

Initial Environmental Examination

Document Stage:Final IEE
Project Number: 40031
ADB Loan No.: 2506
Month Year: August 2012

**India: Rajasthan Urban Sector Development
Investment Program - Bharatpur Circular 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
FI	-	Financial Intermediary
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	-	Multitranches Financing Facility
MoEF	-	Ministry of Environment and Forests
NAAQS	-	National Ambient Air Quality Standards
OD	-	Outer Diameter
OHSR	-	Over Head Service Reservoir
OM	-	Operations Manual
PHED	-	Public Health Engineering Department
PMU	-	Project Management Unit
RCC	-	Reinforced Cement Concrete
ROW	-	Right of Way
RPCB	-	Rajasthan State Pollution Control Board
RSPM	-	Respirable Suspended Particulate Matter
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
UA	-	Urban Agglomeration
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

CONTENTS

I.	INTRODUCTION	1
A.	Purpose of the report	1
B.	Extent of the IEE study.....	1
II.	DESCRIPTION OF THE PROJECT.....	7
A.	Type, Category & Need	7
B.	Location, Size and Implementation Schedule.....	7
C.	Description of the Subproject	7
D.	Description of Existing traffic	8
E.	Traffic Projection	9
F.	Description of the Upgradation and Construction proposal.....	11
III.	DESCRIPTION OF THE ENVIRONMENT.....	14
A.	Physical Resources	14
B.	Biological Resources	21
C.	Economic Development.....	22
D.	Infrastructure.....	22
E.	Social and Cultural Resources.....	23
IV.	ANTICIPATED IMPACTS AND MITIGATION MEASURES	24
A.	Pre construction – Design and Location	24
B.	Construction.....	25
C.	Operation and Maintenance	26
V.	PUBLIC CONSULTATION AND INFORMATION DISCLOSURE.....	34
A.	Project Stakeholders	34
B.	Consultations and Disclosure to Date	34
C.	Future Consultation and Disclosure	35
VI.	GRIEVANCE REDRESS MECHANISM	37

VII.	ENVIRONMENTAL MANAGEMENT PLAN	38
A.	Institutional Arrangements.....	38
B.	Environmental Mitigation Plan	40
C.	Environmental Monitoring Program	40
D.	Environmental Management Plan Costs.....	61
VIII.	FINDINGS AND RECOMMENDATIONS.....	62
A.	Findings	62
B.	Recommendations.....	64
IX.	CONCLUSIONS	65
	ANNEXURE 1 – RAPID ENVIRONMENT ASSESSMENT (REA) CHECKLIST.....	66
	ANNEXURE 2 - PUBLIC CONSULTATION- ENVIRONMENT	72
	ANNEXURE 3 - RECOMMENDED CONTRACT CLAUSES	77
	ANNEXURE 4 –LIST AFFECTED COMMUNITY PROPERTIES ALONG PROJECT ROAD	80
	ANNEXURE 5- DETAILS OF TREE PLANTATION ALONG PROJECT ROAD	81

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 Multitranches 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 Bharatpur Circular Road sub-project but which is subject to Environmental Examination. This is the Initial Environmental Examination (IEE) report for the Bharatpur Circular Road transport 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 Bharatpur, the headquarters town of Bharatpur district, in the Eastern part of Rajasthan. Bharatpur Town is located the East longitude 76°53' to 78°17' and North latitude 26°22' to 27°83' and altitude of 175.00 meters above mean sea level and is very well connected with Delhi-Mumbai broad gauge railway line. A broad gauge railway line also links it with Jaipur. The work consist improvement and strengthening of 7.8 km Circular road development project road revolving around old Bharatpur town and 1.0 km road connecting it to NH-11. Above mentioned project also involve 1 km connecting link between circular road and NH-11.

4. **Description of Environment:**

Topography: Topography Bharatpur lies between the East longitude 76o 53' to 78o 17' and North latitude 26o 22' to 27o 83'. It is situated at 100 meters above MSL. Topographically Bharatpur, is leveled and saucer in shape.

Drainage: The peculiar topography of the town provides natural drainage pattern. The area has been divided into two river drainage basins, namely Barah river basin towards north and Banganga river basin towards south.

Natural Hazards: Bharatpur town lies in medium to high risk zone (III and IV). The area is prone to earthquakes as it is located on comparatively unstable geological plains based on evaluation of the available earthquake zone information. The Natural Hazard Zone Map of Bharatpur district is shown in Figure 1. Evaluation of the map shows that larger part of the district is flood prone but the project road alignment is not located in this area, The project road alignment is entirely located within Bharatpur town.

Geology: The rock types of district exposed are grouped under Alwar and Ajabgarh Groups belonging to the Delhi super group (Lower to Middle Proterozoic). The rocks of Alwar group

comprising quartzite, basic volcanic tuffaceous sandstone, shale etc. are well exposed in the south-western part of the district around Khankhera. The major parts of the district are occupied Quaternary alluvium and blown sand which conceal the hard rock geology. Hydro-geological domains of unconsolidated and consolidated rocks formation with varying ground water potential.

Geomorphology: Geo-morphologically the district classified into seven geomorphic units namely hill and valley, younger flood plans, ravine, obstacle dunes and pediment / pedi-plain. On an average 90 % of the district area covered with unconsolidated porous formations.

Mineral Resources: Barytes, buildings stones, and quartz are the important minerals of the district. There are no mineral resources identified along the project road alignment as it entirely situated in Bharatpur town.

Soils: The soil is generally alluvial, prone to water logging. The nature of recently alluvial calcareous has been observed. Nutrient level in the Bharatpur soil including area coverage of saline and sodic soil. The nutrient status of the Bharatpur soil is graded as low to medium level.

Climate: The climate of Bharatpur is generally dry. The maximum average temperature during summer is 44 degree Celsius to 47 degree Celsius and during winters it is -5 degree Celsius to 1 degree Celsius. The climate is generally dry. The wind blows at low except during summer and monsoon, when hard and turbulent winds are experienced. The average rainfall is 646 mm with 80 to 90 percent of the annual rains is experienced during June to September.

Air Quality: The ambient air quality monitoring has been done with respect to area along the project road for establishment of baseline information. The concentrations of various parameters show that across the proposed road corridor PM10 is higher at all monitored location while PM2.5 is exceeding the limit (60 $\mu\text{g}/\text{m}^3$) at two location that is at PHED Pump House Near Hiradash Bus Stand (77.33 $\mu\text{g}/\text{m}^3$) and Bizlighar Choraha (81.8 $\mu\text{g}/\text{m}^3$). Both these location are crowded commercial location. The type of fuel used for cooking near bus stand (there are many small dhaba/small hotel) as well as congregation of traffic is the main plausible reason for the observed high concentrations. The other pollution sources in the region are mainly traffic and windblown dust.

Surface Water: There are quite a number of rivers that flow through the Bharatpur district. The main rivers are Chambal, Ban-Ganga, Barah, Parwati and Gambhiri. However, there is no water quality monitoring stations at any of these rivers. Visual observations and interviews with PHED show that main purposes of these rivers are agricultural, fishing, and domestic uses. Accordingly, water quality is not deteriorated.

Groundwater: There are number of National Hydrographic monitoring stations of Central Ground Water Board in and around Bharatpur. Fluctuation of ground water level in most of the cases ranged between 5 - 10 m below ground level. Records of groundwater quality monitoring from Public Health Engineering Department (PHED) show groundwater quality in Bharatpur town conforms to the set norms of the municipality. It has been noted that groundwater contains high levels of total dissolved solids in its surrounding vicinity.

Biological Resources: The boundaries of the Bharatpur Bird Sanctuary, also known as Keoladeo National Park, a UNESCO World Heritage site and its administrative boundary

located within 25 meter from project road alignment. According to the Bharatpur Bird Sanctuary Management Plan, the identified buffer zone is 500 m from the periphery of the bird sanctuary and all activities beyond this range are acceptable and the nearest project road alignment is more than 500 meter away from buffer zone. The protected area contains grasslands, woodlands, swamps, and wetlands. These diverse habitats are home to 374 avian species including 140 species of waterfowl, 372 species of plants, 34 species of mammals, 57 species of fish, 14 species of snakes, 5 species of lizards, 3 species of geckos, 7 species of turtles, 8 species of amphibians, 71 species of butterflies, and a variety of other lower biota.

Flora: The forests are generally irregular and situated on hills, usually on rocky or stony slopes or gently undulating grounds. Dhok (*Anogeissus Pendula*) is the principal species growing in these forests are: *Acacia catechu* (Khair), *Acacia leucophloe* (Arunj), *Butea monosperma* (Dhak). No endangered species has been observed along and around the project road.

Fauna: The district is known for its duck shoots. Geese, ducks, teals pintails, Siberian cranes during winter. Local birds are mainly egrets, painted storks, ibises, cormorants, saras-cranes, spoonbills, and open-billed storks, darter, besides common parakeets, crows, babblers, partridges and weaver bird. No endangered species has been observed along and around the project road.

Land use: Bharatpur district spreads over an area of 5,066 km² comprising urbanization area circulation public and semi-public, agriculture land, commercial area, road, water bodies, agriculture research and mining. The project road alignment is entirely located on municipal land within the town.

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.

5. There is protected area namely "Bharatpur Bird Sanctuary" located near the proposed roads and few small temples located along the proposed road. Short term loss of accessibility to some shops is expected during widening of the road. The proposed project involve only up-gradation and widening of existing road and entire alignment is located in municipal area so any significant impact is very unlikely on "Bharatpur Bird Sanctuary".

6. During project implementation the impacts are consider on physical environment like water, air, soil, noise; on biological environment, like flora and socio-economic environment (which is positive in some extent) and sensitive receptors. 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 and minimize the social impacts are taken care. Safety measures, both occupational and social are considered and those are depicted in this report. Traffic management plan will be implemented during construction of roads. During operation phases there are few positive socio-economic impacts will be anticipated like short term employment.

7. 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 Monitoring Specialist (EMS) 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.

8. Implementation of Environmental management plan and monitoring frequency will be taken care during construction phase. Most 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 building 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 residents, 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 INR 0.428 million.

9. 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 after advertising in Local NEWS papers. 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.

10. The project authority will establish a mechanism to receive and facilitate resolution of affected persons' concerns, complaints and grievances about the project's environmental performance.

11. 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 these two documents and the Environmental Monitoring Plan proposed in IEE and the internal and external monitoring proposed in the Resettlement Framework are also implemented in full.

12. 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 additional work is required to comply with ADB procedure.

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).

4. This Initial Environmental Examination (IEE) has been prepared for the project "Widening & strengthening of circular roads of Bharatpur town" as part of RUIDP Phase-II Tranche II. The subproject covers up-gradation and widening of existing circular road including side drain and culverts within available ROW.

5. This IEE report covers the general environmental profile of Bharatpur and includes an overview of the potential environmental impacts and their magnitude on physical, ecological, economic, and social and cultural resources within the subproject's influence area during design, construction, and operation stages. An Environmental Management Plan (EMP) is also proposed as part of this report which includes mitigation measures for significant environmental impacts during implementation of the Project, environmental monitoring program, and the responsible entities for mitigation and monitoring.

B. Extent of the IEE study

6. Indian law and ADB policy 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.

7. This IEE report was prepared on the basis of detailed screening and analysis of all environmental parameters, field investigations and stakeholder consultations to meet the requirements for environmental assessment process and documentation as per ADB's Environmental Policy (2002) and Government of India Environmental Impact Assessment (EIA) Notification of 2006.

1 ADB Policy

8. 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.

9. **Screening and Categorization.** The nature of the environmental 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 impact are assigned to one of the following four categories:

Category "A" Projects could have significant adverse environmental impacts. An EIA is required to address significant impacts.

Category "B" Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. An IEE is required to determine whether significant environmental 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 are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.

Category "FI" Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all Projects will result in insignificant impacts.

10. 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.

11. **Environmental Management Plan:** An EMP which addresses the potential impacts and risks identified by the environmental assessment shall be prepared. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the Project's impact and risks.

12. **Public Disclosure:** ADB will post the following safeguard documents on its website so affected people, other stakeholders, and the general public can provide meaningful inputs into the project design and implementation:

- (i) For environmental category A projects, draft EIA report at least 120 days before Board consideration;
- (ii) Final or updated EIA and/or IEE upon receipt; and
- (iii) Environmental Monitoring Reports submitted by Investment Program Implementation Unit (IPIU) during project implementation upon receipt.

2 National Law

13. The Government of India EIA Notification of 2006 (replacing the EIA Notification of 1994), sets out the requirement for environmental assessment in India. This states that Environmental Clearance 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.

14. 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 Environmental Clearance if appropriate.

15. Category B projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA). The State level EAC categorises 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 Environmental Clearance 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.

16. The only type of infrastructure provided by the RUSDIP that is specified in the EIA Notification is Common Municipal Solid Waste Management Facility (CMSWMF¹), where EC is required for all Common Municipal Solid Waste Management Facilities.

17. EC is thus not required for the proposed circular road sub-project that is the subject of this Environmental Examination.

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)

Table- 1.1 Environmental Acts and their application in the sub-project context

SL No	Applicable GOI Policies & Regulations	Objective	Reason for applicability
1	Environmental (Protection) Act 1986	To protect and Improve overall environment	Environment in general
2	Environmental Impact Assessment (EIA) notification, 1994	Requirement of Environmental Impact Assessment	Not applicable
3	Air (prevention and control of pollution) Act 1974	To control air pollution by controlling emission and air pollutants according to prescribed standards.	Air Pollution
4	Water(Prevention) and control of Pollution)Act and Cess Acts of 1977	To control water pollution by controlling emission &water pollutants as per prescribed standards	Water pollution
5	Indian forest Act 1980	To protect forests	Not applicable
6	The Wildlife (Protection) Act 1972	Protection Wild Life	Not applicable
7	Ancient Monuments and Archaeological sites & Remains Act 1958	Conservation of Cultural and Historical remains found in India	Applicable, (indirectly) Archaeological remains
8	The Land Acquisition Act 1894 & 1989	Set out rule for acquisition of land by Government.	Not applicable
9	Noise Pollution (Regulation and Control) rules 2000	Noise pollution regulation and controls	Applicable, Control of Noise pollution
10	Public liability insurance Act 1991	Assessment of hazardous materials and accident hazards	Applicable, Health and safety
11	Biological Diversity Act 2000	disclosure of species survey or collection activities to the National Biodiversity Authority	Not applicable
12	EIA notification 2006	For impact assessment of infrastructural Projects	Not applicable
13	International Environmental regulations in which India is a signatory	International environmental issues such as emission of green house gases	Applicable (indirectly) Global environmental issues

Table- 1.2 Applicable Cross sectoral law

SN	Applicable GOI Acts	Year	Objective	Applicability
1	Minimum wages Act,	1948	Grossly misused Act 1948, most important as far as the poverty ridden local people are concerned. For role of Social welfare department and labour department, a more effective mechanism needs to be developed.	Direct
2	Child labour (prohibition and regulation) Act 1986	1986	Grossly misused Act, effective mechanism need to be established to abolish this from the highways system permanently.	Direct
3	Labour Act	1988	The health and safety of workers employed in construction work etc	Direct
4	The Factories Act	1948	Health and Safety considerations for workers (Need to extend the provisions to highways)	Direct
5	The Right to Information Act (Very important Umbrella Act)	2005	One of the most important Acts, which will strengthen the right to freedom of speech and expression Act.	Direct

Table- 1.3 Environmental permits/approvals required for the sub-project

SL No	Env. Issues	MoEF for Category A project	PCB & SEIAA	State Forest Dept.	Wild Life Dept.	PHED & Water Resource Dept.	Local Bodies
1	Forest	No	Yes	Permission for tree removal will be required from Municipal Council as project is within Municipal limit or from state forest department	No	No	Yes, from municipality
2	Wildlife	N/A	N/A	N/A	N/A	N/A	N/A
3	Environment	N/A	Yes, for CTE & CTO , if Hot mix plant is setup for	No	N/A	N/A	N/A

			project				
4	Air/water/ noise related	No	Yes, if Hot Mix plant is setup for project.	No	N/A	N/A	N/A
5	Water (impacts as well as construction requirements)	No	No	No	No	Yes, from GWB for extraction of ground water, and from irrigation department for use of surface water	Yes, if it is sourced from community owned sources.
6	Debris disposal	No	No	No	No	No	From Municipal Council For disposal sites
7	Land acquisitions and rehabilitation	N/A	N/A	N/A	N/A	N/A	N/A

3 Review and Approval Procedure

18. For Category B projects the Initial Environmental Examination (IEE) and its summary (SIEE) as required, including an Environmental Management Plan (EMP) with budget identifying the cost of its implementation as incorporated in the related bid document if any, with adequate public consultation for each subproject, in accordance with the EARF will be submitted to ADB for review and approval before award of related contract. The approved summary IEE (SIEE) reports are required to be circulated worldwide by ADB, via the depository library system and are placed on the ADB website. The full IEE reports are also made available to the interested parties upon request.

4 Scope of Study

19. This is the IEE for the sub-project "Widening & strengthening of circular roads of Bharatpur town". 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 & Need

20. **Type.** This is a transportation subproject intended to improve the current situation in Bharatpur Town in terms of improved traffic system. This is one of a series of subprojects designed by the RUSDIP that are intended to raise the standards of the municipal infrastructure and services of Bharatpur Town and the other urban center to those expected of modern Asian towns.

21. **Category.** Environmental examination indicates the proposed subproject falls within ADB's environmental Category B projects. The Project components will only have small-scale, temporary and localized impacts on the environment, and can be mitigated. 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.

22. **Need.** 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. Improvement in the traffic system was identified as a key priority in the City Level Investment Plan (CLIP) prepared for Bharatpur town. The CLIP has been discussed at the City Level Committee (CLC) meeting comprising of the major stakeholders, who reinforced /confirmed that the proposed Bharatpur Circular Road subproject is a priority for the town.

B. Location, Size and Implementation Schedule

23. The sub-project is located in Bharatpur, the headquarters town of Bharatpur district, in the Eastern part of Rajasthan (**Figure 2.1**).

24. Bharatpur Town is located the East longitude 76°53' to 78°17' and North latitude 26°22' to 27°83' and altitude of 175.00 meters above mean sea level and is very well connected with Delhi-Mumbai broad gauge railway line. A broad gauge railway line also links it with Jaipur.

25. The work consist improvement and strengthening of 7.8 km Circular road development project road revolving around old Bharatpur town and 1.0 km road connecting it to NH-11. Above mentioned project also involve 1 km connecting link between circular road and NH-11.

26. Detailed design started in the year 2011 and construction will be completed by the end of the 2012.

27. Photographs of the project road are attached as **Annexure -2**

C. Description of the Subproject

28. The 7.8 km (+1 km) long Bharatpur circular road consist of six major junctions which divides it into same number of small stretches, which are detailed below:-

- Kaliki Bagichi to Heerads Bus stand
- Heeradas Bus stand to Kumhergate
- Kumhergate to Red cross circle
- Red cross to RBM Hospital

- RBM Hospital to Bijlighar Chouraha
- Bijlighar to Kali ki bagichi

29. There is 22 m long old arch bridge near RBM hospital on this stretch which is required to be dismantled. Width of this bridge is 7.0 m, which is required to be widened to 24.0 m. During construction of this bridge traffic would be passed from another bridge located at 100 m distance from existing one.

30. Existence of water lines has been observed below the existing pavement width and the damage of the pavement with breakage of line has also been found in the past. Therefore, it is advised to start the new construction only after shifting of water pipe line. Also, if new lines like sewerage have to be laid under city development project then it should also be laid before constructing new road. Details of Over ground utilities like electric and telephone pole which are required be shifted is given in subsequent chapters.

D. Description of Existing traffic

31. Three days classified traffic volume count survey has been carried out on selected spots. In order to facilitate the analysis and formulation of subsequent inferences, it is imperative that the traffic surveys were carried out in detail. The locations, durations and other minute details were decided after careful consideration of physical conditions as well as in depth understanding of the port operations and its past trends.

32. The corridor was divided into a number of Homogeneous Traffic links i.e. sections of more or less similar Traffic Characteristics to carry out the volume count survey. The surveys were conducted for three consecutive working days, 24 hours each day, in 15-minute intervals for three working day 24hr traffic survey was conducted at four points on 10/06/11, 16/06/11 and 16/06/11. These locations were:-

- At Bijli Ghar Junction
- At Kalikibagichi
- At Kumhergate
- At Red Cross circle

33. The total daily traffic (both directions) worked out on these roads is 16000 pcu's/day (At Bijli Ghar), 12628 pcu's/day (KalikiBagichi), 22,000 pcu's/day (Kumhergate), 12000 pcu's/day (for Kumhergate to Red Cross at Red Cross) and 21000 pcu's/day(for Red Cross to Bijlighar at Red Cross circle)

Table 2.1: Traffic Volume count (pcu/day) at Bijli ghar Junction

Location of Traffic count	Bijli Ghar Junction	
	Towards Red cross	Towards Kali ki Bagichi
Traffic Both Direction (pcu/day)	16231	15914

2.2 Traffic Volume count (pcu/day) at Kalikibagichi

Location of Traffic count	Kaliki Bagichi		
	Towards Heera Das	Towards Bijli ghar	Towards NH-11
Traffic Both Direction (pcu/day)	12630	13790	15257

2.3 Traffic Volume count (pcu/day) at Kumhergate

Location of Traffic count	Kumhergate	
	Towards Heerdas	Towards Red cross
Traffic Both Direction (pcu/day)	23007	21900

2.4 Traffic Volume count (pcu/day) at Red cross circle

Location of Traffic count	Red Cross Circle	
	Towards Kumhergate	Towards Bijli ghar
Traffic Both Direction (pcu/day)	22231	11896

Peak Hour Traffic for above locations are as below.

Location -1 (AT Bijli Ghar)

Peak Hour is 7 PM – 8 PM and total Pcus are 1100 pcu / hr

Location -2 (Kalikibagichi)

Peak Hour is 10 AM – 11AM and total Pcus are 900 pcu / hr

Location -3 (Kumhergate)

Peak Hour is 2 PM – 3 PM and total Pcus are 1500 pcu/ hr

Location -4 (Red cross circle)

Peak Hour is 3 PM – 4 PM and total Pcus are 900 pcu / hr

34. Studying the traffic volume count for per day and peak hour studies, it has been observed that, Bharatpur being an agriculture dominated area, the movement of tractor –trolley traffic is high, which results to high pcu per hr. The peak hr has been observed in morning, evening and also at mid of day for different locations. Billi ghar traffic is mainly dominated by two/three wheeler and cars, whereas Kumhergate and Red Cross has maximum number of commercial vehicles specially tractor-trolley.

E. Traffic Projection

35. Growth of Traffic for a city road is altogether different from growth for a highway. For a city road it depends on population of the town and density in particular area. Other factors which affect the traffic intensity of the road are its location on map of that city. Speed of city extension also effect traffic growth. The road width in urban areas is designed to accommodate the

design peak hour traffic. The design peak hour traffic is estimated based on a simple projection of present peak hour traffic for a design period of 15-20 years (adopted for arterial roads as per IRC-86:1984). The growth rate of different vehicle is estimated by Transport Demand Elasticity Method considering past traffic data, vehicle registration data, change of socio economic pattern in urban areas, future development plan etc. In absence of such data, it is very difficult to estimate the actual growth rate for different vehicles.

36. In general, the average traffic growth rate for this type of urban areas (Bharatpur) is around 5%. The growth rate as per IRC 37-2001 is 7.5% which is higher than the actual growth at present. The present traffic is projected for both the growth rates i.e. 7.5% & 5% for design period of 15 years.

37. Projected Peak Hour traffic for the horizon year 2027 (1.5Years Construction Period & 15 Years Design Life), for both the growth rates i.e. 7.5% & 5%, on different location of project city roads presented in **Table 2.5**.

Table 2.5:- Traffic Projection for different locations of circular road, Bharatpur

Location/Growth rate(%)	PCU in Peak hr for horizon year 2027 for different growth rate	
	5%	7.5%
Bijli Ghar	2401	3498
Kalikibagichi	1964	2862
Kumhergate	3274	4771
Red cross Circle	1964	2862

According to IRC: 86-1983, Tentative practical capacities for both uni direction and two direction flows of urban roads between junctions are given in **Table 2.6**

Table 2.6:- Tentative Capacities of Urban Roads between Intersections

No of traffic lanes and widths	Traffic flow	Capacity in PCUs per hour for various traffic conditions		
		Roads with no frontage access no standing vehicles, very little cross traffic	Roads with frontage access but no standing vehicle and high capacity intersections	Roads with free frontage access parked vehicles and heavy cross traffic
4-lane (14 m)	One way	4800	3000	2400
	Two way	4000	2500	2000
6-lane (21 m)	One way	3600	2500	2200
	Two way	6000	4200	3600

38. Comparing projected traffic with tentative capacities of urban roads between intersections (IRC: 86-1983), it is concluded that provided width of road 14.0 m is sufficient for the need of projected traffic.

F. Description of the Upgradation and Construction proposal

- **Road Geometry**

Existing Carriageway width for Maximum portion of the project corridor is 14.0 m, which is found sufficient for next 15 years. Therefore, maximum portion does not require widening except stretch from Kaliki Bagichi to Heeradas circle. 1.5 m interlocking tiles on both side of road are also proposed for whole length of project corridor, road cross section for different stretches would be:

- **NH-11 to Kali ki bagichi & Kumher Gate to Red Cross and till Kali ki bagichi**

Carriageway width	14.0 m
Median	1.0 m
Footpath	1.5 m both side

- **Heeradas Circle to Kumher Gate**

Carriageway width	14.0 m
Median	1.5 m
Footpath	1.5 m both side

- **Cross-section elements**

Cement Concrete pavement has been proposed for Bharatpur city road. With reference to traffic studies, two different cross-sections are proposed for different stretches of circular road. One section is for Anah Gate to Redcross which is dominated by heavy truck traffic coming from Mathura and other for rest of the circular road, used by urban traffic which has less number of commercial vehicles. Therefore, there are two pavement cross-sections, which are as follows:

- **Cement Concrete pavement cross-section would be:**

- Heeradas to Redcross
 - PCC M-10 - 100 mm
 - PCC M-30 – 330 mm
- Redcross to Kalikibagichi and Heeradas circle via RBM hospital and Bijlighar
 - PCC M-10 - 100 mm
 - PCC M-30 - 250 mm

Section of road from NH-11 to Kalikibagichi would be widened with existing Bitumious course.

BC	40 mm
DBM	130 mm
WMM	250 mm
GSB	300 mm

Cross sections are attached here with the DPR.

- **Drain & Cross Drainage Work**

Considering the importance of drainage for life of road, the study of existing drainage system and further any requirement of side drainage, has been done. The 8.8 km long stretch of circular road mostly passes through open areas, which is also moving above the ground level. Some of the stretches like Heeradas to Kumhergate and Bijlighar to Kalikibagichi are habitated.

According to this study requirement of drainage has been found along habitated area along circular road, which is from Heeradas circle to Redcross circle and Kanigujar Chouraha to kali ki bagichi. Rest of the stretch of circular road is open land and also running on embankment.

For stretch from Kanigujar chouraha to Kalikibagichi drain according to drainage master plan has already been constructed by RUSDIP, which satisfies the requirement. As per drainage master plan of RUSDIP, a new drain has also been proposed in this DPR for section from Heeradas circle to Redcross circle. Design details and estimates for the above mentioned drain has been picked from the master plan are attached with same.

39. There are two existing culvert and one minor bridge for cross drainage facility along the circular road. Culvert at Ch 4350 is required to be replaced because of insufficient width. Need of one more balancing culvert has been found at CH 1350 near Kalikibagichi. Therefore, two Pipe culverts have been proposed at the above mentioned locations.

40. Detailed Topographical survey for 8.8 km project corridor has been done with Total station. In this survey maximum features of the road way like utilities, structures, drain, shoulder etc have been covered. As per the site visit it has been found that 40% of the length of circular road is running over 1 to 2 m high embankment, which is followed by water logged pockets around both side of road. It has also been observed that existing pavement is settled for number of locations and also captured by big cracks. Seeing all the above mentioned factors embankment material test has been suggested by consultant.

As per IRC apart from CBR following soil test are advised:-

- PI index i.e. Liquid and Plastic limit
- Sieve analysis
- Dry density

CBR test was conducted on 3 samples of the soil, after soaking for four days for 3 locations.

The average CBR values for all locations were found equal to 5.

The proposed work components and its estimate has been mentioned in **table 2.7**

Table:- 2.7 Proposed work and its estimate

S. No.	Description	Total BOQ Amount (Rs.)
1.	Site Clearance and Dismantling	9322435.80
2.	Earth work	710483.20
3.	Sub Base and Base course	913413.60
4.	Flexible Payment	5421639.60
5.	Cement Concrete	160372396.80
6.	Traffic Signages, Road Marking and Other Appurtenances	25467813.00
7.	Bridge	16557004.35
8.	Culvert	1882307.62
9.	Street light	2762665.00
10.	Horticulture	992712.00
Sub Total (Part A to Part I)		224402870.97
Drainage Works		
11.	Drain from Heeradas circle to Redcorss Circle	53500257.45
Provisional Sum		
12.	Provisional Sum (Utility Shifting etc.)	3800000
13.	Provisional Sum (Health and Safety)	500000
Sub Total provisional Sum		4300000
Total Amount		282203128.42

III. DESCRIPTION OF THE ENVIRONMENT

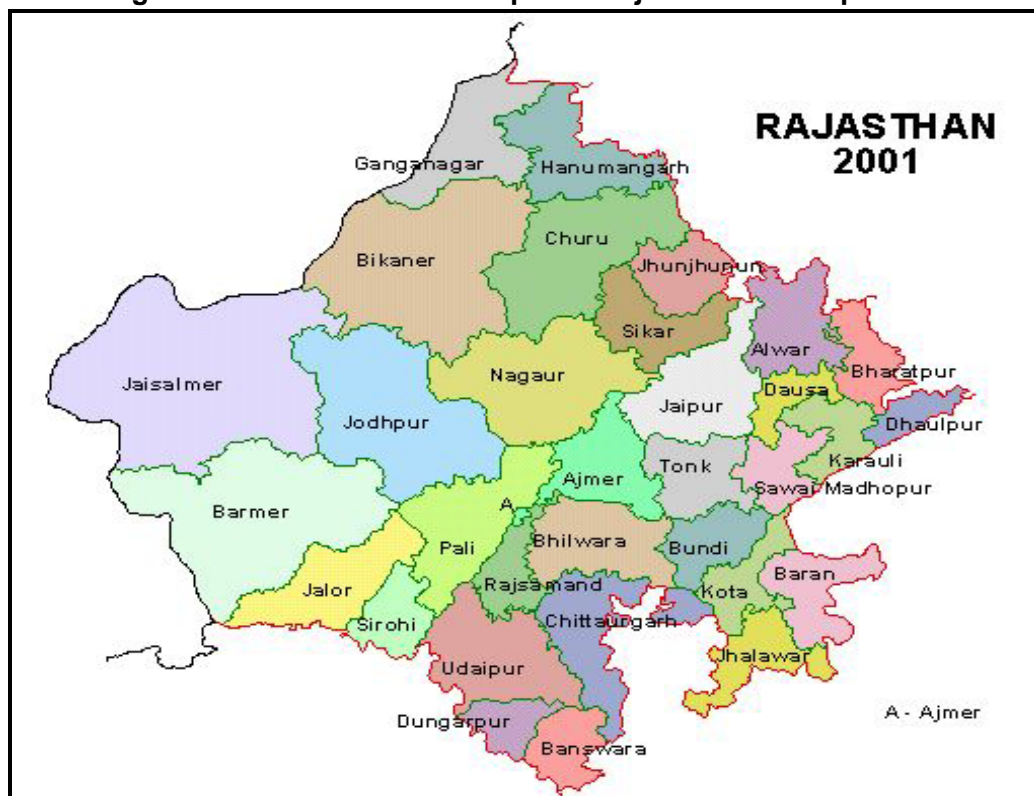
A. Physical Resources

1. Administrative Boundaries

41. Bharatpur District is located in the extreme east of Rajasthan, and shares borders with Uttar Pradesh. Bharatpur Town is the district headquarters and lies roughly in the centre. The National Highway No.11 connecting Agra, Jaipur and Bikaner passes through Bharatpur. Its total length within the District is about 73 Kms, the State capital Jaipur is 180 Km from Bharatpur. The municipal area covers 56.14 km² in total.

42. Bharatpur is strategically located between the most eastern part of the State. It forms boundaries with Gurgaon district of Haryana in the north and north-east. Mathura and Agra lies in the east. Dhaulpur district lies in its south and Sawai Madhopur, Dausa and Alwar district in the west. Bharatpur city is one of the Historical city of the Rajasthan state and it is also a Railway Junction. Historical monuments such as Keoladeo National Park, Lohagarh Fort or the "Iron Fort", Government Museum, The Palace, Deeg, Gopal Bhavan, Bengal Chamber, Suraj Bhavan, Nand Bhavan, Purana Mahal and Deeg Fort are some of the places of Tourist's attractions. The 'Eastern Gateway to Rajasthan' was founded by Maharaja Surajmal in 1733 AD, it was once an impregnable well fortified city, carved out of the region formerly known as Mewat. The trio of Bharatpur, Deeg and Dholpur has played an important part in the history of Rajasthan. Map of Bharatpur is shown in **Figure 3.1**.

Figure 3.1: Location of Bharatpur in Rajasthan state Map





2. Topography, Drainage, and Natural Hazards

43. **Topography.** Topography Bharatpur lies between the East longitude 76° 53' to 78° 17' and North latitude 26° 22' to 27° 83'. It is situated at 100 meters above MSL. Topographically Bharatpur, is levelled and saucer in shape.

44. **Drainage.** The peculiar topography of the town provides natural drainage pattern. The area has been divided into two river drainage basins, namely Barah river basin towards north and Banganga river basin towards south.

45. **Natural Hazards.** Bharatpur town lies in medium to high risk zone (III and IV). The area is prone to earthquakes as it is located on comparatively unstable geological plains based on evaluation of the available earthquake zone information. The Natural Hazard Zone Map of Bharatpur district is shown in Figure 1. Evaluation of the map shows that larger part of the district is flood prone but the project road alignment is not located in this area.

3. Geology, Geomorphology, Mineral Resources, and Soils

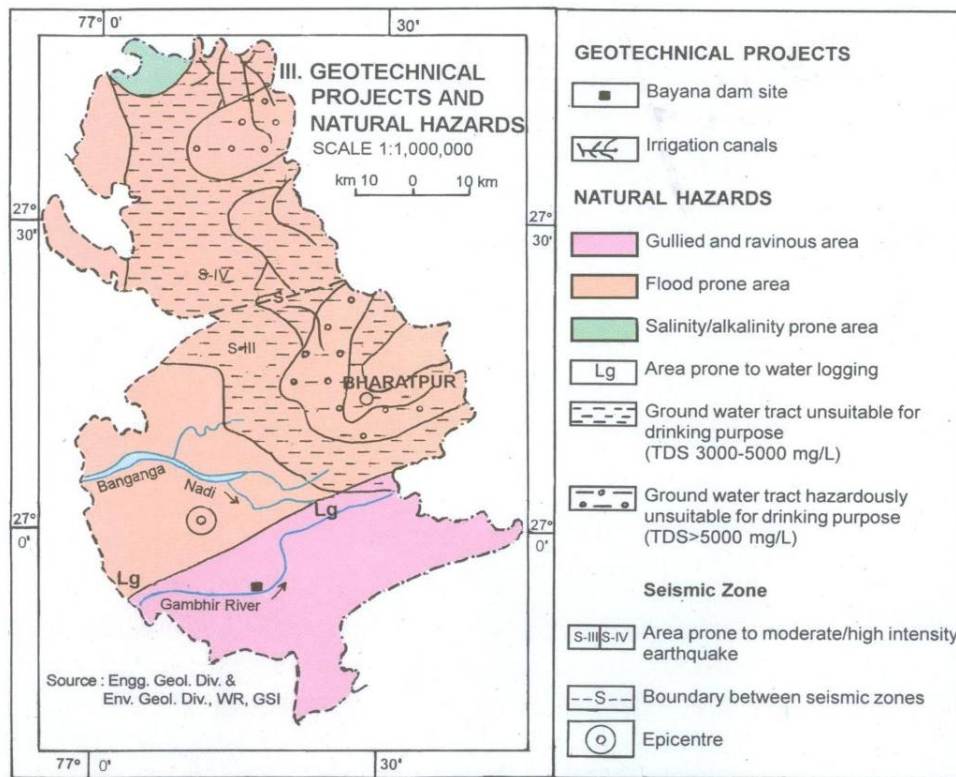
46. **Geology.** The rock types of district exposed are grouped under Alwar and Ajabgarh Groups belonging to the Delhi super group (Lower to Middle Proterozoic). The rocks of Alwar group comprising quartzite, basic volcanic tuffaceous sandstone, shale etc. are well exposed in the south-western part of the district around Khankhera. The major parts of the district are occupied Quaternary alluvium and blown sand which conceal the hard rock geology. Hydro-geological domains of unconsolidated and consolidated rocks formation with varying ground water potential.

47. **Geomorphology.** Geo-morphologically the district classified into seven geomorphic units namely hill and valley, younger flood plains, ravine, obstacle dunes and pediment / pediplain. On an average 90 % of the district area covered with unconsolidated porous formations.

48. **Mineral Resources.** Barytes, buildings stones, and quartz are the important minerals of the district. However, there are no mineral resources along or around the project site as the project road alignment is entirely located in Bharatpur town and traverse through populated area.

49. **Soils.** The soil is generally alluvial, prone to water logging. The nature of recently alluvial calcareous has been observed. Nutrient level in the Bharatpur soil including area coverage of saline and sodic soil. The nutrient status of the Bharatpur soil is graded as low to medium level.

Figure 3.2: Natural Hazard Zone Map of Bharatpur



Source: GSI Resource map

4. Climate

50. The climate of Bharatpur is generally dry. The maximum average temperature during summer is 44 degree Celsius to 47 degree Celsius and during winters it is -5 degree Celsius to 1 degree Celsius. The climate is generally dry. The wind blows at low except during summer and monsoon, when hard and turbulent winds are experienced. The average rainfall is 646 mm with 80 to 90 percent of the annual rains is experienced during June to September.

5. Air Quality

51. The ambient air quality monitoring has been done with respect to area along the project road for establishment of baseline information. The study area represents entirely commercial and residential environment. The sources of air pollution in the region are vehicular traffic; dust arising from unpaved road and domestic fuel burning. The prime objective of the baseline air quality study is to establish the existing ambient air quality along the project road corridor. This will also be useful for assessing the conformity to standards of the ambient air quality specified by CPCB due to the construction and operation of the project road. This section describes the identification of sampling locations, methodology adopted for monitoring and frequency of sampling. The results of monitoring during the study period are also presented in below mentioned **Table 3.1**.

Table 3.1:- Air quality along the project road

Sl.No.	Location	Sampling Date	PM2.5 ($\mu\text{g}/\text{m}^3$)	PM10 ($\mu\text{g}/\text{m}^3$)	NO ₂ ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	CO (mg/m^3)
1	Kali Bagichi Choraha (Circle Road)	27/04/2012	50.76	113.26	19.22	10.93	0.5
2	Kali Bagichi Choraha (Circle Road)	28/04/2012	52.10	131.12	22.49	10.49	0.5
3	Kali Bagichi Choraha (Circle Road)	30/04/2012	52.21	133.61	22.08	10.98	0.5
Average			51.69	125.9	21.26	10.8	0.5
4	Bizalighar Choraha (Ring Road)	28/04/2012	87.70	267.74	19.86	11.84	0.5
5	Bizalighar Choraha (Ring Road)	29/04/2012	85.27	250.3	21.33	12.06	0.5
6	Bizalighar Choraha (Ring Road)	30/04/2012	72.45	208.49	19.36	11.11	0.5
Average			81.8	242.1	20.18	11.67	0.5
7	Red Cross Circle (Ring Road)	30/04/2012	55.39	131.95	22.93	14.32	0.5
8	Red Cross Circle (Ring Road)	1/05/2012	53.63	138.95	27.1	13.00	0.5
9	Red Cross Circle (Ring Road)	2/05/2012	58.12	137.81	25.47	12.60	0.5
Average			55.71	136.2	25.12	13.30	0.5
10	PHED Pump House (Nr. Hiradas B.S)	1/05/2012	76.26	210.65	20.06	10.95	0.5
11	PHED Pump House (Nr. Hiradas B.S)	2/05/2012	78.94	206.9	20.21	11.20	0.5
12	PHED Pump House (Nr. Hiradas B.S)	3/05/2012	75.18	229	20.04	11.10	0.5
13	PHED Pump House (Nr. Hiradas B.S)	4/05/2012	78.94	206.12	20.43	11.50	0.5
Average			77.33	213.16	20.18	11.18	0.5
Permissible limits as per CPCB Notification, New Delhi, 18 th November, 2009 for Industrial, Residential, Rural and Other area			60	100	80	80	02*

Where: *= Maximum limits for 8 hourly monitoring

Observations of ambient air quality:

52. The concentrations of various parameters presented in above mentioned **Table 3.1** show that across the proposed road corridor PM₁₀ is higher at all monitored location while PM2.5 is exceeding the limit (60 $\mu\text{g}/\text{m}^3$) at two location that is at PHED Pump House Near

Hiradash Bus Stand ($77.33 \mu\text{g}/\text{m}^3$) and Bizlighar Choraha ($81.8 \mu\text{g}/\text{m}^3$). Both these location are crowded commercial location. The type of fuel used for cooking near bus stand (there are many small dhaba/small hotel) as well as congregation of traffic is the main plausible reason for the observed high concentrations. The other pollution sources in the region are mainly traffic and windblown dust.

53. Maximum daily average concentration of PM10 was recorded as higher 242.1 at Bizlighar chaoraha and minimum 125.9 at Kali Bagichi Choraha (Circular Road) which is also higher than limit ($100 \mu\text{g}/\text{m}^3$) set by Central Pollution Control Board .

54. The gaseous parameters, SO₂ and NO₂ and Co have been recorded well within prescribed limit.

6. Noise Quality

The primary data for noise quality were also generated at three locations along the project road and presented below.

Table 3.2 Ambient Noise Bharatpur

Sl. No.	Sampling Location	Sampling date	Observation Value [in dB(A)] L Daytime			Observation Value [in dB(A)] L Night Time		
			L _{max}	L _{min}	L _{eq}	L _{max}	L _{min}	L _{eq}
1	Sisam Mod (Shastri Park Chauraha)	12/05/2012	83.00	48.20	72.32	69.00	37.50	56.81
2	Nr MSJ College Area Gate (Main Gate)	13/05/2012	72.50	44.50	63.32	53.70	37.20	45.70
3	Hanuman Mandir (Nr. MSJ College Area)	14/05/2012	55.00	41.20	49.40	50.20	36.50	42.89

The monitored result of ambient noise level shows that day time value at one location namely Sisam Mod (Shastri Park Chauraha) it is higher than prescribed limit (for commercial area it is 65dB) The all there monitored location is commercial/semi commercial. The night time noise level is also higher at two location than prescribed limit (45 dB for commercial area) namely Sisam Mod (Shastri Park Chauraha) and Nr MSJ College Area Gate (Main Gate). Both these location represent commercial/ Semi commercial area.

7. Surface Water

55. There are quite a number of rivers that flow through the Bharatpur district. The main rivers are Chambal, Ban-Ganga, Barah, Parwati and Gambhiri. However, there is no water quality monitoring stations at any of these rivers. Visual observations and interviews with PHED show that main purposes of these rivers are agricultural, fishing, and domestic uses. Accordingly, water quality is not deteriorated.

56. Within the vicinity of the proposed project area, there are no significant man made streams are found except few drain and small pond. No river system was observed in the vicinity of the proposed road. In order to have baseline information on the water quality 2 number of sample were collected in May 2012. The details of analysis result have been presented in below **Table 3.3**.

57. The baseline monitored data show that all the monitored parameter is below the standard set by Central Pollution Control Board, Gov. of India.

Table 3.3 Surface Water Quality of Bharatpur

S N	Parameters	Result (Giriraj Canal)	Result (Nougrah Pond)	Test Method
1	pH (at 25°C)	8.04	7.16	APHA 21 st Edition, 4500-H+B
2	Colour (Hazen Unit)	<5	<5	APHA 21 st Edition, 2120 B
3	Turbidity (NTU)	62	16	APHA 21 st Edition, 2130 (B)
4	Odour	Unobjectionable	Unobjectionable	APHA 21 st Edition, 2150
5	Taste	Salty	Salty	APHA 21 st Edition, 2160
6	Total Hardness as CaCO ₃ (mg/l)	988.80	1339.00	APHA 21 st Edition, 2340 C
7	Calcium as Ca (mg/l)	140.36	173.39	APHA 21 st Edition, 3500 Ca B
8	Alkalinity as CaCO ₃ (mg/l)	574.91	154.68	APHA 21 st Edition, 4500-CI-B
9	Chloride as Cl (mg/l)	2331.90	2230.51	APHA 21 st Edition, 4500-CI-B
10	Residual Free Chlorine (mg/l)	<0.20	<0.20	APHA 21 st Edition, 3500-CI-B
11	Cyanide as CN (mg/l)	<0.02	<0.02	APHA 21 st Edition, 4500-CN-CD
12	Magnesium as Mg (mg/l)	155.18	220.25	APHA 21 st Edition, 2340 B
13	Total Dissolved Solids (mg/l)	4527.00	3937.00	APHA 21 st Edition, 2540 C
14	Sulphate as SO ₄ (mg/l)	314.19	331.08	APHA 21 st Edition, 4500 E
15	Fluoride as F (mg/l)	0.42	0.44	APHA 21 st Edition, 4500 -F-D
16	Nitrate as NO ₃ (mg/l)	0.26	0.32	IS3025 (P-34) 1988
17	Iron as Fe(mg/l)	0.50	0.48	APHA 21 st Edition, 3500-Fe B
18	Aluminium as Al (mg/l)	<0.03	<0.03	APHA 21 st Edition, 3111 B
19	Boron (mg/l)	<0.50	<0.50	APHA 21 st Edition, 4500BC
20	Phenolic Compounds (mg/l)	<0.001	<0.001	APHA 21 st Edition, 5530 C Photometric method 5530 D
21	Anionic Detergents as MBAS (mg/l)	<0.02	<0.02	APHA MBAS Method, 5540 C
22	Hexa Chromium as Cr+6 (mg/l)	<0.01	<0.01	APHA 21 st Edition, 3111 B
23	Zinc as Zn (mg/l)	<0.10	<0.10	APHA 21 st Edition,3111 B
24	Copper as Cu (mg/l)	<0.02	<0.02	APHA 21 st Edition ,3111 B
25	Manganese as Mn (mg/l)	<0.10	0.26	APHA 21 st Edition, 3111 B

26	Cadmiun as Cd (mg/l)	<0.01	<0.01	APHA 21 st Edition, 3111 B
27	Lead as Pd (mg/l)	<0.05	<0.05	APHA 21 st Edition , 3111 B
28	Selenium as Se (mg/l)	<0.01	<0.01	APHA 21 st Edition, 3111 B
29	Arsenic as As (mg/l)	<0.05	<0.05	APHA 21 st Edition, 3111 B
30	Mercury as Hg (mg/l)	<0.02	<0.02	APHA 21 st Edition, 3111 B
31	Total Suspended Solid (mg/l)	89.00	27.00	APHA 21 st Edition, 2540 D
32	Biochemical Oxygen Demand (mg/l)	9.30	7.20	APHA 21 st Edition, 5210 B
33	Chemical Oxygen Demand (mg/l)	30.92	20.62	APHA 21 st Edition, 5220 B

8. Groundwater

58. There are number of National Hydrographic monitoring stations of Central Ground Water Board in and around Bharatpur. Fluctuation of ground water level in most of the cases ranged between 5 - 10 m below ground level.

59. Records of groundwater quality monitoring from Public Health Engineering Department (PHED) show groundwater quality in Bharatpur town conforms to the set norms of the municipality. It has been noted that groundwater contains high levels of total dissolved solids in its surrounding vicinity.

B. Biological Resources

60. The boundaries of the Bharatpur Bird Sanctuary, also known as Keoladeo National Park, a UNESCO World Heritage site, are located near to proposed project site. The administrative boundary of Keoladev National Park is hardly 25 meter away from nearest stretch of project road however the buffer zone is more than 500 meter away from project road. According to the Bharatpur Bird Sanctuary Management Plan, the identified buffer zone is 500 m from the periphery of the bird sanctuary and all activities beyond this range are acceptable. The protected area contains grasslands, woodlands, swamps, and wetlands. These diverse habitats are home to 374 avian species including 140 species of waterfowl, 372 species of plants, 34 species of mammals, 57 species of fish, 14 species of snakes, 5 species of lizards, 3 species of geckos, 7 species of turtles, 8 species of amphibians, 71 species of butterflies, and a variety of other lower biota.

61. **Flora.** The forests are generally irregular and situated on hills, usually on rocky or stony slopes or gently undulating grounds. Dhok (*Anogeissus Pendula*) is the principal species growing in these forests are: *Acacia catechu* (Khair), *Acacia leucophloe* (Arunj), *Butea monosperma* (Dhak). No endangered species has been observed along / near the project road as it is entirely situated in Bharatpur town.

62. **Fauna.** The district is known for its duck shoots. Geese, ducks, teals pintails, Siberian cranes during winter. Local birds are mainly egrets, painted storks, ibises, cormorants, saras-cranes, spoonbills, and open-billed storks, darter, besides common parakeets, crows, babblers, partridges and weaver bird. No endangered species has been observed along / near the project road as it is entirely situated in Bharatpur town.

C. Economic Development

63. Economic base of a town reflects its prosperity. Bharatpur town, being the districts headquarter, has been functioning as administrative centre. Bharatpur is known not only for agriculture production but also for oil industries. It has also 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 centre for nearby towns and villages. Tourism income contributes very much towards economic generation of the town on the contrary household industries play a big role in providing employment and income generation.

64. **Land use.** Bharatpur District spreads over an area of 5,066 km² covering urbanization area circulation, public and semi-public, agriculture land, commercial area, road, water bodies, agriculture research and mining. The project road is an internal town's road and traverse entirely through the populated area of towns located on municipal land.

65. **Commerce.** The main retail and wholesale business activities of the town are carried out with the newly developed main market street where retail and transport-oriented businesses are located.

66. **Industrial Development.** In Bharatpur the industrial areas are Brij industrial area, Byana industrial area and Deeg industrial area. The project road alignment is not located in this industrial area; however it traverses through few portion of commercial area of the town.

67. **Agriculture.** Bharatpur district is known not only for agriculture production but for oil industries also mustard seeds and other agriculture products come to the market through mandies (wholesale market) established by Krishi Upaj Mandi Samiti (wholesale market committee) These Krishi Upaj Mandies are in Bharatpur. Nadbai, Weir, Deeg, Kaman, Bayana, Roopwas, and Bhusawar. About 70-80% of lands used for agricultural purpose.

D. Infrastructure

68. **Water supply.** The total combined available water from the ground water and surface water is 24.03 MLD out of which 22.0 MLD is used for residential purpose and 2.03 MLD is used for other purposes. Current supply per capita is 60 liters per capita per day (lpcd) as against the standards of 135 lpcd. The existing water supply system comprises mainly of asbestos cement (AC) pipes.

69. **Sewerage and Sanitation.** Bharatpur town does not have underground sewerage system. Out of the occupied residential houses only about 41.88% population have some kind of individual facilities and about 28.78% population with Low Cost Sanitation (LCS). Most of the houses have adopted the practice of providing onsite disposal by constructing water seal/bore hole latrines or by providing septic tank with effluent discharge into soak pits or open surface drains.

70. **Drainage.** Presently there exists a minimal network of storm water drains. These drains are also receiving the sludge and waste through domestic sewer. The existing drainage system is a piece-meal construction without proper designs of open nallahs (drains) that are irregular and insufficient. The waste water along with sewage is discharged into the fields towards west of the town through open drains.

71. **Industrial Effluents.** Industries are outside the town area. The industries are required to treat their own effluents before disposal and are not allowed by the Bharatpur Nagar Parishad to connect to the local sewer network.

72. **Solid Waste.** The total waste generation in the town is about 116.74 MTD. It is important to note that no initiatives have been taken till now in terms of door to door collection of solid waste. Presently most of the town wastes are simply dumped without any treatment in depressions, ditches or by the sides of the road flank. It has been observed that tiny quantity of domestic waste (collected from nearby houses) is being dumped temporarily near a small portion of the subproject road. Infestations by insects and flies, scavenging by domestic animals and rag picking through the wastes are a common sight in the dumpsite.

73. **Transportation.** Bharatpur is well connected with all the important towns of the Rajasthan State and Uttar Pradesh State. It is situated on the National Highway No.11 connecting Agra, Jaipur, and Bikaner. Its total length within the district is about 71 km. The total road network length of the district is 1,985 km.

E. Social and Cultural Resources

74. **Demography.** Total population of Bharatpur is 2,549,121 as per latest provisional figures released by Directorate of Census Operations in Rajasthan. This shows increase of 21.32 percent in 2011 compared to figures of 2001 census. The initial figures of data shows that male and female were 1,357,896 and 1,191,225 respectively. Bharatpur District of Rajasthan comprises an area of 5,065 sq.km. As per census 2011, density of Bharatpur District per square km is 503 compared to 415 per sq.km of 2001. Sex ratio of girls in Bharatpur district per 1000 boys was recorded 877 i.e. an increase of 23 points from the figure of 2001 census which puts it at 854.

75. In 2011 census, data of Bharatpur district regarding child under 0-6 age were also collected. There were total 430,833 children under age of 0-6 against 428,181 of 2001 census. Of total 430,833 male and female were 231,265 and 199,568 respectively. Child Sex Ratio as per census 2011 was 863 compared to 879 of census 2001. Children's proportion in total population was around 3.71 percent. This figure was around 3.72 percent as per 2001 census.

76. In education sector, Bharatpur District is having average literacy rate of 71.16 percent. Male literacy and female literacy were 85.70 and 54.63 percent respectively. In all, there were total 1,507,274 literates compared to 1,063,582 literates of 2001 census.

77. The population of Bharatpur 205,235 (2001 Census) with a density of 3,644.22 persons per km². High growth is accounted on induced industrial development, natural growth, concentration of developmental activities like establishments of more government offices, trade and commerce, services and other activities, colleges and residential colonies.

78. **Health and Educational Facilities.** There are good educational facilities in Bharatpur district, which serve both townspeople and inhabitants of surrounding villages and towns in the hinterland. There are 1,482 primary schools, 538 secondary and higher secondary schools, 33 general degree colleges, and 4 industrial training institutes and polytechnic college.

79. There are 430 numbers hospitals and dispensaries located in Bharatpur. Of these 7 are general hospitals, 59 primary health centers, 2 maternity and pediatric centers, 1 tuberculosis hospital, 2 leprosy hospitals, 36 dispensaries, and 323 subcenters.

80. **History, Culture, and Tourism.** Bharatpur the Eastern Gateway to Rajasthan was founded by Maharaja Suraj Mal in 1733 AD, it was once an impregnable well fortified city, carved out of the region formerly known as Mewat .The trio of Bharatpur, Deeg and Dholpur has played an important part in the history of Rajasthan.

81. Bharatpur is the main tourist place of Rajasthan. The historical places include Lohagarh fort or the 'Iron Fort' and other places like Keoladeo National Park, Kamra Khas Palace, Deeg fort, and Purana Mahal which attracts domestic and foreign tourists .The subproject sites are not located in or near any historically, culturally, archaeologically or architecturally significant areas

IV. ANTICIPATED IMPACTS AND MITIGATION MEASURES

82. 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. ADB Environmental Policy (2002) require that impacts and risks will be analyzed during pre-construction, construction, and operational stages in the context of the subproject's area of influence. As defined previously, the primary impact areas are (i) the sites along the project road (ii) main routes/intersections which will be traversed by construction vehicles; and (ii) quarries and borrow pits as sources of construction materials. The secondary impact areas are: (i) entire Bharatpur area outside of the delineated primary impact area; and (ii) entire Bharatpur district in terms of over-all environmental improvement.

83. The ADB Rapid Environmental Assessment Checklist for Urban Development found in the Environmental Assessment Guidelines (2003) was used to screen the subproject for environmental impacts and to determine the scope of the IEE investigation. The completed Checklist is attached as **Annexure-I**. All the proposed subproject components will interact physically with the environment.

84. In the case of this subproject (i) most of the individual elements are relatively small and involve straightforward construction and operation, so impacts will be mainly localized and not greatly significant; (ii) most of the predicted impacts are associated with the construction process, and are produced because that process is invasive, involving small excavation and earth movements; and (iii) being located in the built-up area of Bharatpur, will not cause direct impact on biodiversity values. The proposed project road "Bharatpur Circular Road" will be constructed entirely on existing alignment within available ROW on government land.

A. Pre construction – Design and Location

85. **Design of the proposed components.** The subproject has been designed for 15-years life. Accordingly, it is proposed that the subproject be commissioned by the year 2012 and the plan horizon year shall be 2027.

86. **Location.** The proposed project road " Bharatpur Circular Road" is located within municipal limit of Bharatpur and 7.8 km road length revolve around old Bharatpur town and 1.0km road length connect to NH-11.

87. **Utilities.** Telephone lines, electric poles and wires, water and sewer lines within the existing right-of-way (ROW) may be impacted. To mitigate the adverse impacts due to relocation of the utilities, DSC will (i) identify and include locations and operators of these

utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and (ii) require construction contractors to prepare a contingency plan

88. **Social and Cultural Resources.** Bharatpur is an area of rich and varied cultural heritage which includes many forts and palaces from the Rajput and Mughal periods. For this subproject, minor excavation will occur within the allotted land, so it could be that there is a low risk of such impacts. If there is any chance of existence of such area during site survey IPIU/DSC will:

- (i) Consult ASI to obtain an expert assessment of the archaeological potential of the 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.

89. **Site selection of construction work camps, stockpile areas, storage areas, and disposal areas.** Priority is to locate camps near the project area. 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 in order to protect the communities (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). All locations would be included in the design specifications and on plan drawings.

90. **Site selection of sources of materials.** Extraction of materials can disrupt natural land contours and vegetation situated on proposed site resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution. To mitigate the potential environmental impacts, locations of quarry site/s and borrow pit/s (for loose material other than stones) would be included in the design specifications and on plan drawings. Priority would be to sites already permitted by Mining Department. If other sites are necessary, these would be located away from populated area, drinking water intakes and streams, natural drainage systems; and in structurally stable areas even if some distance from construction activities. It will be the construction contractor's responsibility to verify the suitability of all material sources and to obtain the approval of Urban Local Body. If additional quarries will be required after construction is started, then the construction contractor shall use the mentioned criteria to select new quarry sites, with written approval of Bharatpur Municipal Council (BMC) or other concerned government agency.

B. Construction

1. Screening of No Significant Impacts

91. From the descriptions given in previous section, 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 along the existing road alignment.

92. 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
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	No protected areas near the sub project site
Flora and Fauna	No rare or endangered species found near the sub project site.
Economic Development	Activities are not large enough to permanently affect this feature.
Land Use	No change in land use.
Commerce, Industry, and Agriculture	Activities are not large enough to affect these features
Population	Activities are not large enough to affect this feature.
Health and education facilities	No health and education facilities lies near the sub project site
Religious sites	Not significant impact but small portion of few religious structure will be impacted as it is coming in proposed ROW.
Historical, Archaeological, Paleontological, or Architectural sites	No scheduled or unscheduled historical, archaeological, paleontological, or architectural sites within the subproject site

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

2. Construction method

94. Road construction is generally started with Clearing and Grubbing of the area of construction. Thereafter Survey work will be carried out including fixing of TBM. After survey earthwork will be done including items like excavation, cutting, loosening & re-compacting, filling vide embankment /sub grade. Then Sub base will be prepared i.e. Granular sub base / Drainage layer. Thereafter Base course will be prepared i.e. Wet Mix Macadam /Water Bound Macadam. Dense Bituminous Macadam and finally wearing course will be laid. Then finally road marking, road signage, road furniture is fixed.

95. 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 construction work is expected to be completed in around 12 months.

3. Anticipated Environmental Impacts and Mitigation Measures

96. Although all work will be conducted at a single, relatively small site, construction will involve a great 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/culvert 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.

97. **Sources of Materials.** Significant amount of gravel, sand, and cement will be required for this subproject. 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 IPMU; and
- (iv) Submit to DSC on a monthly basis documentation of sources of materials
- (v) The earth and quarry material will be sourced from approved and authorized agency.

98. Using these sources would have the additional benefit of providing a beneficial use for what would otherwise be large quantities of waste material, so it will be very important to coordinate these activities to enable this to be done.

99. Moving such a large quantity of material could cause further physical impacts, including the creation of dust during dry weather and silt-laden runoff during rainfall, both of which would affect people who live and work near the site and reduce the quality of adjacent land. The Contractor will almost certainly plan the work to ensure that all earthworks are conducted during the dry season to avoid the difficult working conditions that prevail during the monsoon, so this will avoid any problems from runoff. It will however be necessary to prevent dust, so the Contractor should be required to:

- o Excavate the earth through cutting and filling up for embankment should be done at the same time for using the earth materials, avoiding the need to stockpile on site;
- o Damp down exposed soil and any sand 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 truck.

100. Conducting the work in the dry season should avoid any drainage problems from rainfall during excavation, and although groundwater often collects in deeper voids, this should also not be a problem at this site because of the low water table in area.

101. **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, sulphur 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,

- (i) gravel, and other construction materials;
- (i) Excavate the culvert/bridge foundations 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.

102. **Surface Water Quality.** Construction activities may result mobilization of settled silt materials, run-off from stockpiled materials, and chemical contamination from fuels and lubricants during construction works, which may contaminate downstream surface water quality of nearby drains and *nala*. These potential impacts are temporary and short-term 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 to the nearby drainage system leading to the water bodies;
- (v) Place storage areas for fuels and lubricants away from any drainage leading to water bodies;
- (vi) Dispose any wastes generated by construction activities in designated sites; and
- (vii) Conduct surface quality inspection according to the Environmental Management Plan (EMP).

103. **Noise Levels.** Project road transverse through adjacent settlements but no, scheduled or unscheduled historical, archaeological, paleontological, or architectural sites along the proposed project road. The sensitive receptors are the road users and general public. 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.

104. **Existing Infrastructure and Facilities.** Telephone lines, electric poles and wires, water and sewer lines within the existing ROW of project road will be removed thus there is anticipated disruption of service during construction. Excavation could however damage existing infrastructure located alongside roads, in particular water supply pipes and sewer lines. It will be particularly important to avoid damaging existing water pipes as these are mainly

manufactured from Asbestos Cement (AC), which can be carcinogenic if inhaled, so there are serious health risks for both workers and the public. It is therefore important that construction contractors will be required to:

- (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
- (iii) Develop and implement an Asbestos Cement Pipes Management Plan

105. **Flora and Fauna.** There are no protected areas along the subproject sites. Few trees and shrubs are vegetation along the road. Land-clearing activities and presence of workers in the sites can damage or cause loss of existing flora. The entire proposed work under this subproject will be within right of way and approximately 70 number of trees need to be removed from ROW. Potential impacts are negative but reversible by mitigation measures. The construction contractors will be required to:

- (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) Earth-ball trees and transplant to IPIU-approved areas;
- (iv) Require to plant three native trees for every one that is removed; and
- (v) Prohibit employees from cutting of trees for firewood.

106. **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.

107. **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) Coordinate with Bharatpur Traffic Police office for temporary road diversions and with 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.

108. **Socio-Economic.** Manpower will be required during the whole period of construction stage. This can result to generation of contractual employment and increase in local revenue. Thus potential impact is positive and long-term. The construction contractor will be required to:

- (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
- (ii) Secure construction materials from local market.

109. **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 and 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 and S Training² 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

² 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.

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 duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.

110. **Community Health and Safety.** Hazards posed to the public; specifically in high-pedestrian areas (such as the busy road) 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.

111. **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.

112. **Social and Cultural Resources.** For this subproject, excavation will occur on and around existing road alignment, so it could be that there is a low risk of such impacts. Nevertheless, the construction contractor will be required to:

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

113. Access road on both side of the railway crossing is not a major residential area, there some government quarters and colony and a petrol pump in the vicinity of the site, so action should be taken to minimise disturbance as far as possible. This will require:

- Consultation with the local community to inform them of the nature, duration and likely effects of the construction work, and to identify any local concerns so that these can be addressed;
- Involving the community in planning the work programme so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times;
- Avoiding conducting noise-generating activities at night;
- Implementing the measures described in EMP to reduce dust;
- Utilising modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensuring that these are maintained to manufacturers' specifications at all times.

114. There is invariably a safety risk when any construction work conducted in an urban area involving number of works, 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:

- Isolate the working 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

115. O&M of Bharatpur Circular Road will be the responsibility of the Urban Local Body that is Urban Improvement Trust (UIT). The project road have a design life of 15 years, during which shall not require major repairs or refurbishments.

- 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

116. Because roads and bridges generally operate without the need for major repair and maintenance (see below), there are several environmental factors that should be unaffected once the new ROB begins to function. These are identified in **Table 4.2** 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 4.2: Fields in which operation and maintenance of the completed road improvement 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.
Geohydrology and Groundwater	Activities will not be large enough to affect these features
Protected Areas	Subproject site is not located nearby any protected area
Flora and Fauna	No rare or endangered species.
Land Use	No change in land use.
Commerce, Industry, and Agriculture	Activities are not large enough to affect these features
Population	Activities are not large enough to affect this feature.
Religious sites	Small portion of few religious structure are falling in ROW , and it will be impacted. But during operation no impact on religious structure is anticipated as their impacted part be removed during construction.
Historical, Archaeological, Paleontological, or Architectural sites	No scheduled or unscheduled historical, archaeological, paleontological, or architectural sites

2. Anticipated Impacts and Mitigation Measures- Operation

117. **Air Quality.** Once the project road 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 as well as reduced Vehicle Operating Cost (VOC). The potential impact is positive and long-term.

118. **Noise Level.** As expected of any road/bridge infrastructures, noise levels tend to increase with vehicular traffic. To mitigate this impact, the Urban Local Body that is Urban Improvement Trust (UIT) will put signages and implement “no blowing of horns” zones where there are sensitive receptors (such as the Religious place, Hospital, educational institute). A detailed chainage wise list of such structures has been presented in **Annexure-5**

119. **Accessibility.** Portions of the roads and bridges 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 roadways, the work will be very short in duration. The potential impacts are negative although will not cause significant physical impacts. To maintain the safety of workers and road-users, Urban Improvement Trust (UIT) will coordinate with the Traffic Police Department so that warning signs and traffic diversions can be set up when necessary.

120. **Ecological Resources.** As there are no significant ecological resources along the project road, the operation and the routine maintenance and repair of the road and surroundings will have no ecological impacts. In fact by planting trees/ shrubs along the project road alignment, there would be some small ecological gain.

121. **Economic Development.** The project road 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 by making the area more attractive to tourists and allowing the more efficient transportation of agricultural produce and other goods to and from the town.

122. **Social and Cultural Resources.** Effects of the operating project road 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.

123. 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. Since people commuting on this road will save time, they will socially much better than before. Citizen of Bharatpur 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.

124. 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 no risk to such features.

V. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Project Stakeholders

125. 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) Custodians and users of socially and culturally important buildings along the project road.
- (iii) State and local authorities responsible for the protection and conservation of archaeological relics, historical sites and artefacts; and
- (iv) State and local tourism authorities.

126. 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 Disclosure to Date

127. An informal discussion/consultation was held (on 19.8.2011 and 30.8.2011) with the locals. Issues discussed are:

- (i) Awareness and extent of the project and development components;
- (ii) Improvement components
- (iii) Project benefit for the economic and social upliftment of local community;
- (iv) Labour availability in the Project area or requirement of outside labour involvement;
- (v) Extent of local disturbances due to Project Construction Work;
- (vi) Necessity of tree felling etc along the project road
- (vii) Water logging and drainage problem if any;
- (viii) Drinking water problem;
- (ix) Forest and sensitive area nearby the project site; and
- (x) Movement of wild animals nearby the project site.
- (xi) Utility shifting along the project road.
- (xii) Other impact during construction work related to business loss and inconvenience of accessibility

128. Public consultations and group discussion meetings were conducted by RUIDP. The objectives were to appraise the stakeholders about the program's environmental and social impacts and present safeguards to mitigate any potential significant impacts. Records of public consultations are attached as **Annexure-2**. The major issues raised are related to traffic interferences, route diversion, effect on ecological resources, and effect on business along the project road 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 subproject and mitigation measures for the potential environmental impacts raised during the public consultations.

129. Discussions were held with the local people during site visits for the preparation of this IEE. Issues discussed were:

- (i) Livelihood / Business affected households should be given assistance in the mode of cash compensation;
- (ii) Preference should be given to local worker to be employed by the contractor during construction work;
- (iii) Adequate safety measures should be taken during construction work;
- (iv) Local people have appreciated the proposed road work they have ensured that they will extend their full cooperation with the Executing Agency during project implementation.

130. Hindi version (which is the local language) 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

131. LSGD extended and expanded the consultation and disclosure process significantly during implementation of RUSDIP. They have appointed an experienced NGO to handle this key aspect of the program. The NGO (Community Awareness Participation Program, CAPP consultant) continuously (i) conducts a wide range of activities in relation to all subprojects in town; and (ii) ensures the needs and concerns of stakeholders are registered and are addressed in subproject design.

132. For this subproject, the CAPP consultant 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:
 - (a) 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
 - (b) Structured consultation meetings with the institutional stakeholders (government bodies and NGOs) to discuss and approve key aspects of the project.
- (ii) Consultation during construction:
 - (a) Public meetings with affected communities to discuss and plan work programs and allow issues to be raised and addressed once construction has started; and
 - (b) Small-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;
- (ii) Project disclosure:
 - (a) Public information campaigns (via newspaper and local 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 towns, informing the public of their availability, and providing a mechanism through which comments can be made.

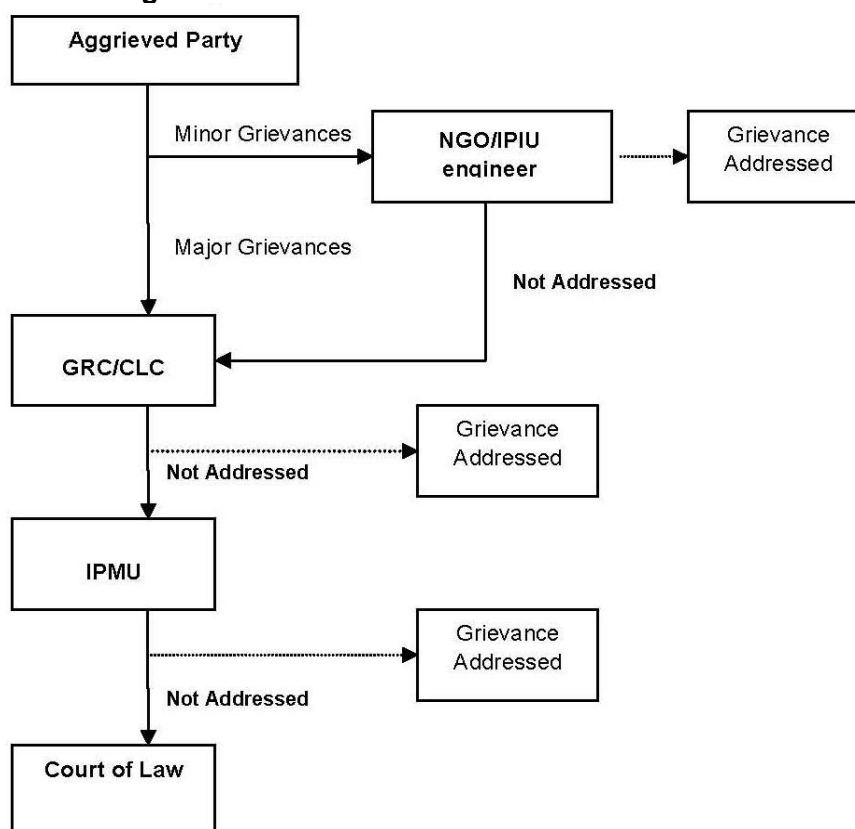
133. Based on ADB's Environmental Policy (2002) requirements, the summary IEE reports are required to be circulated worldwide by ADB, via the depository library system and are placed on the ADB website. The full IEE reports are also made available to the interested parties upon request.

VI. GRIEVANCE REDRESS MECHANISM

134. 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 2**.

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

Figure 2: 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

136. 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 Committee³ (EC) assists LSGD in providing policy guidance and coordination across all towns and subprojects.; and

³ 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.

- (vii) City Level Committees⁴ (CLCs) have also been established in each town to monitor project implementation in the town and provide recommendations to the IPIU where necessary.

137. **Figure 3** shows institutional responsibility for implementation of environmental safeguard at different level.

1. Responsible for carrying out mitigation measures

138. During construction stage, implementation of mitigation measures is the construction contractor's responsibility while during operation stage, Urban Improvement Trust (UIT) will be responsible for the conduct of maintenance or repair works.

139. To ensure implementation of mitigation measures during the construction period, contract clauses **(Recommended Contract Clauses mentioned in Annexure 3 and EMMP mentioned in Table 5 to 10)** 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 IPIU.

2. Responsible for carrying out monitoring measures

140. During construction, DSC's Environment Safeguards Officer and the designated representative of IPIU will monitor the construction contractor's environmental performance.

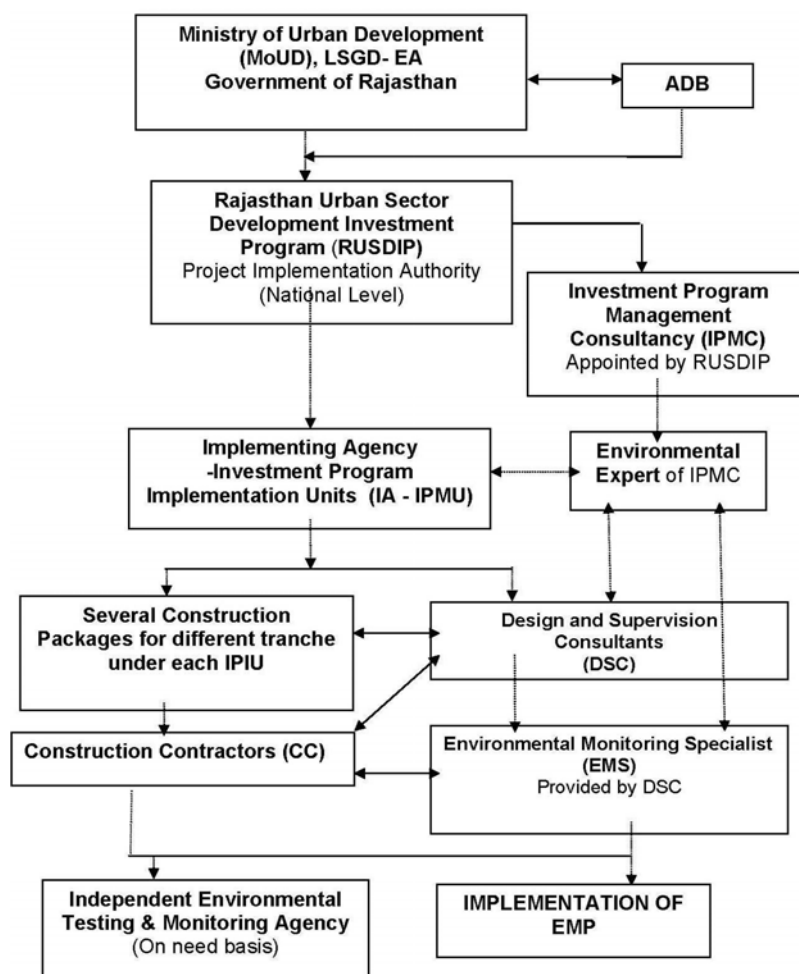
141. During the operation stage, monitoring will be the responsibility of CMB.

3. Responsible for reporting

142. LGSD will submit to ADB biannual reports on implementation of the EMP and will permit ADB to field environmental review missions as and when needed which will review in detail the environmental aspects of the Project. Any major accidents having serious environmental consequences will be reported immediately.

⁴ CLCs are chaired by District Collector_s, with members including officials of the ULB, local representatives of state government agencies, the IPIU, and local NGOs and CBOs.

Figure 3: Institutional Responsibility- RUSDIP



B. Environmental Mitigation Plan

143. **Tables 5 to 7** shows the potential adverse environmental impacts, proposed mitigation measures, responsible parties, and estimated cost of implementation. ADB approved EMMP will be included in the bid documents and will be further reviewed and updated during implementation in consent with ADB.

C. Environmental Monitoring Program

144. **Tables 8 to 10** show the proposed environmental monitoring program for this subproject. It includes all relevant environmental parameters, description of sampling location, frequency of monitoring, applicable standards, responsible parties, and estimated cost. Monitoring activities during the detailed engineering design stage will from 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 5: Anticipated Impacts and Mitigation Measures – Pre-construction Environmental Mitigation Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
Environmentally-sensitive Areas	A few trees will be cut and vegetation will be cleared in the sub-project area	(i) Inventory the trees to be cut; (ii) Obtain tree-cutting permit from Municipal Board/Council and/or District Collector; and (iii) Include in the bid documents provisions on replacement of 3 trees for every one tree cut during construction.	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, water and sewer lines within the existing right-of-way (ROW) will be replaced.	(i) Integrate utility ducts to the proposed road 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	(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 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 (CAPP)	(i) plan drawings showing entry and exit points; (ii) records of future 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 site; (ii) Consider alternatives if the site is found to be of medium or high risk;	IPIU and DSC	Chance Finds Protocol

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		<p>(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</p> <p>(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.</p>		
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Disruption to traffic flow and sensitive receptors	<p>(i) Prioritize areas within or nearest possible vacant space in the subproject sites;</p> <p>(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;</p> <p>(iii) Do not consider residential areas;</p> <p>(iv) Take extreme care in selecting sites to avoid direct disposal to <i>nallah</i>/water body or in areas which will inconvenience the community.</p>	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.
Sources of Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding	<p>(i) Prioritize sites already permitted by the Mining Department;</p> <p>(ii) If other sites are necessary, inform construction contractor that it is their responsibility to</p>	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

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
	and water logging, and water pollution.	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.		additional quarry sites if necessary.

Table 6: 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 nearby areas may cause general scouring resulting in endangerment of bridges and continuous degradation of town 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 IPMU; 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 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)	(i) Consult with IPIU/DSC on the designated areas for stockpiling of clay, soils, gravel, and other construction materials; (ii) Excavate the bridge foundations 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	Construction Contractor	(i) Location of stockpiles; (ii) complaints from sensitive receptors; (iii) heavy equipment and machinery with air pollution control devices (iii) ambient air for respirable particulate matter (RPM) and suspended particulate matter (SPM); (iv) vehicular emissions such as sulphur dioxide (SO ₂), nitrous oxides (NO _x), carbon monoxide (CO), and hydrocarbons

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		(v) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly.		
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 earth-moving and excavation equipment, and the transportation of equipment, materials, and people	(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	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

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		measured at a distance of 10 m or more from the vehicle/s.		
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 (iii) Develop and implement an Asbestos Cement Pipes Management Plan	Construction Contractor	(i) Existing Utilities Contingency Plan; (ii) Asbestos Cement Pipes Management Plan
Flora and Fauna	Land-clearing activities and presence of workers along project 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 permission from the Municipal Council or District Collector/concerned department; (iii) Earth-ball trees and transplant to IPIU-approved areas; (iv) 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 permission of impacted trees; (ii) number of replanted trees
Landscape and Aesthetics	solid wastes as well as excess construction materials	(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.	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.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
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 Traffic Police Office for temporary road diversions and with for provision of traffic aids if transportation activities cannot be avoided during peak hours; and (viii) 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 – Income.	Impede the access of residents and customers to nearby shops	(i) Leave spaces for access between mounds of soil; (ii) Provide walkways and metal sheets where required to maintain access across trenches for people and vehicles; (iii) Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools; (iv) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and (v) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers	Construction Contractor	(i) Complaints from sensitive receptors; (ii) number of walkways, signages, and metal sheets placed at subproject sites.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		for concerns/complaints. (vi) Avoid full closure of any street during construction ; (vii) Execution of work in the night to complete it as early as possible, wherever necessary; (viii) Avoid peak tourist season for execution of work where shops exists		
Socio-Economic-Employment	generation of contractual employment and increase in local revenue, land acquisition of private land and damage to permanent or temporary structures of public	(i) Employ at least 50% of the labor force, or to the maximum extent, local persons within the 2-km of immediate area if manpower is available; and (ii) Secure construction materials from local market. (iii) Prepare resettlement plan (iv) Give proper compensation for acquired land or damaged properties of public	DSC, IPIU and Contractor	(i) employment records; (ii) records of sources of materials (iii) Resettlement plan (iv) Compensation given to public
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 and S) Plan which will include measures such as: (a) excluding public from the site/ working site should be access controlled; (b) ensuring all workers are provided with and use Personal Protective Equipment; (c) H and 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 first-aid can be provided at all times. Equipped first-aid facility shall be easily accessible throughout the site; (iii) Provide medical insurance coverage for workers; (iv) Secure all installations from unauthorized intrusion and accident risks;	Construction Contractor	(i) site-specific Health and Safety (H and 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 and S orientation trainings (viii) personal protective equipments; (ix) % of moving equipment outfitted with audible back-up alarms;

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		<p>(v) Provide supplies of potable drinking water;</p> <p>(vi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances;</p> <p>(vii) Provide H and 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;</p> <p>(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;</p> <p>(ix) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;</p> <p>(x) Ensure moving equipment is outfitted with audible back-up alarms;</p> <p>(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</p> <p>(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.</p>		<p>(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.</p>
Community Health	traffic accidents and vehicle	(i) Plan routes to avoid times of peak-	Construction	(i) Traffic Management

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
and Safety.	collision with pedestrians	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.	Contractor	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; (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.	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 (after project work is completed)
Social and Cultural Resources	risk of archaeological chance finds	(i) Strictly follow the protocol for chance finds in any excavation work;	Construction Contractor	(i) records of chance finds

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		(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.		

Table 7: Anticipated Impacts and Mitigation Measures – Operation and Maintenance Environmental Mitigation Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
Noise Level	noise levels tend to increase with vehicular traffic	Put signages and implement “no blowing of horns” zones where there are sensitive receptors	Urban Improvement Trust (UIT)	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	Urban Improvement Trust (UIT)	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.	Urban Improvement Trust (UIT)	% survival of planted trees

Table 8: 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	All through the project road alignment.	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	once	IPMU

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
					estimated		
Utilities		DSC	(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	checking of records	(i) utility ducts included in the design; (ii) list of affected utilities and operators prepared; (iii) requirement for a contingency plan for service interruptions included in BID documents	once	IPMU
Access Roads	All through project road alignment.	DSC and Non-government Organization in charge of public consultation and disclosure	(i) plan drawings showing entry and exit points; (ii) records of future 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	All through project road alignment, within proposed ROW	IPIU and DSC	Chance Finds Protocol, Resettlement plan	checking of records	Chance Finds Protocol and Resettlement plan provided to construction contractors prior to commencement of activities	once	IPMU
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	designated area	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,	checking of records	List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas provided to	once	IPMU

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
			and disposal areas.		construction contractors prior to commencement of works.		
Sources of Materials	not applicable	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.	checking of records	(i) list of approved quarry sites and sources of materials provided to construction contractors (ii) BID document included requirement for verification of suitability of sources and permit for additional quarry sites if necessary.	once	IPMU
Baseline Environmental Condition – Ambient Air Quality	2-3 location along Subproject sites	DSC	Establish baseline values of respirable particulate matter (RPM) and (ii) suspended particulate matter (SPM)	Air sample collection and analyses by in-house laboratory or accredited 3rd party laboratory	GOI Ambient Air Quality Standards	Once prior to start of construction.	IPMU
Baseline Environmental Condition - Water Quality	2-3 location along Subproject sites	DSC	Establish baseline values of suspended solids (TSS), (iii) pH (iv) biological oxygen demand (BOD), (v) faecal	Air sample collection and analyses by in-house laboratory or accredited 3rd party laboratory	GOI Water Quality Standards	Once prior to start of construction.	IPMU

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
			coliform				
Baseline Environmental Condition Noise quality	4-5 location representing residential , commercial and sensitive locations	DSC	Establish baseline value of day and night noise level.	Through Sound Level Meter (SLM) by in-house laboratory or accredited 3rd party laboratory	GOI set standard for day and night .	Once prior to start of construction.	IPMU

Table 9: 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 excavation work)	Monthly submission for construction contractor as needed for DSC	DSC
Air Quality	Construction sites and areas designated for stockpiling of materials. Other than this locations where baseline monitoring has been done like , at Bizalighar Choraha, , Kali Bagichi	Construction Contractor	(i) Location of stockpiles; (ii) complaints from sensitive receptors; (iii) heavy equipment and machinery with air pollution control devices (iii) ambient air for respirable particulate	(i) checking of records; (ii) visual inspection of sites	(i) stockpiles on designated areas only; (ii) complaints from sensitive receptors satisfactorily addressed; (iii) air pollution control devices working properly; (iv) GOI	Biannual for checking records (excluding Monsoon period)	DSC

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
	Choraha, Red Cross Circle (Ring Road), PHED Pump House (Nr. Hiradas Bus stand).		matter (RPM) and suspended particulate matter (SPM); (iv) vehicular emissions such as sulphur dioxide (SO ₂), nitrous oxides (NOx), carbon monoxide (CO), and hydrocarbons (HC)		Ambient Quality Standards for ambient air quality; (iv) GOI Vehicular Emission Standards for SO ₂ , NOx, CO and HC.		
Water Quality	(i) construction sites; (ii) areas for stockpiles, storage of fuels and lubricants and waste materials; In addition to above Nougrah Pond .	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	visual inspection	(i) designated areas only; (ii) silt traps installed and functioning; (iii) no noticeable increase in suspended solids and silt from construction activities (iv) GOI Standards for Water Discharges to Inland Waters and Land for Irrigation	Biannual for checking records (excluding Monsoon period)	DSC

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
			oxygen demand (BOD), and coliforms.				
Noise Levels	(i) construction sites; (ii) areas for stockpiles, storage of fuels and lubricants and waste materials; (iii) work camps In addition to above near baseline Air monitoring has been done and at Sisam Mod (Shastri Park Chauraha), Nr MSJ College Area Gate (Main Gate) and Hanuman Mandir (Nr. MSJ College Area)	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	(i) checking of records; (ii) visual inspection	(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	(i) Existing Utilities Contingency Plan; (ii) Asbestos Cement Pipes Management Plan	(i) checking of records; (ii) visual inspection	implementation according to Utilities Contingency Plan and Asbestos Cement Plan	as needed	DSC
Flora and Fauna	(i) construction sites;	Construction Contractor	(i) tree-cutting permission for	(i) checking of records;	number of trees cut,	as needed	DSC

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
	(ii) location where replacement trees will be planted		affected trees; (ii) number of replanted trees	(ii) visual inspection	replanted and location according to the tree-cutting permit		
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 signages placed at subproject sites.	visual inspection	(i) implementation of Traffic Management Plan; (ii) complaints from sensitive receptors satisfactorily addressed; (iii) signages visible and located in designated areas	Monthly	DSC

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Socio-economic - Income	construction sites	Construction Contractor	(i) complaints from sensitive receptors; (ii) number of walkways, signages, and metal sheets placed at subproject sites.	visual inspection	(i) complaints from sensitive receptors satisfactorily addressed; (ii) walkways, ramps, and metal sheets provided (iii) signages visible and located in designated areas	quarterly	DSC
Socio-Economic-Employment	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 Health and Safety	construction sites	Construction Contractor	(i) site-specific Health and Safety (H and 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	(i) checking of records; (ii) visual inspection	(i) implementation of H and 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	Quarterly	DSC

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
			where workers are not exposed to hazardous or noxious substances; (vii) record of H and 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.		clean eating area, and number of sign boards are according to approved plan; (v) % of moving equipment outfitted with audible back-up alarms		
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	Quarterly	DSC

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
					from sensitive receptors satisfactorily addressed		
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 10: 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	Urban Improvement Trust (UIT)	complaints from sensitive receptors	checking of records	complaints from sensitive receptors satisfactorily addressed	as needed	IPMU
Accessibility	subproject sites	Urban Improvement Trust (UIT)	complaints from sensitive receptors	checking of records	complaints from sensitive receptors satisfactorily addressed	as needed	IPMU
Ecological Resources	subproject sites	Urban Improvement Trust	% survival of planted trees	checking of records	at least 80% survival rate	quarterly	IPMU

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
		(UIT)					

D. Environmental Management Plan Costs

145. Most of the mitigation measures require the Construction Contractors to adopt sound engineering practice at construction sites, which should be part of their normal procedures already, so there are unlikely to be major costs associated with compliance. Regardless of this, any costs 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.

146. The remaining actions in the EMP are the various environmental monitoring activities to be conducted by the Environmental Monitoring Specialist (EMS) in the DSC. These have been budgeted elsewhere but budget is listed below in the event additional person months are required and found necessary by DSC, and their costs are shown in **Table 11**. The figures show that the total cost of environmental management and monitoring for the subproject as a whole is **INR 0.527 million**.

Table 11: Environmental Management and Monitoring Costs (INR)

Item	Quantity	Unit Cost	Total Cost	Source of Funds
1. Implementation of EMP (1 years)				
Environmental Monitoring Specialist of DSC	1 x 2 month	150,000 ⁵	300,000	DSC
Environmental Monitoring (Baseline data) – Pre Construction work				
Ambient Air	3 location x twice a week=6 sample	12000	72000	RUIDP/DSC
Ambient Noise	6	2500	15000	RUIDP/DSC
Water (Ground Water & Surface Water)	1+1	6000	12000	RUIDP/DSC
Soil	1	6000	6000	RUIDP/DSC
Environmental Monitoring - During Construction Work				
Ambient Air	3 location x twice a week=6 sample+1 at worker camp=Total 7	12000	84000	RUIDP/DSC
Ambient Noise	8	2500	20000	RUIDP/DSC
Water (Ground Water & Surface Water)	2+1	6000	18000	RUIDP/DSC
TOTAL			527000/-	

EMP = Environmental Management Plan. Unit cost is as per standard prevailing market rate

⁵ Unit costs of domestic consultants include fee, travel, accommodation and subsistence

VIII. FINDINGS AND RECOMMENDATIONS

A. Findings

147. The Project is designed to improve the quality of life, better accessibility and smooth traffic flow. It has a strong community development focus reinforced by integrated poverty reduction, health and hygiene improvement investment projects. Moreover, urban residents including nearby the rural residents in surrounding hinterland will benefit from improved roads allowing better access to urban markets and social services provided in the Project towns. The towns' economies will benefit from enhanced productivity as a result of health improvement, time savings in travel, saving in vehicle operating cost, as well as from increased urban efficiency arising from improved road.

148. During project design, community meetings were held with beneficiaries to discuss sanitation, poverty, resettlement, affordability issues, and environmental concerns. Socioeconomic surveys obtained information and individual views on current situations and future preferences. Potential environmental impacts of urban infrastructure improvements are mainly short-term during the construction period and can be minimized by the proposed mitigating measures and environmentally sound engineering and construction practices.

149. The process described in this document has assessed the environmental impacts of the proposed Bharatpur Circular Road sub-project. Potential negative impacts were identified in relation to both construction and operation of the improved infrastructure, but no impacts were identified as being due to either the project design or location. 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 outline designs for the infrastructure. These include locating all activities within the ROW of existing roads, to avoid the need to acquire land or relocate people;

150. This means that the number of impacts and their significance has already been reduced by amending the design.

151. Regardless of these and various other actions taken during the IEE process and in developing the project, there will still be impacts on the environment when the project road is constructed and when it is operating. This is mainly because of the length of road and its location in busy area 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 significant impacts are on the physical environment, the human environment, and the cultural heritage.

152. During the construction phase, impacts mainly arise from the need to import a significant quantity of waste soil to level the road, and because the work will inevitably cause some disruption to road traffic. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation. These include:

- Covering soil during transportation and when stored on site;
- Watering exposed soil during dry and windy weather;
- Planning work with the appropriate authorities to minimise disruption of road traffic.

153. Proposed road will be constructed on existing alignment within available ROW. No new alignment has been proposed and no additional land need to be acquired and there is no involuntary resettlement required.

154. One field in which impacts are much less is archaeology, however here a series of specific measures have been developed to avoid damaging important remains. These include:

- Assessing the archaeological potential of the site, and selecting an alternative subproject if the site is considered to be of medium or high risk;
- Including archaeological, cultural and historical authorities and interest groups as project stakeholders to benefit from their expertise;
- Developing a protocol for use in conducting all excavation to ensure that any chance finds are recognised, protected and conserved.

155. There were limited opportunities to provide environmental enhancements, but certain measures were included. For example, it is proposed that the project will:

- Employ in the workforce people who live in the vicinity of the construction site to provide them with a short-term economic gain;
- Plant shrubs in the median of project road all through the road to mask it from other side view and give it a more natural and pleasing appearance.

156. These and the other mitigation and enhancement measures are summarised in Table 5 to Table 7 which also shows the location of the impact, the body responsible for the mitigation, and the programme for its implementation.

157. Once the Project road is 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 town authorities and police to ensure adequate precautions are taken to maintain the safety of workers and road users.

158. The main impacts of the operating Bharatpur Circular Road 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. **Table 8 to Table10** also assesses the effectiveness of each mitigation measure in reducing each impact to an acceptable level. This is shown as the level of significance of the residual impact (remaining after the mitigation is applied). This shows that all impacts will be rendered at least neutral (successfully mitigated), and that certain measures will produce a benefit (in addition to the major benefits provided by the operating schemes).

160. Mitigation will be assured by a programme of environmental monitoring conducted during both construction and operation to ensure that all measures are provided as intended, and to determine whether the environment is protected as envisaged. This will include Environmental monitoring of different parameter like Air, water, noise etc , 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

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.

B. Recommendations

162. 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 these two documents;
- The Environmental Monitoring Plan proposed in this report and the internal and external monitoring proposed in the Resettlement Framework are also implemented in full.

IX. CONCLUSIONS

163. The environmental status of the proposed improvements in urban transport and road sector in Bharatpur Town has been assessed. Issues related to Involuntary Resettlement were assessed by a parallel process of resettlement planning and will be compensated by measures set out in detail in the Resettlement Framework for the subproject.

164. The overall conclusion of both processes is that providing the mitigation, compensation and enhancement measures are implemented in full, there should be no significant negative environmental impacts as a result of location, design, construction or operation of the subproject. There should in fact be some small benefits from recommended mitigation and enhancement measures, and major improvements in quality of life and individual and public health once the project is in operation.

165. Based on the findings of the IEE, the classification of the Project as Category "B" is confirmed, and further special study or detailed EIA is NOT required to be undertaken to comply with ADB Environmental policy (2002) or GoI EIA Notification (2006).

Annexure- 1

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: **Rajsthan Urban Sector Infrastructure Development Programm**

Sector Division: **Roads and Highways**

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 cultural site along the project road.
➤	Protected Area	√		The Keoladeo National Park or Keoladeo Ghana National Park formerly known as the Bharatpur Bird Sanctuary and its administrative boundary is approx 25 meter away from nearest project road alignment. However the buffer zone of Bird sanctuary is more than 500 meter away from nearest stretch of project road.
➤	Wetland		√	There is no wetland within radius of 10 km.
➤	Mangrove		√	No mangrove vegetation in/around project area.
➤	Estuarine		√	No Estuarine in/around project area
➤	Buffer Zone of protected area		√	Project road is within Municipal boundary of Bharatpur Town and not within Buffer Zone of Nearest Bharatpur Bird Sanctuary
➤	Special area for protecting biodiversity		√	There is no special /notified area for protecting biodiversity is in/around project area. (except Keoladeo National Park which is within 10km of project road)
B. Potential Environmental Impacts				

Will the Project causes			
<ul style="list-style-type: none"> ▪ Encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries? 		√	Proposed project road is of up-gradation and widening of existing Bharatpur Circular road. There are few cultural/religious structures coming within proposed ROW which needs to be removed /relocated. Slight impact on these structures is expected.
<ul style="list-style-type: none"> ▪ Encroachment on precious ecology (e.g. sensitive or protected areas)? 		√	The only protective area is Bharatpur Bird Sanctuary near the project area, but there will not be any kind of encroachment on it as project road alignment is located in town only.
<ul style="list-style-type: none"> ▪ Alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site? 		√	Except a drain, no other water course crossing the project road or along the project road alignment.
<ul style="list-style-type: none"> ▪ Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction? 		√	Not expected, general local workers are engaged in construction work. A small worker camp cum construction yard will be constructed , away (more than 500 m) from water body and local population
<ul style="list-style-type: none"> ▪ Increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing? 	√		Rock crushing, cutting and filling work is not proposed as proposed work is limited to widening and up-gradation of Bharatpur Circular road. Slight increase in air pollution due to asphalt processing during construction is expected which will be localized and limited to construction work only.
<ul style="list-style-type: none"> ▪ Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation during project construction and operation? 		√	Biological and radiological risk is very unlikely. Physical and to some extent chemical risk is always associated with civil construction work. All kind of latest protective gear will be provided to workers.
<ul style="list-style-type: none"> ▪ Noise and vibration due to blasting and other civil works? 	√		Blasting is not required, Noise and vibration is expected in civil work during construction. Appropriate measure shall be taken.
<ul style="list-style-type: none"> ▪ Dislocation or involuntary resettlement of people? 	√		Temporary dislocation of small vender is expected along the road.
<ul style="list-style-type: none"> ▪ Dislocation and compulsory resettlement of people living in right-of-way? 	√		Dislocation of some structure (partial) is expected.
<ul style="list-style-type: none"> ▪ Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups? 	√		Some of the vendors residing along the project road will be impacted for short time limited to construction work.
<ul style="list-style-type: none"> ▪ Other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress? 	√		Project road is located in market area so some inconvenience is expected but it will be short term during construction only, appropriate measure shall be taken to reduce dust.
<ul style="list-style-type: none"> ▪ Hazardous driving conditions where construction interferes with pre-existing roads? 		√	The project road is within the market area , speed of vehicle is generally low so hazardous driving like situation will not arise , traffic diversion and management plan shall be developed

<ul style="list-style-type: none"> ▪ 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? 		√	Predominantly local, local worker will be engaged in construction work. Appropriate mitigation measure will be taken for solid waste generated in worker camp.
<ul style="list-style-type: none"> ▪ Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents? 		√	No borrow area will be made along the project road alignment. There is no need to raise embankment height of proposed road as the proposed project is generally limited to widening and up-gradation.
<ul style="list-style-type: none"> ▪ Accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials? 		√	Except asphalt, no other toxic material will be used in construction work, accident risk associated with vehicular traffic is very less as project road alignment is situated within town where the speed of vehicle is already regulated and low.
<ul style="list-style-type: none"> ▪ Increased noise and air pollution resulting from traffic volume? 		√	Noise and air pollution will be less as stopping of vehicle and congestion of traffic will be less due to widening of road.
<ul style="list-style-type: none"> ▪ Increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road? 		√	There is no water body (except a drain) along the project road. The vehicles engaged for construction work shall be parked and designated place. Maintenance including oiling shall be done only in construction yard at impermeable surface.
<ul style="list-style-type: none"> ▪ Social conflicts if workers from other regions or countries are hired? 		√	Most of the construction worker will be engaged from local area.
<ul style="list-style-type: none"> ▪ Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)? 		√	During construction work, the worker will be hired from nearby area. During operation generally the local resident will use the project road as the entire road is located within the town.
<ul style="list-style-type: none"> ▪ 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? 		√	No explosive will be used impermeable storage camp will be constructed to store chemical and fuel. The storage camp will be controlled access.
<ul style="list-style-type: none"> ▪ 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. 		√	Construction area will be clearly demarcated and it will be controlled access. Only worker and project concerned member will be allowed to visit the operational site as well as storage site.

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.			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)		√	Bharatpur town lies in medium to high risk zone (III and IV). The area is prone to earthquakes as it is located on comparatively unstable geological plains based on evaluation of the available earthquake zone information. Other risk like floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions is unlikely.
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 sub-grade).		√	The proposed project road is having a length of 8 km, located with the Bharatpur town so such change like change in temperature, precipitation or extreme events is very unlikely.
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)?		√	Proposed project is limited to widening and up-gradation of existing road so it will not impact on vulnerable groups.
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)?		√	Proposed project is limited to widening and up-gradation of existing road. There no significant impact is expected on climate or disaster vulnerability.

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	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.

Environment	Natural Hazards and Climate Change	Example Impact on Roads and Highways
	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.	
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,	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 salt-water intrusion in to groundwater,

Environment	Natural Hazards and Climate Change	Example Impact on Roads and Highways
	<p>coastal erosion, with coral reefs threatened by ocean warming in some areas. Sea level rise is likely to threaten 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.</p>	
Mountain ecosystems	<p>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.</p>	<p>Damage to infrastructure from landslides and mudflows, permafrost melting causes damage to roads, glacial lake outbursts wash out river-crossings.</p>
Volcanic environments	<p>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.</p>	<p>Damage and loss of roads, insecurity for roadworks crew and maintenance</p>

Annexure- 2**PUBLIC CONSULTATION- ENVIRONMENT****Subproject:- Bharatpur Circular Road (Bharatpur)**

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
- Temporary business loss during construction work
- Forest and sensitive area nearby the project site

1. **Date and time of Consultation: 18.08.2011 and 30.08.2011 Entire day.**

2. **Location: Along the project road in different stretch**

Sr. No.	Key Issues/Demands	Perception of community	Action to be taken
1	Awareness of the project – including coverage area	Mostly people along the proposed project corridor are aware that Bharatpur circular road is being up-graded/improved.	For awareness and participation of local community, there is CAPP program, which is being implemented. Before start of the project caution boards indicating the nature or work will be displayed
2	In what way they may associate with the project	They will be benefitted by overcoming the problem of traffic jam. Vehicle operating cost (VOC) will also be reduced. Local people will get short time employment.	Prior to start of construction Traffic management plan will be made in co-ordination with Local Traffic police. Atleast 50% people from nearby area should be engaged in construction work.
3	Presence of any forest, wild life or any sensitive / unique environmental components nearby the project area	Boundary of Bharatpur Bird Sanctuary is within 100-200 meter from proposed project road. But As the proposed project road is within urban area (within Municipal limit) and no such issue except Some trees may be required to cut, during construction.	Shrubs will be planted in median.
4	Presence of historical/ cultural/ religious sites nearby	Bharatpur fort is located in the center of the loop of the circular road alignment.	Impact due to sub-project on Bharatpur fort is very unlikely as it is more than 2 km away from the proposed road alignment and proposed project involve only up-gradation and widening.
5	Un favorable climatic condition	Very hot during summer (upto 48	Appropriate measure will be

Sr. No.	Key Issues/Demands	Perception of community	Action to be taken
		degree celcius) and very cold during winter.	taken during construction period.
6	Occurrence of flood	No flood occurred during last 20 years in Bharatpur town.	
7	Drainage and sewerage problem facing	Yes , during rainy season there is a problem of drainage system in town	Side drain along the proposed project road alignment has been proposed.
8	Present drinking water problem – quantity and quality	Not much .	Potable water will be provided to construction worker.
9	Present solid waste collection and disposal problem	There is no proper scientific collection and disposal system exist in Bharatpur town , The waste collected by municipal body is just dumped . outside the Bharatpur town.	Construction waste and waste generated from worker camp will be disposed in designated and approved place in scientific manner.
10	Availability of labours during construction time	Yes, labours are easily available	At least 50 % of construction worker will from nearby area.
11	Accessibility to project road during construction.	Yes	Project road will be accessible to local commuter as well to shopkeeper. However short term inconvenience at a particular stretch may be expected.
12	Perception of villagers on tree felling and afforestation	Few trees which are on government own land are coming to ROW of proposed road.	Shrubs in median of proposed project road will be planted all through the alignment.
13	Dust and noise pollution and disturbances during construction work	These may affect for a short period during construction work.	Proper mitigation measures like sprinkling of water , transportation of material by covered vehicle will be consider.
14	Setting up worker camp site within the village/ project locality	As local worker will be engaged in construction work so setting up worker camp should not be an issue of concern.	Worker cam and construction yard will be established atleast 500 meter away from local population.
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	All measure regarding Environmental Health and safety will be considered.
16	Conflict among beneficiaries downstream users – water supply project using of river water	No such issue	
17	Requirement of enhancement of other facilities	Few structures , like public drinking water facility, transformer and electric pole need to be re-located and few small shops may be partially affected they should be rehabilitated.	Partially affected structure will be rehabilitated properly.
18	Whether local people agreed to sacrifice their lands (cultivable or	No private land is being affected as the project area comes under government land, some of the	

Sr. No.	Key Issues/Demands	Perception of community	Action to be taken
	not) for beneficial project after getting proper compensation	small shops may get partially affected.	

NAME AND TITLES OF PERSONS CONSULTED

1. Gautam - Auto parts and repairing
2. - Panna Behl- Auto parts and repairing
3. Lakshman Prasad- Kailash Automobiles
4. Sk Sainini- Saini Paints (owner)
5. Kanhaiya Lal Gurnani- shop keeper
6. Udai Singh Bhati- Shopkeeper

Only random, informal survey has been conducted to know general view, public participation and their expectation from the sub-project. It's important to note that they want to take up the issue to their union before they come up with their opinion. So there is need for a focused group discussion or consultation with the affected/dislocated person. The detail of public consultation is proposed and its outcome will be prepared in separately in Resettlement Plan (RP).



Photograph of consultation in circular Road

Summary of outcome:

The local people were of the view that they are aware about the work of RUIDP and other agencies. A majority of the people are in favour of the proposed project. Infact, they are very eager towards the implementation phase of the project. As per the local people, the roads are not able to cater present traffic. Also the conditions of the road are not good. At some placeless the roads possess holes which create problems for the local people as in the rainy season; it paves a way for the numerous road accidents that take place in this area. The other problems faced by them are bad odor from the waste heap during the summer and the monsoon season which also acts as a source of disease spreading bacteria. They also complained that there are no proper waste management facilities in the area. People are very much interested for up-gradation and widening of Bharatpur Circular road. As the local daily commuters are suffering greatly due to traffic jam and other inconvenience due to traffic jam like dust and smoke generating from standing vehicle. They also suggested that local people should be given opportunities during the project construction tenure. People are ready to extend all types of

support during execution of the project. They also want that sewerage, drainage and solid waste management projects should be taken up as early as possible. There is no land falling under private ownership, so there is no issue of private property acquisition. Only some trees, shops might get partially affected. These should be rehabilitated as per norms of loan agency.

Photograph of the Bharatpur Circular Road



Recommended Contract Clauses

- A. Sources of Materials
- (i) Use quarry sites and sources permitted/licensed 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.
- B. Air Quality
- (i) Consult with IPIU/DSC on the designated areas for stockpiling of clay, soils, gravel, and other construction materials;
 - (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.
- C. 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).
- D. Noise Levels
- (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.
- E. Existing Infrastructure and Facilities
- (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
 - (iii) Develop and implement an Asbestos Cement Pipes Management Plan
- F. Accessibility
- (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 Traffic Police Office for temporary road diversions and with 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.

G. Landscape and Aesthetics

- (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.

H. Socio-Economic – Income

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

I. Socio-Economic – Employment

- (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
- (ii) Secure construction materials from local market.

J. Occupational Health and Safety

- (i) Develop and implement site-specific Health and Safety (H and 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 and 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 and 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.
- K. Asbestos Cement Pipes
- (i) Train all personnel (including manual labourers) to enable them to understand the dangers of AC pipes and to be able to recognise them in situ;
 - (ii) Report to management immediately if AC pipes are encountered;
 - (iii) Develop and apply AC Management Plan.
- J. Community Health and Safety.
- (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.
- L. Work Camps
- (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) 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.
- M. Social and Cultural Resources
- (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.

Annexure -4

Affected Community Properties along Bharatpur Circular Road

Sl.No	Chainage	Hand Pump (A)		Temples (B)		Others (C) (lumpsum)
		L	R	L	R	
1	500-1000					Bus stop
2	1500-2000	1(tube well water supply 7.2M)*				
3	2500-3000		1=			
4	3000-3500				1(small Temple)	
5	3500-4000			1(3.7m from Centerline)		
6	4500-5000				1(Hanuman temple 6 M)	
7	5000-5500					Bus stop
8	6000-6500					Bus stop
9	6500-7000				1(Small) =	
10	7000-7500				1(Big)=	
11	8000-8500		1		3(Small)= Rs 50000 X3	
12	8500-9000				1(shani temple)	

Details of Tree Plantation along Bharatpur Circular Road

Sl. No.	Chainage (in Km)	Girth<30cm		Girth30-60cm		Girth60-90cm		Girth>90cm		Total	
		L	R	L	R	L	R	L	R	L	R
1	0.000-500									0	0
2	500-1000		2	2	3		2			2	7
3	1000-1500	3	4							3	4
4	1500-2000									0	0
5	2000-2500			1						1	0
6	2500-3000									0	0
7	3000-3500			1						1	0
8	3500-4000									0	0
9	4000-4500		1							0	1
10	4500-5000	1	1							1	1
11	5000-5500									0	0
12	5500-6000			3	3					3	3
13	6000-6500	1	2		1			1		2	3
14	6500-7000				1	1				1	1
15	7000-7500	7	2			1				8	2
16	7500-8000	2	4		2					2	6
17	8000-8500	3	3		1					3	4
18	8500-9000	4	3	2	1		1			6	5
	Total	21	22	9	12	2	3	1	0	33	37

Note: - The Species of tree includes Babul (*Acacia nilotica* predominant), Eucalyptus (*Eucalyptus globules*), Neem (Margo/ *Azadirachta indica*), Imli / Tamarind (*Tamarindus indica*) and Khajura tree .