUESTIONS	Yes	No	REMARKS
A. PROJECT SITING Is the project area adjacent to or within any of the following Environmentally sensitive areas?			
▪ Cultural heritage site		√	No any cultural heritage site is present near Project site
▪ Protected area		√	Not Applicable
▪ Wetland		√	Not Applicable
▪ Mangrove		√	Not Applicable
▪ Estuarine		√	Not Applicable
▪ Buffer zone of protected area		√	Not Applicable
▪ Special area for protecting biodiversity		√	Not Applicable
B. POTENTIAL ENVIRONMENTAL IMPACTS Will the project cause...			
▪ encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?		√	One temple exist out of the ROW and influence zone of the subproject
▪ encroachment on precious ecology (e.g. sensitive or protected areas)?		√	
▪ alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?		√	No waterway is crossed by proposed road

SCREENING QUESTIONS	Yes	No	REMARKS
▪ deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?		√	No surface water body exist with project influence zone
▪ increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing?		√	No rock crushing or cutting and filling work is proposed
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	√		Workers engaged shall be in occupational health and safety risks during construction and operation phase due to physical and chemical hazards
▪ noise and vibration due to blasting and other civil works?	√		Blasting is not proposed but noise may be created during construction phase
▪ dislocation or involuntary resettlement of people?	√		There are some mobile vendors near railway crossing
▪ dislocation and compulsory resettlement of people living in right-of-way?	√		There are some temporary shop on railway level crossing
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	
▪ other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?		√	
▪ hazardous driving conditions where construction interferes with pre-existing roads?		√	The new access road is to be developed, therefore no interference with pre-existing roads
▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI's and HIV/AIDS) from workers to local populations?	√		Poor sanitation and solid waste disposal in construction camps and work sites may create health hazards to workers and local communities, transmission of communicable diseases is also possible due to possible engagement of few outside workers
▪ creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?		√	
▪ accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials?		√	No toxic materials are proposed to be used in proposed project
▪ increased noise and air pollution resulting from traffic volume?	√		Operation of transportation vehicles and construction equipments may increase noise and air pollution in the locality
▪ increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?	√		Accidental leakage of oil and grease from construction vehicles and equipments or leakages due to poor maintenance may cause risk of water pollution

SCREENING QUESTIONS	Yes	No	REMARKS
▪ social conflicts if workers from other regions or countries are hired?		√	Most of the workers shall be hired locally as per guidelines
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	Improvement in the existing road will not result in large population influx
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		√	There are no major use, transportation or disposal of materials such as explosives, fuel and other chemicals during construction and operation
▪ community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning.		√	No community safety risks, due to accidental and natural causes during project execution is expected.

Climate Change and Disaster Risk Questions The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.	Yes	No	REMARKS
• Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)	√		Awar town lies in high earthquake risk (Zone IV)
▪ Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (eg., increased erosion or landslides could increase maintenance costs, permafrost melting or increased soil moisture content could affect sub0-grade).		√	
▪ Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (eg., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?		√	
▪ Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by encouraging settlement in areas that will be more affected by floods in the future, or encouraging settlement in earthquake zones)?		√	

Note: Hazards are potentially damaging physical events.

Appendix I: Environments, Hazards and Climate Changes

Environment	Natural Hazards and Climate Change	Example Impact on Roads and Highways
Arid/Semi-arid and desert environment	Low erratic rainfall of up to 500 mm rainfall per annum with periodic droughts and high rainfall variability. Low vegetative cover. Resilient ecosystems & complex pastoral and systems, but medium certainty that 10–20% of drylands degraded; 10-30% projected decrease in water availability in next 40 years; projected increase in drought duration and severity under climate change. Increased mobilization of sand dunes and other soils as vegetation cover declines; likely overall decrease in agricultural productivity, with rain-fed agriculture yield reduced by 30% or more by 2020. Earthquakes and other geophysical hazards may also occur in these environments.	Reduced availability of water for compaction during construction, increased sand on carriageways reduce road safety, road alignment may need to be reviewed where, for example, agriculturally productive zones are shifting.
Humid and sub-humid plains, foothills and hill country	More than 500 mm precipitation/yr. Resilient ecosystems & complex human pastoral and cropping systems. 10-30% projected decrease in water availability in next 40 years; projected increase in droughts, heatwaves and floods; increased erosion of loess-mantled landscapes by wind and water; increased gully erosion; landslides likely on steeper slopes. Likely overall decrease in agricultural productivity & compromised food production from variability, with rain-fed agriculture yield reduced by 30% or more by 2020. Increased incidence of forest and agriculture-based insect infestations. Earthquakes and other geophysical hazards may also occur in these environments.	Increased landslides and mudflows disrupt road networks, Increased moisture content in the subsurface can result in increased penetration of water into the fill, which may also collapse, Reduced effectiveness of drainage which results in a reduction in the bearing capacity of the soils which become saturated
River valleys/ deltas and estuaries and other low-lying coastal areas	River basins, deltas and estuaries in low-lying areas are vulnerable to riverine floods, storm surges associated with tropical cyclones/typhoons and sea level rise; natural (and human-induced) subsidence resulting from sediment compaction and ground water extraction; liquefaction of soft sediments as result of earthquake ground shaking. Tsunami possible/likely on some coasts. Lowland agri-business and subsistence farming in these regions at significant risk.	Same as above
Small islands	Small islands generally have land areas of less than 10,000km ² in area, though Papua New Guinea and Timor with much larger land areas are commonly included in lists of small island developing states. Low-lying islands are especially vulnerable to storm surge, tsunami and sea-level rise and, frequently, coastal erosion, with coral reefs threatened by ocean warming in some areas. Sea level rise is likely to threaten	Increased salinity increases corrosion of materials which can break-down, Road is eroded by increased wave action, Increased flooding from overtopping of sea-water over road or

Environment	Natural Hazards and Climate Change	Example Impact on Roads and Highways
	the limited ground water resources. High islands often experience high rainfall intensities, frequent landslides and tectonic environments in which landslides and earthquakes are not uncommon with (occasional) volcanic eruptions. Small islands may have low adaptive capacity and high adaptation costs relative to GDP.	salt-water intrusion in to groundwater,
Mountain ecosystems	Accelerated glacial melting, rockfalls/landslides and glacial lake outburst floods, leading to increased debris flows, river bank erosion and floods and more extensive outwash plains and, possibly, more frequent wind erosion in intermontane valleys. Enhanced snow melt and fluctuating stream flows may produce seasonal floods and droughts. Melting of permafrost in some environments. Faunal and floral species migration. Earthquakes, landslides and other geophysical hazards may also occur in these environments.	Damage to infrastructure from landslides and mudflows, permafrost melting causes damage to roads, glacial lake outbursts wash out river-crossings.
Volcanic environments	Recently active volcanoes (erupted in last 10,000 years – see www.volcano.si.edu). Often fertile soils with intensive agriculture and landslides on steep slopes. Subject to earthquakes and volcanic eruptions including pyroclastic flows and mudflows/lahars and/or gas emissions and occasionally widespread ashfall.	Damage and loss of roads, insecurity for roadworks crew and maintenance

Annexure – 3

PUBLIC CONSULTATION- ENVIRONMENT

ROB Alwar

Location: ROB at Jai Marg, Alwar

Issues discussed

- Awareness and extent of the project and development components
- Benefits of Project for the economic and social Upliftment of Community
- Labour availability in the Project area or requirement of outside labour involvement
- Local disturbances due to Project Construction Work
- Necessity of tree felling etc. at project sites
- Water logging and drainage problem if any
- Drinking water problem
- Forest and sensitive area nearby the project site

1. **Date and time of Consultation: 01.04.2012, 02.30 p.m.**

2. **Location: near ROB site, access road and nearby locations**

A. Table: Issues of the Public Consultation- Design phase

Sr. No.	Key Issues/Demands	Perception of community	Action to be taken
1	Awareness of the project – including coverage area	Mostly people are unaware of the project	Before start of the project public consultations in nearby areas to be done and caution boards indicating the nature or work to be displayed
2	In what way they may associate with the project	They will be benefitted by overcoming the problem of traffic jam at the time of closed railway crossing	
3	Presence of any forest, wild life or any sensitive / unique environmental components nearby the project area	No such issue except one tree may be required to cut, during construction	Compensatory plantation to be done against the felling trees
4	Presence of historical/ cultural/ religious sites nearby	One temple is there	Temple is out of ROW and will not be affected.
5	Un favorable climatic condition	Very hot during summer (upto 48 degree celcius) and very cold during winter	
6	Occurrence of flood	No flood occurred during last 20 years	
7	Drainage and sewerage problem facing	Yes, nallah passing under railway culvert becomes filled with water during heavy rains	Drainage system to be improved
8	Present drinking water problem – quantity and quality	No any	
9	Present solid waste collection and disposal problem	No any, SW is collected by municipal authority regularly	
10	Availability of labour during	Yes, labors are easily available	

Sr. No.	Key Issues/Demands	Perception of community	Action to be taken
	construction time		
11	Access road to project site	yes	
12	Perception of villagers on tree felling and afforestation	One tree may be cut	Tree cutting permit to be taken and compensatory plantation to be done for the cut trees
13	Dust and noise pollution and disturbances during construction work	These may affect for a short period	Proper mitigation measures to be consider
14	Setting up worker camp site within the village/ project locality	Project will be located in the Govt. land so setting of worker camp will not cause any problem to local habitants	
15	Safety of residents during construction phase and plying of vehicle for construction activities	Yes during construction phase road traffic and safety of road users should be taken care	Plan should be made to maintain the safety of people and safe traffic flow
16	Conflict among beneficiaries downstream users – water supply project using of river water	No such issue	
17	Requirement of enhancement of other facilities	Road lighting, signage and demarcation	These are taken in DPR
18	Whether local people agreed to sacrifice their lands (cultivable or not) for beneficial project after getting proper compensation	ROB is proposed on government land no land acquisition is proposed	

Summary of outcome:

People are very much interested for construction of ROB, because they are suffering greatly due to traffic jam.

Annexure - 4

BASE LINE AND DURING CONSTRUCTION MONITORING

Monitoring	Location	Parameters	Frequency	No. of locations/ samples	Remarks
Ambient Air Quality Monitoring					
	2 location i.e. Fruit & Vegetable market and UIT office	RSPM (PM ₁₀) & PM _{2.5} , SO ₂ , NOx and CO	1 day 24 Hrs. basis- Semi-annually for 2 years	2 locations nearby the project site= 8 samples	-
Ambient Noise Level Monitoring					
Sound Pressure Level	2 location i.e. Near Bridge site and UIT office	L _{eq}	1 day 24 Hrs. basis- Semi-annually for 2 years	2 locations nearby the project site= 8 samples	-
Water Quality Monitoring					
Surface water Quality parameters		Not Applicable	Not Applicable	Not Applicable	Not applicable as no surface water body exist near project influence area

POST CONSTRUCTION MONITORING

Monitoring	Project Work Type	Parameters	Frequency	No. of locations/ samples	Remarks
Ambient Air Quality Monitoring					
	2 location i.e. Fruit & Vegetable market and UIT office	RSPM (PM ₁₀) & PM _{2.5} , SO ₂ , NOx and CO	1 day 24 Hrs. basis- Semi-annually for 1 year	2 locations nearby the project site= 4 samples	-

Monitoring	Project Work Type	Parameters	Frequency	No. of locations/ samples	Remarks
Ambient Noise Level Monitoring					
Sound Pressure Level	2 location i.e. Near Bridge site and UIT office	L _{eq}	1 day 24 Hrs. basis- Semi-annually for 1 year	2 locations nearby project= 8 Samples	-

Annexure - 5

Recommended Contract Clauses for Contractors

A. Sources of Materials

- o Use quarry sites and sources permitted by government;
- o Verify suitability of all material sources and obtain approval of Investment Program Implementation Unit (IPIU);
- o If additional quarries will be required after construction has started, obtain written approval from IPIU; and;
- o Submit to DSC on a monthly basis documentation of sources of materials.

B. Air Quality

- o Consult with IPIU/DSC on the designated areas for stockpiling of clay, soils, gravel, and other construction materials;
- o Damp down exposed soil and any stockpiled on site by spraying with water when necessary during dry weather;
- o Use tarpaulins to cover sand and other loose material when transported by trucks; and
- o Fit all heavy equipment and machinery with air pollution control devices which are operating correctly and have PUC of all the construction vehicles updated.

C. Surface Water Quality

- o Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
- o Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with IPIU/DSC on designated disposal areas;
- o Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
- o Place storage areas for fuels and lubricants away from any drainage leading to water bodies;
- o Dispose any wastes generated by construction activities in designated sites; and
- o Conduct surface quality inspection according to the Environmental Management Plan (EMP).

D. Noise Levels

- o Plan activities in consultation with IPIU/DSC so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance;
- o Require horns not be used unless it is necessary to warn other road users or animals of the vehicle's approach;
- o Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and
- o Maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at a distance of 10 m or more from the vehicle/s.

E. Existing Infrastructure and Facilities

- o Obtain from IPIU and/or DSC the list of affected utilities and operators;
- o Prepare a contingency plan to include actions to be done in case of unintentional interruption of services

F. Accessibility

- o Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
- o Schedule transport and hauling activities during non-peak hours;
- o Locate entry and exit points in areas where there is low potential for traffic congestion;
- o Keep the site free from all unnecessary obstructions;

- o Drive vehicles in a considerate manner;
- o Coordinate with Alwar Municipal Traffic Office for temporary road diversions and with for provision of traffic aids if transportation activities cannot be avoided during peak hours; and
- o Notify affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.

G. Landscape and Aesthetics

- o Prepare and implement Waste Management Plan;
- o Recover used oil and lubricants and reuse or remove from the sites; (iii) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- o Remove all wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and
- o Request IPIU/DSC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.

H. Socio-Economic – Income

- o Leave spaces for access between mounds of soil;
- o Provide walkways and metal sheets where required to maintain access across trenches for people and vehicles;
- o Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools;
- o Consult businesses and institutions regarding operating hours and factoring this in work schedules; and
- o Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.

I. Socio-Economic – Employment

- o Employ at least 50% of the labor force, or to the maximum extent, local persons within the 2-km immediate area if manpower is available; and
- o Secure construction materials from local market.

J. Occupational Health and Safety

- o Develop and implement site-specific Health and Safety (H&S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use Personal Protective Equipment; (c) H&S Training for all site personnel; (d) documented Procedures to be followed for all site activities; and (e) documentation of work-related accidents;
- o Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;
- o Provide medical insurance coverage for workers;
- o Secure all installations from unauthorized intrusion and accident risks;
- o Provide supplies of potable drinking water;
- o Provide clean eating areas where workers are not exposed to hazardous or noxious substances;
- o Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers;
- o Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted;
- o Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
- o Ensure moving equipment is outfitted with audible back-up alarms;

- o Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and
- o Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.

K. Community Health and Safety.

- o Plan routes to avoid times of peak-pedestrian activities.
- o Liaise with IPIU/DSC in identifying high-risk areas on route cards/maps.
- o Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.
- o Provide road signs and flag persons to warn of dangerous conditions.

L. Work Camps

- o Consult with IPIU/DSC before locating project offices, sheds, and construction plants;
- o Minimize removal of vegetation and disallow cutting of trees;
- o Provide water and sanitation facilities for employees;
- o Prohibit employees from poaching wildlife and cutting of trees for firewood;
- o Train employees in the storage and handling of materials which can potentially cause soil contamination;
- o Recover used oil and lubricants and reuse or remove from the site;
- o Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- o Remove all wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and
- o Request IPIU/DSC to report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.

M. Social and Cultural Resources

- o Strictly follow the protocol for chance finds in any excavation work;
- o Request IPIU/DSC or any authorized person with archaeological field training to observe excavation;
- o Stop work immediately to allow further investigation if any finds are suspected; and
- o Inform IPIU/DSC if a find is suspected, and take any action they require ensuring its removal or protection in situ.