

# Initial Environmental Examination

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October 2013

IND: Construction of Multi-Level Parking Facility at  
Construction of Mechanized Automated Multi Level  
Parking Facility at Super Bazaar, Jammu  
(Tranche 3)

Prepared by Economic Reconstruction Agency, Government of Jammu and Kashmir  
for the Asian Development Bank.

## CURRENCY EQUIVALENTS

(as of 25 November 2013)

Currency unit	–	rupee (INR)
INR1.00	=	\$.015997
\$1.00	=	INR 62.5115

## ABBREVIATIONS

ADB	-	Asian Development Bank
ASI	-	Archaeological Survey of India
BIS	-	Bureau of Indian Standards
CBD	-	Central Business District
CTE	-	Consent To Establish
CTO	-	Consent To Operate
CPCB	-	Central Pollution Control Board
CPHEEO	-	Central Public Health And Environmental Engineering Organization
CPS	-	Central Pumping Station
DI	-	Ductile Iron
DMA	-	District Metering Area
DSC	-	Design And Supervision Consultancy
EA	-	Executing Agency
EAC	-	Expert Appraisal Committee
EARF	-	Environment Assessment And Review Framework
EC	-	Environmental Clearance
EIA	-	Environmental Impact Assessment
EMP	-	Environment Management Plan
ERA	-	Economic Reconstruction Agency
FI	-	Financial Intermediary
GLSR	-	Ground Level Service Reservoir
GoI	-	Government of India
GPH	-	Gallon Per Hour
GRM	-	Grievance Redressal Mechanism
HDPE	-	High Density Poly-Ethylene
IA	-	Implementing Agency
IEE	-	Initial Environmental Examination
IST	-	Indian Standard Time
J&K	-	Jammu And Kashmir
JDA	-	Jammu Development Authority
JKUSDIP	-	Jammu And Kashmir Urban Sector Development Investment Programme
JMC	-	Jammu Municipal Corporation
LG	-	Lac Gallon
LHS	-	Left Hand Side
LPCD	-	Litre Per Capita Per Day
MFF	-	Multi –Tranche Financing Facility
ML	-	Million Litre
MLD	-	Million Litre Per Day
MoEF	-	Ministry Of Environment And Forests

MSW	-	Municipal Solid Waste
MT	-	Metric Ton
MTR	-	Month's Total Rainfall
NAAQS	-	National Ambient Air Quality Standards
NH	-	National Highway
OHT	-	Over Head Tank
OM	-	Operations Manual
PMU	-	Project Management Unit
PM <sub>2.5</sub>	-	Particulate Matter Below 2.5 Micron Particle Size
PM <sub>10</sub>	-	Particulate Matter Below 10 Micron Particle Size
PMC	-	Project Management Consultant
PUC	-	Pollution Under Control
PWD	-	Public Works Department
RCC	-	Reinforced Cement Concrete
REA	-	Rapid Environmental Assessment
RF	-	Resettlement Framework
RHS	-	Right Hand Side
RP	-	Resettlement Plan
ROW	-	Right Of Way
RSPM	-	Respirable Suspended Particulate Matter
SC	-	Supervision Consultants
SPCB	-	State Pollution Control Board
SPM	-	Suspended Particulate Matter
SPS	-	Safeguards Policy Statement
STP	-	Sewage Treatment Plant
TMP	-	Traffic Management Plan
ToR	-	Terms Of Reference
UEED	-	Urban Environmental Engineering Department

### WEIGHTS AND MEASURES

cm	-	centimetre
crore	-	10 million = 10,000,000
cumec	-	cubic meter per second
lac	-	100 thousand = 100,000
Kanal	-	505.39 square meter
km	-	kilometer
kph	-	kilometer per hour
lpd	-	liters per day
m	-	meter
m <sup>2</sup>	-	square meter
mg/l	-	milligrams per liter
mm	-	millimeter
MSL	-	mean sea level
µ	-	10 <sup>-6</sup> meter
µg/m <sup>3</sup>	-	micrograms per cubic meter

### NOTE{S}

In this report, "\$" refers to US dollars.  
 "INR" and "₹" refer to Indian rupees

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## EXECUTIVE SUMMARY

1. Economic Reconstruction Agency (ERA) has undertaken Jammu and Kashmir Urban Sector Development Investment Program (JKUSDIP), financed by the ADB through Multi-Tranche Financing Facility (MFF). The total estimated cost of the program is about US \$485 million, out of which \$300 million will be financed by ADB. The primary objective of JKUSDIP is to promote economic development in the State of Jammu and Kashmir (J&K) through expansion of basic services such as water supply, sewerage, sanitation, drainage, solid waste management, urban transport and other municipal functions in Jammu, Srinagar and other important urban centers of the State. JKUSDIP will also strengthen the service delivery capacity of the responsible state urban agencies and urban local bodies through management reform, capacity building and training. The program is to be implemented in 4 to 7 tranches over a period of 8 years. Each tranche constitutes a separate loan. Tranche 2 (Project-1) of JKUSDIP (Loan 2331-IND) is under implementation. One of the subprojects identified under Tranche 3 is the improvement of existing parking facility in Super Bazar and Old Police Station Area (City Chowk), in Jammu City.

2. **Subproject Scope:** The Jammu City multi-level parking subproject will improve the existing parking lot in Super Bazar and Old Police Station Area (City Chowk) by construction of a mechanized parking facility. The major objectives of the subproject are: (i) decongestion of traffic in Super Bazar and Old Police Station Area (City Chowk); (ii) reduction of on-street parking; (iii) provision of safe, secure and efficient vehicular circulation/passage inside as well as outside parking facility and thereby enhancing public safety and security; (iv) provision of good public amenities for residents and tourists in the area; (v) improved long term traffic management in the city.

3. **Categorization.** Subproject components followed environmental criteria specified in the revised Environmental Assessment and Review Framework (EARF)<sup>1</sup> adopted for the Tranche 2 of JKUSDIP. Jammu City multi-level parking subproject is classified as Environmental Category B as per Asian Development Bank Safeguard Policy Statement (ADB SPS) as no significant impacts are envisioned. This initial environmental examination (IEE) is prepared based on the concept of proposed works and following existing legislations of Government of India and Government of Jammu and Kashmir; and requirements of ADB SPS. This IEE will be updated for any change in the scope after the finalization of the detailed project report (DPR) however already provides (i) basic information about the environmental conditions of the subproject area of influence, (ii) environmental impacts identified and assessed as part of the planning and design process, (iii) recommended actions to reduce those impacts to acceptable levels and to implement these in the environmental management plan (EMP) including who has to implement and monitor implementation of mitigation measures.; and (iv) guidance on how environmental monitoring has to be carried out including observations on- and off-site, document checks, and interviews with workers and beneficiaries.

4. **Implementation Arrangements.** Economic Reconstruction Agency (ERA) will be responsible for ensuring compliance to environmental requirements of ADB as well as central and state governments. ERA's safeguard unit will monitor the implementation of environmental

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<sup>1</sup> The EARF has been revised to be aligned with ADB's Safeguard Policy Statement 2009. The original EARF was prepared for JKUSDIP in accordance to ADB's Environment Policy 2002. However, with implementation of SPS 2009, the EARF was required to be revised for Tranche-2 and subsequent tranches of JKUSDIP.

covenants with the assistance of Project Management Consultants (PMC) and Design and Supervision Consultants (DSC).

5. **Description of the Environment.** The subproject site is located in an existing parking site in centre of Jammu City and not within or adjacent to environmentally sensitive areas such as cultural heritage site, protected area, wetland, buffer zone of protected area, and special area for protecting biodiversity. No water courses adjacent to the subproject site.

6. **Anticipated Impacts.** Planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible thus environmental impacts as being due to the subproject design or location were not significant.

7. Key construction impacts include (i) temporary disruption of services during realignment of existing utilities in the site; (ii) interference with accesses to businesses due to construction works; (iii) risk of accidents associated with vehicular traffic and transport of materials; (iv) increased volume of construction vehicles on the roads may lead to increased wear and tear of roads in the vicinity of the subproject site; and (v) exposure to increased noise, dust, vibrations; hazardous chemicals (oils and lubricants) and waste materials. An Environmental Management Plan (EMP) has been developed to provide specific actions deemed necessary to assist in mitigating the environmental impacts, guide the environmentally-sound execution of the proposed subproject, and ensure efficient lines of communication between the implementing agency, project management unit, and contractors.

8. In the operational phase, all facilities and infrastructure will operate with routine maintenance, which should not affect the environment. Facilities will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only.

9. **Environmental Management.** An Environmental Management Plan (EMP) has been developed to provide specific actions deemed necessary to assist in mitigating the environmental impacts, guide the environmentally-sound execution of the subproject, and ensure efficient lines of communication between the implementing agency, project management unit, and contractors. The EMP also provides a pro-active feasible and practical working tool to enable the measurement, reporting and monitoring performance on site. The EMP will be included in the bid documents and will be further reviewed and updated during implementation. The EMP will be included in the contractual clauses and will be made binding on all contractors operating on the site. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance. Any requirements for corrective action will be reported to the ADB.

10. **Consultation, Disclosure and Grievance Redress.** The stakeholders were involved through on-site discussions and public consultation, after which views expressed were incorporated into the IEE and in the planning of the subproject. The IEE will be made available at public locations in the city and will be disclosed to a wider audience via the ADB and ERA websites. The consultation process will be continued and expanded during subproject implementation to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation. A grievance redress mechanism is described within the IEE to ensure any public grievances are addressed quickly.

11. **Monitoring and Reporting.** The PMC and DSC will be responsible for monitoring and will submit monthly monitoring reports to ERA, and ERA will send semi-annual monitoring reports to ADB. ADB will post the environmental monitoring reports on its website.

12. **Conclusions and Recommendations.** The citizens of Jammu City will be the major beneficiaries of this subproject. With the improved parking facilities, they will be provided with long term traffic management. Therefore the proposed subproject is unlikely to cause significant adverse impacts and net environmental benefits to citizens of Jammu City will be positive. The potential impacts that are associated with design, construction and operation can be mitigated to standard levels without difficulty through proper engineering design provided that the EMP is included in the contract and its provisions implemented and monitored to their full extent.

13. Based on the findings of the IEE, there are no significant impacts and the classification of the subproject as Category "B" is confirmed. No further special study or detailed environmental impact assessment (EIA) needs to be undertaken to comply with ADB SPS.

## I. INTRODUCTION

1. Economic Reconstruction Agency (ERA) has undertaken the Jammu and Kashmir Urban Sector Development Investment Program (JKUSDIP), financed by the ADB through Multi-Tranche Financing Facility (MFF). The total estimated cost of the program is about US \$485 million, out of which \$300 million will be financed by ADB. The primary objective of JKUSDIP is to promote economic development in the State of Jammu and Kashmir (J&K) through expansion of basic services such as water supply, sewerage, sanitation, drainage, solid waste management, urban transport and other municipal functions in Jammu, Srinagar and other important urban centers of the State. JKUSDIP will also strengthen the service delivery capacity of the responsible state urban agencies and urban local bodies through management reform, capacity building and training. The program is to be implemented in 4 to 7 tranches over a period of 8 years. Each tranche constitutes a separate loan. Tranche 2 (Project-1) of JKUSDIP (Loan 2331-IND) is under implementation. One of the subprojects identified under Tranche 3 is the improvement of existing parking facility in Super Bazar and Old Police Station Area (City Chowk) in Jammu City.

2. The Jammu City multi-level parking subproject will improve the existing parking lot in Super Bazar and Old Police Station Area (City Chowk) by construction of a mechanized parking facility. The major objectives of the subproject are: (i) decongestion of traffic in Super Bazar and Old Police Station Area (City Chowk) (ii) reduction of on-street parking; (iii) provision of safe, secure and efficient vehicular circulation/passage inside as well as outside parking facility and thereby enhancing public safety and security; (iv) provision of good public amenities for residents and tourists in the area; and (v) improved long term traffic management in the city.

3. Subproject components followed environmental criteria specified in the revised Environmental Assessment and Review Framework (EARF)<sup>2</sup> adopted for the Tranche 2 of JKUSDIP. Jammu City multi-level parking subproject is classified as Environmental Category B as per Asian Development Bank Safeguard Policy Statement (ADB SPS) as no significant impacts are envisioned.

4. This initial environmental examination (IEE) is prepared based on the concept of proposed works and following existing legislations of Government of India and Government of Jammu and Kashmir; and requirements of ADB SPS. ADB rapid environmental assessment checklist for road projects was used to screen the subproject for environmental impacts and to determine the scope of IEE investigation (**Appendix 1**).

5. This IEE will be updated for any change in the scope after the finalization of the detailed project report (DPR) however already provides (i) basic information about the environmental conditions of the subproject area of influence, (ii) environmental impacts identified and assessed as part of the planning and design process, (iii) recommended actions to reduce those impacts to acceptable levels and to implement these in the environmental management plan (EMP) including who has to implement and monitor implementation of mitigation measures.; and (iv)

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<sup>2</sup> The EARF has been revised to be aligned with ADB's Safeguard Policy Statement 2009. The original EARF was prepared for JKUSDIP in accordance to ADB's Environment Policy 2002. However, with implementation of SPS 2009, the EARF was required to be revised for Tranche-2 and subsequent tranches of JKUSDIP.

guidance on how environmental monitoring has to be carried out including observations on- and off-site, document checks, and interviews with workers and beneficiaries.

## II. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

### A. ADB Policy

6. ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB's SPS, 2009. This states that ADB requires environmental assessment of all project loans, program loans, sector loans, sector development program loans and loans involving financial intermediaries and private sector loans.

7. **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 impacts and are assigned to one of the following four categories:

- (i). Category A. Projects could have significant adverse environmental impacts. An EIA is required to address significant impacts.
- (ii). 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.
- (iii). Category C. Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.
- (iv). 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.

8. **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.

9. **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 PMU during project implementation upon receipt.

## **B. National and State Laws**

10. The implementation of the subprojects will be governed by Government of India (GoI) and State of Jammu and Kashmir environmental acts, rules, regulations, and standards. These regulations impose restrictions on the activities to minimize/mitigate likely impacts on the environment. It is the responsibility of the project executing and implementing agencies to ensure subprojects are consistent with the legal framework, whether national, state or municipal/local. Compliance is required in all stages of the subproject including design, construction, and operation and maintenance.

11. **EIA Notification.** The EIA Notification of 2006, as amended (replacing the EIA Notification of 1994), sets out the requirement for environmental assessment in India. This states that environmental clearance (EC) is required for specified activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. The subproject is not listed in the EIA Notification of 2006 "Schedule of Projects Requiring Prior Environmental Clearance" thus EC is not required.

12. **Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments.** Control of water pollution is achieved through administering conditions imposed in consent issued under provision of the Water (Prevention and Control of Pollution) Act, 1974. These conditions regulate the quality and quantity of effluent, the location of discharge and the frequency of monitoring of effluents. Any component of the subproject having potential to generate sewage or trade effluent will come under the purview of law and will have to obtain Consent to Establish (CTE) from State Pollution Control Board (SPCB) before starting implementation and Consent to Operate (CTO) before commissioning. Discharges shall comply with standards notified by the Central Pollution Control Board. Rehabilitation of water supply distribution network is not included in the lists of activities requiring CTE and CTO however hot mix plants, wet mix plants, stone crushers etc, if installed for construction, shall require CTE and CTO from SPCB.

13. **Air (Prevention and Control of Pollution) Act of 1981, as amended.** Activities having potential to emit air pollutants have to obtain CTE from SPCB before starting implementation and CTO before commissioning the project. Emissions shall comply with standards notified by the Central Pollution Control Board. The occupier of the project/facility has the responsibility to adopt necessary air pollution control measures for abating air pollution. The following require CTE and CTO from SPCB: (i) diesel generators; and (ii) hot mix plants, wet mix plants, stone crushers etc, if installed for construction.

14. **The Noise Pollution (Regulation and Control) Rules, 2000, as amended.** This rule mandates regulation and control of noise generating sources. Since the subproject site is located within the city, construction activities and use of heavy machinery and vehicles may increase the ambient noise levels during the construction phase. The occupier of subprojects have to take measures for abatement of noise pollution ensuring that the existing noise levels do not exceed the standards specified under this rule.

15. **Ancient Monuments and Archaeological Sites and Remains Rules of 1959 and J&K Ancient Monuments Preservation (Amendment) Act of 2010.** These laws designate the area within a radius of 100 meters (m) from the "protected property" as "prohibited area" and up to 200m from the boundary of prohibited area as "regulated area". No development activity (including mining operations and construction) is permitted in the "prohibited area" and all

development activities likely to damage the protected property are not permitted in the “regulated area” without prior permission of the Archaeological Survey of India (ASI). Protected property includes the sites, remains, and monuments protected by ASI or the State Department of Archaeology. Some archaeological, historical monuments and religious places like Bahu Fort, Peer Mitha Tomb, Shahi Masjid at Mast Garh and Mubarak Mandi complex are located in Jammu City. However the subproject site is beyond the prohibited and regulated areas.

16. **Jammu and Kashmir Preservation of Specified Trees Act of 1969 and Rules of 1969, as amended.** If cutting of scheduled trees is required during preparation of sites, permission will be obtained by ERA from the Sericulture/Revenue Department prior to commencement of construction works.

17. **Jammu and Kashmir Forest Conservation Act, 1997, as amended.** If cutting of forestry trees are required during subproject execution, permission to be obtained by ERA from the forest department prior to commencement of construction works.

18. **Building and Other Construction Workers (Regulation of Employment and Conditions of service) Act of 1996 and Rules 1998, as amended.** This act applies to all the building and other construction activities to which the provisions of Factories Act, 1948 and Mines Act, 1952 do not apply. The J&K State Government, in pursuance of this act, has constituted a Welfare Board of building and other construction workers. This law aims to provide for regulation of employment and conditions of service of the building and other construction workers as also their safety, health and welfare measures in every establishment which employs ten or more workers. This act provides for registration of each establishment within a period of sixty days from the commencement of work and registration of building workers as beneficiaries under this Act. Compliance to provisions of health and safety measures for the construction workers in conformity with International Labor Organization (ILO) convention No.167 concerning safety and health in construction. The contractors engaged for execution of the subproject shall comply with the provisions of this Act.

19. The summary of environmental regulations and mandatory requirements for the proposed subproject is shown in Table 1.

**Table 1: Applicable Environmental Regulations**

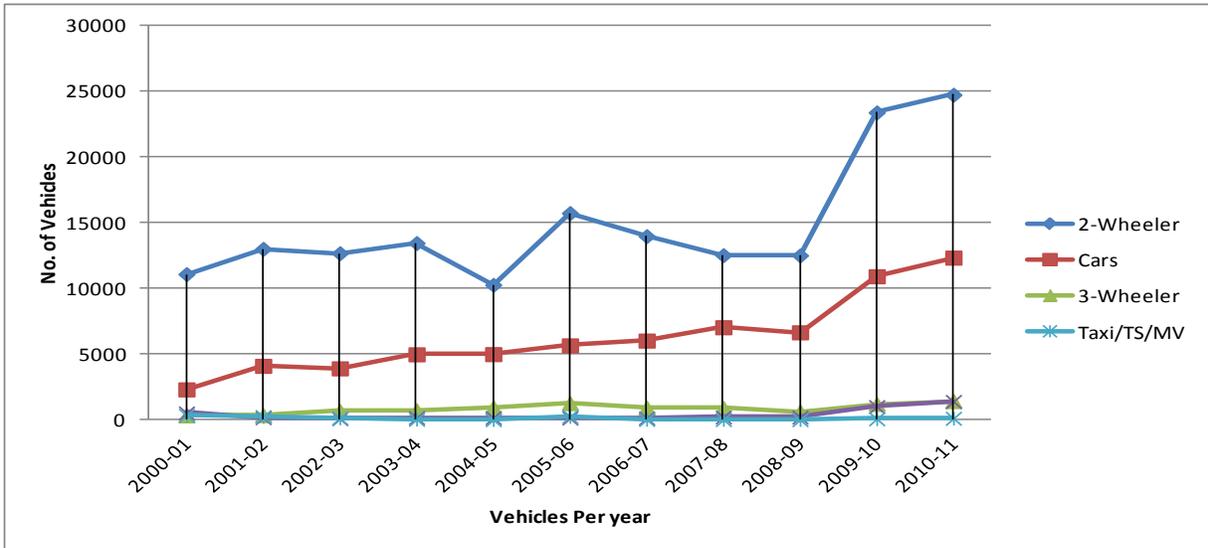
Applicability of Acts/Guidelines	Compliance Criteria	Responsibility
The EIA notification, 2006 (and its subsequent amendments in 2009) provides for categorization of projects into category A and B, based on extent of impact	The sub project is not covered in the ambit of the EIA notification. As a result, the categorization, and the subsequent environmental assessment and clearance requirements, either from the state or the central Government is not triggered.	NA
The Wildlife Conservation Act, 1972, as amended and J&K Wildlife (Protection) Act 1978, as amended, provide for protection and management of Protected Areas	The wildlife protection act is not applicable to the proposed subproject.	NA
- Jammu and Kashmir Forest (Conservation) Act, 1997, as amended. - The Jammu And Kashmir Preservation of Specified Trees Act, 1969 and Rules of 1969, as amended.	Clearance from Forest department for cutting of trees, if any. Based on preliminary design, this act is not applicable as cutting of trees is not envisaged. However to be assessed again during detailed design stage.	If cutting of tree is required based on detailed design, ERA will obtain the clearance.
The Ancient Monuments and Archaeological Sites and Remains	The subproject area does not fall within the prohibited/ regulated area or is situated close to	NA

<b>Applicability of Acts/Guidelines</b>	<b>Compliance Criteria</b>	<b>Responsibility</b>
Act, 1958, and the rules, 1959 provide guidance for carrying out activities, including conservation, construction and reuse in and around the protected monuments.	any such site of archeological importance.	
- Water (Prevention and control of pollution) Act, 1974, as amended - Air (prevention and control of pollution) Act, 1981, as amended	Consent to Establish (CTE) and Consent to Operate (CTO) from the J&K SPCB for setting up of hot mix plants, wet mix plants, stone crushers and diesel generators.	To be obtained by the Contractor, prior to construction.
Noise Pollution (Regulation and Control) Rules, 2000, as amended.	Contractors have to take measures for abatement of noise pollution ensuring that the existing noise levels do not exceed the standards specified under this rule.	Contractor
Building and Other Construction Workers (Regulation of Employment and Conditions of service) Act of 1996 and Rules 1998 provide for regulation of employment and conditions of service of the building and other construction workers as also their safety, health and welfare measures in every establishment which employs ten or more workers.	Registration of each establishment within a period of sixty days from the commencement of work and registration of building workers as beneficiaries under this Act. Compliance to provisions of health and safety measures for the construction workers in conformity with ILO convention No.167 concerning safety and health in construction	Contractor

### **III. DESCRIPTION OF THE PROJECT**

#### **A. Existing Condition**

20. Jammu City like any other historical city has very complex road network. The present urban transportation situation is un-organized and seriously lacking parking facilities. Usage of private transportation is predominantly observed and the growth in the number of private vehicles is evident from the number of vehicles registered in the Jammu District. Population in Jammu City is increasing in range of 2.0 to 2.2% yearly. With increase in population and establishment of new colonies in extended parts of Jammu City, that leads to demand of more cars which ultimately load on the exiting parking facilities. The number of cars added to the city has increase at an alarming rate. Car registration has increased from 2,306 in year 2000 to 2001 to 12,344 in year 2010 to 2011. Nominal growth in two-wheeler registration has been found from 11,091 in year 2000 to 2001 to 24,757 in year 2010 to 2011 (Figure 1).

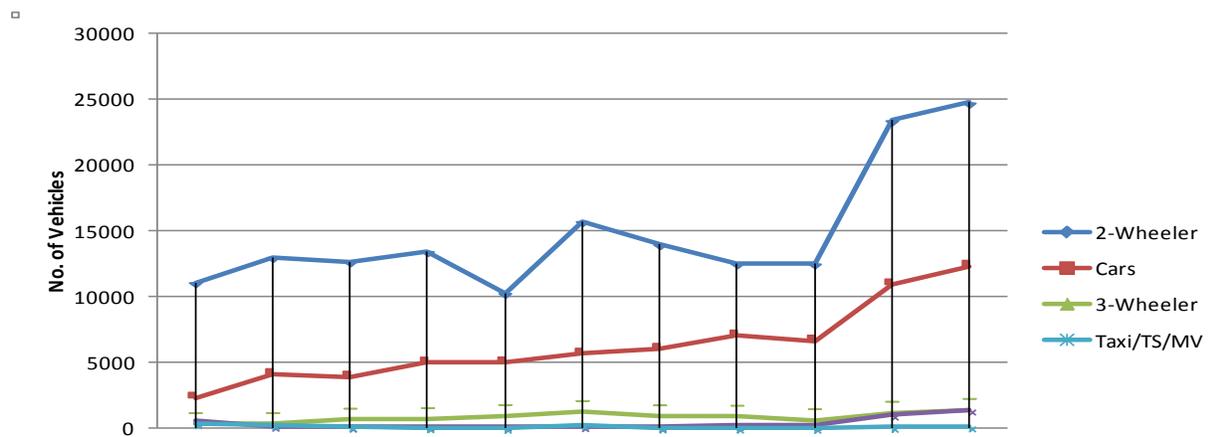


**Figure 1: Numbers of Vehicles Registered in Jammu District**

21. Being the winter capital of the State of Jammu and Kashmir, the winter sessions of the assembly are held in Jammu City. During the period of Darbar i.e. the administrative capital's winter session in Jammu, majority of the elected members prefer to stay in the members of legislative assembly (MLA) Hostel which is near to Super Bazar and Old Police Station locality (City Chowk) . This adds to the traffic and parking requirements. Super Bazar and Old Police Station Area (City Chowk) also has some institutional land uses around like Sri Maharaja Gulab Singh(SMGS) Government Hospital, Government Girls High School, and Government Secretariat. Commercial places like Shalimar Chowk, Ragunath market, and Parade Market are in the vicinity of Super Bazar and Old Police Station Area (City Chowk). It is also a popular as a shopping district, specifically along the streets leading to the Purani Mandi.

22. The existing parking facility of Jammu Development Authority JDA in Super Bazar and Old Police Station Area (City Chowk) is quite inadequate as limited number of vehicles can be accommodated in it and is unable to take the whole stress of the present traffic. As a result, road carriageway is also being used for parking. Presently the parking is also observed on both sides along the lanes leading to Super Bazar and Old Police Station Area (City Chowk). The parking is haphazard with no designated parking slots thus is potential threat of accidents also. Approximately half of the road space is being used for parking which is resulting in severe traffic congestion in the area. During peak-hours of parking, the road user is forced to travel away from actual destination in search of parking space. As a result, more fuel is burnt and there by excessive pollution is being added in the surrounding environment. The photographic representation is given in the **Appendix 2**, to depict the current situation.

**B. Proposed Subproject and Components**



23. A multi-level car parking structure is proposed to provide for parking facilities for Super Bazar and Old Police Station (City Chowk) and surrounding areas. The objectives of the project are: (i) decongestion of traffic in the Super Bazar and Old Police Station Area (City Chowk); (ii) reduction of on street parking; (iii) provision of safe, secure and efficient vehicular circulation/passage inside as well outside parking and thereby enhancing in public safety and security; (ii) provision of good public amenities for residents and tourists in the area; and (iv) improvement of long term traffic management in the city

24. Based on the concept of proposed works the subproject includes construction of a multi-level mechanized parking facility having ground cover area for around 720 numbers of cars. The parking facility will have 4 levels in the basement, ground level and 6 levels above ground (total of 10 useable levels). The structure will also include public amenities like toilets etc. Water storage tanks will be part of the structure, to provide water for the public amenities and also for firefighting system. The facility will have dedicated power supply and also have 24 hour power backup from power generators. Total area of 1670 square meters is required out of 4256 square meters available. Initial survey and assessment indicate that the subproject will not involve any involuntary land acquisition. The layout is shown in **Figure 2** and combined parking floors plan in **Figure 3**.

25. The proposed subproject is expected to have the following benefits: (i) reduction in delays and fuel saving; (ii) enhancing public safety and security; (iii) enhancing safety for vehicles; (iv) strengthening attractiveness and image capacity as an economic location factor; (v) improvement in the road efficiency; (vi) visually comforting urban image and identity; and (vii) improved infrastructures

**C. Implementation Schedule:**

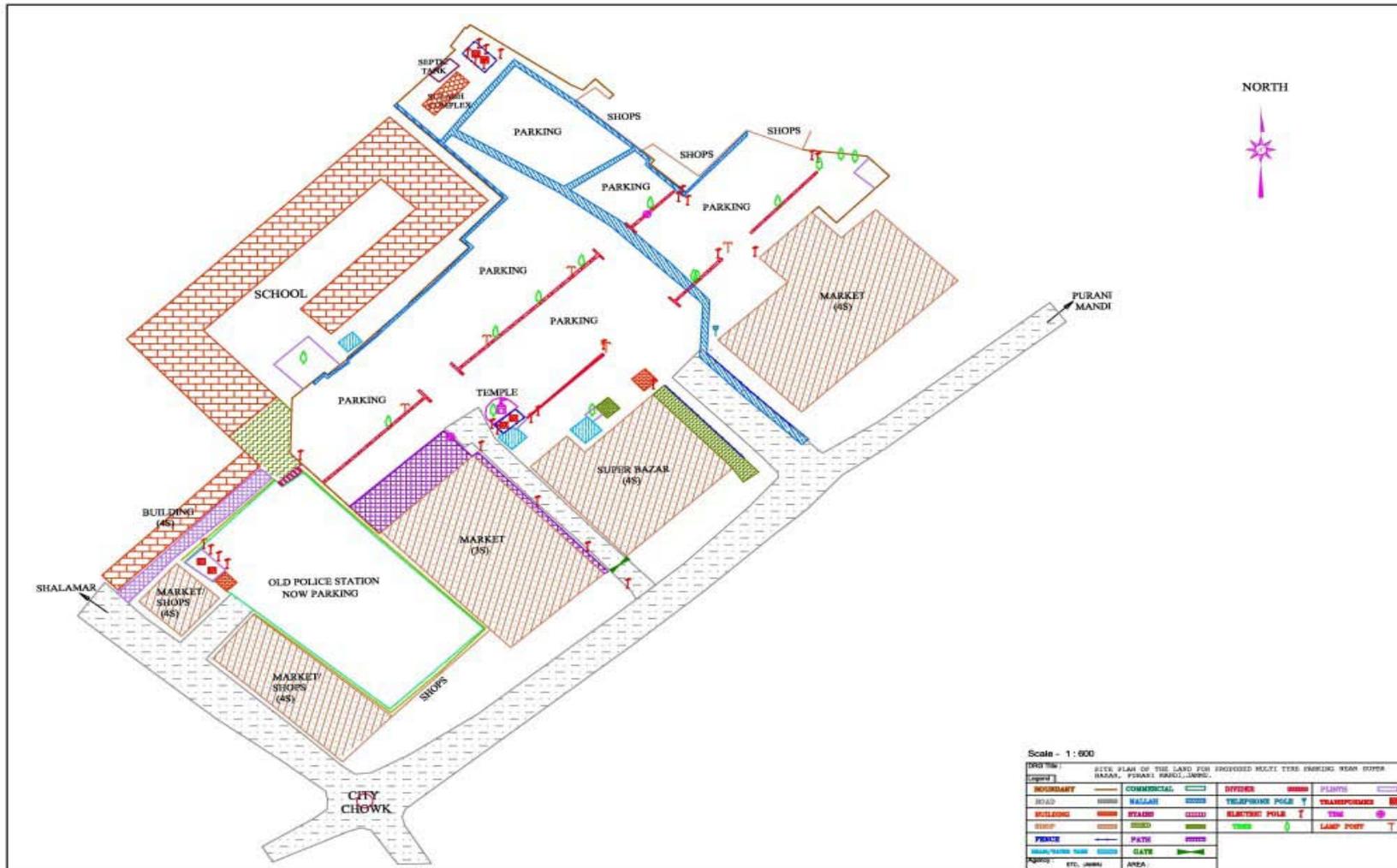
26. Proposed construction period of the each component is 24 months. Indicative timeline of subproject is tabulated below. This will be updated based on the DPR.

**Table 2: Implementation Schedule**

<b>Activity</b>	<b>Time</b>
Acceptance of safeguard documents	October 2013
Completion of Detailed Project Report (DPR)	November 2013
Acceptance of updated safeguard documents based on DPR	November 2013
Invitation for bids	November 2013
Contract award	May 2014

Commencement of work	June 2014
Completion of contract	December 2016

Figure 2: Layout Plan of the Proposed Multi Level Parking Facility At Super Bazar and Old Police Station Area (City Chowk), Jammu City





**Figure-3 COMBINED PARKING FLOORS PLAN**

#### IV. DESCRIPTION OF THE ENVIRONMENT

##### A. Physical Resources

27. **Administrative Boundaries.** The subproject sites are located in the built-up area of Jammu City. Jammu, the winter capital of Jammu and Kashmir, is situated at an average altitude of 312m above mean sea level (msl) in the foothills of Shivaliks. Jammu District is bounded in the north and north east by the Reasi and Udhampur districts; in the east and south east by Udhampur district and Samba district; in the south and west by international border with Pakistan; in the north west by district Rajouri. The entire district can be divided into two distinct portions. The area forming north of Jammu-Chhamb road and Jammu-Pathankot road which is known as Kandi area is comparatively under-developed and is mostly rainfed. The area south of these roads is largely fed by canal and tube wells for irrigation purposes and is relatively more prosperous.

28. River Tawi flows through the city and divides it into two parts. The old city is situated on the right bank of the River. Areas on left bank of Tawi are relatively newly developed. Jammu City is located between 32° 36' to 32° 48' North latitudes and 74° 48' to 75° 30' East longitude with a total municipal area of approximately 112 sq. km. and total Jammu Development Authority (JDA) area of approximately 287 sq. km. It is well connected by air, railways and road with other states of India.

29. **Topography.** The topography of the city is from plain to undulating. Jammu City falls in the sub Himalayan Region (lower Shivalik). The city is divided into two parts by river Tawi. First the plain part (south of Tawi river), where elevation varies from 280 to 310 m above msl and Second the old city on lower reaches of Shivalik having an altitude of 307 to 450 m above msl.

30. **Surface Water.** During rains, the storm water flows through the existing drains and finally discharge into river Tawi, which is a major left bank tributary of river Chenab. The river divides Jammu City into eastern and western parts. The river originates from Kali Kundi glacier and area adjoining south-west of Bhadarwah in Doda district (J&K), at an elevation of about 4000m. According to Central Water Commission (CWC), Jammu the discharge of river Tawi is minimum during January-February and maximum during August. Execution of proposed subproject is not expected to have any impact of the any of the surface water resources of the area.

31. **Geohydrology and Groundwater.** Ground water in Jammu occurs mostly under water table (phreatic or unconfined) conditions in major parts of the city. In the western part of Jammu City (on right bank of river Tawi) the depth of water level in the tube wells is ranging from 3.60m (Waziranwali Gali, Bohri) to 91.00m (Keran, Kamal Nagar) below ground level. Whereas, in eastern part of the Jammu City (on left bank of river Tawi) the depth of water level in the tube wells is ranging from 7.55m (in Babliana area) to 92.80m (Channi Himmat Sector-1A) below ground level.

32. The area of Jammu has surplus exploitable ground water potential as per hydrogeological assessment study carried out by Central Ground Water Board (CGWB) and Project Management Consultant of ADB loan 2151-IND (2007). It has been indicated in the reports that the present ground water extraction in the area is only 17.62% of the total available potential; and the area thus lies in the safe category of ground water development. Execution of proposed subproject is not expected to have any impact on the ground water resources of the area.

33. **Drainage.** Jammu City is located on a plain to undulating terrain and the drainage system of the city relies on gravity. Out of the total primary drainage network of 132 km

length in Jammu City, 51 km length of primary drains are lined and the remaining 81 km are unlined channels. Following the master plan recommendations, part of drainage rehabilitation and improvement works has been taken up under ADB Loan 2151-IND (loan-1-multi sector project for infrastructure rehabilitation in J&K) by J&K Economic Reconstruction Agency (ERA) and by the Urban Environmental Engineering Department (UEED) under their ongoing schemes. Some of the remaining drainage works are proposed under Tranche 2 of JKUSDIP.

34. As per storm water drainage master plan, Jammu City is divided into five drainage zones. The details of the drainage zones are as below:

(i) **Zone I:** This zone includes the areas like Pratap Garh, Shalamar, Karan market, Rehari, Krishna Nagar, Peerkho, Rajindra Nagar, Christian Colony, Chand Nagar, Shiv Nagar, Shakti Nagar, Panjtirthi, etc. Major drains under this zone are Gandha nallah (length 3.2 km), Rehari nallah, Krishna Nagar nallah (length 3.5 km), Peerkho nallah (length 0.95 km), Rajindra Nagar nallah (length 1.7 km), Jogi Gate nallah (length 0.48 km), Chand Nagar nallah (length 0.5 km), Shiv Nagar nallah (length 0.7 km), Shakti Nagar nallah (length 0.5 km) and Panjtirthi nallah (length 1.5 km)

(ii) **Zone II:** This zone includes the areas like Nanak Nagar, Trikuta Nagar, Shastri Nagar, Sanjay Nagar, Nai Basti, Rampura, Bikram Chowk, Channi Himmat, etc. Major drains under this zone are Landoichoi main nallah (15.4km), Landoichoi nallah T-2 (6.3 km), Landoichoi nallah T-3 (3.3 km), Nai Basti (Rampura ) nallah (1.0 km), Bikram Chowk nallah (1.5 km), University to Bikram Chowk nallah (1.7 km), Channi Himmat main nallah (1.77km) and T4 (Landoi choi) nallah (4.93 km).

(iii) **Zone III:** This zone includes the areas like Ban Talab, Chenore, Roop Nagar, Om Nagar, Patoli, Janipur, Basant Nagar, Paloura, Subash Nagar, Bhawani Nagar, Rajpura, etc. Major drains under this zone are Ban Talab Chinore nallah (9.3km), Roopnagar nallah (7.66 km), Om Nagar nallah (4.9km), Patoli nallah (4.3), Janipur nallah (9.9 km), Basant Nagar nallah (0.75 km), Paloura nallah (4.0 km), Subash Nagar nallah (1.4 km), Bhawani Nagar nallah (4.2 km) and Rajpura nallah (0.8 km).

(iv) **Zone IV:** This zone includes the areas like Gangyal, Digiana, Trikuta Nagar Extension, Preet Nagar, Dilli, Sainik Colony, Matto Colony, Kalu Chak, etc. Major drains under this zone are Gangyal nallah (8.2 km), Digiana nallah (3.0 km), Ashram nallah (3.5 km), Dilli nallah (2.5 km), Sainik Colony nallah (6.0 km) and Kalu chak nallah (7.5km).

(v) **Zone V:** This zone includes the areas like Narwal, Ratnu Chak, Suhaora, Darap, Sher Garh, Rakh Rajpur, Jarate Chak, Chuthe Chak, Basi Khurd, etc. Major drains under this zone are Balole nallah & Tributaries (12 km), Pati Khad & Tributaries (8 km), Tarore Khad (6 km), Kalk nallah and Tributaries (7 km) and Devika nallah and Tributaries (5 km).

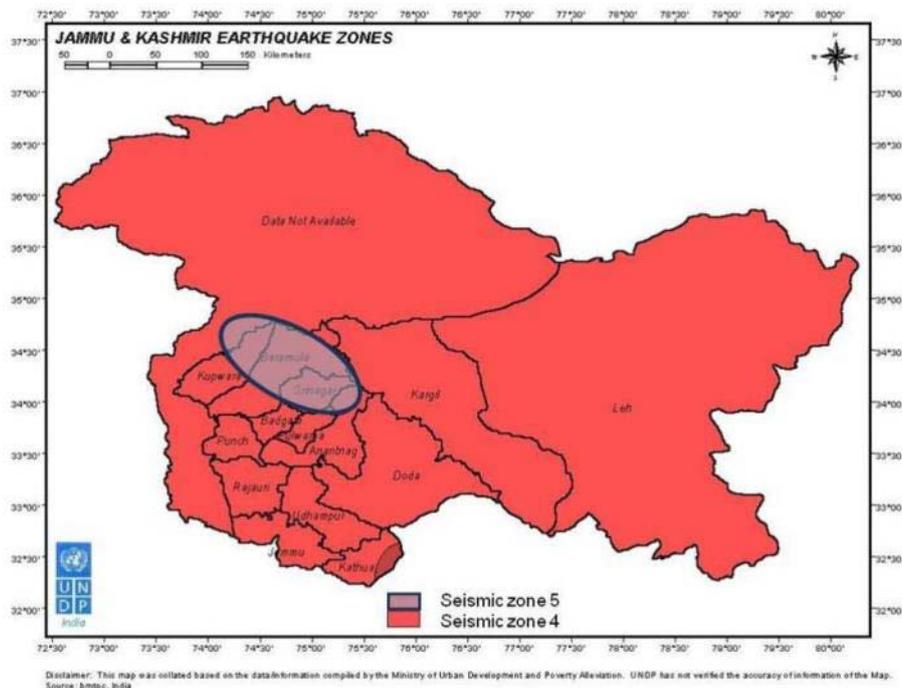
35. **Natural Hazards.** The Indian subcontinent has a history of devastating earthquakes. The major reason for the high frequency and intensity of the earthquakes is that India is driving into Asia at a rate of approximately 47 mm/year. Geographical statistics of India show that almost 54% of the land is vulnerable to earthquakes. The latest version of seismic zoning map of India given in the earthquake resistant design code of India [IS 1893 (Part 1) 2002] assigns four levels of seismicity for India in terms of zone factors. In other words, the earthquake zoning map of India divides India into 4 seismic zones (Zone 2, 3, 4 and 5) unlike its previous version which consisted of five or six zones for the country. According to the present zoning map, Zone 5 expects the highest level of seismicity whereas Zone 2 is associated with the lowest level of seismicity.

36. The state of Jammu and Kashmir is the western most extension of the Himalayan mountain range in India. Here it comprises of the Pir Panjal, Zanskar, Karakoram and

Ladakh ranges. The Main Boundary Thrust (MBT) underlies the Pir Panjal Range and is known as the Panjal Thrust in the region. The Zaskar ranges which are part of the Great Himalayan range are underlain by the Zaskar Thrust. The Kashmir Valley lies between the Pir Panjal and the Zaskar thrusts, making it very vulnerable to earthquakes. Other northern parts of Jammu & Kashmir are heavily faulted. Along the Zaskar and the Ladakh ranges runs a North West (NW) – South East (SE) trending strike-slip fault, the longest in the Jammu & Kashmir area. Apart from the routine small tremors, moderate to large earthquakes have hit nearly all parts of the state. However, it must be stated that proximity to faults does not necessarily translate into a higher hazard as compared to areas located farther away, as damage from earthquakes depends on numerous factors such as subsurface geology as well as adherence to the building codes.

37. Keeping in view the maximum credible earthquake magnitudes in the region, the subproject area (in Jammu) is classified in Zone-IV as per the Bureau of Indian Standards (BIS) Code of Practice (IS-1893-2002). These maximum credible earthquake magnitudes represent the largest earthquakes that could occur on the given fault, based on the current understanding of the regional geo-tectonics.

38. The earthquake zonation map of Jammu and Kashmir is given in Figure-4 below:



**Figure 4: Jammu and Kashmir earthquake zones.**

39. **Floods.** Owing to its topography and presence of natural drainage in the form of river Tawi and other natural as well as artificial drains, incidence of any major flooding has not been recorded in the Jammu City. The volume of water received by river Tawi during rains does not cause flooding in Jammu City owing to large capacity of the river channel and elevation difference between the level of subproject area and river bed.

40. **Geology and Geomorphology.** The Geology of the territories of Jammu, Kashmir and Ladakh have been divided into three different structural Zones: (i) the Panjal; (ii) Zaskar; and (iii) the Tertiary Groups. These three geological divisions form the basis of the physical divisions of the State. The Panjal forms the outer plain, the outer hills and the middle mountains. The Zaskar includes the whole of the eastern region from Spiti and

Lahol to the lofty Karakoram mountains in the north. The Tertiary Groups include the valley of Kashmir and other river valleys.

41. Geologically, the area can be explained as the northern hilly area underlain by the Shivalik rocks and the southern outer plain area underlain by the sediments of recent and Sub-Recent times, laid down by the present day streams of the area.

(i) **Northern Hill Area:** Hills constitute about 37% of the total geographical area of the district. The terrain is rugged with strike valleys and dissected ridge slopes. Altitude of the area varies roughly between 400 and 700m above mean sea level. Major physiographic slope is towards the southwestern direction i.e. towards the outer plain area. The major rivers flowing through the hilly area of the district viz. Basantar, Jammu Tawi, Chenab and Munawar Tawi have their origin quite to the north of the district limits. These rivers act as major drainage lines in the area and enter outer plains of the district south of the outer most Shivalik hills.

(ii) **Southern Outer Plains:** These are located at the foot of the outer most Shivalik hills and have an altitude varying between 280 and 400m above mean sea level. Innumerable seasonal drains traverse the area. These streams are boulder laden and have broad shallow channels, having water only for short time after the rains. The plains can further be divided into two parts the '*Kandi*' in the north and the '*Sirowal*' in the south, towards Pakistan border.

42. The geological succession occurring in the area is presented in Table 3 below.

**Table 3: Geological Succession of Jammu district**

	<b>Geological Horizon</b>	<b>Lithology</b>	<b>Age</b>
	Alluvium, fan, terrace deposits ( <i>Kandi</i> and <i>Sirowals</i> )	Heterogeneous clastic sediments	Sub-recent to Recent
Upper Shivaliks	Boulder bed stage	Conglomerates sand stones with intercalations of red clays	Lower to Middle Pleistocene.
	Pinjor stage	Coarse sandstone, sand rock and massive sandstone beds.	Lower Pleistocene
	Tatrot stage	Sandstone drab clays alternative beds.	Upper Pliocene
Middle Shivaliks	Dhokpathan stage	Sandstone & shale with isolated sand nodules	Lower Pliocene
	Nagri stage	Sandstones & Shale, Hard & compact	Upper Miocene
Lower Shivaliks	Chingi stage	Bright red shale and sandstones	Middle Miocene
	Kamlial stage	Hard red sandstones & shale with pseudo conglomerates	Middle to lower Miocene

Source: Central Ground Water Board - Ground water information booklet, Jammu district

43. **Soils.** Two types of soils are mainly observed in the Jammu City and its adjoining areas namely mountainous soil and loamy soil. Mountainous soil is brown in colour, medium in available nitrogen and potash and deficient in available phosphorous. The soil reaction is slightly acidic to neutral and texture in general varies from loam to sandy loam except in low valley areas being heavy textured. The proposed alignment of subproject is located within Jammu City, which primarily comprises of alluvial deposits which generally include silty-clay or clayey-silt type soil in intermixed layers with potential seams of fine to coarse sand.

44. **Climate.** The climate of the area is subtropical with hot and dry climate in summer and cold climate in winters. May and June are the hottest months while December and January are the coldest.

45. **Temperature.** May and June are the hottest months while December and January are the coldest. In Jammu district the temperature varies from cold in winter with minimum temperature touching even 0.9 degree Celsius to heat wave in summers when the

temperature shoots upto 46 degree Celsius. (J&K Official Website: [www.http://jammu.nic.in/district/aboutjammu.asp](http://jammu.nic.in/district/aboutjammu.asp)).

46. **Rainfall.** The rainy season usually starts from the end of June or the beginning of July. Average annual rainfall in the district Jammu is about 1052 mm<sup>3</sup>. The rainfall data for district Jammu for seven years (from 2006 to 2012) is presented in the **Table 4**.

**Table 4: Rainfall Data of District Jammu (Month's Total Rainfall in mm).**

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2006	70.8	4.2	44.6	10.7	16.1	150.2	379.9	269.4	123.8	56.0	7.0	32.4
2007	0.0	95.9	243.6	3.0	28.0	185.2	274.0	333.0	42.4	0.0	3.7	8.9
2008	98.0	23.4	2.2	56.4	42.8	228.2	384.9	225.8	20.0	21.1	0.0	20.3
2009	69.5	34.1	15.6	41.1	11.6	18.6	244.4	273.4	26.1	7.2	4.2	0.6
2010	7.5	26.9	4.9	6.2	39.1	67.0	272.9	586.1	84.4	31.5	2.6	52.8
2011	9.4	74.9	57.7	19.9	24.3	317.4	371.4	468.2	89.2	11.5	0.1	0.5
2012	102.4	35.9	20.0	48.6	9.5	7.9	268.9	512.0	204.6	1.3	4.0	62.4

Source: Hydromet Division, India Meteorological Department

47. **Air Quality.** The sub project area is mostly urban area. Vehicular traffic is the major contributor for environmental pollution. The subproject sections pass through built-up area with residential, commercial and institutional establishments. The ambient air quality data with respect to RSPM (PM<sub>10</sub>), SO<sub>2</sub> and NO<sub>2</sub> was measured at specified sites in project area and the results are presented in **Table 5 and 6** below. The data was collected during October, 2012, February 2013 and September 2013 by the Environmental Monitoring Laboratory of ERA. The sampling was conducted by using the High Volume Air Sampler "Envirotech APM 460BL" with gas assembly APM 411TE. The sampling was done for 8 hours during the peak traffic hours.

**Table 5: Ambient Air Quality Data at Various Locations in October 2012**

S.No.	Site /Location	Site Type	Date of sampling	Parameters		
				RSPM (PM <sub>10</sub> ) <sup>4</sup> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )
1	Rehari Colony	Residential, Rural and other area	06-10-2012	155.76	13.70	28.08
2	Lower Shiv Nagar	Residential, Rural and other area	09-10-2012	112.76	15.06	24.49
3	Near Sarwal Hospital	Residential, Rural and other area	10-10-2012	102.23	19.98	38.77
4	Bhawani Nagar at Janipur	Residential, Rural and other area residential	11-10-2012	89.56	15.35	28.74
5	Lakkarmandi at Janipur	Residential, Rural and other area	13-10-2012	103.19	13.27	21.17
	<b>NAAQ Standards<sup>5</sup></b>			<b>100</b>	<b>80</b>	<b>80</b>

NAAQS= National ambient air quality standards of Government of India; NO<sub>2</sub>= Nitrogen dioxide; PM<sub>10</sub>= Particulate matter below 10µ particle size; RSPM= Respirable suspended particulate matter; SO<sub>2</sub>= Sulphur dioxide

<sup>3</sup> Source: Central Ground Water Board - Ground water information booklet, Jammu district.

<sup>4</sup> PM<sub>2.5</sub> will be provided later as the equipment to measure PM<sub>2.5</sub> is not yet available. The requisite equipment shall be procured and the baseline data shall be again generated for all parameters before start of works on the proposed subproject.

<sup>5</sup> National Ambient Air Quality Standards (NAAQS), Government of India published in Gazette of India, Extraordinary, Part-II, Section-3, Subsection-i vide no. G.S.R. 826(E), dated 16<sup>th</sup> September 2009

**Table 6 : Ambient Air Quality Data at Various Locations in the Month of February and September 2013**

S.No.	Site /Location	Site Type	Date of sampling	Parameters		
				RSPM (PM <sub>10</sub> ) (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )
1	Lower Shiv Nagar	Residential, Rural and other area	02-02-2013	117.18	24.06	40.46
2	Upper Shiv Nagar	Residential, Rural and other area	06-02-2013	96.85	09.32	20.05
3	Naseeb Nagar	Residential, Rural and other area	07-02-2013	93.20	10.96	24.73
4	Vikas Nagar	Residential, Rural and other area	8-02-2013	97.71	15.35	25.40
5	Near Govt. Medical College, Jammu	Residential, Rural and other area	13-09-2013	69.44	38.77	20.83
6.	City Chowk project site	Residential, Rural and other area	07-09-2013	66.37	19.42	28.95
	<b>NAAQ Standards</b>			<b>100</b>	<b>80</b>	<b>80</b>

NAAQS= National ambient air quality standards of Government of India; NO<sub>2</sub>= Nitrogen dioxide; PM<sub>10</sub>= Particulate matter below 10µ particle size; RSPM= Respirable suspended particulate matter; SO<sub>2</sub>= Sulphur dioxide

48. The result of the tests concludes that the values obtained for NO<sub>2</sub> and SO<sub>2</sub> are within the permissible limits at all the sites, similarly, the values of Respirable suspended particulate matter (PM<sub>10</sub>) were also within the permissible limit at six sites. However, the values of PM<sub>10</sub> recorded at remaining five sites remained higher than the permissible limits as stipulated under National Ambient Air quality Standards. The higher RSPM values at these sites are due to movement of traffic in the vicinity of these sites.

49. The National Ambient Air Quality Standards have been revised by Ministry of Environment and Forests, Government of India on 16th September 2009, wherein the Respirable Suspended Particulate Matter (RSPM) has been further divided into PM<sub>10</sub> and PM<sub>2.5</sub>. The air quality monitoring equipment presently available with J&K ERA can measure the total particulate matter below 10µ particle size (i.e. PM<sub>10</sub>). However, separate values for PM<sub>2.5</sub> cannot be determined. The requisite equipment shall be procured by ERA for measurement of PM<sub>2.5</sub> and baseline data shall be generated for all parameters before start of works on the proposed subproject. Procurement of equipments for environmental monitoring laboratories of ERA shall be an independent exercise and shall not be a part of this subproject.

50. **Ambient Noise Levels.** The subproject sections pass through built-up area with residential, commercial and institutional establishments and significant volume of traffic pass through these sections causing frequent traffic jams in the area. Heavy traffic movement in the subproject area is considered to be the major cause of noise pollution. The existing noise levels at various locations have been presented as baseline data in Table-13 and 14. The noise levels were monitored during day time in October 2012, February 2013 and September 2013 by the Environmental Monitoring Laboratory of J&K ERA.

**Table 7: Ambient Noise Quality Data at Various Locations in October 2012**

S.No.	Site/ Location	Date of sampling	Site type	Day time noise levels dB(A) $L_{eq}$	Noise standards <sup>6</sup> (dB(A) $L_{eq}$ )	quality (dB(A) $L_{eq}$ )
1	Rehari Colony	06-10-2012	Residential, Rural and other area.	69.2	55	
2.	Lower Shiv Nagar	09-10-2012	Residential, Rural and other area.	54.9	55	
3	Near Sarwal Hospital	10-10-2012	Residential, Rural and other area.	64.6	55	
4	Bhawani Nagar at Jamipur	11-10-2012	Residential, Rural and other area.	59.8	55	
5	Lakkarmandi at Janipur	13-10-2012	Residential, Rural and other area.	57.2	55	

dB(A)  $L_{eq}$  = the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

**Table 8: Ambient Noise Quality Data at Various Locations February and September 2013**

S.No.	Site/ Location	Date of sampling	Site type	Day time noise levels dB(A) $L_{eq}$	Noise standards (dB(A) $L_{eq}$ )	quality (dB(A) $L_{eq}$ )
1	Lower Shiv Nagar	02-02-2013	Residential, Rural and other area.	69.5	55	
2	Upper Shiv Nagar	06-02-2013	Residential, Rural and other area.	59.9	55	
3	Naseeb Nagar	07-02-2013	Residential, Rural and other area.	59.7	55	
4	Vikas Nagar	08-02-2013	Residential, Rural and other area	62.8	55	
5	Near Govt. Medical College	13.09.2013	Residential, Rural and other area	72.6	55	
6	City Chowk project site	7/9/2013	Residential, Rural and other area	65.6	55	

dB(A)  $L_{eq}$  = the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

51. On comparison of noise quality data with the limits specified for different types of the areas in the ambient noise quality standards (under schedule to the Noise Pollution (Regulation And Control) Rules, 2000 of Government of India) it is evident that the noise values at all of the sites in both the tables during day time are higher than the permissible standards. This may be attributed to the commercial activities and traffic movement coupled with frequent traffic jams and blowing of horns in the subproject site. (Table.7 and 8)

52. Execution of the proposed subproject shall be done during day time only, therefore ruling out the possibility of any noise pollution during night time. In case, any works are to be carried out during night time then the baseline data shall be generated prior to start of any such work.

## B. Ecological Resources

<sup>6</sup> Standards specified in the schedule of Noise Pollution (Regulation And Control) Rules, 2000 of Government of India. The Principal Rules were published in the Gazette of India, vide S.O. 123(E), dated 14.2.2000 and subsequently amended vide S.O. 1046(E), dated 22.11.2000, S.O. 1088(E), dated 11.10.2002, S.O. 1569 (E), dated 19.09.2006 and S.O. 50 (E) dated 11.01.2010 under the Environment (Protection) Act, 1986

53. **Terrestrial ecology and Biodiversity.** No sensitive ecological areas are located along the subproject site.

54. **Forest Areas and Trees.** The subproject is located within Jammu City and there is no forest within or adjacent to the subproject site. Based on preliminary design, only very minimum (24 nos ) cutting of trees is envisaged. However to be assessed again during detailed design stage.

55. **Wild fauna.** No wild animals are reported in and around the subproject site.

56. **Rare or Endangered Species.** No rare or endangered animal or plant species are reported in the subproject area of influence.

57. **Protected Area.** There is no protected area within or adjacent to the subproject site. The nearest distance between Ramnagar wildlife sanctuary and the outer periphery of the proposed subproject is 1.06 km The activities proposed under this subproject are not expected to have any impact on the wildlife sanctuary.

58. **Fisheries.** Works will be conducted in areas not adjacent to the river.

### **C. Economic Development**

59. Jammu and Kashmir's economy is predominantly dependent on agriculture and allied activities. Directly and indirectly, it supports about 80 per cent of the population besides contributing nearly 60 per cent of the state revenue, which adequately explains the over-dependency of the population on agriculture. The overall economic growth of the state depends largely on the progress of agricultural sector.

60. The state is divided into three agro-climatic zones: Jammu, Kashmir and Ladakh; each has its own specific geo-climatic condition, which determines the cropping pattern and productivity. Rice is the chief crop of Kashmir zone, followed by maize, barley and wheat. Jammu region dominates both in maize and wheat production. In the Ladakh region, barley is the major cereal crop followed by wheat. The production of three important food crops, namely, rice, maize and wheat, contributes a major portion of the foodgrain in the state and accounts for about 84 percent of the total cropped area; the balance 16 per cent is shared  
61. by inferior cereals and pulses. Nearly 75 per cent of the country's temperate fruits, mainly apples, are grown in the state.

62. Agricultural exports from Jammu and Kashmir include apples, barley, cherries, corn, millet, oranges, rice, kidney beans, peaches, pears, saffron, sorghum, vegetables, and wheat, while manufactured exports include handicrafts, rugs, and shawls.

63. Horticulture also plays a vital role in the economic development of the state. With an annual turnover of over INR 3000 million, apart from foreign exchange of over INR 800 million, this sector is the next biggest source of income in the state's economy. Horticultural produce from the state includes apples, apricots, cherries, pears, plums, almonds and walnuts.

64. **Land Use Pattern.** Jammu is known as a city of temples and is the summer capital of Jammu and Kashmir state. The proposed land use distribution of Jammu City as per the master Plan (2001-2021) is given in the **Table 9** below.

**Table 9: Jammu local area land use distribution – proposed**

	Land use	Proposed land use (2021)	
		Area (ha.)	% of Developed area
1	Residential	12000	41.7
2	Commercial	487	1.7
3	Industry	521	1.8
4	Open spaces	4462	15.5
5	Transportation	3178	11.0
6	Utilities	50	0.2
7	Government	2277	7.9
8	Institutional	817	2.8
9	Agriculture and water bodies	5000	17.4
	<b>Total Developed area (ha)</b>	<b>28,792</b>	<b>100</b>

Source: Jammu Master Plan 2001 -2021

65. The land use in the project corridor comprises of built up area and transportation area. The built up areas consist of residential complexes, government/private offices and buildings, educational institutes, religious places and commercial establishments such as shops, hotels, restaurants, etc. The transportation area constitutes of existing roads in the subproject area.

**Commercial Activities.** The activities in the impact zone are of mixed type including, government departments, hotels, restaurants, banquet halls, shops, educational institutions, as well as residential houses. Predominant among these involves commercial activities in the form of wholesale, retail or small scale services. Six multi storied commercial building are located in the vicinity of the subproject site, predominant among them is Super market complex. Besides number of other commercial establishments are also located in the general area of the City Chowk. Area has all the facilities like toilets, potable water supply and electricity. A Sulabh toilet complex was constructed under ADB loan-2151-IND (Loan 1-multi- sector project for infrastructure rehabilitation in J&K) at the existing parking lot.

66. **Industrial Development.** Although the Jammu district have good number of industries, majority of them small-scale units, the Super Bazar and Old Police Station Area (City Chowk) has no industrial units. The predominant activity in this part of Jammu city involves wholesale, retail or small scale services.

67. **Agriculture.** The outskirts of Jammu City are bordered with agricultural fields. Ranbir canal brings water to these agricultural fields from Chenab River through the Jammu City. The Basmati rice of Jammu (cultivated in Ranbir Singh Pura of Jammu district) is very famous and is exported to various countries. However, Super Bazar and Old Police Station Area (City Chowk) being heart of the city and densely buildup area has no agricultural activities in the vicinity. **Infrastructure Facilities.** Since, the subproject is spread over major portions of Jammu City; the infrastructure facilities like schools, hospitals, colleges, electricity and communication in the subproject area are satisfactory. Govt. Girls High School is located near the subproject site. Govt. SMGS hospital is located near the Super Bazar and Old Police Station Area (City Chowk) .

68. During execution of the proposed subproject, there will be no impact on the main building of any department/ facility, therefore no impact on any educational, administrative or medical service is anticipated.

69. **Water supply.** Potable water supply distribution system was introduced in the city of Jammu in the year 1934 with surface source as river Tawi. Now the source of water supply to the city of Jammu is surface water from river Tawi and ground water tapped through

number of tube wells located throughout the city. Improvements in the water supply system are being undertaken under JKUSDIP.

70. City Chowk area being one of the oldest part of the city has well established water supply distribution network. Water supply is provided for the fixed hour of the day to the residential and commercial establishments.

71. **Sewerage System.** The western part of the Jammu City (old city on right bank of river Tawi) earlier had no systematic sewerage system in place and only a few areas were being catered by a 10 MLD sewage treatment plant (STP) at Gole, Bhagwati Nagar. Now proper sewerage network is being established in this part of the city by Urban Environmental Engineering Department (UEED) and Economic Reconstruction Agency and two new sewage treatment plants with 27 MLD capacity (UEED) and 30 MLD capacity (ERA) are being constructed for proper sewerage management. In the Super Bazar and Old Police Station Area (City Chowk) the sewerage system is being established by the UEED under its ongoing scheme. The sewerage network and STP construction by ERA are being carried out under ADB loan 2331-IND (Tranche-1 of JKUSDIP). At the moment, no user charges are levied by the Authority. But in the long run some user charges will be levied from every catered house hold to ensure operational efficiency of this vital public system. No separate sewerage system has been established in eastern part of the Jammu City (on left bank of river Tawi) which contains newly developed and developing areas of the city.

72. **Solid Waste.** Jammu City has been divided in two zones and 71 administrative wards for the purpose of civic administration including sanitation. The sanitation work of each ward is looked after by the Sanitation Officer, Assistant Sanitation Officers, Sanitary Inspectors and Sanitary Supervisors. There is multiple layer arrangement of supervision. Every layer of supervisor is meant for supervising the work of sanitary worker. Super Bazar and Old Police Station Area (City Chowk) is provided with garbage bins for the collection of the waste. Like other parts of the Jammu City, the waste is then transported to the dumping site for final disposal.

73. As per the Solid Waste Management Master Plan of Jammu City, average waste generation from residential areas was 298.675 grams per capita per day in 2006 and the total waste from Municipal area was estimated to be 221 metric ton (MT) per day in 2006, which was likely to be increased to 282 MT by 2011, 361 MT by 2016, 460 MT by 2021 and 587 MT by 2026. The waste generation from entire JDA (Jammu Development Authority) area was estimated to be 317MT; 409MT; 528MT; 681 MT and 880 MT in respective years of 2006, 2011, 2016, 2021 and 2026.

74. **Transportation.** Jammu City is well connected with rest of India by air, rail and road. National Highway - 1A connects Ambala to Srinagar via Jammu. The road network available within Jammu City caters to the intra-city traffic. Super Bazar and Old Police Station Area (City Chowk) is connected with the other parts of the city through well maintained road network.

#### D. Social and Cultural Resources

75. **Demography.** Jammu and Kashmir has a Muslim majority population. Though Islam is practiced by about 67% of the population of the state and by 97% of the population of the Kashmir valley, the state has large communities of Buddhists, Hindus and Sikhs. In totality, the Muslims constitute 67% of the population, the Hindus about 30%, the Buddhists 1%, and the Sikhs 2% of the population. The demographic status of Jammu and Kashmir is given in Table-10.

**Table 10: Demographic status of Jammu and Kashmir**

Division	Population	% Muslim	% Hindu	% Sikh	% Buddhist and other
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Kashmir (53.9%)	6763871	97.16%	1.84%	0.88%	0.11%
Jammu (43.7%)	5483881	30.69%	65.23%	3.57%	0.51%
Ladakh (2.3%)	288624	47.40%	6.22%	–	45.87%
<b>Jammu and Kashmir</b>	<b>12548926</b>	<b>66.97%</b>	<b>29.63%</b>	<b>2.03%</b>	<b>1.36%</b>
<b>Statistics calculated from the 2011 Census of India</b>					

76. In Jammu and Kashmir, the principal spoken languages are Kashmiri, Urdu, Hindi, Dogri, Pahadi, Balti, Ladakhi, Gojri, Shina and Pashto. However, Urdu written in the Persian script is the official language of the state.

77. **Health and Educational Facilities.** The health care facilities are provided by both government and privately owned hospitals. Prominent among them are Government Medical College Hospital, Shri Maharaja Gulab Singh (SMGS) Hospital, Acharaya Shri Chandra College of Medical Sciences and Hospital, catering to the health care needs of major part of the state. The Government Medical College is being expanded with a Super-Speciality facility on the pattern of All India Institute of Medical Sciences (AIIMS), New Delhi. Apart from these, a number of private nursing homes are scattered throughout Jammu City.

78. Notable higher education or research institutes in Jammu include Government Medical College; Acharaya Shri Chandra College of Medical Sciences; Indira Gandhi College for Dental Sciences, Government College of Engineering and Technology and a number of Government and private Degree Colleges. University-level education is provided by University of Jammu; Sher-e-Kashmir University of Agricultural Sciences and Technology, Jammu; Shri Mata Vaishno Devi University; Baba Ghulam Shah Badshah University and Central University of Jammu.

79. **History, Culture, and Tourism.** The Constitution of India does not allow people from regions other than Jammu and Kashmir to purchase land in the state. Jammu's *Dogra* culture and tradition is much similar to that of neighboring Punjab and Himachal Pradesh. Traditional Punjabi festivals such as Lohri and Baisakhi are celebrated with great zeal and enthusiasm throughout the region.

80. After Dogras, Gujjars form the second-largest ethnic group in Jammu. Known for their semi-nomadic lifestyle, Gujjars are also found in large numbers in the Kashmir valley. Similar to Gujjars, Gaddis are primarily herdsman who hail from the Chamba region in Himachal Pradesh. Gaddis are generally associated with emotive music played on the flute. The Bakkarwals found both in Jammu and the Vale of Kashmir are wholly nomadic pastoral people who move along the Himalayan slopes in search for pastures for their huge flocks of goats and sheep.

81. There are no archeological or historical monuments in the immediate vicinity of subproject site. The monuments protected by State in Jammu are Bahu Fort, Peer Mitha Tomb at Peer Mitha, Mast Garh Shahi Masjid, Mubarak Mandi complex, Royal Bowli at Nandini and Mosque at Chak Jaffer. Of these, Peer Mitha Tomb is the nearest with a distance of about 1.31 km from the outer periphery of the subproject area. The monuments protected by Archeological Survey of India are Fort at Akhnoor and Remains of Ancient Site (Pambaran) at Ambaran, Akhnoor. No such protected monument is located in the close vicinity of the proposed subproject site. The distance of protected monuments/sites from the outer periphery of subproject site has been presented in Table 11.

**Table 11: Distance of Protected Monuments/Sites from the Outer Periphery of Subproject Site**

S. No	A. State Protected monument/site	Distance from outer periphery of subproject site (in km)
1.	Bahu Fort	1.6
2.	Peer Mitha Tomb, Peer Mitha	0.36
3.	Shahi Mosque, Mast Garh	0.69
4.	Mubarak Mandi Complex	1.04
5.	Mosque at Chak Jaffer	15.60
6.	Royal Bowli at Nandini	16.00
<b>B. Archaeological Survey of India Protected Sites</b>		
7.	Fort at Akhnoor	21.44
8.	Remains of Ancient site (Pambaran) at Ambaran, Akhnoor	23.04

82. **Sensitive Environmental Receptors.** The sensitive environmental receptors adjacent to the subproject site include religious places, educational institutions, health care centres, community property resources, etc. The details are given in the Table 12 below.

**Table 12: Sensitive Environmental Receptors Near Multi-Level Parking Facility at Super Bazar and Old Police Station Area (City Chowk) , Jammu City**

	Name of sensitive receptor	Distance from the edge of proposed alignment (m)
1.	Govt. Girls High School	20m away from construction site
2.	Tree shrine/ sacred grove Temple within the site	0 m away from construction site
3	SMGS Hospital	170m away from construction site
4	Ranvashwer Temple	100 m away from construction site

83. The above listed sensitive environmental receptors have been identified for proper supervision during the subproject execution stage so as to avoid and minimize any negative impact. As such, these sites may face the minor impacts of increased air and noise pollution during execution of the proposed subproject. During finalization of design, all the sensitive receptors are to be saved judiciously.

## V. ANTICIPATED IMPACTS AND MITIGATION MEASURES

84. As the DPR of the current subproject has not been prepared yet, the present IEE report assesses the impacts of the proposed activities on various environmental attributes of the subproject site mostly based on the concepts. This IEE will be updated during detailed design phase.

85. **Methodology.** Issues for consideration have been raised by the following means: (i) input from interested and affected parties; (ii) desktop research of information relevant to the proposed subproject; (iii) site visit and professional assessment by environment specialist engaged by the implementing agency; and (iv) evaluation of proposed design scope and potential impacts based on the environment specialist's past experience.

86. The methodology used to rate the impacts was qualitative. Each category was divided into a number of different levels. These levels were then assigned various criteria as indicated in Table 13:

**Table 13: Summary of Quantifiers and Qualifiers Used for Assessment Purposes**

Duration (time-scale)	Short-term	Impact restricted to construction (0-2 year).
	Medium-term	Impact will continue throughout operation (3-30 years for storage facilities and distribution network and 3-15 years for pumping machinery).
	Long-term	Impacts will exist beyond the life of the water supply system (>30 years for storage facilities and distribution network and >15 years for pumping machinery)
	Permanent	Impacts will have permanent potential
Geographic spatial scale	Site	The impact will be limited to within the site boundaries.
	Local	The impact will affect surrounding areas.
	Regional	The impact will affect areas far beyond the site boundary but limited to the State of Jammu and Kashmir.
Significance rating pre / post-mitigation (positive / negative)	Low	The impact will have a minimal effect on the environment.
	Medium	The impact will result in a measurable deterioration in the environment.
	High	The impact will cause a significant deterioration in the environment.
Mitigation	n/a	No mitigation necessary.
	Full	Full mitigation/reversal of the impact is possible.
	Partial	Only partial mitigation/reversal of the impact is possible
	None	No mitigation or reversal of the impact is possible
Degree of Certainty	Definite	(>90%)
	Probable	(>70%)
	Possible	(>40%)
	Unsure	(<40%)

### A. Planning and Design Phase

87. Planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible. The concepts considered in preliminary design of the proposed multi-level parking facility are: (i) reduce the load of traffic stress from roadside parking; (ii) decongest traffic in the vicinity of Super Bazar and Old Police Station Area (City Chowk); (iii) most suitable construction methodology; and (iv) site constraints.

88. As per Rites Traffic survey the peak parking requirement works out to 1480 cars. Assuming a growth rate of 4% per annum, the projected peak demand for car parking in the year 2030, works out to 2680 cars. Parking facility is proposed with a total capacity of 720 car spaces through 10 levels of multi level parking – 6 levels above the ground and 4 levels below the ground. Assuming 2.5 turnarounds in a day, the provided capacity will cater to this demand. Besides above a provision for parking of 100 2-wheelers at a time has been made on the ground floor of proposed Multilevel Automated Parking.

89. Benefit in terms of height consumed by the car parking floors is substantial as 6 floors which are allocated for Sedans are consuming only 1.8 meters per floor and 4 floor allocated for SUVs consumes 2.25 meters per floor. The ground floor is allocated with 3.6 meters of clear height to allow the fire fighting vehicle to easily maneuver inside the premises. Evacuation time for all the 720 cars will be approximately 2 hours 50 minutes.

90. There are some multi storied commercial buildings around the subproject site. Adequate space shall be left between proposed structure and the commercial building and suitable construction methodology shall be adopted to avoid any impact on these buildings. Salient design features are presented in Table 14.

**Table 14: Salient Design Features of the Subproject.**

<b>Parameter</b>	<b>Design Consideration</b>
Location	Existing lot operated and maintained by JDA in Super Bazar and Old Police Station Area (City Chowk) of Jammu City. Total of 1670 square meters is required out of total 4256 sq m available.
Type of parking	Fully Automated Puzzle type parking structure
Design Years	35 Year
Design capacity	720 cars
Number of Levels	10 levels – 4 levels in the basement & 6 levels above the ground with total built-up area of 16,700 sq.mt
Facilities	Administrative office cum control room Toilets Backup generator for power supply Storage tanks for water supply
Climatic Conditions	Rainfall and its run off in the subproject area may cause disruption/damage to works under execution and public inconvenience. Furthermore, climatic conditions play an important role during dispersion of noise and air pollutants. Seasonal climatic conditions shall be considered for scheduling of construction activities.
Air Quality	During construction phase some emissions of dust are anticipated during various transportation, excavation and construction activities. Certain volumes of dust and gaseous emissions will also be generated during the construction period from construction machineries like excavators, vehicles engaged in transportation of construction materials, etc. Pollutants of primary concern at this stage include Respirable Suspended Particulate Matter (PM <sub>10</sub> and PM <sub>2.5</sub> ) and gaseous emissions. However, transportation of construction materials will be confined to adequate trips per day depending upon extent of construction activity. Proper mitigation methods will be adopted to control obnoxious gases and dust generated, if any.
Drainage and hydrology	The subproject components are not expected to have any negative impact on the drainage and hydrology of the area. Runoff from the subproject will produce a highly variable discharge in terms of volume and quality and in most instances will have no discernable environmental impact.
Ecological diversity	The subproject is situated within an existing built up area of Jammu City. No areas of ecological diversity occur within the subproject location. Due to the nature and locality of the subproject, it is unlikely to have any impacts on biodiversity within the area.
Land use and livelihoods	The land use in the project corridor comprises of existing parking area.  The subproject will not involve any involuntary land acquisition. A small temple located in the existing parking shall have no impact as per the preliminary design.
Traffic flow and access	Due to the location and nature of the subproject, there will be interference with the exiting parking facilities for that alternate parking facility had already been identified - one is second JDA parking 100 m away and other one is Secretariat parking. ERA will coordinate with the traffic police for the implementation of the Traffic Management Plan.
Infrastructure and services	There are a number of existing infrastructure and services (roads, telecommunication lines, power lines and various pipelines) within the vicinity of the subproject. To mitigate the adverse impacts due to relocation of the utilities, Design Supervision Consultants (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.
Noise and vibrations	During construction phase, some noise and vibration will be generated from the various construction activities like construction works, operation of construction equipment and vehicles engaged in transportation of construction materials. However, these will be confined to the work sites only and will be temporary in nature occurring mostly during daytime.

<b>Parameter</b>	<b>Design Consideration</b>
Hazard vulnerability	The subproject location is vulnerable to earthquakes (seismic zone IV) and the design of the structure has been worked out considering the seismic vulnerability. The IS code assigns zone factor of 0.24 for Zone 4. IS 13827:1993 Improving Earthquake Resistance of Earthen Buildings – Guidelines and IS 4326:1993 Earthquake Resistant Design and Construction of Buildings - Code of Practice are considered in design.
Aesthetics, landscape character, and sense of place <sup>7</sup>	The subproject is considered to be compatible with the surrounding landscape and is not expected to negatively impact the existing visual quality or landscape character of the area.

91. The following table (Table 15) outlines potential impacts gleaned from a process that included a review of available documentation, ground-verified during the site visit, i.e. how, where and when the proposed development could interact and affect the environment significantly, and details what mitigation measures may be taken to counteract these impacts.

92. There is much scope to minimize access impacts on shops within the Super Bazar and Old Police Station Area (City Chowk) and users of existing parking facility and other public infrastructures such as toilets through proper planning and implementation of mitigation measures to a level which will not affect income. In case of disruption of access to the shops, the contractor will provide assistance through provision of planks etc. to continue the business during the construction period. Alternative parking sites have already been identified and contractors will be required to coordinate with JDA and traffic enforcers to ensure existing traffic situation will not be aggravated because of the project.

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<sup>7</sup> Aesthetics refer to the visual quality of an area as imparted by the physical properties of an area, such as scale, colour, texture, landform, level of enclosure, and in particular, the land use occurring within an area. Landscape character refers to an area's intrinsic appeal and is not dependent on its visual quality but rather on its specific situation as determined by the following: its level of accessibility or remoteness, level of naturalness, lack of disturbance, current and potential use, rarity, cultural or historic importance, and potential value to people. The landscape character determines the extent of visual compatibility of the structures with its immediate surroundings. Impacts are not restricted to the vicinity but the entire viewshed (area from where the infrastructure will be visible). The spirit, or sense of place (Genius Loci), can be defined as the extent to which a person can recognise or recall a place as being distinct from other places and as having a vivid, or unique, or at least a recognizable character. It indicates the intrinsic value that a community places on the aesthetic, therapeutic or emotional qualities and character of an area. Aesthetics, landscape character and sense of place are all subjective concepts that are often influenced by individuals' perceptions.

**Table 15: Summary of Anticipated Potential Environmental Impacts during Planning and Design Stage**

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
Existing Situation	<ul style="list-style-type: none"> <li>The existing parking facility is not sufficient to take the whole stress of present traffic.</li> <li>Large number of cars is parked on adjoining side of road that leads to traffic congestion.</li> <li>On roadside parking has potential threat for accidents also.</li> <li>Traffic congestion on road also lead to loss of fuel..</li> </ul>	<ul style="list-style-type: none"> <li>The subproject will improve the overall Parking facility of the area in a safe and efficient manner by providing adequate parking facility.</li> </ul>	High ( - )	Site/Local	Medium-term	Full Mitigation Definite	High ( + )
Planning initiatives	<p>Planning initiatives have been identified as:</p> <ul style="list-style-type: none"> <li>Establishment of an efficient parking facility in the area.</li> <li>To provide cheap and secure parking facility to the people.</li> <li>To reduce the traffic stress from road side by enhancing parking area.</li> <li>Minimize the illegal parking in the area.</li> </ul>	<ul style="list-style-type: none"> <li>The subproject will improve the parking facility in the area in a safe and efficient manner. This will allow for the planning initiatives to be realized.</li> </ul>	High ( - )	Site/Local	Medium-term	Full mitigation definite	High ( + )
Identification of Parking facility needs and demands	<p>The ERA vision is to provide safe, reliable, effective and efficient Parking facility which will best meet the needs of the people at improving levels of service in a way which supports government strategies for economic and social development, whilst being environmentally and economically sustainable.</p>	<ul style="list-style-type: none"> <li>The subproject will substantially increase the parking facility and storage parking area.</li> <li>Replacement of exiting parking facility into advanced Automated parking facility.</li> </ul>	High ( - )	Local	Medium-term	Full mitigation definite	High ( + )
Climatic Conditions	<p>The nature and intensity of rainfall events in an area, has implications for storm water management.</p> <p>Smoke from burning activities could be wider spread on windy days especially when dust could be blown off site.</p>	<ul style="list-style-type: none"> <li>Seasonal climatic variations will be considered during scheduling of construction activities in the area.</li> <li>Excavations and other clearing activities will only be done during agreed working times and permitted weather conditions.</li> <li>Storm water control during</li> </ul>	High ( - )	Local	Medium-term	Full mitigation definite	High ( + )

Air Quality	<ul style="list-style-type: none"> <li>• Sensitive receptors like educational institutions, religious places may be affected temporarily by increased Noise and related impacts during the construction phase..</li> <li>• Burning of waste and cleared vegetation.</li> </ul>	<p>construction phase as per the method approved by the Engineer</p> <ul style="list-style-type: none"> <li>• Ensure compliance with the Air Act.</li> <li>• Ensure compliance with emission standards.</li> <li>• Guidelines that deal with the control of air pollution on site have been outlined in the Environmental Management Plan (EMP).</li> <li>• Monitoring of air pollution levels in potential problem areas will be undertaken.</li> </ul>	High ( - )	Local	Medium-term	Full mitigation definite	High ( + )	
Drainage hydrology	and	<p>The proposed development is situated within an existing built up area where drainage infrastructure already exists. No water courses, wetlands or estuaries occur within the subproject location. Due to the nature and locality of the subproject there is unlikely to have any significant impacts on water resources within the immediate area.</p>	<ul style="list-style-type: none"> <li>• The site surface to be engineered and shaped in such a way that rapid and efficient evacuation of runoff is achieved.</li> <li>• Provide containment areas for potential pollutants at construction camps, refuelling, depots, concrete batching plants, etc.</li> <li>• Waste management practices will be implemented.</li> <li>• The transport, storage, handling and disposal of hazardous substances will be controlled and managed.</li> </ul>	High ( - )	Local	Medium-term	Full mitigation definite	High ( + )
Land use and livelihoods	and	<ul style="list-style-type: none"> <li>• Due to the location and nature of the subproject, there will be no such interference. There may be temporary disruptions to health services, education services, local businesses, transport services, pedestrian movements, due to construction related noise, visual, and air pollution.</li> </ul>	<ul style="list-style-type: none"> <li>• ERA has consulted with various interested and affected parties, departments, etc. within the area and will be continued during the construction phase.</li> <li>• Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.</li> </ul>	High ( - )	Local	Medium-term	Full mitigation definite	High ( + )
Traffic flow and access	and	<p>Due to the location and nature of the subproject, there will be interference with the</p>	<ul style="list-style-type: none"> <li>• Existing parking vehicles will be rerouted to</li> </ul>	High ( - )	Local	Medium-term	Full mitigation	High ( + )

	exiting parking facilities	another suitable location.					definite	
Infrastructure and services	There are a number of existing infrastructure and services (roads, telecommunication lines, power lines and various pipelines) within the vicinity of the subproject.	<ul style="list-style-type: none"> <li>The City Traffic Police will be available on site in the monitoring of traffic in the early stages of the operations during construction</li> <li>Keep construction related disturbances to a minimum.</li> <li>Consult with affected service providers regarding impacts on access to infrastructure and services and alternatives.</li> <li>Consult with affected communities or businesses prior to foreseeable disruptions, for example notifying residents of a temporary interruption of water supply.</li> </ul>	Medium ( - )	Local	Short-term	Full Mitigation Probable	Low ( - )	
Noise and vibrations	During construction phase, some noise and vibration will be generated from the various construction activities like construction works, operation of construction equipment and vehicles engaged in transportation of construction materials	<ul style="list-style-type: none"> <li>Locate concrete batching, asphalt, and crushing plants, lay down areas and construction camps away from sensitive receptors.</li> <li>Restrict construction activities to reasonable working hours where near sensitive receptors.</li> </ul>	High ( - )	Site and Local	Short-term	Partial Mitigation Probable	Medium ( - )	

## B. Construction Phase

93. Table 16 presents an indication of what activities and facilities are likely to be undertaken during construction of the subproject, including the associated inputs and outputs.

**Table 16: Summary of Activities and Facilities, Resource Use, and Produced Outputs during Construction Phase**

Activities and Facilities	Inputs/Resource Use	Outputs/Waste Production
<ul style="list-style-type: none"> <li>• Construction camp and its associated facilities (including lay-down areas)</li> <li>• Storage camps and lay-down areas               <ul style="list-style-type: none"> <li>– Materials and equipment stockpiles</li> <li>– Handling and storage of hazardous materials including chemicals additives, gravel, cement, concrete and lubricants.</li> </ul> </li> <li>• Source of water</li> <li>• Vegetation clearance</li> <li>• Drilling</li> <li>• Movement of construction staff, equipment and materials</li> <li>• Importation of selected materials for construction.</li> <li>• Noise and vibrations</li> <li>• Dust suppression</li> <li>• Waste production and temporary storage/disposal i.e. used fuels, waste concrete and bitumen, spoil materials and general waste</li> <li>• Use of bitumen/asphalt</li> <li>• Erosion prevention</li> <li>• Rehabilitation of existing tree shrine within the site to another nearby location</li> </ul>	<ul style="list-style-type: none"> <li>• Cement</li> <li>• Chemical additives used in concrete</li> <li>• Paving blocks</li> <li>• Aggregate (sand and stone)</li> <li>• Gravel (fill material and selected material for sub-base and base layers)</li> <li>• Water               <ul style="list-style-type: none"> <li>– Drinking, cooking and sanitation at construction camps</li> <li>– Water for dust suppression</li> <li>– Water applied to base and sub-base layers during compaction</li> <li>– Water for application to sub-base and base layers prior to compaction</li> </ul> </li> <li>• Petrochemicals</li> <li>• Other chemicals/lubricants/paints</li> <li>• Construction vehicles, machinery and equipment</li> <li>• Temporary energy supply to construction camps</li> <li>• Labour               <ul style="list-style-type: none"> <li>– Recruitment of construction workforce</li> <li>– Skills training</li> </ul> </li> <li>• Public movement control               <ul style="list-style-type: none"> <li>– need barriers (not just danger tape) to protect people from entering the site during construction</li> </ul> </li> <li>• Public support and involvement is required for the rehabilitation of the tree shrine</li> </ul>	<ul style="list-style-type: none"> <li>• Waste concrete and other construction rubble</li> <li>• Used fuels, lubricants, solvents and other hazardous waste</li> <li>• General waste</li> <li>• Contaminated soil               <ul style="list-style-type: none"> <li>– Soil contaminated with bitumen</li> <li>– Soil contaminated with petrochemicals (i.e. oils and lubricants) and other chemicals</li> </ul> </li> <li>• Sewage and grey water (temporary construction camp sanitation)</li> <li>• Spoil material (excess soil removed during excavations)</li> <li>• Noise and vibrations (construction vehicles and machinery)</li> <li>• Lighting at construction camps, equipment yards and lay-down areas</li> <li>• Plant material removed from servitude/right-of-way during vegetation clearance</li> <li>• Smoke and fumes               <ul style="list-style-type: none"> <li>– Burning of waste</li> <li>– Burning of vegetation cover</li> <li>– Fires used for cooking and space heating (construction camps)</li> <li>– Vehicle exhaust emissions</li> </ul> </li> </ul>

94. The following table (Table 17) outlines potential impacts during the construction phase gathered from a process that included a review of available documentation, verified during the site visit, i.e. how, where and when the proposed development can interact and affect the environment significantly, and details what mitigation measures may be taken to counteract these impacts.

**Table 17: Summary of Anticipated Potential Environmental Impacts during Construction Phase**

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
Climate	<ul style="list-style-type: none"> <li>The nature and intensity of rainfall events in an area, has implications for storm water management.</li> <li>Smoke from burning activities could be wider spread on windy days especially when dust could be blown off site.</li> </ul>	<ul style="list-style-type: none"> <li>Seasonal climatic variations will be considered during scheduling of construction activities in the area.</li> <li>Excavations and other clearing activities will only be done during agreed working times and permitted weather conditions.</li> <li>Storm water control during construction phase as per the method approved by the Engineer.</li> <li>Seeding of topsoil and subsoil to prevent wind and water erosion of soil surfaces.</li> <li>No open fires permitted on site</li> </ul>	Low (-)	Site	Short-term	Full Mitigation Probable	Low (-)
Air Quality	<ul style="list-style-type: none"> <li>Sensitive receptors (e.g. health facilities, educational institutions, religious places) may be affected temporarily by increased Noise and related impacts during the construction phase.</li> <li>Fugitive dust can also impact roadside air quality during construction. Exhaust fumes from construction machinery, and potential smoke from cooking fires.</li> <li>Burning of waste and cleared vegetation.</li> <li>Odours from use of toilet 'facilities' other than provided facilities.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure compliance with the Air Act and regular monitoring</li> <li>Ensure compliance with emission standards.</li> <li>Guidelines that deal with the control of air pollution on site have been outlined in the Environmental Management Plan (EMP).</li> <li>Monitoring of air pollution levels in potential problem areas will be undertaken.</li> <li>Management (including storage, transport, handling and disposal) of hazardous substances used during construction.</li> <li>Dust control measures have been included in the EMP.</li> <li>Dust generating construction activities will be avoided during strong winds.</li> <li>Soil loads in transit will be kept covered.</li> <li>Stockpiles of soil will be kept</li> </ul>	High (-)	Local	Short-term	Partial Mitigation Probable	Medium (-)

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
		<p>covered or have suitable dust palliative applied such as water.</p> <ul style="list-style-type: none"> <li>• A suitable dust palliative (water) will be applied if dust levels rise above acceptable levels.</li> <li>• Regular servicing of the vehicles off site in order to limit gaseous emissions.</li> <li>• No open fires permitted on site.</li> <li>• Temporary toilet facilities will be provided on site and will be maintained on a daily basis.</li> </ul>					
Geology	<ul style="list-style-type: none"> <li>• Contamination from spillage of petroleum products, spent engine oil and oil leaks from construction vehicle maintenance taking place on site.</li> <li>• Contamination through use of toilet 'facilities' other than provided facilities.</li> </ul>	<ul style="list-style-type: none"> <li>• Rehabilitate all sites used during construction including construction camps, stockpile area, temporary access and hauling routes, as soon as possible after the disturbance has ceased.</li> <li>• Contractor to exercise strict care in the disposal of construction waste, with proof of disposal at an approved site provided after offloading each waste load and this is logged/registered.</li> <li>• Contaminated water will be contained and disposed off site at an approved disposal site (the site to be identified by contractor and approved by Engineer).</li> <li>• The contractor will dispose of waste from the oil interceptors at approved disposal site (the site to be identified by contractor and approved by Engineer).</li> <li>• Cement, concrete and chemicals will be mixed on a concrete plinth and provisions will be made to contain spillages or overflows into the</li> </ul>	Medium ( - )	Site	Short-term	Full Mitigation Probable	Low ( - )

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
		soil. <ul style="list-style-type: none"> <li>No vehicle maintenance to be allowed on site.</li> <li>If oil spills occur the contaminated soil will be disposed of at approved disposal site (the site to be identified by contractor and approved by Engineer).</li> <li>Temporary toilet facilities will be provided by contractor on site and maintained on a daily basis.</li> <li>Topsoil and subsoil will be protected from contamination.</li> <li>Subsoil and overburden in all construction and lay down areas to be stockpiled separately and returned for backfilling in the correct soil horizon order.</li> </ul>					
Drainage and hydrology	<ul style="list-style-type: none"> <li>The proposed development is situated within an existing built up area where drainage infrastructure already exists. No water courses, wetlands or estuaries occur within the subproject location. Due to the nature and locality of the subproject there is unlikely to have any significant impacts on water resources within the immediate area.</li> </ul>	<ul style="list-style-type: none"> <li>The site surface to be engineered and shaped in such a way that rapid and efficient evacuation of runoff is achieved.</li> <li>Provide containment areas for potential pollutants at construction camps, refuelling, depots, concrete batching plants, etc.</li> <li>Waste management practices will be implemented.</li> <li>The transport, storage, handling and disposal of hazardous substances will be controlled and managed.</li> </ul>	Low ( - )	Site	Short-term	Full Mitigation Probable	Low ( + )
Biodiversity Fauna and Flora	<ul style="list-style-type: none"> <li>The proposed development is situated within an existing built up area. No areas of ecological diversity occur within the subproject location. Due to the nature and locality of the subproject there is unlikely to have any significant</li> </ul>	<ul style="list-style-type: none"> <li>Adequate care shall be taken during construction of parking facility to avoid any impact on the existing trees outside the periphery of the construction site and enough compensatory forestation should be done for the 15</li> </ul>	Low ( - )	Site	Short-term	Full Mitigation Probable	Low ( + )

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
	impacts on biodiversity within the area. Around 15 trees existing in the site will have to be cut for this project	trees removed in a suitable site					
Land Uses	<ul style="list-style-type: none"> <li>• Due to the location and nature of the subproject, there will be no such interference.</li> <li>• There may be temporary disruptions to health services, education services, local businesses, transport services, pedestrian movements, due to construction related noise, visual, and air pollution.</li> </ul>	<ul style="list-style-type: none"> <li>• ERA has consulted with various interested and affected parties, departments, etc. within the area and will be continued during the construction phase.</li> <li>• DSC will make provisions for vehicle and pedestrian access to maintain community linkages.</li> <li>• Consult with local departments, organizations, etc regarding location of construction camps, access and hauling routes and other likely disturbances during construction.</li> <li>• Provide clear and realistic information regarding detours and alternative accesses for local communities and businesses in order to prevent unrealistic expectations.</li> <li>• Provide clear and realistic information regarding employment opportunities and other benefits for local communities in order to prevent unrealistic expectations.</li> <li>• Make use of local labour, materials, goods and services as far as possible.</li> <li>• Provide walkways and metal sheets where required to maintain access for people and vehicles.</li> <li>• Increase workforce in front of critical areas such as educational institutions, places of worship, business establishments and health facilities to shorten the duration of impacts.</li> </ul>	High ( - )	Local	Short-term	Partial Mitigation Probable	Medium ( - )

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
		<ul style="list-style-type: none"> <li>Consult businesses and institutions regarding operating hours and factor this in work schedules.</li> <li>Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.</li> </ul>					
Infrastructure and Services	<ul style="list-style-type: none"> <li>There is no temporary as well as permanent disruption of infrastructure.</li> <li>There are a number of existing infrastructure and services (roads, telecommunication lines, power lines and various pipelines) within the vicinity of the subproject area.</li> </ul>	<ul style="list-style-type: none"> <li>Utility shifting will be undertaken prior to commencing construction works.</li> <li>Keep construction related disturbances to a minimum.</li> <li>Consult with affected service providers regarding impacts on access to infrastructure and services and alternatives.</li> <li>Consult with affected communities or businesses prior to foreseeable disruptions, for example notifying residents of a temporary interruption of water supply.</li> <li>Provide backup or alternative services during construction-related disruptions, for example by providing generators for power supply.</li> <li>Provide access points to infrastructure and services.</li> <li>Monitor complaints by the public.</li> </ul>	Medium ( - )	Local	Short-term	Full Mitigation Probable	Low ( - )
Traffic	<ul style="list-style-type: none"> <li>Increased volume of construction vehicles on the roads may lead to increased wear and tear of roads in the vicinity of the subproject sites.</li> <li>Road safety concerns due to slow moving construction vehicles.</li> <li>The vehicles being parked in the site have to be provided with an</li> </ul>	<ul style="list-style-type: none"> <li>Existing parking vehicles will be rerouted to another suitable location.</li> <li>The City Traffic Police will be available on site in the monitoring of traffic in the early stages of the operations during construction</li> <li>A communications strategy is of vital importance in terms of alternative</li> </ul>	High ( - )	Site/Local	Short-term	Partial Mitigation Probable	Medium ( - )

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
	alternate parking location.	parking facility. <ul style="list-style-type: none"> <li>• Construction site is clearly defined.</li> <li>• Access of all construction and material delivery vehicles will be strictly controlled.</li> <li>• Deliveries will not be allowed during peak traffic hours.</li> </ul>					
Health and Safety	<ul style="list-style-type: none"> <li>• Danger of construction related injuries.</li> <li>• Open fires in construction camp can result in accidents.</li> <li>• Safety of workers and general public must be ensured.</li> <li>• Poor waste management practices and unhygienic conditions at temporary ablution facilities can breed diseases.</li> <li>• Standing water due to inadequate storm water drainage systems and inadequate waste management practices; pose a health hazard by providing breeding grounds for disease vectors such as mosquitoes, flies and snails.</li> <li>• The use of hazardous chemicals in construction can pose potential environmental, health and safety risks.</li> </ul>	<ul style="list-style-type: none"> <li>• Implement good housekeeping practices at the construction camp.</li> <li>• Strict health and safety measures to be implemented and audited on a regular basis.</li> <li>• Secure enclosed construction site.</li> <li>• Hiring of reputable contractors.</li> <li>• Provide warning signs of hazardous working areas.</li> <li>• Excavations to be clearly demarcated and barriers (not just danger tape) erected to protect pedestrians from open trenches.</li> <li>• Workers will be thoroughly trained in using dangerous equipment.</li> <li>• Workers have the right to refuse work in unsafe conditions.</li> <li>• Undertake waste management practices.</li> <li>• Control speed and movement of construction vehicles.</li> <li>• Improved signage, speed control, walkways and crossings will reduce safety risks due to construction.</li> <li>• Exclude public from the site.</li> <li>• Ensure all workers are provided with and use Personal Protective Equipment. Ensure the visibility of workers through their use of</li> </ul>	High ( - )	Site and Local	Short-term	Partial Mitigation Possible	Low ( - )

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
		<p>high visibility vests when working in or walking through heavy equipment operating areas;</p> <ul style="list-style-type: none"> <li>• Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;</li> <li>• Provide medical insurance coverage for workers;</li> <li>• Provide clean eating areas where workers are not exposed to hazardous or noxious substances;</li> <li>• 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;</li> <li>• Ensure moving equipment is outfitted with audible back-up alarms;</li> <li>• 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.</li> </ul>					
Noise and Vibrations	<ul style="list-style-type: none"> <li>• Sensitive receptors (health facilities, educational institutions, religious places) may be affected temporarily by increased traffic and related impacts.</li> <li>• Use of heavy vehicles and equipment may generate high levels of noise.</li> </ul>	<ul style="list-style-type: none"> <li>• Locate concrete batching, asphalt, and crushing plants, lay down areas and construction camps away from sensitive receptors.</li> <li>• Restrict construction activities to reasonable working hours where near sensitive receptors.</li> <li>• Keep adjacent landowners</li> </ul>	High ( - )	Site and Local	Short-term	Partial Mitigation Probable	Medium ( - )

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
	<ul style="list-style-type: none"> <li>Vibrations resulting from bulk earthworks and other construction activities may create significant disturbances to nearby people and businesses.</li> <li>Disturbance from afterhours work.</li> </ul>	<p>informed of unusually noisy activities planned.</p> <ul style="list-style-type: none"> <li>Regulate roadworthiness of vehicles.</li> <li>Ensure that machinery is in a good state of maintenance.</li> <li>Silencers must be fitted and maintained to all machinery on site.</li> <li>Monitor noise levels in potential problem areas.</li> </ul>					
Aesthetics, Landscape Character, and Sense of Place	The presence of heavy duty vehicles and equipment, temporary structures at construction camps, stockpiles, may result in impacts on aesthetics and landscape character.	<ul style="list-style-type: none"> <li>Storage areas will be properly fenced off.</li> <li>All domestic solid waste will be collected from a central point of disposal and fed into the city waste collection system.</li> <li>Contractor to exercise strict care in disposing construction waste, with proof of disposal at the approved site provided after offloading each waste load and this to be logged/registered.</li> <li>Identification of suitable waste disposal site with enough capacity to hold additional waste to be produced by the proposed construction activities.</li> <li>Use of recycled material is encouraged.</li> <li>Guidelines regarding management of waste on site have been outlined in the appendix II of EMP.</li> <li>Retain mature trees on and around the site where possible.</li> <li>Cluster construction activities on site on a specific area to avoid "sprawl".</li> <li>Unwanted material and litter will be removed on frequent basis.</li> </ul>	Medium ( - )	Site and Local	Short-term	Partial Mitigation Definite	Low ( - )

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
Workers Conduct	<ul style="list-style-type: none"> <li>Construction workers on site disrupting adjacent land uses by creating noise, generating litter, and possible loitering.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure strict control of labourers, minimizing working hours to normal working times, control littering, and ensure no overnight accommodation is provided.</li> </ul>	Low ( - )	Local	Short-term	Full Mitigation Definite	Low ( - )
Spoil/debris management	<ul style="list-style-type: none"> <li>The subproject is expected generate huge quantity of construction waste as well as spoils</li> </ul>	<ul style="list-style-type: none"> <li>The contractor has to prepare a comprehensive waste management plant .</li> <li>For the management of debris the contractor has to prepare a debris disposal management plan.</li> </ul>	Medium (+)	Local	Short-term	Partial Mitigation Probable	High ( + )
Employment Generation	<ul style="list-style-type: none"> <li>The subproject will provide employment opportunities for local people during construction.</li> <li>Expectations regarding new employment will be high especially among the unemployed individuals in the area.</li> <li>Labourers gathering at the site for work can be a safety and security issue, and must be avoided.</li> <li>The training of unskilled or previously unemployed persons will add to the skills base of the area.</li> </ul>	<ul style="list-style-type: none"> <li>The use of labour intensive construction measures will be used where appropriate.</li> <li>Employ local (unskilled) labour if possible.</li> <li>Training of labour to benefit individuals beyond completion of the subproject.</li> <li>Recruitment of labours will take place offsite.</li> </ul>	Medium (+)	Local	Short-term	Partial Mitigation Probable	High ( + )
Archaeological and Cultural Characteristics	<ul style="list-style-type: none"> <li>The proposed development will not require demolition of structures or Archaeological Survey of India (ASI) - or state-protected monuments and buildings.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure that construction staff members are aware of the likelihood of heritage resources being unearthed and of the scientific importance of such discoveries.</li> <li>ASI or the State Department of Archaeology will be contacted if any graves be discovered and all activities will be ceased until further notice.</li> <li>ASI or the State Department of Archaeology will be contacted if any heritage resources or objects, defined in the Act, be discovered and all activities will be ceased until further notice.</li> </ul>	Low ( - )	Local	Short-term	Full Mitigation Definite	Low ( - )

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
		<ul style="list-style-type: none"> <li>• Any heritage object found will not be moved without prior consultation with ASI or the State Department of Archaeology and all activities will be ceased immediately.</li> <li>• No structures older than 100 years will be allowed to be demolished, altered or destructed without a permit from ASI or the State Department of Archaeology.</li> </ul>					

**C. Operation and Maintenance Phase**

95. In the operational phase, all facilities and infrastructure will operate with routine maintenance, which should not affect the environment. Facilities will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only.

96. Table 18 presents an indication of what activities and facilities are likely to be undertaken during operation and maintenance of the subproject, including the associated inputs and outputs.

**Table 18: Summary of Activities and Facilities, Resource Use, and Produced Outputs during Operation and Maintenance Phase**

Activities and Facilities	Inputs/Resource Use	Outputs/Waste Production
<ul style="list-style-type: none"> <li>• Signages</li> <li>• Safety barriers</li> <li>• Lighting</li> <li>• Litter collection</li> <li>• Maintenance activities</li> <li>– Repairing and maintenance of machinery.</li> <li>• Eradication and control of invasive vegetation species</li> <li>• Auxiliary activities and Infrastructure</li> <li>– Markets and shops</li> </ul>	<ul style="list-style-type: none"> <li>• Manual de-weeding for eradication and control of invasive vegetation species</li> <li>• Labour</li> <li>• Vehicles and equipment used for inspections and maintenance.</li> </ul>	<ul style="list-style-type: none"> <li>• Vehicle exhaust emissions</li> <li>• Dust</li> <li>• Waste/worn out material removed during maintenance</li> <li>• Noise and vibrations</li> <li>• Lighting</li> </ul>

97. The following table (Table-19) outlines potential impacts during the operation and maintenance phase gathered from a process that included a review of available documentation, verified during the site visit, i.e. how, where and when the proposed development can interact and affect the environment significantly, and details what mitigation measures may be taken to counteract these impacts

**Table 19: Summary of Anticipated Potential Environmental Impacts during Operation and Maintenance Phase**

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
Climate	<ul style="list-style-type: none"> <li>The corrosive nature of climatic conditions may impact the parking facility infrastructure.</li> </ul>	<ul style="list-style-type: none"> <li>Regular Operation maintenance of the parking facility infrastructure.</li> </ul>	Low ( - )	Site	Medium-term	Partial Mitigation Probable	Low ( + )
Geology	<ul style="list-style-type: none"> <li>At the time of excavation water seepage may cause structural collapse.</li> </ul>	<ul style="list-style-type: none"> <li>Regular monitoring of infrastructure is required during excavation phase of said project.</li> </ul>	Low ( - )	Site	Long-term	Full Mitigation Possible	Low ( - )
Land Uses	<ul style="list-style-type: none"> <li>Some trees existing within the construction sites will be cut for the construction.</li> <li>The proposed project is expected to facilitate an integrated development approach to the area thereby improving the overall quality of life.</li> <li>The proposed development is expected to bring about positive economic benefits in the medium- to long- term.</li> <li>Local businesses and educational facilities, etc. are likely to benefit from the subproject.</li> </ul>	<ul style="list-style-type: none"> <li>Regular maintenance and monitoring of the parking facility infrastructure so as to ensure that its functional capacity and efficiency does not reduce.</li> <li>Suitable forestation will be done for the trees removed</li> <li>Suitable landscaping will be done in the parking facility</li> </ul>	High ( + )	Site and Local	Long-term	Full Mitigation Possible	High ( + )
Health and Safety	<ul style="list-style-type: none"> <li>To prevent the road side parking we reduce the number of accidents.</li> </ul>	<ul style="list-style-type: none"> <li>Undertake regular monitoring and maintenance of Multi level parking facility structure</li> </ul>	High ( + )	Local	Long-term	Partial Mitigation Probable	High ( + )
Aesthetics, Landscape Character, and Sense of Place	<p>The subproject is considered to be compatible with the surrounding landscape and is not likely to impact negatively on the existing visual quality or landscape character of the area.</p>	<ul style="list-style-type: none"> <li>Monitor housekeeping, littering and illegal dumping.</li> <li>Suitable landscaping will be done in the parking facility</li> </ul>	Low ( + )	Site and Local	Long-term	Partial Mitigation Probable	High ( + )
Cultural resources	<p>The subproject is unlikely to create any impact on any of the cultural resources within the project city except that thing that a small tree shrine/sacred grove that exists</p>	<p>The tree shrine/sacred grove that exist within the sire have to be rehabilitated.</p>	High ( + )	Local	Long-term	Mitigation Probable	High ( + )

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
	within the site have to be rehabilitated.						

#### **D. Cumulative Environmental Impacts**

98. Table 20 presents the cumulative impacts which are impacts that result from the incremental impact of the subproject activity on a common resource when added to the impacts of other past, present, or reasonably foreseeable future activities.

99. The cumulative impact assessment (CIA) examined the interaction between the project's residual effects (i.e., those effects that remain after mitigation measures have been applied) and those associated with other past, existing and reasonably foreseeable future projects or activities. The interaction of residual effects associated with multiple projects and/or activities can result in cumulative impacts, both positive and negative. The project's potential cumulative effects were considered with respect to Valued Components (VCs) in the categories of environmental and socio-economic in four areas:

- (i) of any potential residual project effects that may occur incrementally over time;
- (ii) consideration of other known relevant projects or activities within the specified study area boundaries, even if not directly related to the project;
- (iii) potential overlapping impacts that may occur due to other developments, even if not directly related to the proposed project; and
- (iv) future developments that is reasonably foreseeable and sufficiently certain to proceed.

100. The project has identified the VCs as water quality, noise, traffic management, social-economic and socio-community, and human health. There are no foreseeable projects that will overlap with this project. The spatial boundary of the project is the area around the project site. The temporal boundary can be considered as the whole Jammu City.

101. Air quality effects will occur during construction. Consequently, although emissions of common air contaminants and fugitive dust may be elevated in proximity to active work site, this impact will be short-term and localized to the immediate vicinity of the site. Greenhouse Gas (GHG) emissions may increase as a result of project activities (i.e., vehicle and equipment operation, concrete production, disposal of excavated material, landfilling of residual wastes). However, reduction in traffic congestion and traffic jams due to drop in the on-road parking after the commissioning of the facility will have positive effect on the air quality of the area. Given the project's relatively minor contribution to common air contaminants and GHG emissions during construction, the overall significance rating of both these potential residual effects is considered to be negligible.

102. Noise level during construction in the immediate proximity of work site is expected to increase. The duration of this exposure will be relatively brief. This exposure represents a temporary, localized, adverse residual effect of low to moderate significance for affected receptors. There may be annoyance to spatially located receptors during construction. However the reduction in the frequent traffic jams will play positive role in long term in curbing the noise pollution in the area after completion of the project.

103. Land use/traffic management concerns will occur spatially during construction. Site-specific mitigation measures will be implemented to address temporary disruptions to land use and access, parking modifications, and increased volumes of construction-related traffic. Since the project area is confined to the existing parking facility area there will be no change in the land use. However, some trees are to be felled for the construction of the project. The loss of the trees will be compensated by planting two trees for each tree cut. Long term improvement in

the traffic management and decongestion of the roads, are expected to develop and enhance the project area. This can be considered a long-term cumulative benefit of the project.

104. No adverse residual effects to human health will occur as a result of project construction or operation. While exposure to elevated noise levels and fugitive dust and common air pollutants will occur in proximity to project work sites during construction, due to their short-term, localized nature, these effects are expected to be minor and insignificant with no measurable effects on human health. On the positive note the decongestion of the roads will result in enhancing the air quality of the area.

105. Therefore the project will benefit the general public by contributing to the long-term improvement of parking facility in Super Bazar and Old Police Station Area (City Chowk) , the commercial hub of Jammu City.

#### **E. Assessment of No-Go (No Build) Option**

106. Table 21 outlines potential impacts associated with the “No-Go” option. The No-Go option involves no additional commitment of resources. If No Go option is chosen then the residents of the subproject areas will continue facing health risks owing to degradation in air quality and accidents due to frequent traffic jams and road congestion as result of on-road parking. Without proper parking facility the Super Bazar and Old Police Station Area (City Chowk) will continue facing the same impacts and their development shall be hindered.

107. No impact is envisaged on the sensitive receptors, but the air and noise quality will continue to deteriorate. Thus Choosing the No-Go option has the same effect as if the decision never occurred. In view of these finding it is recommended that the No Go shall not be adopted and the proposed project shall be taken up.

108. So, finally it can be concluded that the subproject shall proceed with adherence to the EMP provisions to mitigate and minimize the impacts.

**Table 20: Summary of Anticipated Potential Cumulative Environmental Impacts**

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
Significant improvement in parking facility.	<ul style="list-style-type: none"> <li>Construction of new automated modern parking facility and replacement of existence parking facility to ensure the safe and legal parking.</li> </ul>	<ul style="list-style-type: none"> <li>Refer to tables above</li> </ul>	High ( - )	Site/Local	Long-term	Full Mitigation Definite	High ( + )
Land use	<ul style="list-style-type: none"> <li>Some trees existing within the construction sites will be cut for the construction.</li> </ul>	<ul style="list-style-type: none"> <li>Refer to tables above</li> </ul>	High ( - )	Site/Local	Long-term	Partial Mitigation Definite	Low ( + )
The rationalization and reorganization of public transport and commercial activities	<ul style="list-style-type: none"> <li>In order to promote the national imperative of promoting public transport, it is essential to provide a safe, efficient, reliable, accessible, convenient and coordinated public transport system with adequate parking facilities in commercial hubs.</li> </ul>	<ul style="list-style-type: none"> <li>Refer to tables above</li> </ul>	High ( - )	Site/Local	Long-term	Full Mitigation Definite	High ( + )

**Table21: Summary of Anticipated Potential Environmental Impacts of the No Build Options**

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
Climate	<ul style="list-style-type: none"> <li>No obvious impacts</li> </ul>	<ul style="list-style-type: none"> <li>n/a</li> </ul>					
Air Quality	<ul style="list-style-type: none"> <li>Will remain the same</li> <li>No impacts on sensitive receptors during construction</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>	Medium ( - )	Local	Long-term		Medium ( - )
Geology	<ul style="list-style-type: none"> <li>No obvious impacts</li> </ul>	<ul style="list-style-type: none"> <li>n/a</li> </ul>					
Drainage and hydrology	<ul style="list-style-type: none"> <li>No obvious impacts</li> </ul>	<ul style="list-style-type: none"> <li>n/a</li> </ul>					
Land Use	<ul style="list-style-type: none"> <li>Without proper parking facility the Super Bazar and Old Police Station Area (City Chowk) continue facing the same impacts and their development shall be hindered.</li> <li>The fragmentation of activities, in particular the public transport ranks, will remain inefficient, inconvenient and unsafe.</li> <li>Lack of defined and dedicated</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>	High ( - )	Local	Long-term		High ( - )

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
	<p>trading space to cater for demand will continue to result in trading operating at undesirable locations, exacerbating problems of congestion and urban degradation.</p> <ul style="list-style-type: none"> <li>Private sector participation and investment will continue to be inhibited, which in turn inhibits the possible redevelopment of the area to be able to realize its full potential, including that of tourism.</li> </ul>						
Traffic	<ul style="list-style-type: none"> <li>No obvious impact</li> </ul>	<ul style="list-style-type: none"> <li>n/a</li> </ul>					
Health and Safety	<ul style="list-style-type: none"> <li>The congestion of road lead to various accidents on road side.</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>	High ( - )	Local	Long-term		High ( - )
Noise Pollution	<ul style="list-style-type: none"> <li>Noise pollution will remain the same.</li> <li>No impacts on sensitive receptors during construction.</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>	Medium ( - )	Local	Long-term		Medium ( - )
Aesthetics, Landscape Character and sense of place	<ul style="list-style-type: none"> <li>Aesthetics, Landscape character and sense of place will remain the same.</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>	Medium ( - )	Local	Long-term		Medium ( - )

## **VI. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION**

### **A. Public participation during the preparation of the IEE**

109. The public participation process included identifying interested and affected parties (stakeholders); informing and providing the stakeholders with sufficient background and technical information regarding the proposed development; creating opportunities and mechanisms whereby they can participate and raise their viewpoints (issues, comments and concerns) with regard to the proposed development; giving the stakeholders feedback on process findings and recommendations; and ensuring compliance to process requirements with regards to the environmental and related legislation.

110. The following methodologies have been used for carrying out public consultation:

- (i) Local communities, individuals affected and owners and employees of affected commercial establishments who are directly or indirectly affected were given priority while conducting public consultation.
- (ii) Walk-through informal group consultations in the proposed subproject area.
- (iii) The local communities had been informed through public consultation with briefing on project interventions including its benefits.
- (iv) The environmental concerns and suggestions made by the participants were listed out, discussed and suggestions were accordingly incorporated in the EMP.

111. Different techniques of consultation with stakeholders were used during project preparation (interviews, public meetings, group discussions, focus Group Discussions etc). Questionnaire was designed and environmental information was collected. Apart from this, a series of public consultation meetings will be conducted during the subproject DPR preparation. Various forms of public consultations (consultation through adhoc discussions on site) will also used to discuss the subproject and involve the community in planning the subproject design and mitigation measures. These activities will be continued throughout the implementation process of the project.

### **B. Notification of Potential Interested and Affected Parties**

112. The interested and affected parties were identified during the course of initial environmental examination. Key methods employed included individual interviews, field level observations, community consultations and discussions, interviews through a pre-drafted interview schedule. Key respondents included project affected persons who only include owners of houses/residences and commercial shops/establishments, etc. In addition to a number of informal consultations conducted regularly in the project corridor, people, selected on a stratified basis to ensure diversified representation, were formally interviewed with the help of an interview schedule. Issues discussed and feedback received is given in Table 22. The records of public consultations are annexed as **Appendix 3**.

**Table 22: Summary of Anticipated Potential Environmental/ Social Concerns**

Concerns raised/ issues discussed	Reply provided
General perception about the project and the awareness about the proposed project	Most of the people consulted were well aware about the proposed subproject And the general perception about the proposed project is good. They agreed to the proposed project and emphasized the need of good and parking facility in the area.
Support of local people for the proposed project?	Local people will support the implementing agency in the project activities. They expressed that this project will be beneficial to them as now they are facing various problems due to traffic congestion. People will give their fullest support to the project, because this project will be a benefit to them.
Prior information about the project is required	People requested to make aware them through a leaflet or prior announcement before start project work in the area. This will be done by through DSC and PIU. Prior to the implementation, the schedule will be published and discussed with local people.
They had bad experience with the government infrastructure improvement projects. According to their previous experience, most of the local road development projects were not completed at a satisfactory level.	This project being an external funded project will be completed within the stipulated time and there is special mechanism to ensure the quality of works done. ERA is having a special GRC and mechanism and public can point out any of these types of issues at any time which will be considered seriously.
Loss of community life like any market places or community activities to be affected	There will be no impact on Community life. If there are minor temporary impacts, people will bare these impacts.
Resettlement and land acquisition	There are no Resettlement and land acquisitions identified. There will be only temporary impacts.
Will the project sitting adversely impact the parking facility in the locality	There will be no such adverse impacts on parking facility due to the proposed project.

**C. Future Consultation and Disclosure**

113. The public consultation and disclosure program with all interested and affected parties will remain a continuous process throughout the subproject implementation and shall include the following:

**(i) Consultation during detailed design**

114. Focus-group discussions with affected persons and other stakeholders to hear their views and concerns will be done during DPR preparation so that these can be addressed in subproject design wherever necessary. Regular updates on the environmental component of the subproject will be kept available at the PMU office of ERA.

115. ERA will conduct information dissemination sessions at important locations in the subproject area and solicit the help of the local community leaders/prominent citizens to encourage the participation of the people to discuss various environmental issues.

116. The PMU, with assistance of DSC/PMC will conduct information dissemination sessions in the subproject area. During EMP implementation DSC, PMC and PMU shall organize public meetings and will apprise the communities about the progress on the implementation of EMP in the subproject works.

117. Structured consultation meetings with the institutional stakeholders (government bodies and NGOs) to discuss and approve key aspects of the project

**(ii) Consultation during construction**

118. Public meetings with affected communities (if any) and other stake holders to discuss and plan work programs and allow issues to be raised and addressed once construction will be held; and

119. Small-scale meetings to discuss and plan construction work with local communities to reduce disturbance and other impacts, and provide a mechanism through which stakeholders can participate in subproject monitoring and evaluation.

**(iii) Project disclosure**

120. A communications strategy is of vital importance in terms of accommodating traffic during road closure, if any. Local communities will be continuously consulted regarding location of construction camps, access and hauling routes and other likely disturbances during construction. The road closure, if any, together with the proposed detours will be communicated via advertising, pamphlets, road signage, etc. Public information campaigns via newspaper/radio/TV, etc. wherever required, to explain the subproject details to a wider population. Public disclosure meetings at key project stages to inform the public of progress and future plans.

121. For the benefit of the community the relevant information will be translated in the local language and made available at: (i) ERA office; (ii) District Magistrate Office; and, (iii) PMU/PIU. This will also upload in the website of ERA. It will be ensured that the hard copies of IEE are kept at such placed which are conveniently accessible to citizens as a means to disclose the document and at the same time creating wider public awareness. Electronic version of the IEE will be placed in the official website of the ERA and the official website of ADB after approval of the IEE by ADB. The PIU will issue Notification on the locality-wise start date of implementation of the subproject. The notice will be issued by the PIU in local newspapers one month ahead of the implementation works. Copies of the IEE will be kept in the PMU/PIU office and will be provided to any person willing to consult the IEE.

**VII. GRIEVANCE REDRESSAL MECHANISM**

122. Redressal of grievances shall be the responsibility of ERA. In this regard an efficient Grievance Redressal Mechanism is already kept in place which will assist the affected persons in resolving queries and complaints. The Grievance Redressal Mechanism follow the following approach:

- (i) If the affected person has any complaint or grievance, he/she is free to lodge his/her complaint with the Project Manager, PIU, JKUSDIP, ERA who will make efforts to address the complaint on ground level itself. The Project Manager will make efforts to redress the grievance within one week from the receipt of the grievance.
- (ii) In case the affected person is not satisfied or his grievance is not redressed he can take the matter to Director Safeguards who will ensure that grievance is redressed within two weeks.

(iii) If Director Safeguards cannot resolve the complaint or the affected person is not satisfied with resolution/ decision, he/she can take the matter to the Chief Executive Officer of ERA.

(iv) Affected persons, at any moment of time are free to approach the court of law at their own will and expenses.

123. Besides the grievance redressal mechanism of the subproject, state has online grievance monitoring system known as 'Awaz-e-Awam' through which affected persons can also lodge their complaints. The affected persons can lodge their complaints online at <http://www.jkgrievance.nic.in>.

124. Apart from the above detailed mechanism for the grievances received at the level of ERA, the provision shall be kept in the EMP of the subproject wherein the contractor will depute one Environmental Safeguard Officer who shall be responsible for implementation of EMP, reporting and grievance redressal on day-to-day basis. The grievances/complaints received at the level of contractor shall be recorded on the Complaints Register and the same shall be forwarded to the DSC (Engineer of the Contract) within 48 hours along with the details of action taken to redress the grievance. The Team Leader of DSC shall immediately try to resolve the issues and forward the details to the Project Manager of PIU. If the action taken by Contractor and DSC is found to be inadequate, then necessary instructions shall be issued by the Project Manager, PIU for implementation of rectification measures. Project Manager PIU shall report the matter to Director Safeguards along with the details on action taken. In order to facilitate the public in general to approach the authorities, in case of grievances/complaints, information boards with contact details of Contractor, Team Leader of DSC, Assistant Project Manager of PIU, Deputy Project Manager of PIU and Project Manager of PIU shall be displayed at all the subproject sites.

## **VIII. ENVIRONMENTAL MANAGEMENT PLAN**

125. The EMP will be updated during detailed design stage. The EMP will guide the environmentally-sound construction of the subproject and ensure efficient lines of communication between the DSC (Engineer), contractors, and PIU/ PMU/ PMC. The EMP identifies three phases of development as: (i) site establishment and preliminary activities; (ii) construction phase; and (iii) post construction/operational phase.

126. The purpose of the EMP is to ensure that the activities are undertaken in a responsible non-detrimental manner with the objectives of: (i) providing a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site; (ii) guiding and controlling the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iii) detailing specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (iv) ensuring that safety recommendations are complied with.

127. A copy of the EMP must be kept onsite during the construction period at all times. The EMP will be made binding on all contractors operating on the site and will be included in the Contractual Clauses. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance. It shall be noted that the Supreme Court of India<sup>8</sup>

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<sup>8</sup> Writ petition no 657 of 1995. The Supreme Court, in its order dated 4 February 2005, that "The Polluter Pays Principle means that absolute liability of harm to the environment extends not only to compensate

mandates that those responsible for environmental damage must pay the repair costs both to the environment and human health and the preventive measures to reduce or prevent further pollution and/or environmental damage. (The polluter pays principle).

128. The Contractor is deemed not to have complied with the EMP if:

- (i) within the boundaries of the site, site extensions and haul/ access roads there is evidence of contravention of clauses;
- (ii) if environmental damage ensues due to negligence;
- (iii) the contractor fails to comply with corrective or other instructions issued by the Engineer/PMU/PIU within a specified time; and
- (iv) The Contractor fails to respond adequately to complaints from the public.

#### **A. Institutional Arrangement**

129. The subproject will be implemented and monitored by the Project Implementation Unit (PIU) of ERA, which will be supported by Design and Supervision Consultant (Engineer) and overall management support shall be provided to ERA by Project Management Consultants (PMC). ERA will be the executing agency.

130. The Safeguard unit of ERA in PMU will monitor the implementation of environmental covenants with assistance of Engineer (DSC) and PMC.

131. ERA shall be responsible for ensuring compliance to environmental requirements of the ADB as well as central/state governments and reporting the same to ADB. An Environmental Management Plan (EMP) will be a part of contract with the civil works contractors engaged for execution of the works. The supervision and implementation of EMP shall be the responsibility of DSC with ERA as monitoring agency (with assistance of PMC). All the statutory environmental clearances (at national, state and local levels) if required (by ERA or by the civil works contractor) for the implementation of the subproject would be obtained in compliance with the national, state and local laws and regulations and in accordance with ADB's environmental policy and guidelines.

132. **ERA (PMU and PIU).** This agency:

- (i) complies with all applicable legislation and is conversant with the requirements of the EMP;
- (ii) assesses all activities requiring special attention as specified and/or requested by the Engineer (DSC) and/or Safeguards Unit of ERA for the duration of the Contract;
- (iii) ensures that the Contractor conducts all activities in a manner that minimizes disturbance to directly affected residents and the public in general, as advised by the Engineer and/or Safeguards Unit of ERA ;
- (iv) may, on the recommendation of the Engineer and/or Safeguards Unit of ERA, through the Executing Agency order the Contractor to suspend any or all works on site if the Contractor or his subcontractor/ supplier fail to comply with the said environmental specifications.

133. **Project Management Consultants (PMC).** This agency:

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the victims of pollution, but also to the cost of restoring environmental degradation. Remediation of damaged environment is part of the process of sustainable development.”

- (i) is conversant with the requirements of the EMP and all applicable legislation.
- (ii) Monitors the implementation of EMP on site and recommends requisite measures in case of non-compliances to ERA.
- (iii) Conducts monitoring through environmental monitoring laboratory in consultation with Safeguards Unit of ERA and the Engineer.
- (iv)
- (v) The Engineer (DSC)
- (vi) This agency:
- (vii) complies with all applicable legislation and is conversant with the requirements of the EMP;
- (viii) arranges information meetings for and consults with interested and affected parties about the impending construction activities;
- (ix) Maintains a register of complaints and queries by members of the public at the site office. This register is forwarded to the Project Manager of PIU on weekly basis.
- (x) enforces and monitors compliance with the requirements of EMP on site;
- (xi) assesses the Contractor's environmental performance in consultation with the Environmental Expert (of DSC) ;
- (xii) Documents in conjunction with the Contractor, the state of the site prior to commencing construction activities.

134. **Environmental Expert of Engineer (DSC).** This individual:

- (i) briefs the Contractor on the requirements of the environmental specification and/or EMP, as applicable;
- (ii) advises the Engineer on the interpretation, implementation and enforcement of the environmental specifications and other related environmental matters;
- (iii) monitors and reports on the performance of the contractor/project in terms of environmental compliance with the EMP to the Engineer and ERA; and
- (iv) Provides technical advice relating to environmental issues to the Engineer.

135. **The Contractor.** This individual/agency:

- (i) complies with all applicable legislation, is conversant with the requirements of the EMP, and briefs staff about the requirements of same;
- (ii) Ensures any sub-contractors/ suppliers, who are utilized within the context of the contract, comply with the environmental requirements of the EMP. The Contractor will be held responsible for non-compliance on their behalf;
- (iii) supplies method statements for all activities requiring special attention as specified and/or requested by the Engineer or Environmental Expert (of Engineer) during the duration of the Contract and provides environmental awareness training to staff;
- (iv) bears the costs of any damages/ compensation resulting from non-adherence to the EMP or written site instructions;
- (v) Conducts all activities in a manner that minimizes disturbance to directly affected residents and the public in general, and foreseeable impacts on the environment.
- (vi) Ensures that the Engineer is informed in a timely manner of any foreseeable activities that will require input from the Environmental Expert (of Engineer).
- (vii) Appoints one full time Environmental Safeguard Officer for implementation of EMP, community liaison, reporting and grievance redressal on day to day basis.
- (viii) Receives complaints/grievances from the public, immediately implements the remedial measures and reports to the Engineer (DSC) within 48 hours.

## B. Capacity Building

136. Training and orientation programmes shall be organized by the Environmental Experts of Engineer (DSC), PMC and ERA for the contractors, laborers, and technical and office staff of the contractors, site engineers of DSC and the relevant staff of the PIU for building their capacity with regards to principles and procedures of environmental management, pollution abatement measures, health and safety measures, grievance redressal mechanism and implementation of EMP.

137. The Contractor will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites. The suggested outline of the training program is presented in Table 23.

**Table 23: Indicative Capacity Building and Training Program**

Description	Contents	Schedule	Participants	Number of programs during project implementation
<b>Program 1</b> Orientation Workshop	ADB Safeguards Policy Statement National and State Environmental Laws and Regulations Identification of impacts and mitigation measures, Implementation of Environmental Management Plan (EMP) and monitoring requirements Incorporation of EMP into the project design and contracts	1 day	ERA officials PMC staff DSC staff	One
<b>Program 2</b> Orientation Program / Workshop for Contractors and Supervisory staff	Environmental issues during construction Implementation of EMP Monitoring of EMP implementation Reporting Requirements Health and Safety Measures	1 day	PIU engineers DSC staff Contractor's staff	Two

**Table 24 : Site Establishment and Preliminary Activities**

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency	Monitoring Indicators	Cost and Sources of Funds
1.	Legislation, permits and agreements	In all instances, ERA, service providers, contractors and consultants must remain in compliance with relevant local and national legislation.	All	Prior to moving onto site and during construction	Compliance certificate	NA
		Proof of compliance to Air Act must be forwarded by the contractor to PMU/PIU (in relation to hot mixing, batch mix plants, stone crushers, diesel generators, etc.)	Engineer	Prior to moving onto site and during construction	Compliance certificate	Engineering Design and cost
		A copy of the EMP must be kept on site during the construction period	Environmental Expert of Engineer (EE)	At all times	EMP	Engineering Design and cost
2.	Access to site <sup>9</sup>	Access to site will be via existing roads. The Contractor will need to ascertain the existing width and condition of the roads and repair damage due to construction.	Engineer	Prior to moving onto site and during construction	Report from contractor	Engineering Design and cost
		The Local Traffic Police Department shall be involved in the planning stages of the road closure and detour and shall be available on site for the monitoring of traffic in the early stages of the operations during road closure.	Engineer	Prior to moving onto site	Traffic Management Plan/Report prepared in consultation with Local Traffic Police Department	Engineering Design and cost
		The Local Traffic Department must be informed at least a week in advance if the traffic in the area will be affected.	Engineer	Prior to moving onto site	Report prepared in consultation with Local Traffic Police Department	NA
		The location of all affected services and servitudes must be identified and confirmed.	Engineer	Prior to moving onto site	Site visit report	NA
		All roads for construction access must be planned and approved by the Engineer and its	Engineer	Prior to moving onto site and during construction.	Approval letter from ERA Environment expert	NA

<sup>9</sup> Access to site and traffic management shall be done in accordance to the directions of Engineer.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency	Monitoring Indicators	Cost and Sources of Funds
		Environmental Expert ahead of construction activities. They shall not be created on an ad-hoc basis.				
		No trees, shrubs or groundcover may be removed or vegetation stripped without the prior permission of the Engineer/Environmental Expert.	Engineer/EE	Before and during construction.	Site visit report	NA
		Agreed turning areas for haulage vehicles are to be formalized and used by the Contractor. No turning manoeuvres other than at the designated places shall be permitted.	Engineer	Prior to moving onto site.	Site visit report	NA
		Contractors shall construct formal drainage for all temporary haulage roads in the form of side drains to prevent erosion and discharge of run-off.	Engineer	Prior to moving onto site.	Newly constructed side drains for temporary haulage Roads /site visit report	Engineering Design and cost
3.	Setting up of construction camp <sup>10</sup>	Choice of site for the Contractor's camp requires the Engineer's permission and must take into account location of local residents, businesses and existing land uses, including flood zones and slip / unstable zones. A site plan must be submitted to the Engineer for approval.	Engineer and EE	During surveys and preliminary investigations and prior to moving onto the site	Approved site plan	Engineering Design and cost
		The construction camp may not be situated on a floodplain or on slopes greater than 1:3.	Engineer and EE	During surveys and preliminary investigations and prior to moving onto the site	Approved site plan	Engineering Design and cost
		If the Contractor chooses to locate the camp site on private land, he must get prior permission from both the Engineer and the	Engineer	During site establishment and ongoing – weekly inspections	Approved site plan and permission letter from Engineer/land owner.	Engineering Design and cost

<sup>10</sup> Careful planning of the construction camp can ensure that time and costs associated with environmental management and rehabilitation are reduced.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency	Monitoring Indicators	Cost and Sources of Funds
		landowner.				
		In most cases, on-site accommodation will not be required. The construction camp can thus be comprised of: <ul style="list-style-type: none"> <li>• site office</li> <li>• ablution facilities</li> <li>• designated first aid area</li> <li>• eating areas</li> <li>• staff lockers and showers (where water and waterborne sewers are available)</li> <li>• storage areas</li> <li>• batching plant (if required)</li> <li>• refuelling areas (if required)</li> <li>• maintenance areas (if required)</li> <li>• crushers (if required)</li> </ul>	Engineer	During set-up		Engineering Design and cost
		Cut and fill must be avoided where possible during the set up of the construction camp.	Engineer	During site set-up	Approved site plan	Engineering Design and cost
		The camp must be properly fenced off and secured	Engineer	During site establishment and ongoing –weekly inspections	Weekly site visit report	Engineering Design and cost
		The Contractor shall make adequate provision for temporary toilets for the use of their employees during the Construction Phase. Such facilities, which shall comply with local authority regulations, shall be maintained in a clean and hygienic condition. Their use shall be strictly enforced.	Engineer	During site establishment and ongoing – weekly inspections	Availability of toilets	Engineering Design and cost
		Under no circumstances may open areas or the surrounding bushes be used as a toilet facility.	Engineer	Ongoing	Availability of toilets /increased awareness about health hygiene and sanitation among workers	Engineering Design and cost

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency	Monitoring Indicators	Cost and Sources of Funds
		Bins and / or skips shall be provided at convenient intervals for disposal of waste within the construction camp.	Engineer	During site set-up and ongoing	Availability of bins and skips/ adherence to the Comprehensive Waste Management Plan	Engineering Design and cost
		Bins shall have liner bags for efficient control and safe disposal of waste	EE	Ongoing	liner bags in bins	Engineering Design and cost
		Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged.	EE	During site set-up and ongoing	Availability of separate bins for biodegradable/plastic wastes/ adherence to the Comprehensive Waste Management Plan	Engineering Design and cost
4.	Establishing equipment lay-down and storage area <sup>11</sup>	Choice of location for equipment lay-down and storage areas must take into account prevailing winds, distances to adjacent land uses, general onsite topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary.	EE	During site set-up	Site visit report of EE and report from contractor regarding storage area	Engineering Design and cost
		Storage areas shall be secure so as to minimize the risk of crime. They shall also be safe from access by children / animals etc.	EE	During site set-up	Site visit report of EE and security in the storage area	Engineering Design and cost
		It is very important that the proximity of residents, businesses, schools, etc. is taken into account when deciding on storage areas for hazardous substances or materials. Residents living adjacent to the construction site must be notified of the existence of the hazardous storage area.	EE	During site set-up	Site visit report of EE, consultation with locals	Engineering Design and cost
		Equipment lay-down and Storage areas must be designated, demarcated and fenced if necessary.	EE	During site set-up	Site visit report of EE /Provision of fencing	Engineering Design and cost
		Fire prevention facilities must be	EE	During site set-up	Availability of fire	Engineering

<sup>11</sup> Storage areas can be hazardous and unsightly and can cause environmental pollution if not designed and managed carefully.

	<b>Activity</b>	<b>Management/Mitigation</b>	<b>Responsible for Monitoring</b>	<b>Frequency</b>	<b>Monitoring Indicators</b>	<b>Cost and Sources of Funds</b>
		present at all storage facilities.			extinguishing facilities / Site visit report of EE	Design and cost
		Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage areas. These pollution prevention measures for storage shall include a bund wall high enough to contain at least 110% of any stored volume. The Contractor shall submit a method statement to the Engineer for approval	EE	During site set-up and ongoing	Method of statement approved by Engineer and Site visit report of EE	Engineering Design and cost
		These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of storm water from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources.	EE	During site set-up and ongoing	Presence of impermeable surface and site visit report of EE	Engineering Design and cost
		Fuel tanks must meet relevant specifications and be elevated so that leaks may be easily detected.	Engineer and Contractor	During site setup and monitored	Report from contractor on fuel tank specification and presence of Elevated fuel tanks	Engineering Design and cost
		Material safety data sheets (MSDSs) shall be readily available on site for all chemicals and hazardous substances to be used on site. Where possible and available, MSDSs shall additionally include information on ecological impacts and measures to minimize negative environmental impacts during accidental releases or escapes.	Engineer and Contractor	Ongoing	Readily available Material safety data sheets with sufficient information on mitigation measures	Engineering Design and cost

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency	Monitoring Indicators	Cost and Sources of Funds
		Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures. The contractor must ensure that its staff are made aware of the health risks associated with any hazardous substances used, have been provided with the appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training.	EE and Contractor	Ongoing	Awareness among workers on safety measures / Availability of protective clothing/equipments	Engineering Design and cost
		Contractors shall submit a method statement and plans for the storage of hazardous materials and emergency procedures.	Engineer and EE	Prior to establishment of storage area	Report from Contractor on hazardous materials and emergency procedures.	Engineering Design and cost
5.	Materials management – sourcing <sup>12</sup>	Contractors shall prepare a source statement indicating the sources of all materials (including topsoil, sands, natural gravels, crushed stone, asphalt, clay liners, etc), and submit these to the Engineer for approval prior to commencement of any work.	Engineer and EE	On award of contract	Report from Contractor and approval letter from Engineer	Engineering Design and cost
		Where possible, a signed document from the supplier of natural materials shall be obtained confirming that they have been obtained in a sustainable manner and in compliance with relevant legislation.	EE	On receipt of natural materials	Confirmation letter from supplier	Engineering Design and cost
		Where materials are borrowed (mined), proof must be provided of authorization to utilize these materials from the landowner/material rights owner and the Department of Geology and Mining.	EE	On receipt of borrowed (mined) materials	Approval letter from Department of Geology and Mining/land owner/ owner	Engineering Design and cost

<sup>12</sup> Materials must be sourced in a legal and sustainable way to prevent offsite environmental degradation.

	<b>Activity</b>	<b>Management/Mitigation</b>	<b>Responsible for Monitoring</b>	<b>Frequency</b>	<b>Monitoring Indicators</b>	<b>Cost and Sources of Funds</b>
6.	Education of site staff on general and environmental conduct <sup>13</sup>	Ensure that all site personnel have a basic level of environmental awareness training.	EE and Contractor	During staff induction and ongoing	Awareness among site personals/ records of training conducted	Engineering Design and cost
		Staff operating equipment (such as excavators, loaders, etc.) shall be adequately trained and sensitized to any potential hazards associated with their task.	EE and Contractor	During staff induction, followed by ongoing monitoring	Awareness among site personals/ records of training conducted	Engineering Design and cost
		No operator shall be permitted to operate critical items of mechanical equipment without having been trained by the Contractor.	EE and Contractor	During staff induction, followed by ongoing monitoring	Awareness among site personals/ records of training conducted	Engineering Design and cost
		All employees must undergo safety training and wear the necessary protective equipments and clothing.	EE and Contractor	During staff induction, followed by ongoing monitoring	Awareness among site personals/ records of training conducted	Engineering Design and cost
		A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: <ul style="list-style-type: none"> <li>• no alcohol/drugs on site;</li> <li>• prevent excessive noise;</li> <li>• construction staff are to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of surrounding bushes as a toilet facility);</li> <li>• no fires permitted on site;</li> <li>• trespassing on private/commercial properties adjoining the site is forbidden;</li> <li>• other than pre-approved security staff, no workers shall be</li> </ul>	EE and Contractor	During staff induction, followed by ongoing monitoring	Awareness among site personals/ records of training conducted	Engineering Design and cost

<sup>13</sup> These points need to be made clear to all staff on site before the subproject begins.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency	Monitoring Indicators	Cost and Sources of Funds
		permitted to live on the construction site; and <ul style="list-style-type: none"> <li>No worker may be forced to do work that is potentially dangerous or that he/she is not trained to do.</li> </ul>				
6.	Social impacts <sup>14</sup>	Open liaison channels shall be established between the site owner, the developer, operator, the contractors and interested and affected parties such that any queries, complaints or suggestions can be dealt with quickly and by the appropriate person(s).	Contractor and EE	Prior to moving onto site and ongoing	Complaints from public and mechanism to deal with grievance	Engineering Design and cost
		Advance road signage indicating the road detour and alternative routes. Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.	Engineer and EE	Prior to moving onto site and ongoing	Presence of advance road signage/ advance notice to public	Engineering Design and cost
		Storage facilities, elevated tanks and other temporary structures on site shall be located such that they have as little visual impact on local residents as possible.	Engineer and EE	During surveys and preliminary investigations and site set-up.	Visual aesthetics of the site	NA
		In areas where the visual environment is particularly important (e.g. along commercial/ tourism routes) or privacy concerns for surrounding buildings exist, the site may require screening. This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction.	Engineer and EE	During surveys and preliminary investigations and site set-up.	Site visit report	Engineering Design and cost

<sup>14</sup> It is important to take notice of the needs and wishes of those living or working adjacent to the site. Failure to do so can cause disruption to work.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency	Monitoring Indicators	Cost and Sources of Funds
		Special attention shall be given to the screening of highly reflective materials on site.	EE	During site set-up	Site visit report	NA
7.	Noise impacts	Construction vehicles are to be fitted with standard silencers prior to the beginning of construction.	Contractor	Prior to moving onto site and ongoing	Report from contractor	Engineering Design and cost
		Equipment that is fitted with noise reduction facilities (e.g. side flaps, silencers, etc) will be used as per operating instructions and maintained properly during site operations	Contractor	Ongoing	Presence of noise reduction facilities in the construction equipments	Engineering Design and cost
8.	Dust/air pollution <sup>15</sup>	Vehicles travelling along the access roads must adhere to speed limits to avoid creating excessive dust.	EE	Ongoing	Report from EE	NA
		Camp construction / haulage road construction – areas that have been stripped of vegetation must be dampened periodically to avoid excessive dust.	EE	Ongoing – more frequently during dry and windy conditions	Dampening of camps and haulage roads/ Air quality monitoring report	Engineering Design and cost
		The Contractor must make alternative arrangements (other than fires) for cooking and / or heating requirements. LPG gas cookers may be used provided that all safety regulations are followed.	Engineer	Ongoing	Arrangements for alternate fuel for cooking/ Air quality monitoring report	Engineering Design and cost
9.	Soil erosion	The time that stripped areas are left open to exposure shall be minimised wherever possible. Care shall be taken to ensure that lead times are not excessive.	Engineer and EE	Throughout the duration of the subproject.	Report from EE	NA
		Wind screening and storm water control shall be undertaken to prevent soil loss from the site.	Engineer and EE	During site set-up	Measures to control soil loss	Engineering Design and cost
		Procedures that are in place to conserve topsoil during the construction phase of the	Engineer and EE	Daily monitoring during site set-up	Topsoil conservation measures	Engineering Design and cost

<sup>15</sup> Establishment of the camp site, and related temporary works can reduce air quality.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency	Monitoring Indicators	Cost and Sources of Funds
		subproject are to be applied to the set up phase. i.e. topsoil is to be conserved while providing access to the site and setting up the camp.				
10.	Storm water <sup>16</sup>	To prevent storm water damage, the increase in storm water run-off resulting from construction activities must be estimated and the drainage system assessed accordingly.	Engineer	During surveys and preliminary Investigations.	Provision of drainage system and report from EE	Engineering Design and cost
		Scheduling of works to be done in accordance to the climatic conditions and the works to be carried out during dry periods so as to avoid any losses due to storm water during rains.	Engineer	During site setup and ongoing.	Work schedules	NA
11.	Water quality <sup>17</sup> .	Storage areas that contain hazardous substances must be bounded with an approved impermeable liner.	Engineer	During site setup.	impermeable liner bounding storage areas	Engineering Design and cost
		Spills in bounded areas must be cleaned up, removed and disposed of safely from the bounded area as soon after detection as possible to minimise pollution risk and reduced bounding capacity.	Engineer and EE	During site setup.	Proper management of spills in bounded areas/ water quality monitoring report	Engineering Design and cost
		A designated, bounded area is to be set aside for vehicle washing and maintenance. Materials caught in this bounded area must be disposed of to a suitable waste site or as directed by the Engineer	Engineer and EE	During site setup.	Bounded area for washing and maintenance of vehicles/ water quality monitoring report	Engineering Design and cost
		Provision shall be made during set up for all polluted runoff to be treated to the Engineer's approval	Engineer and EE	During site setup and to be monitored weekly	Provision for all polluted runoff/ water quality monitoring report	Engineering Design and cost

<sup>16</sup> Serious financial and environmental impacts can be caused by unmanaged storm water.

<sup>17</sup> Incorrect disposal of substances and materials and polluted run-off can have serious negative effects on groundwater quality.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency	Monitoring Indicators	Cost and Sources of Funds
		before being discharged into the storm water system. (This will be required for the duration of the project.)				
12.	Conservation of the natural environment <sup>18</sup>	No vegetation may be cleared without prior permission from the Engineer.	Engineer and EE	During site setup and ongoing.	Approval letter from Engineer	NA
		Trees that are not to be cleared shall be marked beforehand with danger tape. The Environmental Expert of Engineer (DSC) must be given a chance to mark vegetation that is to be conserved before the Contractor begins clearing the site.	Engineer and EE	During site set-up	Markings with danger tape / report from EE	Engineering Design and cost
		Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas. (Particular attention must be paid to imported material).	EE	Ongoing in camp Site, haulage Areas	Site visit report of EE	NA
13.	Set-up of waste management procedure	The excavation and use of rubbish pits on site is forbidden.	EE	Ongoing	Site visit report of EE/ Debris Disposal Site Management and Redevelopment Plan	Engineering Design and cost
		Burning of waste is forbidden.	EE	Ongoing	Site visit report of EE/ adherence to the Comprehensive Waste Management Plan	NA
14.	Cultural environment	Prior to the commencement of construction, all staff need to know what possible archaeological or historical objects of value may look like, and to notify the Engineer/Contractor shall such an item be uncovered.	EE	During site set-up And ongoing.	Awareness of staff	Engineering Design and cost
15.	Security and safety	Lighting on site is to be set out to provide maximum security and to enable easier policing of the site, without creating a visual nuisance	Engineer	During site set-up	Site visit report of EE	NA

<sup>18</sup> Alien plant encroachment is particularly damaging to natural habitats and is often associated with disturbance to the soil during construction activities. Care must be taken to conserve existing plant and animal life on and surrounding the site.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency	Monitoring Indicators	Cost and Sources of Funds
		to local residents or businesses.				
		Material stockpiles or stacks, such as, pipes must be stable and well secured to avoid collapse and possible injury to site workers / local residents.	Engineer and EE	Ongoing	Stability of stockpiles, stacks & pipes/ Site visit report of EE	NA
		Flammable materials shall be stored as far as possible from adjacent residents / businesses.	Engineer and EE	Ongoing	Storage area of flammable materials	NA
		All interested and affected parties shall be notified in advance of any known potential risks associated with the construction site and the activities on it. Examples are: <ul style="list-style-type: none"> <li>• stringing of power lines</li> <li>• earthworks / earthmoving machinery on steep slopes above houses / infrastructure</li> <li>• risk to residences along haulage roads / access routes</li> </ul>	Engineer and EE	24 hours prior to activity in question	Advance notice to PAPs	Engineering Design and cost

DSC = Design and Supervision Consultant; EE = Environmental Expert of DSC/Engineer

**Table 25: Management of Construction and Workforce Activities**

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency	Monitoring Indicators	Cost and Sources of Funds
1.	Access to site	Contractors shall ensure that all side drains and scour check walls on access and haul roads are functioning properly and are well maintained.	Engineer	Weekly and after heavy rains.	Site visit report of EE	Engineering Design and cost
		Contractors shall ensure that access roads are maintained in good condition by attending to potholes, corrugations and storm water damage as soon as these develop.	Engineer	Weekly inspection.	Condition of access roads / Site visit report of EE	Engineering Design and cost
		If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have been spilt.	Contractor	When necessary	Condition of roads / Site visit report of EE	Engineering Design and cost
		Unnecessary compaction of soils by heavy vehicles must be avoided; construction vehicles must be restricted to demarcated access, haulage routes and turning areas.	Contractor	Ongoing monitoring.	Site visit report of EE	NA
		Cognizance of vehicle weight / dimensions must be	Engineer	Ongoing monitoring.	Site visit report of	NA

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency	Monitoring Indicators	Cost and Sources of Funds
		taken when using access constructed out of certain materials. e.g. paved surfaces / cobbled entranceways.			EE	
2.	Maintenance of construction camp and work site	The Contractor must monitor and manage drainage of the camp site to avoid standing water and soil erosion.	Engineer	Ongoing monitoring.	Condition of camp site/ Site visit report of EE	Engineering Design and cost
		Run-off from the camp site must not discharge into neighbours' properties.	Engineer	Ongoing monitoring.	Condition of camp site/ Site visit report of EE	NA
		Toilets are to be maintained in a clean state and shall be moved to ensure that they adequately service the work areas.	Contractor	Weekly inspection	Condition of toilets in camp site/ Site visit report of EE	Engineering Design and cost
		The Contractor is to ensure that open areas or the surrounding bushes are not being used as toilet facility.	Contractor	Weekly inspection	Site visit report of EE/ availability of enough toilets	Engineering Design and cost
		The Contractor shall ensure that all litter is collected from the work and camp areas daily.	Contractor	Ongoing monitoring.	Proper collection system for litters adherence to the Comprehensive Waste Management Plan	Engineering Design and cost
		Bins and/or skips shall be emptied regularly and waste shall be disposed of at the pre-approved site. Waybills for all such disposals are to be kept by the Contractor for review by the Engineer/EE.	Contractor and Engineer	Weekly inspection	Proper waste management facility/ Site visit report of EE/ adherence to the Comprehensive Waste Management Plan	Engineering Design and cost
		Eating areas shall be regularly serviced and cleaned to ensure the highest possible standards of hygiene and cleanliness.	Contractor	Daily monitoring.	General cleanliness at eating areas/ Site visit report of EE	Engineering Design and cost
		The Contractor shall ensure that his camp and working areas are kept clean and tidy at all times.	Contractor and Engineer	Weekly monitoring	General cleanliness at camp/working areas/ Site visit report of EE adherence to the Comprehensive Waste Management Plan	Engineering Design and cost
3.	Staff conduct	The Contractor must monitor the performance of	Contractor	Ongoing monitoring.	Report on	NA

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency	Monitoring Indicators	Cost and Sources of Funds
		construction workers to ensure that the points relayed during their induction have been properly understood and are being followed. If necessary, the EE and/or a translator shall be called to the site to further explain aspects of environmental or social behaviour that are unclear.	and Engineer		performance of workers on environmental or social behaviour from contractor/ Site visit report of EE	
		The rules that are explained in the worker conduct section, must be followed at all times	Contractor and Engineer	Ongoing monitoring.	General behavior of works/ Site visit report of EE	NA
4.	Dust and air pollution <sup>19</sup>	Vehicles travelling to and from the construction site must adhere to speed limits so as to avoid producing excessive dust.	Engineer	Ongoing monitoring.	Site visit report of EE	NA
		A speed limit of 30km/hr must be adhered to on all dirt roads.	Engineer	Ongoing monitoring.	Site visit report of EE	NA
		Access and other cleared surfaces including backfilled trenches must be dampened whenever possible and especially in dry and windy conditions to avoid excessive dust.	Engineer	Ongoing monitoring.	Dampening of access and cleared surfaces/ Site visit report of EE	Engineering Design and cost
		Where dust is unavoidable in residential or commercial areas, screening will be required utilizing wooden supports and shade cloth.	Engineer	As directed by the engineer.	Provision of screens to minimize dust / Site visit report of EE	Engineering Design and cost
		Vehicles and machinery are to be kept in good working order and to meet manufacturers specifications for safety, fuel consumption, etc.	Contractor	Ongoing monitoring.	Site visit report of EE/ conditions of vehicles	Engineering Design and cost
		Should excessive emissions be observed, the Contractor is to have the equipment seen to as soon as possible.	Engineer	As directed by the engineer.	Site visit report of EE/ observation on emissions	Engineering Design and cost
		No fires are allowed on site except for the burning of firebreaks.	Engineer	Ongoing monitoring.	Site visit report of EE	NA
5.	Soil erosion	Once an area has been cleared of vegetation, the top layer (normally 150mm) of soil shall be removed and stockpiled in the designated area.	Contractor	Ongoing monitoring.	Site visit report of EE	Engineering Design and cost
		The full length of the works shall not be stripped of vegetation prior to commencing other activities. The time that stripped areas are exposed shall be minimized wherever possible.	Engineer and Contractor	Ongoing monitoring.	Scheduling of works/ Site visit report of EE	Engineering Design and cost
		Top soiling and revegetation shall commence immediately after the completion of an activity and at	Contractor	As each activity is completed.	Topsoiling and revegetation / Site	Engineering Design and

<sup>19</sup> Main causes of air pollution during construction are dust from vehicle movements and stockpiles, vehicle emissions and fires.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency	Monitoring Indicators	Cost and Sources of Funds
		an agreed distance behind any particular work front.			visit report of EE	cost
		Storm water control and wind screening shall be undertaken to prevent soil loss from the site.	Engineer	Ongoing monitoring.	Provision of Storm water control and wind screening	Engineering Design and cost
		Side tipping of spoil and excavated materials shall not be permitted – all spoil material shall be disposed of as directed by the Engineer.	Engineer	Ongoing monitoring.	Disposal system of spoils/ Storm water control and wind screening	Engineering Design and cost
		Battering of all banks shall be such that cut and fill embankments are no steeper than previous natural slopes unless otherwise permitted by the Engineer. Cut and fill embankments steeper than previous ground levels shall be revegetated immediately on completion of trimming or shall be protected against erosion using bioengineered stabilization measures.	Engineer and Contractor	As the cut and fill activity is completed.	Observation Battering of all banks and revegetation on embankments/Site visit report of EE	Engineering Design and cost
		All embankments, unless otherwise directed by the Engineer, shall be protected by a cut off drain to prevent water from cascading down the face of the embankment and causing erosion.	Engineer	Immediately after the creation of the embankment/stripping of vegetation.	Provision of cutoff drain at embankments / Site visit report of EE	Engineering Design and cost
6.	Storm water	The Contractor shall not in any way modify nor damage the banks or bed of streams, rivers, wetlands, other open water bodies and drainage lines adjacent to or within the designated area, unless required as part of the construction project specification. Where such disturbance is unavoidable, modification of water bodies shall be kept to a minimum in terms of: <ul style="list-style-type: none"> <li>removal of riparian vegetation</li> <li>opening up of the stream channel</li> </ul>	Contractor	Ongoing monitoring.	Disturbance to adjacent water bodies/wetlands/Site visit report of EE	Engineering Design and cost
		Earth, stone and rubble is to be properly disposed of so as not to obstruct natural water pathways over the site i.e. these materials must not be placed in storm water channels, drainage lines or rivers.	Engineer	Monitoring throughout the duration of the project.	Proper disposal of earth, stone and rubble	Engineering Design and cost
		There shall be a periodic checking of the site's drainage system to ensure that the water flow is unobstructed.	Engineer and Contractor	Monthly inspection.	Drainage system in the site / Site visit report of EE	Engineering Design and cost
		The use of high velocity storm water pipelines shall be avoided in favour of open, high friction, semi-permeable channels wherever feasible.	Engineer and Contractor	As directed by the engineer	Condition of storm water pipes/ Site visit report of EE	Engineering Design and cost
		Storm water outfalls shall be designed to reduce flow velocity and avoid stream bank and soil erosion.	Engineer and Contractor	As directed by the engineer	Condition of storm water pipes/ Site	Engineering Design and

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency	Monitoring Indicators	Cost and Sources of Funds
					visit report of EE	cost
		During construction, un-channelled flow must be controlled to avoid soil erosion. Where large areas of soil are left exposed, rows of straw / hay or bundles of cut vegetation shall be dug into the soil in contours to slow surface wash and capture eroded soil. The spacing between rows will be dependent on slope.	Engineer and Contractor	As surfaces become exposed.	Site conditions / Site visit report of EE	Engineering Design and cost
		Where surface run-off is concentrated (e.g. along exposed roadways/tracks), flow shall be slowed by contouring with hay bales or bundled vegetation generated during site clearance operation. If the area must be used for construction vehicles, berms may be used instead. The berms must be at least 30 cm high and well compacted. The berms shall channel concentrated flow into detention ponds or areas protected with hay bales for flow reduction and sediment capture.	Engineer and Contractor	Ongoing monitoring.	Condition of surface run off – mechanism to slow down the flow/ Condition of storm water pipes/ Site visit report of EE	Engineering Design and cost
7.	Water quality <sup>20</sup>	Mixing / decanting of all chemicals and hazardous substances must take place either on a tray or on an impermeable surface. Waste from these shall then be disposed of to a suitable waste disposal site.	Contractor and Engineer	Regular monitoring (refer to the environmental monitoring program)	Disposal mechanism of hazardous substances / Site visit report of EE	Engineering Design and cost
		Every effort shall be made to ensure that any chemicals or hazardous substances do not contaminate the soil or ground water on site.	Contractor	Regular monitoring (refer to the environmental monitoring program)	Site visit report of EE	Engineering Design and cost
		Care must be taken to ensure that run-off from vehicle or plant washing does not enter the surface/ground water. Wash water must be passed through a three-chamber oil-grease trap prior to being discharged as effluent.	Contractor	Regular monitoring (refer to the environmental monitoring program)	Provision to manage runoff from vehicle and plant washing/ Site visit report of EE	Engineering Design and cost
		Site staff shall not be permitted to use any stream, river, other open water body or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing or for any construction or related activities. Municipal water (or another source approved by the Engineer) shall	Contractor	Regular monitoring (refer to the environmental monitoring program)	Site visit report of EE/ Water quality monitoring report	Engineering Design and cost

<sup>20</sup> Water quality is affected by the incorrect handling of substances and materials. Soil erosion and sediment is also detrimental to water quality. Mismanagement of polluted run-off from vehicle and plant washing and wind dispersal of dry materials into rivers and watercourses are detrimental to water quality.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency	Monitoring Indicators	Cost and Sources of Funds
		instead be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting etc.				
		Emergency contact numbers of the SPCB shall be referred to in order to deal with spillages and contamination of aquatic environments.	Engineer and Contractor	As necessary	Display of contact numbers/ Site visit report of EE	Engineering Design and cost
8.	Conservation of natural environment	As the work front progresses the Contractor is to check that vegetation clearing has the prior permission of the Engineer.	Engineer	Ongoing monitoring.	Permission from the engineer	Engineering Design and cost
		Only trees that have NOT been marked beforehand are to be removed, if cutting of trees is required.	Contractor	Ongoing monitoring.	Site visit report of EE	Engineering Design and cost
		Gathering of firewood, fruit, plants, crops or any other natural material on site or in areas adjacent to the site is prohibited.	Contractor	Ongoing monitoring.	Site visit report of EE / provision of alternate fuel to works	Engineering Design and cost
		The hunting of birds and animals on site and in surrounding areas is forbidden.	Contractor	Ongoing monitoring.	Site visit report of EE	Engineering Design and cost
		Immediate revegetation of stripped areas and removal of aliens by de-weeding must take place. This significantly reduces the amount of time and money that must be spent on alien plant management during rehabilitation.	Contractor	Ongoing monitoring.	revegetation of stripped areas/ Site visit report of EE	Engineering Design and cost
		Alien vegetation encroachment onto the site as a result of construction activities must be controlled during construction.	Contractor	Twice-monthly monitoring.	Site visit report of EE	Engineering Design and cost
		Where possible, cleared indigenous vegetation shall be kept in a nursery for use at a later stage in the site rehabilitation process.	Contractor	As the work front progresses.	Site visit report of EE	Engineering Design and cost
9.	Materials management	Stockpiles shall not be situated such that they obstruct natural water pathways.	Engineer and Contractor	Location as directed by the engineer	Location of stock piles/ Site visit report of EE	Engineering Design and cost
		Stockpiles shall not exceed 2m in height unless otherwise permitted by the Engineer.	Engineer	Location as directed by the engineer	Height of stock piles/ Site visit report of EE	Engineering Design and cost
		If stockpiles are exposed to windy conditions or heavy rain, they shall be covered either by vegetation or cloth, depending on the duration of the project. Stockpiles may further be protected by the construction of berms or low brick walls around their	Contractor	As necessary	covering of stock piles/ Site visit report of EE	Engineering Design and cost

	<b>Activity</b>	<b>Management/Mitigation</b>	<b>Responsible for Monitoring</b>	<b>Frequency</b>	<b>Monitoring Indicators</b>	<b>Cost and Sources of Funds</b>
		bases.				
		Stockpiles shall be kept clear of weeds and alien vegetation growth by regular de-weeding.	Contractor	Monthly monitoring	condition of stock piles/ Site visit report of EE	Engineering Design and cost
		All concrete mixing must take place on a designated, impermeable surface.	Contractor	Ongoing monitoring.	Site conditions/ Site visit report of EE	Engineering Design and cost
		No vehicles transporting concrete to the site may be washed on site.	Contractor	Ongoing monitoring.	Site conditions/ Site visit report of EE	Engineering Design and cost
		No vehicles transporting, placing or compacting asphalt or any other bituminous product may be washed on site.	Contractor	Monthly monitoring.	Site conditions/ Site visit report of EE	Engineering Design and cost
		Lime and other powders must not be mixed during excessively windy conditions.	Contractor	As necessary	Site conditions/ Site visit report of EE	Engineering Design and cost
		All substances required for vehicle maintenance and repair must be stored in sealed containers until they can be disposed of / removed from the site.	Contractor	Ongoing monitoring.	Site conditions/ Site visit report of EE	Engineering Design and cost
		Hazardous substances / materials are to be transported in sealed containers or bags.	Engineer and Contractor	Ongoing monitoring	Site conditions/ Site visit report of EE	Engineering Design and cost
		Spraying of herbicides / pesticides shall not take place under windy condition.	Contractor	As necessary.	Site conditions/ Site visit report of EE	Engineering Design and cost
10.	Waste management	Refuse must be placed in the designated skips / bins which must be regularly emptied. These shall remain within demarcated areas and shall be designed to prevent refuse from being blown out by wind.	Contractor	Ongoing monitoring.	SWM collection and management system, Site conditions/ Site visit report of EE adherence to the Comprehensive Waste Management Plan	Engineering Design and cost
		In addition to the waste facilities within the construction camp, provision must be made for waste receptacles to be placed at intervals along the work front.	Contractor	Ongoing monitoring.	Provision for waste receptacles along the work front./ Site visit report of EE adherence to the Comprehensive Waste Management	Engineering Design and cost

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency	Monitoring Indicators	Cost and Sources of Funds
					Plan	
		Littering on site is forbidden and the site shall be cleared of litter at the end of each working day.	Contractor	Ongoing monitoring.	Site conditions/ Site visit report of EE adherence to the Comprehensive Waste Management Plan	Engineering Design and cost
		Recycling is to be encouraged by providing separate receptacles for different types of wastes and making sure that staff is aware of their uses.	Contractor	Ongoing monitoring.	Collection system of SWM/Awareness of staff / Site visit report of EE adherence to the Comprehensive Waste Management Plan	Engineering Design and cost
		All waste must be removed from the site and transported to a disposal site or as directed by the Engineer. Waybills proving disposal at each site shall be provided for the Engineer's inspection.	Engineer and Contractor	Checked at each site meeting.	SWM disposal systems/ waybills/ Site visit report of EE adherence to the Comprehensive Waste Management Plan	Engineering Design and cost
		Construction rubble shall be disposed of in pre-agreed, demarcated spoil dumps that have been approved by the Engineer, or at disposal sites.	Engineer and Contractor	Ongoing monitoring.	Construction rubble management/ / Site visit report of EE	Engineering Design and cost
		Waste from toilets shall be disposed of regularly and in a responsible manner. Care must be taken to avoid contamination of soils and water, pollution and nuisance to adjoining areas.	Contractor	Weekly monitoring.	Septic tank for toilets/ / Site visit report of EE adherence to the Comprehensive Waste Management Plan	Engineering Design and cost
		Hazardous waste disposal must be carried out by the Contractor in a responsible manner at approved site. Waybills for this shall be provided.	Contractor and Engineer	Ongoing monitoring.	Hazardous waste disposal systems/ waybills/ Site visit report of EE adherence to the Comprehensive Waste Management Plan	Engineering Design and cost
		A sump (earth or other) must be created for concrete	Engineer and	Ongoing monitoring.	Management of	Engineering

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency	Monitoring Indicators	Cost and Sources of Funds
		waste. This is to be de-slugged regularly and the cement waste is to be removed to the approved disposal site.	Contractor		concrete waste / Site visit report of EE adherence to the Comprehensive Waste Management Plan	Design and cost
11.	Social impacts <sup>21</sup>	Contractor's activities and movement of staff to be restricted to designated construction areas.	Engineer	Ongoing.	Site visit report of EE	NA
		Should the construction staff be approached by members of the public or other stakeholders, they shall assist them in locating the Engineer or Contractor, or provide a number on which they may contact the Engineer or Contractor.	Engineer and Contractor	Ongoing monitoring.	Interaction and record of grievance from public	NA
		The conduct of the construction staff when dealing with the public or other stakeholders shall be in a manner that is polite and courteous at all times. Failure to adhere to this requirement may result in the removal of staff from the site by the Engineer.	Engineer	Ongoing monitoring.	Report from contractor	NA
		Disruption of access for local residents, commercial establishments, institutions, etc. Must be minimized and must have the Engineer's permissions.	Engineer	Ongoing monitoring.	Record of grievance from public	NA
		Provide walkways and metal sheets where required to maintain access for people and vehicles.	Contractor	Ongoing monitoring	Provision of walkways and metal sheets	NA
		Increase workforce in front of critical areas such as educational institutions, places of worship, business establishment and health care establishments to shorten the duration of impacts.	Contractor	Ongoing monitoring		NA
		Consult businesses and institutions regarding operating hours and factoring this in work schedules.	Engineer and Contractor	At least 1 week prior to the activity taking place.	Schedule of work/ report of EE	Engineering Design and cost
		The Contractor is to inform neighbours in writing of disruptive activities at least 24 hours beforehand. This can take place by way of leaflets placed in the pick boxes giving the Engineer's and Contractor's details or other method approved by the Engineer. Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.	Engineer and Contractor	At least 24 hrs prior to the activity taking place.	Advance notice issued to public/ report of EE	Engineering Design and cost

<sup>21</sup> Regular communication between the Contractor and the interested and affected parties is important for the duration of the contract.

Activity	Management/Mitigation	Responsible for Monitoring	Frequency	Monitoring Indicators	Cost and Sources of Funds
	The project contractor will ensure that there is provision of alternate access to business establishments during the construction so that there is no closure of these shops or any loss of clientage.	Engineer and Contractor	Ongoing monitoring	Provision of alternate access to business establishments / report of EE	Engineering Design and cost
	Contractor shall submit to Engineer the confirmation obtained from the business/shop owner that such access was provided during project execution on the specified format titled <b>“Confirmation from Operator of Commercial establishment/shop for provision of temporary Access by Contactor”</b> . This format has been appended as <b>Appendix-1 to EMP</b> .	Engineer	On completion of works at each site	Confirmation from Operator of Commercial establishment/shop for provision of temporary Access by Contactor	Engineering Design and cost
	Lighting on the construction site shall be pointed downwards and away from oncoming traffic and nearby houses.	Engineer	Ongoing monitoring.	Lighting at site/ report of EE	Engineering Design and cost
	The site must be kept clean to minimize the visual impact of the site.	Engineer	Weekly monitoring.	Cleanliness and visual aesthetics/ report of EE	Engineering Design and cost
	If screening is being used, this must be moved and re-elected as the work front progresses.	Engineer	Ongoing monitoring.	visual aesthetics/ report of EE	Engineering Design and cost
	Machinery and vehicles are to be kept in good working order for the duration of the project to minimize noise nuisance to neighbours.	Contractor	Ongoing monitoring.	Noise of vehicles/ conditions of vehicles/ visual aesthetics/ report of EE	Engineering Design and cost
	Notice of particularly noisy activities must be given to residents / businesses adjacent to the construction site. Examples of these include: <ul style="list-style-type: none"> <li>• noise generated by jackhammers, diesel generator sets, excavators, etc.</li> <li>• drilling</li> <li>• dewatering pumps</li> </ul>	Engineer and Contractor	At least 24 hrs prior to the activity taking place.	Advance notice to public visual aesthetics/ report of EE	Engineering Design and cost
	Noisy activities must be restricted to the times given in the Project Specification or General Conditions of Contract.	Engineer	Ongoing monitoring.	Scheduling of activities / visual aesthetics/ report of EE	Engineering Design and cost
	The Engineer and Contractor are responsible for ongoing communication with those people that are interested in / affected by the project.	Engineer and Contractor		Communication records with locals/ report of EE	Engineering Design and cost
	A complaints register (refer to the Grievance	Contractor	Monthly monitoring.	Complaints register /	Engineering

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency	Monitoring Indicators	Cost and Sources of Funds
		Redressal Mechanism) shall be housed at the site office. This shall be in carbon copy format, with numbered pages. Any missing pages must be accounted for by the Contractor. This register is to be tabled during monthly site meetings.	and Engineer		report of EE	Design and cost
		Interested and affected parties' need to be made aware of the existence of the complaints book and the methods of communication available to them.	Engineer and Contractor	Ongoing monitoring.	Awareness of locals about the project and GRM	Engineering Design and cost
		Queries and complaints are to be handled by: - documenting details of such communications <ul style="list-style-type: none"> <li>• submitting these for inclusion in complaints register</li> <li>• bringing issues to Engineer's attention immediately</li> <li>• taking remedial action as per Engineer's instruction</li> </ul>	Contractor	Ongoing monitoring.	Complaints register / report of EE	Engineering Design and cost
		Selected staff are to be made available for formal consultation with the interested and affected parties in order to: <ul style="list-style-type: none"> <li>• explain construction process</li> <li>• answer questions</li> </ul>	Contractor	Ongoing monitoring.	Record of consultations	Engineering Design and cost
		Contractor shall immediately take the necessary remedial action on any complaint/grievance received by him and forward the details of the grievance along with the action taken to Engineer within 48 hours of receipt of such complaint/grievance.	Engineer	Ongoing monitoring	Complaints register / report of EE/ record of corrective action taken	Engineering Design and cost
12.	Cultural environment	All the staff and labourers of the Contractor be informed about the possible items of historical or archaeological value which include old stone foundations, tools, clayware, jewellery, remains, fossils etc.	Engineer and EE	As required.	Awareness of workers	Engineering Design and cost
		If something of this nature be uncovered, ASI or State Department of Archaeology shall be contacted and work shall be stopped immediately.	Engineer and EE	As required.	Awareness of workers	Engineering Design and cost
13.	Environment Safeguard Officer	Contractor shall appoint one Environment Safeguard Officer who shall be responsible for assisting contractor in implementation of EMP, community liaison, consultations with interested/affected parties, reporting and grievance redressal on day-to-day basis.	Engineer and EE	Person to be appointed before start of construction activities and remain available through the project duration.	Appointment and work record of ESO by contractor/ report of EE	Engineering Design and cost

ASI = Archaeological Survey of India; EE = Environmental Expert of Engineer (DSC); SPCB= State Pollution Control Board

**Table 26: Post Construction Activities**

	<b>Activities</b>	<b>Management/Mitigation</b>	<b>Responsible for Monitoring</b>	<b>Frequency</b>	<b>Monitoring Indicators</b>	<b>Cost and Sources of Funds</b>
1.	Construction camp	All structures comprising the construction camp are to be removed from site or handed over to the property owner/ community as per mutual agreement (if established on private/community land).	Engineer	Subproject completion	Condition of the site / report of EE	Engineering Design and cost
		The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up.	Engineer	Subproject completion	Condition of the site / report of EE	Engineering Design and cost
		All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be top-soiled and re-grassed using the guidelines set out in the revegetation specification that forms part of this document.	Engineer	Subproject completion	Condition of the site / report of EE	Engineering Design and cost
		The Contractor must arrange the cancellation of all temporary services.	Engineer	Subproject completion	report of EE	NA
2.	Vegetation	All areas that have been disturbed by construction activities (including the construction camp area) must be cleared of alien vegetation.	Engineer	Subproject completion	Condition of the site / report of EE	Engineering Design and cost
		Trees cut from the project site shall be compensated with a compensatory afforestation	Engineer	Subproject completion	Replanted trees/ record of afforestation/ report of EE	Engineering Design and cost
		All vegetation that has been cleared during construction is to be removed from site or used as much as per the revegetation specification, (except for seeding alien vegetation).	Engineer	Subproject completion	Condition of the site / report of EE	Engineering Design and cost
		The Contractor is to water and maintain all planted vegetation until the end of the defects liability period and is to submit a method statement regarding this to the Engineer.	Engineer	Subproject completion	Condition of the replanted vegetation / report of EE	Engineering Design and cost
3.	Land rehabilitation	All surfaces hardened due to construction activities are to be ripped and imported materials thereon removed.	Contractor	Subproject completion	Condition of the site / report of EE	Engineering Design and cost
		All rubble is to be removed from the site to an approved disposal site. Burying of rubble on site is prohibited.	Contractor	Subproject completion	Condition of the site / report of EE	Engineering Design and cost

	<b>Activities</b>	<b>Management/Mitigation</b>	<b>Responsible for Monitoring</b>	<b>Frequency</b>	<b>Monitoring Indicators</b>	<b>Cost and Sources of Funds</b>
		The site is to be cleared of all litter.	Contractor	Subproject completion	Condition of the site / report of EE	Engineering Design and cost
		Surfaces are to be checked for waste products from activities such as concreting or asphaltting and cleared in a manner approved by the Engineer.	Contractor	Subproject completion	Condition of the site / report of EE	Engineering Design and cost
		All embankments are to be trimmed, shaped and replanted to the satisfaction of the Engineer.	Engineer and Contractor	Subproject completion	Condition of the embankments/ report of EE	Engineering Design and cost
		Borrow pits are to be closed and rehabilitated in accordance with the pre-approved management plan for each borrow pit. The Contractor shall liaise with the Engineer regarding these requirements.	Engineer	Subproject completion	Rehabilitation of borrow pits/ report of EE	Engineering Design and cost
		The Contractor is to check that all watercourses are free from building rubble, spoil materials and waste materials.	Contractor	Subproject completion	Condition of the water courses/ report of EE	Engineering Design and cost
4.	Materials and infrastructure	Fences, barriers and demarcations associated with the construction phase are to be removed from the site unless stipulated otherwise by the Engineer.	Engineer	Subproject completion	Restoration of the site/ report of EE	Engineering Design and cost
		All residual stockpiles must be removed to spoil or spread on site as directed by the Engineer.	Engineer	Subproject completion	Restoration of the site/ report of EE	Engineering Design and cost
		All leftover building materials must be returned to the depot or removed from the site.	Contractor	Subproject completion	Restoration of the site/ report of EE	Engineering Design and cost
		The Contractor must repair any damage that the construction work has caused to neighbouring properties.	Contractors	As directed by the Engineer.	report of EE	Engineering Design and cost
5.	General	A meeting is to be held on site between the Engineer, EE and the Contractor to approve all remediation activities and to ensure that the site has been restored to a condition approved by the Engineer.	Engineer and EE	On completion of the construction and maintenance phases	MOM/report of the EE	NA
		Temporary roads must be closed and access across these blocked.	Engineer and EE	On completion of construction	Report of the EE	NA
		Access or haulage roads that were built across watercourses must be rehabilitated by removing temporary bridges and any other materials placed in/or near to watercourses. Revegetation of banks or streambeds must be as necessary to stabilize these and must be approved by the Engineer.	Engineer and Contractor	On completion of construction	Rehabilitation of haulage roads/report of the EE	NA

	<b>Activities</b>	<b>Management/Mitigation</b>	<b>Responsible for Monitoring</b>	<b>Frequency</b>	<b>Monitoring Indicators</b>	<b>Cost and Sources of Funds</b>
		All areas where temporary services were installed are to be rehabilitated to the satisfaction of the Engineer	Engineer and Contractor	On completion of construction	Rehabilitation of sites/report of the EE	NA

**EE = Environmental Expert of Engineer (DSC)**

## C. Environmental Monitoring Programme

138. Table 27 outlines the environmental monitoring program to ensure implementation of the management and mitigation measures specified in the EMP. The table shall be read within the context of the body of the entire EMP.

**Table 27: Environmental Monitoring Program**

Aspect	Parameter	Standards	Location	Duration / frequency	Implementation	Supervision	Cost and Sources of Funds
1. Site establishment and preliminary activities							
Legislation, permits and agreements	Consent for Establishment and Consent to Operate (in relation to hot mixing, wet mixing, batching plant, stone crushers, and diesel generators, etc.)	Air Act Water Act Noise Act	-	Prior to moving onto site and during construction	Contractor	Engineer/EE/PMU/PMC	These consents are to be obtained by contractor on his own cost.
	Copy of EMP	EARF and ADB SPS	Subproject site, offices, website, library, etc.	At all times	Contractor, Engineer and EE	PMU/PMC	Engineering Design and cost
Access to site	Existing conditions	EMP	All access and haul roads	Prior to moving onto site	Engineer, EE and Contractor	PMU/PMC	Engineering Design and cost
	Road closures and traffic rerouting	Traffic management plan and EMP	All affected roads	One week in advance of the activity	Engineer and EE	PMU/PMC	Engineering Design and cost
	Notifications and road signage's	Traffic management plan and EMP	All affected roads	One week in advance of the activity	Engineer and EE in coordination with the Contractor and Traffic Police	PMU/PMC	Engineering Design and cost
Construction camp	Approval of location and facilities	EMP	As identified	Prior to moving onto site	Contractor with the Engineer and EE	PMU/PMC	Engineering Design and cost
Equipment lay-down and storage area	Approval of location and facilities	EMP	As identified	Prior to moving onto site and during site set-up	Contractor with the Engineer and EE	PMU/PMC	Engineering Design and cost
Materials management – sourcing	Approval of sources and suppliers	EMP	As identified	Prior to procurement of materials	Contractor with the Engineer and EE	PMU/PMC	Engineering Design and cost
Education of site staff	Awareness level training - Environment - Health and safety	EMP and records	-	During staff induction, followed by schedule as determined	Contractor with the Engineer and EE	PMU/PMC	Engineering Design and cost
Social impacts	Public consultations,	EARF, ADB SPS	Subproject site	Prior to moving	Contractor with the	PMU	Engineering Design

Aspect	Parameter	Standards	Location	Duration / frequency	Implementation	Supervision	Cost and Sources of Funds
	information disclosure, communication strategy	and EMP		onto site and ongoing	Engineer, EE, PIU/PMC		and cost
	GRM register	EMP	Subproject site	Prior to moving onto site and ongoing	Contractor with the Engineer, EE, PIU	PMU/PMC	Engineering Design and cost
Noise quality	Baseline data for noise level in dB(A) $L_{eq}$	National noise standards	Once before start of construction works at 2 sensitive sites, and 1 construction site as identified by Engineer.	Once prior to site set-up	Contractor	Engineer/EE/PMU/PMC	Engineering Design and cost
Air quality	Baseline ambient data for particulate matters 10 and 2.5 ( $PM_{10}$ , $PM_{2.5}$ ), sulfur dioxide ( $SO_2$ ), nitrogen dioxide ( $NO_2$ )	National ambient air quality standards	Once before start of construction works at 2 sensitive sites, and 1 construction site as identified by Engineer.	Once prior to site set-up	Contractor	Engineer/EE/PMU/PMC	Engineering Design and cost
Soil erosion	Soil erosion management measures	EMP	As identified by the engineer	During site set-up and throughout the duration of the subproject	Contractor with the Engineer and EE	PMU/PMC	Engineering Design and cost
Storm water	Storm water management measures	EMP	As identified by the engineer	During site set-up and throughout the duration of the subproject	Contractor with the Engineer and EE	PMU/PMC	Engineering Design and cost
Conservation of natural environment	Existing conditions	EMP	Subproject sites	Prior to site set-up	Contractor with Engineer and EE	PMU/PMC	Engineering Design and cost
Waste management procedure	Disposal sites	EMP	As determined	Prior to site set-up and ongoing throughout the subproject	Contractor with Engineer and EE	PMU/PMC	Engineering Design and cost

Aspect	Parameter	Standards	Location	Duration / frequency	Implementation	Supervision	Cost and Sources of Funds
Cultural environment	Chance finds	ASI Act and EMP	As determined	Prior to site set-up and ongoing throughout the subproject	Contractor with Engineer and EE	PMU/PMC	Engineering Design and cost
<b>2. Construction phase</b>							
Access to site	Qualitative characteristics	Pre-subproject condition and EMP	All access and haul roads	Refer to EMP (table on management of construction and workforce activities)	Contractor	Engineer	Engineering Design and cost
Construction camp	Qualitative characteristics	Pre-subproject condition and EMP	Camp site	Prior to site set-up and ongoing throughout the subproject	Contractor	Engineer	Engineering Design and cost
Staff conduct	Site records (accidents, complaints)	EMP	Subproject sites	Ongoing	Contractor	Engineer	Engineering Design and cost Engineering Design and cost
Air quality	PM <sub>10</sub> , PM <sub>2.5</sub> , SO <sub>2</sub> , NO <sub>2</sub>	National ambient air quality standards	At 2 sensitive sites, and 1 construction site as identified by Engineer.	during subproject execution	Contractor	Engineer/EE/PMU/PMC	Engineering Design and cost
Water quality	pH, BOD, COD, TDS, Pb, Oil & Grease, Detergents and Faecal Coliforms for Surface water.	Indian standards for Inland Surface Water (IS: 2296, 1982)	Once in six months from camps as specified by the Engineer (DSC	Once in 6 months for one year	Contractor	Engineer/EE/PMU/PMC	Engineering Design and Cost
Soil erosion	Soil erosion management measures	EMP	Subproject sites	Ongoing	Contractor	Engineer	Engineering Design and cost
Storm water	Soil erosion management measures	EMP	Subproject sites	Ongoing	Contractor	Engineer	Engineering Design and cost
Conservation of natural resources	Vegetation conditions	EMP	Subproject sites	Ongoing	Contractor	Engineer	Engineering Design and cost
Materials management	Qualitative characteristics	EMP	Subproject sites	Ongoing	Contractor	Engineer	Engineering Design

Aspect	Parameter	Standards	Location	Duration / frequency	Implementation	Supervision	Cost and Sources of Funds
nt							and cost
Waste management	Qualitative characteristics	EMP	Subproject sites	Ongoing	Contractor	Engineer	Engineering Design and cost
	Disposal manifests	EMP	Subproject sites	Ongoing	Contractor	Engineer	Engineering Design and cost
Social impacts	Public consultations, information disclosure, communication strategy	EARF, ADB SPS and EMP	Subproject sites	Ongoing	Contractor with the Engineer, EE, PIU	PMU/PMC	Engineering Design and cost
	GRM register	EMP	Subproject sites	Ongoing	Contractor with the Engineer, EE, PIU	PMU/PMC	Engineering Design and cost
Cultural environment	Chance finds	ASI Act and EMP	Subproject sites	Ongoing	Contractor	Engineer	
Noise quality	Noise level in dB(A) $L_{ea}$	National noise standards	2 sensitive locations near construction sites, and 1 locations construction site as specified by the Engineer (DSC).	Once in every month	Contractor	Engineer/EE/PMU/PMC	Engineering Design and cost
<b>3. Post-construction activities</b>							
Construction camp	Pre-existing conditions	EMP	Construction camp	Subproject completion	Contractor	Engineer	Engineering Design and cost
Vegetation	Pre-existing conditions	EMP	Subproject sites	Subproject completion	Contractor	Engineer	Engineering Design and cost
Land rehabilitation	Pre-existing conditions	EMP	Subproject sites	Subproject completion	Contractor	Engineer	Engineering Design and cost
Materials and infrastructure	Pre-existing conditions	EMP	Subproject sites	Subproject completion	Contractor	Engineer	Engineering Design and cost
General	Records	EMP	Subproject sites	Subproject completion	Contractor with Engineer and EE	PMU/PMC	Engineering Design and cost
<b>4. Defect liability period</b>							
Air quality	PM <sub>10</sub> , PM <sub>2.5</sub> , SO <sub>2</sub> , NO <sub>2</sub>	National ambient air quality standards	Once at 10 sensitive locations as specified by the Engineer (DSC).	Once in 6 months	Contractor	Engineer/EE/PMU/PMC	Engineering Design and cost
Noise	Noise level in	As per	Once at	Once in 6	Contractor	Engineer/	Engineering

Aspect	Parameter	Standards	Location	Duration / frequency	Implementation	Supervision	Cost and Sources of Funds
quality	dB(A) L <sub>eq</sub>	national noise standards	10 sensitive locations as specified by the Engineer (DSC).	months		EE/ PMU/PMC	g Design and cost
<b>5. Operation and maintenance stage</b>							
Air quality	PM <sub>10</sub> , PM <sub>2.5</sub> , SO <sub>2</sub> , NO <sub>2</sub>	National ambient air quality standards	Once two sensitive locations	Once in 6 months	Contractor	Engineer	To be managed by the external operating agency
Noise quality	Noise level in dB(A) L <sub>eq</sub>	As per national noise standards	Once at two sensitive locations	Once in 6 months	Contractor	Engineer	To be managed by the external operating agency

EE= Environmental Expert of Engineer (DSC)

#### D. Environmental Management and Monitoring Cost

139. The Contractor's cost for site establishment, preliminary activities, construction, and defect liability activities will be incorporated into the contractual agreements, which will be binding on him for implementation. The air quality and noise level monitoring of construction and defect liability phases will be conducted by the contractor.

140. The operation phase mitigation measures are again of good operating practices, which will be the responsibility of implementing agency (ERA). The air quality and noise level monitoring during the operation and maintenance phase will be conducted by the environmental laboratory of ERA, therefore there are no additional costs.

141. The activities identified in environmental monitoring program mainly includes site inspections and informal discussions with workers and local people and this will be the responsibility of PMU and PMC with the assistance of DSC, costs of which are part of project management. Table 28 presents the estimated cost to implement the EMP.

**Table 28: Indicative Cost for EMP Implementation**

Component	Description	Number	Cost per Unit (INR)	Cost (INR)	Source of Funds
Legislation, Permits and Agreements	Consent to Establish and Consent to Operate for plants and machinery of the contractor.	As required	Not Applicable	Not Applicable	These consents are to be obtained by contractor on his own cost.
Public consultations and information disclosure	Information disclosure and consultations during preconstruction and construction phase.	As required	Lump sum	300,000	Part of the project cost
Afforestation for the trees removed from the parking site	Afforestation for the trees removed from the parking site. 2 times equal to the number of the trees removed will replanted	15x2=30(@1:2)	700	21000	Part of the project cost

Component	Description	Number	Cost per Unit (INR)	Cost (INR)	Source of Funds
Rehabilitation of existing tree shrine	The tree shrine is to be relocated to another suitable location identified by JMC/DSC	one	Lump sum	100000	Part of the project cost
Providing access to commercial establishments and properties.	Providing access, in case of access disruptions, to affected properties.	As per requirement	Contractor's liability	Not applicable	Covered under engineering cost
Dust Suppression at subproject sites	Application of dust suppression measures during construction phase.	As required	Lump sum	10,00,000	Covered under engineering design and cost
Protection measures against noise pollution	Construction of noise walls (as per requirement)	As required	Lump sum	2,50,000	Covered under engineering design and cost
Traffic management	Safety Signboards, delineators, traffic regulation equipments, flagman, temporary diversions, etc	Wherever required throughout subproject site	Contractor's liability	Not applicable	Covered in engineering cost
Capacity building	Program 1 covering ERA officials, PMC and DSC staff	One program	60,000	60,000	Covered under project cost
	Program 2 covering staff of PIU, DSC and contractor	Two programs	10,000	20,000	
Baseline Monitoring	Site preparation and preliminary activities				
Air	Once before start of construction works at 2 sensitive locations near construction sites, and 1 locations at project site.	3 samples	7,000 per sample	21,000	Covered under engineering design and cost
Noise	Once before start of construction works at 2 sensitive locations near construction sites, and 1 locations at construction site.	3 samples	1,000 per sample	3,000	Covered under engineering design and cost
Construction Monitoring					
Air	Once in three months at 2 sensitive locations near construction sites, (for two years)  Every months at 1 locations at construction site (for two years)	40 samples	7,000 per sample	2,80,000	Covered under engineering design and cost
Noise	Once in three months at 2 sensitive locations near construction sites, (for two years)	40 samples	1,000 per sample	40,000	Covered under engineering design and cost

Component	Description	Number	Cost per Unit (INR)	Cost (INR)	Source of Funds
	Once in every months at 1 locations near construction sites as identified by DSC (for two years)				
Water	Once in six months at construction cam and labor camp	12	5000 per sample	60000	Covered under engineering design and cost
Defect Liability Period					
Air	Once at 2 sensitive locations near construction sites and 3 locations at construction site.	5 samples	7,000 per sample	35,000	Covered under engineering design and cost
Noise	Once at 2 sensitive locations near construction sites and 3 locations at construction site	5 samples	1,000 per sample	5,000	Covered under engineering design and cost
Any unanticipated impact due to subproject implementation	Mitigation of any unanticipated impact arising during construction phase and defect liability period.	Lump sum	2,00,000	2,00,000	
Operations and Maintenance					
Air	Once at 2 sensitive locations near construction sites and	5 samples	7,000 per sample	35,000	Cost to be managed by the operating agency/ Govt.
Noise	Once at 2 sensitive locations near construction sites and	5 samples	1,000 per sample	5,000	Cost to be managed by the operating agency/ Govt
Total					2,395,000*

\* The total cost is exclusive of monitoring cost during O&M stage which has to be managed by the operating agency.

## IX. CONCLUSION AND RECOMMENDATIONS

142. The process described in this document has assessed the environmental impacts of all elements of the proposed subproject based on the concept for Multi level parking facility in Jammu City under tranche 3. Potential negative impacts were identified in relation to pre-, construction and operation of the improved infrastructure, but no environmental impacts were identified as being due to either the subproject 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 designs for the infrastructure. This means that the number of impacts and their significance has already been reduced by amending the design. This IEE will be updated after the finalization of DPR for any change in the scope or additional impacts identified.

143. The public participation processes undertaken during IEE preparation ensured stakeholders are engaged during the preparation of the designed documents. The planned information disclosure measures and process for carrying out consultation with affected people will facilitate their participation during project implementation. The general perception of the public is that the sub project will improve the quality of urban life

144. The subproject's Grievance Redressal Mechanism will provide the citizens with a platform for redressal of their grievances and describes the informal and formal channels, time frame and mechanisms for resolving complaints about environmental performance.

145. The EMP will guide the environmentally-sound construction of the subproject and ensure efficient lines of communication between the DSC (Engineer), contractors, PIU and PMU/PMC. The EMP will (i) ensure that the activities are undertaken in a responsible non-detrimental manner; (ii) provide a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site; (iii) guide and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iv) detail specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (v) ensure that safety recommendations are complied with.

146. A copy of the EMP will be kept on site during the construction period at all times. The EMP will be made binding on all contractors operating on the site and will be included within the Contractual Clauses. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

147. 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.

148. Although there will be no need to acquire land or relocate people, nearby businesses may lose one of the multiple access available as such no loss of clientele is anticipated. There are only limited opportunities to provide environmental enhancements in this subproject, but certain measures will be included in the DPR.

149. Therefore, as per ADB SPS, the subproject is classified as Environmental Category B and does not require further Environmental Impact Assessment.

## APPENDIX 1: RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST

Screening questions			
<b>a. Project siting</b>			
Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
<ul style="list-style-type: none"> <li>• Cultural heritage site</li> </ul>	✓		The subproject area comprises of residential structures, and commercial establishments. The developmental activities such as construction works are ongoing at an average pace.
<ul style="list-style-type: none"> <li>• Legally protected Area (core zone or buffer zone)</li> </ul>		✓	None of the subproject components are adjacent to or within any environmentally sensitive area.
<ul style="list-style-type: none"> <li>• Wetland</li> </ul>		✓	None of the subproject components are within or adjacent to any cultural heritage site. The archaeologically protected monument closest to subproject area is 'Peer Mitha tomb' at about 0.36km distance from outer periphery of sub project area.
<ul style="list-style-type: none"> <li>• Mangrove</li> </ul>		✓	None of the subproject components are within or adjacent to any protected area.
<ul style="list-style-type: none"> <li>• Estuarine</li> </ul>		✓	Not applicable
<ul style="list-style-type: none"> <li>• Special area for protecting biodiversity</li> </ul>		✓	Not applicable
<b>b. Potential environmental impacts</b>			
Will the project cause...			
<ul style="list-style-type: none"> <li>• Impacts on the sustainability of associated sanitation and solid waste disposal systems and their interactions with other urban services.</li> </ul>		✓	Anticipated during construction activities. However, impacts are temporary and short in duration. The EMP includes measures to mitigate impacts.
<ul style="list-style-type: none"> <li>• Deterioration of surrounding environmental conditions due to rapid urban population growth, commercial and industrial activity, and increased waste generation to the point that both manmade and natural systems are overloaded and the capacities to manage these systems are overwhelmed?</li> </ul>		✓	Not applicable
<ul style="list-style-type: none"> <li>• Degradation of land and ecosystems (e.g. loss of wetlands and wild lands, coastal zones, watersheds and forests)?</li> </ul>		✓	Not applicable
<ul style="list-style-type: none"> <li>• Dislocation or involuntary resettlement of people?</li> </ul>		✓	Not applicable
<ul style="list-style-type: none"> <li>• Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable group?</li> </ul>		✓	Not applicable
<ul style="list-style-type: none"> <li>• Degradation of cultural property, and loss of cultural heritage and tourism revenues?</li> </ul>		✓	Not applicable
<ul style="list-style-type: none"> <li>• Occupation of low-lying lands, floodplains and steep hillsides by squatters and low-income groups, and their exposure to increased health hazards and risks due to pollutive industries?</li> </ul>		✓	Not applicable
<ul style="list-style-type: none"> <li>• Water resource problems (e.g. depletion/degradation of available water supply, deterioration for surface and ground water quality, and pollution of receiving waters)?</li> </ul>		✓	Not applicable
<ul style="list-style-type: none"> <li>• Air pollution due to urban emissions?</li> </ul>	✓		Anticipated during construction activities. However, impacts are temporary and short in duration. The EMP includes measures to mitigate impacts.

Screening questions	Yes	No	Remarks
• Risks and vulnerabilities related to occupational health and safety due to physical, chemical and biological hazards during project construction and operation?	✓		Anticipated during construction activities. However, impacts are temporary and short in duration. The EMP includes measures to mitigate impacts.
• Road blocking and temporary flooding due to land excavation during rainy season?	✓		Anticipated during construction activities. However, impacts are temporary and short in duration. The EMP includes measures to mitigate impacts.
• Noise and dust from construction activities?		✓	Envisaged during the construction activities, Adoption of the mitigation measures shall effectively address such impacts during construction.
• Traffic disturbances due to construction material transport and wastes?		✓	Traffic diversion plan, will be prepared by contractor in consultation with Engineer to avoid traffic disturbances.
• Temporary silt runoff due to construction?	✓		Temporary silt runoff is expected due to construction activities which is required to be mitigated by silt traps
• Hazards to public health due to ambient, household and occupational pollution, thermal inversion, and smog formation?		✓	Not applicable.
• Water depletion and/or degradation?		✓	Not applicable.
• Overpaying of ground water, leading to land subsidence, lowered ground water table, and salinization?		✓	Not applicable.
• Contamination of surface and ground waters due to improper waste disposal?		✓	Waste disposal shall be done in legitimate manner and will not cause water pollution
• Pollution of receiving waters resulting in amenity losses, fisheries and marine resource depletion, and health problems?	✓		Construction activities will not cause surface water pollution and loss of fisheries
• Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?	✓		Only small number of workers shall execute the construction works, therefore no burden on social infrastructure and services is expected
• Social conflicts if workers from other regions or countries are hired?		✓	No social conflicts is expected due to workers
• 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 operation and construction?		✓	Materials will be stored in specific area. EMP will be applied as per requirement
• Community safety risks due to both accidental and natural hazards, 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?		✓	The construction area will be barricaded from visitors movement area and therefore no risk of community safety will exist
• Impacts on the sustainability of associated sanitation and solid waste disposal systems and their interactions with other urban services.		✓	During construction only excavated soil and demolition waste is expected as solid waste which shall be disposed or reused as per approved management plan.

**Climate change and disaster risk questions**

The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.

**Yes    No    Remarks**

• Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes

✓ The subproject location is vulnerable to earthquakes (seismic zone IV) and the design of the structure shall be worked out considering the seismic vulnerability.

• Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (e.g., increased extreme rainfall increases flooding, damaging proposed infrastructure)?

✓ This is only small construction project with short duration which is not expected to lead to such hazards

• Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?

✓ No such problem exist at this site

• Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by paving vulnerable groundwater recharge areas, or using water from a vulnerable source that is relied upon by many user groups, or encouraging settlement in earthquake zones)?

✓ No such problem exist at this site

**Appendix-2 Photographs of the existing parking facility and road side parking  
Views of the existing parking packed with parked cars**





**Another side view of the existing parking taken from the roof of a building**





**Road side parking on City Chowk to Shalamar Road**



**Road side parking on City Chowk to Rangunath bazar Road**



**Road side parking on City Chowk to Kanak mandi Road**

### APPENDIX 3: PUBLIC CONSULTATIONS FOR MULTI-LEVEL PARKING FACILITY AT SUPER BAZAR AND OLD POLICE STATION AREA (CITY CHOWK) , JAMMU CITY

Various issues related to the proposed subproject were discussed at various locations throughout the subproject site. Discussions were held with the parties directly and indirectly affected by the subproject execution as well as the general public of the subproject area. The problems faced by them along with their suggestions/concerns were recorded and the same have been given due consideration during formulation of the project design, IEE and EMP.

The participants, in general were in favor of the upcoming subproject. However, they were concerned about the temporary problems which are expected to arise during construction stage such as traffic related issues, loss of access and increase in air pollution due to dust emissions. People are ready to extend all types of support during execution of the project. The details of the public consultation are detailed below:

#### Issues discussed

- (i) Awareness and extent of knowledge about the subproject.
- (ii) Information on the benefits of the subproject in terms of economic and environmental enhancement.
- (iii) Information on perceived benefits from the proposed subproject including augmentation in parking facility, reduction in traffic congestion, etc.
- (iv) Information on perceived losses from the proposed subproject during execution stage in terms of temporary disturbance in traffic, loss of access to, commercial establishments/shops, institutions, etc. and increase in air and noise pollution, etc. during construction.
- (v) Presence of any historical/cultural site in the vicinity.
- (vi) Presence of any protected area/wetland in or adjoining the construction site.
- (vii) Information on economic development in terms of creation of an important urban facility and generation of direct employment during the execution of the subproject.

#### Summary of Public Consultation Dated 06-09-2013 to 10-09-2013 at Different Locations in The Subproject Area

.	Issues Discussed	Feedback received	Remarks
1	Problems faced due to absence of the proposed facility under the subproject	The parking area presently available is not sufficient to meet the need of present traffic load. The existing parking facility always lead to traffic congestion in the area due to less parking space and not proper facility for exit and entrance. . The road side parking may be the main cause of accident in the area.	The participants in general were of the view that the proposed parking facility is the need of the hour and welcomed the subproject and ensured their full support.
2	Awareness and extent of knowledge about the subproject	Generally, most of the people consulted were well aware about the proposed subproject as ample information for the same has been disseminated during similar subprojects executed by J&K ERA under its earlier loan from ADB and by other line departments.	Public consultation in different forms like one to one consultation, circulations of questionnaire, group discussions, etc. need to be a continuous process and EA will ensure this process throughout the project execution.

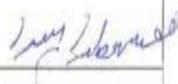
.	Issues Discussed	Feedback received	Remarks
2	Information on the perceived benefits of the subproject in terms of economic and environmental enhancement	<p>General benefits perceived by the people are summarized as follows:</p> <p>Combination of stack and moving cars  Mechanical system of some type to move a car to its parking space  However putting the car into and/or the operation of the system requires some action by an attendant or the driver  Automated storage and retrieval system  Separate drop off and pick up transfer areas  Automated mechanical system to lift the car and transport it to a pre-determined parking space in the system  No drive way required  No need for attendants for parking  Auto orientation of retrieved car hence no need for driver to back out  Quick retrieval time  Extremely safe and reliable with safety sensors and optional automatic gates</p>	<p>People impacted directly or indirectly due to subproject implementation should be adequately compensated.  During implementation, maximum efforts should be made to minimize hindrances of public access by providing alternative access to roads, streets and homes.  The work should be carried out at a fast pace so that the duration of access disruption is minimized.  People suggested an efficient operation and maintenance system after the completion of the project.</p>
4	Information on perceived losses from the proposed subproject during execution stage in terms of disruptions in traffic, temporary access disruptions during execution and air and noise pollution, etc.	<p>People opined that potential temporary impacts of access disruption for, shops/commercial establishments, and institutions, etc. should be mitigated through good construction practices and an effective environment and contractors construction plan which should ensure providing walkways and metal sheets to maintain access across trenches, increasing the workforce in front of shops/commercial establishments, consulting business and institutions regarding operating hours and factoring this in work schedules, providing advance information on works to be undertaken including appropriate signage's etc.</p>	<p>Effective mitigation measure should be in place so that problems related to traffic disruptions; air and noise pollution are minimized.</p>
5	Presence of any historical/cultural site in the vicinity	<p>There is no historical/cultural site in the corridor of the subproject.</p>	<p>However there is only two sensitive receptors. in the project area for which proper mitigation measures relevant to the location and nature of the receptor will be kept in place during project execution and same will be part of EMP.</p>
6	Presence of any protected area/wetland in or adjoining the construction site.	<p>There is no protected area in the corridor of the subproject.</p>	
8	Information on economic development in terms of reduction in problems due insufficient parking facility in the area.	<p>People were well aware about the benefits of the subproject which proposes Multi level parking facility in Super Bazar and Old Police Station Area (City Chowk) Jammu. It will ensure sufficient parking facility .In addition; people at large were aware about the fact that during the execution of subproject a large number of skilled/semi-skilled/unskilled people shall get employment and thus were in favour of construction works.</p>	

## List of Respondents:

### Public Consultation Attendance Slip

Sub-project Name: Construction of Multi Storied Parking Facilities at CITY  
Chowk near Super Bazar, Jammu.

Date: 7/9/2013 Venue: city chowk

Sl. No	Name	Address/phone	Signature
1	Rajesh kumar	R/o Chinoo, Jammu	
2	Jimmy Sabarwal	9596627498 R/o Daygama	
3	Sham Sharma	9622027429 R/o Akhnoor	SHAM
4	Pawan kumar	9858277712 Bamfalsah	
5	Kay kumar	R/o city Chowk, Jammu 9419441387	

Public Consultation Attendance Slip

Sub-project Name: Construction of Multi Storied Parking Facilities at CITY Chowk near Super Bazar, Jammu.

Date: 7/9/13 Venue: City Chowk

Sl. No	Name	Address/phone	Signature
1	Kavi Raj	2407883   city chowk	[Signature]
2	Kuldeep Chatri	985829604   G.H.S. City Chowk	[Signature]
3	Om Prakash	9419189122   G.H.S. City Chowk Jmm	[Signature]
4	Mr. Shagufti Namin	9596866201   G.H.S. City Chowk Jmm	[Signature]
5	Mr. Hanjra Gupta	9419284396   G.H.S. City Chowk Jmm	[Signature]
6	Mrs Sonia Jain	9419902662   G.H.S. City Chowk Jmm	[Signature]
7	S. Purjeet Singh	9419258687   G.H.S. City Chowk	[Signature]
8	Tilak Raj	9469680011   G.H.S. City Chowk	[Signature]
9	Poonam	9419633969   G.H.S. City Chowk	[Signature]
10	Hanjra Kaur	9018446444   G.H.S. City Chowk	[Signature]
11	Meena Bakshi	9419287558   G.H.S. City Chowk	[Signature]
12	Ratan Lal	[Signature]	[Signature]
13	Poo Lakshmi Gupta	R/o city chowk shopkeeper	[Signature]
14	Vijay Kumar	R/o Behari	[Signature]

**Summary of outcomes:**

The various issues related to proposed subproject have been discussed at Super Bazar and Old Police Station Area (City Chowk) subproject site.

Some of the local people are aware about the upcoming work. Most of the people are in favour of the upcoming subproject due to the following benefits:

- (i) Decongestion of Traffic
- (ii) Reduction in delays & fuel saving
- (iii) Enhancing public safety and security.
- (iv) Enhancing Safety for vehicles.
- (v) Strengthening attractiveness and image capacity as an economic location factor.
- (vi) Improvement in the Road Efficiency
- (vii) Visually comforting urban image and identity

Stakeholders consulted suggested provision of terrace garden with musical fountain etc which will encourage tourism.

ERA reiterated its commitment that the requisite environmental management measures shall be incorporated in EMP and public consultation shall be a regular process during all stages of the subproject to solve any issues arising out of the proposed works.

**APPENDIX 1 of EMP:**

**CONFIRMATION FROM OPERATOR OF COMMERCIAL ESTABLISHMENT/SHOP FOR PROVISION OF TEMPORARY ACCESS BY CONTACTOR**

Name of Subproject : \_\_\_\_\_  
Name of Contractor : \_\_\_\_\_  
Name of the Affected Person : \_\_\_\_\_  
Nature of Establishment : \_\_\_\_\_  
Location of Establishment : \_\_\_\_\_  
Nature of Access Disruption : \_\_\_\_\_  
Nature of Alternate Access Provided by Contractor : \_\_\_\_\_  
Duration and Date of Disruption : \_\_\_\_\_ days from \_\_\_\_\_ to \_\_\_\_\_

I hereby confirm that access disruption caused to my property as per the duration and the dates mentioned above was effectively mitigated by provision of alternate access by contractor. Provision of alternate access ensured no closure or loss of clientage to my commercial establishment.

Signature of Affected person

Signature of Contractor's representative

## **APPENDIX 2 of EMP:**

### **GUIDELINES FOR PREPARING COMPREHENSIVE WASTE MANAGEMENT PLAN**

#### **A. OVERVIEW**

A comprehensive waste management plan shall be prepared by the Contractor prior to initiation of any works. The purpose of the plan is to provide standardized procedures for the clearance, removal and disposal of debris caused by major debris / waste generated during the construction work as well as to establish the most efficient and cost effective methods to resolve debris disposal issues.

#### **B. PREPARATION OF COMPREHENSIVE WASTE MANAGEMENT PLAN**

The Contractor should prepare a Comprehensive Waste Management Plan to be submitted to EE for approval prior to setting up of construction and labour camp and it should comprise the following details:

- Categorization of waste into degradable, biodegradable and hazardous categories and list of different types of waste that falls in each of these categories.

- Estimates about the quantity of waste generated in each category and type of storage units required.

- Detail the provisions for storage and handling of waste until disposed. A plan of the respective camps / areas like construction camp, labour camp etc. to be attached indicating in it the space allocated for storage and handling of wastes.

- Detail the precautions to be taken while storing, handling and disposing each type of waste, trainings to be imparted to workers to create awareness about waste management.

- Details of each debris disposal site: Copy of approved site identification report along with location plan on a village map or an FMB, showing the debris disposal sites, site, its survey no., access road, project stretch, distance form the project stretch, surrounding features and land use like residences, agricultural land, water bodies etc., photograph of the site showing the topography and other existing features.

#### **C. TRAINING FOR PROJECT STAFF AND WORKERS**

All staff and workers involved in the highway construction should be imparted training about comprehensive waste management plan including the need for such a plan, its components and measures adopted by the Contractor for implementing it. In addition, all personnel involved should be made aware about various steps and measures each of them has to follow so as to ensure the compliance to the comprehensive waste management plan.

#### **D. PRECAUTIONS TO BE ADOPTED DURING DISPOSAL OF DEBRIS/WASTE MATERIAL**

The Contractor shall take the following precautions during transportation and disposal of debris/waste material:

- A register should be kept for recording the details of the waste generated and their disposal.

- The pre-designated disposal sites should be a part of Comprehensive Solid Waste Management Plan and should be identified as per the EMP clauses prior to initiation of any work on a particular section of the road.

- The Contractor will take full care to ensure that public or private properties are not damaged/ affected during the site clearance for disposal of debris and the traffic is not interrupted.

- All arrangements for transportation during dismantling and clearing debris, considered incidental to the work, will be implemented by the Contractor in a planned manner as approved and directed by the EE.

- In the event of any accidental spill or spread of wastes onto adjacent parcels of land, the Contractor will immediately remove all such waste material/s and restore the affected area to its original state to the satisfaction of EE.

Contractor should ensure that any spoils/materials unsuitable for embankment fill shall not be disposed off near any water course; water body; agricultural land; natural habitats like grass lands, wet lands, flood plains, forests etc. pasture; eroded slopes; and in ditches, which may pollute the surrounding including water sources.

Contractor should ensure effective water sprinkling during the handling and transportation of materials where dust is likely to be created.

Materials having the potential to produce dust will not be loaded beyond the side and tail board level and will be covered with a tarpaulin in good condition.

Any diversion required for traffic during disposal of debris shall be provided with traffic control signals and barriers after discussion with the local body and as approved by EE.

During the debris disposal, Contractor will take care of surrounding features and avoid any damage to trees and properties.

Surplus fly ash, bottom ash and lime, if any, transported for use on this corridor shall not be left open and dumped at any disposal site. Contractor shall take care of such residual materials for use at any other location/s of new embankment construction work with proper protection measures

No hazardous and contagious waste material shall be disposed at such locations.

**E. WASTE DISPOSAL IN CONSTRUCTION CAMP**

Concrete flooring and oil interceptors should be provided for hot mix plant area, workshops, vehicle washing and fuel handling area.

POL (petroleum, oil and lubricants) waste shall be stored safely in separate containers and should be disposed off by transfer only to recycler/ re-refiners possessing valid authorization from the State Pollution Control Board and valid registration from the Central Pollution Control Board.

Used lead batteries, if any, should be disposed as per the Batteries (Management and Handling) Rules 2001.

Water separated and collected from oil interceptor should be reused for dust suppression.

There should be a register to record the details of the oil wastes generated at the workshops and oil storage areas.

The Contractor will provide separate garbage bins in the camps and ensure that these are regularly emptied and disposed off in safe and scientific manner as per the Comprehensive Solid Waste Management Plans approved by the EE.

No incineration or burning of wastes shall be carried out.

Discarded plastic bags, paper and paper products, bottles, packaging material, gunny bags, hessian, metal containers, strips and scraps of metal, PVC pipes, rubber and poly urethane foam, auto mobile spares, tubes, tires, belts, filters, waste oil, drums and other such materials shall be either reused or will be sold /given out for recycling.

Septic tank must be provided for toilets and the sludge should be cleared by municipal exhausters.

**F. WASTE DISPOSAL IN LABOUR CAMP**

The Contractor should provide separate garbage bins in the camps for bio-degradable, non-degradable and domestic hazardous waste and ensure that these are regularly emptied and disposed off in safe and scientific manner.

The disposal of kitchen waste and other biodegradable matter shall be carried out in pits covered with a layer of earth within the camp site to avoid smell and pests. The Contractor may use the compost from such wastes as manure in the plantation sites.

Non-biodegradable waste like discarded plastic bags, paper and paper products, bottles, packaging material, gunny bags, hessian, metal containers, strips and scraps of metal, PVC pipes, rubber and poly urethane foam, auto mobile spares, tubes, tires,

belts, filters, waste oil, drums and other such materials shall be either reused or should be sold /given out for recycling.

No incineration or burning of wastes should be carried out.

Effluent treatment system like septic tank with soak pits provided for toilets should be sited, designed, built and operated in such a way that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place.

Soak pits must be provided to collect waste water from bathrooms and kitchen.

**G. DISPOSAL OF BITUMINOUS WASTE**

The bituminous waste should be used for development of roads inside the construction camps, haul roads or for filling pot holes in rural roads.

At locations identified for disposal of residual bituminous wastes, the disposal will be carried out over a 60 mm thick layer of rammed clay so as to eliminate the possibility of leaching of wastes into the ground water.

The Contractor will suitably dispose off unutilized non-toxic debris either through filling up of borrows areas located in wasteland or at pre-designated disposal sites, subject to the approval of EE.

Debris generated from pile driving or other construction activities along the rivers and streams drainage channels shall be carefully disposed in such a manner that it does not flow into the surface water bodies or form puddles in the area.

**H. DISPOSAL OF NON BITUMINOUS WASTE**

Non-bituminous wastes other than fly ash may be dumped in borrow pits (preferably located in barren lands) where such borrow pits are not suitable to be re-developed as an economic source like pisci-culture or a source of irrigation. Such borrow pits can be filled up with non-bitumen wastes and then covered with a minimum 30cm layer of the soil, where plantation of trees and shrubs will be taken-up by the Contractor as a part of site rehabilitation.

Local tree species suitable for such re-habitation work shall be selected in consultation with local community.

**I. REUSE OF DEBRIS GENERATED FROM DISMANTLING STRUCTURES AND ROAD SURFACE**

Debris generated due to the dismantling of existing road will be suitably reused in the proposed construction as follows

Eighty percent (80%) of the sub-grade excavated from the existing road surface, excluding the scarified layer of bitumen, shall be reused in the civil works after improving the soil below the subgrade through addition of sand and suitable cementing material for qualitative up-gradation.

The dismantled scraps of bitumen will be utilized for the paving of cross roads, access roads and paving works in construction sites and campus, temporary traffic diversions, haulage routes, parking areas along the corridor or in any other manner approved by the Environmental Officer of Soversion Conculatants(SC).

## APPENDIX 3 of EMP:

### GUIDELINES FOR SITING AND MANAGEMENT OF SPOIL/DEBRIS DISPOSAL SITE

#### A. OVERVIEW

Construction of highways generates huge quantity of building debris, which needs to be disposed off in previously identified sites suitable for such an activity. This process entails close scrutiny of the sites with respect to their location and this section details out the criteria to be followed in doing so. Moreover, it also guides the Contractor as to how to prepare the site without causing much impact on the surrounding environment.

#### B. CRITERIA FOR LOCATING THE SITE/S

The locations of waste disposal have to be selected such that:

The said site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, top-soil stripping, stacking and preservation should be undertaken prior to initiation of any activities.

Debris disposal site shall be at least 200 m away from surface water bodies<sup>22</sup>.

No residential areas shall be located within 100 m downwind side of the site.

The site is minimum 250 m. away from sensitive locations like settlements, ponds/lakes or other water bodies, wetlands, protected areas, forests, wildlife habitats / Ecologically sensitive areas, seasonal streams, rivers, canals, flood plains, educational institutions, medical centers, religious sites, cultural or heritage sites and play grounds.

The local governing body and community shall be consulted while selecting the site.

The selected site shall meet with the local regulatory requirements (including those of SPCB, Municipalities etc.).

The site shall preferably be owned by government so that there is no need to acquire the land for the same.

After identification of the site the Contractor should fill up the prescribed reporting format and submit the same for approval to the EE. Any activity on the site can be initiated only after obtaining permission from the EE.

#### C. FINALIZATION OF SELECTED SITE/S

The selected site/s shall be approved by EE and ERA, after considering compliance with the EMP clauses and this guideline. No agreements or payments shall be made to the land owner/s prior to receipt of a written approval from the EE. Any consequence of rejection prior to the approval shall be the responsibility of the Contractor and shall be made good at his own cost.

#### D. SETTING UP OF DEBRIS DISPOSAL SITE

Following steps has to be undertaken while setting up a debris disposal site:

Top soil conservation has to be undertaken as per the guidelines given in EMP.

Considering the topography of the site contour trenches as detailed in EMP should be made along the site boundary to prevent soil erosion.

Fencing should be provided for the debris disposal site to prevent trespassing of humans and animals into the area as well as to prevent spread of the waste material through action of wind, water, scavengers or rag pickers.

No of trees cut should be recorded and three times the same should be planted as green belt development or elsewhere as part of the project.

Provide proper drainage facility so that the run off from the site doesn't contaminate any near by water sources or rivers.

#### E. PREPARATION OF DEBRIS DISPOSAL SITE MANAGEMENT AND REDEVELOPMENT PLAN

The Contractor after getting approval from the competitive authority for the selected site should submit a detailed **Debris Disposal Site Management and Redevelopment Plan** comprising the following details:

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<sup>22</sup> In the absence of site meeting the stipulated criteria, an alternate site can be selected specifying the reasons. In such a case, the construction camp management plan should incorporate additional measures specific to the site as suggested by the EE.

**Section-1: Details of site:** Copy of approved site identification report along with location plan on a village map or an FMB, showing the site, its survey no., access road, project stretch, distance from the project stretch, surrounding features and land use like residences, agricultural land, water bodies etc., photograph of the site showing the topography and other existing features.

**Section-2: Site preparation:** Activities that should be undertaken for preparing the site based on EMP and this guideline.

**Section-3: Arrangements within the site:** A layout plan showing the existing trees, green belt, locations where contour trenches should be dug etc.

**Section-4: Mitigation measures** that will be undertaken as per the EMP while preparing the site and dumping the waste should be separately listed out.

**Section-5: Other details:** Any other relevant details like copy of approvals / clearances obtained, species wise no. of trees to be cut and the details of top soil to be removed and conserved like quantity, location of storing etc. shall also be provided.

**Section 6: Re-development plan:** which should indicate following points: (i) species wise no of tree to be planted, (ii) Proposed use of the land in the post construction phase, if it is a public property, (iii) Presence of existing facilities that could be put in use by the land owner if it is a leased out private land or by the community in case of a public property and (iv) Other site specific mitigation measures to be undertaken as recommended by the EE.

**Section-7: Annexure-(a) Copy of** permissions obtained from local governing body / community etc. as applicable, **(c) Copy of agreement entered with site owner**, in case of leased out sites.

All the drawings should have north direction marked in it along with prevailing wind direction. Necessary dimensions and specifications should be provided where ever necessary. The debris site management plan should be submitted to the EE for a written approval before any physical work is undertaken. The EE will carefully examine the proposals in light of the various EMP and regulatory provisions and provide suggestions, as necessary to the Contractor who will implement it within the stipulated time period.

Contractor needs to prepare this document for each different site identified and EE shall undertake a thorough analysis of the said management and redevelopment plan through a site investigation and suggest additional mitigation measures as demanded by the features of the specific site and its surroundings.

#### **F. REDEVELOPMENT OF WASTE DISPOSAL SITES**

Along with the format seeking permission/approval for the disposal site/location from the Engineer/Supervision Consultant, the Contractor shall also submit a rehabilitation plan for the area. Following points have to be kept in view while undertaking the rehabilitation measure:

The dump sites shall be suitably rehabilitated by planting local species of shrubs and other plants. The species (region specific) shall be chosen from the list suggested in the EA/EMP. Local species of trees should be selected so that the landscape is coherent and is in harmony with the surrounding environment.

Rehabilitation can also include conversion into farm land, playground, parking area, block plantation area etc.

Some of the dumpsites could be used either for plantation or for growing agricultural products such as ginger, turmeric or oranges etc.

Care should always be taken to maintain the hydrological flow in the area.

**APPENDIX 4 of EMP:  
CHECKLIST FOR THE MONITORING OF SPOIL/DEBRIS DISPOSAL SITE MANAGEMENT**

A	Project Details	Date of Monitoring:		
1.	Name of project stretch and link no.			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Status of completion of the project			
5.	Name of Debris Disposal Site with sl. no. in register of sites			
<b>B</b>	<b>Monitoring Details</b>			
Sl. No.	Environmental Management Measures	EE's observation (Yes / No / Not Applicable)	Corrective Actions Proposed	Remarks
1.	Whether the construction operations are carrying out in such a manner that no waste material is dumped or disposed off in an unhealthy manner that causes any environmental hazard?			
2.	Whether the debris forming work close to the streams and water bodies are generally avoided during the monsoon period?			
3.	Whether the debris disposal site is at least 200 meter away from the surface water body?			

4.	Whether the debris disposal site is at least 500 meter away from the ecologically sensitive are, residential area or main road?			
5.	Whether the debris disposal along the water courses and close to the drainage channels are in such a manner that it do not cause any blockage to the flow of water?			
6.	Whether the bituminous waste is used as a surfacing material to the access roads to base camps, quarries, borrow area, temporary diversion, haulage routes etc.?			
7.	Whether the waste disposal details are submitted to the EE in the prescribed format?			
8.	Whether the spoils from excavation of the river bed are disposing off at specified area suggested by the engineers?			
9.	Whether the debris generated due to dismantling of existing permanent structure is reused in the temporary diversion?			
10.	Whether the preserved topsoil is used for redevelopment of the area?			
11.	Whether green belt is developed ?			

12.	Whether all applicable clearances are obtained and valid till date?			
Signature of Environment and Safety Engineer (ESE) of the Contractor with date			Signature of Environmental Officer of the DSC with date	

*Note: The Environmental Officer has to use this format to monitor the implementation of Environmental Management Measures for each Debris Disposal Site Quarterly. Corrective actions with specific timeframe should be proposed for each Environmental Management Measure, which is not implemented satisfactorily. A copy of the filled up format should be given to the ESE of the Contractor. EE has to attach this format to the Quarterly Report to be submitted to ERA, with details of corrective action taken by the Contractor.*