

Initial Environmental Examination

April 2012

IND: Jammu and Kashmir Urban Sector
Development Investment Program — Jammu City
Urban Road Subproject

ABBREVIATIONS

ADB	-	Asian Development Bank
ASI	-	Archeological Survey of India
CBD	-	Central Business District
CTE	-	Consent to Establish
CTO	-	Consent to Operate
DSC	-	Design and Supervision Consultancy
CPCB	-	Central Pollution Control Board
CPWD	-	Central Public Works Department
DP	-	Displaced Person
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
GoI	-	Government of India
GRM	-	Grievance Redressal Mechanism
IA	-	Implementing Agency
IEE	-	Initial Environmental Examination
IRC	-	Indian Road Congress
IST	-	Indian Standard Time
J and K	-	Jammu and Kashmir
JDA	-	Jammu Development Authority
JKUSDIP	-	Jammu and Kashmir Urban Sector Development Investment Programme
JMC	-	Jammu Municipal Corporation
LCV	-	Light Commercial Vehicle
LHS	-	Left Hand Side
MFF	-	Multi –Tranche Financing Facility
MLD	-	Million liter per day
MoEF	-	Ministry of Environment and Forests
MORTH	-	Ministry of Road Transport and Highways
MSW	-	Municipal Solid Waste
MT	-	Metric ton
MTR	-	Month's Total Rainfall
NAAQS	-	National Ambient Air Quality Standards
NH	-	National Highway
NSL	-	Natural soil level
OM	-	Operations Manual
PCU	-	Passenger car unit
PIU	-	Project Implementation Unit
PMU	-	Project Management Unit
PM2.5	-	Particulate Matter below 2.5 micron particle size
PM10	-	Particulate Matter below 10 micron particle size
PSC	-	Project Support 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
SPCB	-	State Pollution Control Board
SPM	-	Suspended Particulate Matter
SPS	-	Safeguards Policy Statement
SRTC	-	State Road Transport Corporation
STP	-	Sewage Treatment Plant
TMP	-	Traffic Management Plan
ToR	-	Terms of Reference
UEED	-	Urban Environmental Engineering Department

WEIGHTS AND MEASURES

cm	-	centimeter
crore	-	100 lakhs = 10,000,000
lakh	-	100 thousand = 100,000
Kanal	-	505.39 square meter
km	-	Kilometer
kph	-	Kilometer per hour
lpd	-	liters per day
m	-	Meter
mg/l	-	milligrams per liter
mm	-	Millimeter
MSL	-	Mean sea level
μ	-	10 ⁻⁶ meter
μg/m ³	-	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 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 millions, out of which \$300 million will be financed by ADB.
2. The primary objective of JKUSDIP is to promote economic development in the State of Jammu and Kashmir (J and 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
3. The program is to be implemented in 4 to 7 tranches over a period of 8 years. Each tranche constitutes a separate loan. Tranche I (Project-1) of JKUSDIP (Loan 2331-IND) is under implementation. One of the subprojects identified under Tranche 2 (Project-2) JKUSDIP is the (i) construction of Bikram Chowk Flyover; and (ii) widening/strengthening of the road from Bikram Chowk to Convent School on Bikram Chowk – Satwari Chowk Road Corridor in Jammu City to improve urban transportation system.
4. The major objectives of the subproject are: (i) decongestion of traffic on the road junctions from Bikram Chowk to Green Belt junction; (ii) improved connectivity to different areas in southern part of Jammu (iii) quick access to the airport from the city area; and (iv) improved long-term traffic management in the Jammu City. The proposed flyover is expected to have the following benefits: (i) immediate positive impact on the area by significantly reducing the number of vehicles routing through the road at grade by approximately 40%; (ii) reduction of traffic is expected to reduce the number of accidents and potential conflicts that occur within the area thus saving human life as well as the economy of the region; (iii) reduced traffic also results in land gains which can be utilized to enhance the pedestrian space and increase pedestrian amenity; (iv) envisaged that pedestrian sidewalks and footpaths will be improved and increased in size together with the general urban design elements to create an environment that is conducive to pedestrian activity; (v) reduced traffic congestion, conflicts and land gains result in a safer and efficient circulation of traffic; and (vi) future development and events need will have better access to and from the City.
5. The legal framework and principles adopted for addressing environmental issues in the proposed subproject have been guided by the existing legislation and policies of the Government of India, Government of Jammu and Kashmir, Asian Development Bank and the Revised Environmental Assessment and Review Framework (EARF)¹ adopted for the Tranche 2 of JKUSDIP.
6. Indian laws and the ADB Safeguard Policy Statement (SPS), 2009 require that environmental impacts of development projects are identified and assessed as part of the planning and design process, and that action is taken to reduce those impacts to acceptable levels.

¹ 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.

7. The take off point of the flyover is Bikram Chowk and terminates near Government Women College, Gandhi Nagar on Bikram Chowk-Satwari Chowk road. The length of the corridor is about 1.5 kilometers and it comprises of (i) widening of present road from six-lane to eight-lane road width in 1.5 km stretch from Bikram Chowk to Presentation Convent School and (ii) construction of 1.3 km long, four-lane flyover from existing Tawi bridge upto gate of Government Women Degree College located on Bikram Chowk-Satwari Chowk road.

8. The subproject site is located in the built-up area of Jammu City, the winter capital of Jammu and Kashmir. It is situated at an average altitude of 312m² above mean sea level in the foothills of lower Shivaliks. The subproject site is characterized as fragmented with high volumes of traffic, pedestrians, and commercial activities competing for limited space. The high levels of traffic create an unsafe environment for residents, pedestrians and commuters alike and are a barrier to redevelopment and growth of the area. The subproject site (i) is not located in areas prone to water-logging and flash flood;(ii) is not within or adjacent to environmentally sensitive areas such as cultural heritage site, protected area, wetland, buffer zone of a protected area and special area for protecting biodiversity;and(iii) has been noted to have increased dust levels compared to other parts of the city due to vehicular movement and congestion. There are no water courses occurring within the subproject corridor, except for Tawi River where it traverses the corridor near the starting point of the proposed flyover.

9. The design of the flyover has taken into consideration reduced traffic congestion, minimized road surface flooding, improved road surface stormwater drainage and maximized land gains due to lanes configurations and layout. 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. However, resettlement impacts are not avoidable as the subproject site is amongst the busiest routes of the city and residential, commercial and institutional establishments exist along the subproject corridor. The proposed development will require land acquisition and demolition of buildings thus will impact businesses, traders, and public transport operators. A Resettlement Plan has been developed in accordance with ADB SPS, 2009 and Indian laws and regulations.

10. Anticipated impacts during the construction period include temporary disruption of services during realignment of existing utilities along the corridor; temporary closure of roads to allow the contractors to build the flyover; cutting of roadside trees; interference with accesses to properties and businesses due to road closures and re-routing of traffic; risk of accidents associated with vehicular traffic and transport of materials; increased volume of construction vehicles on the roads may lead to increased wear and tear of roads in the vicinity of the proposed site; and exposure to increased noise, dust, vibrations; hazardous chemicals (such as bitumen, old asphalt layers, 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 construction of the proposed flyover, 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 and monitoring performance on site.

11. Anticipated impacts during operation and maintenance include increased air pollution and noise over time due to gradual increase in traffic volumes on the road; improved air quality

² Source: Central Ground Water Board (Ground Water Information Booklet Jammu District, Jammu & Kashmir).

to sensitive receptors in proximity as a result of separation of traffic through the area; reduced traffic resulting to reduced number of accidents and potential conflicts that occur within the area; reduced traffic resulting in land gains which can be utilized to enhance the pedestrian space and increase pedestrian amenity and better access to and from the City. The reduction of traffic through the area allows for the area to be redeveloped and revitalized in a coordinated and integrated manner, ensuring connectivity between the various land uses, greater pedestrian spaces as well as a general urban redesign of the appearance of the area to create a better quality environment for the people. This will enhance the existing trading, transport, infrastructure, and associated facilities as well as encouraging commercial, retail and residential initiatives within the area thus providing broader impetus for the redevelopment of the surrounding areas and the Jammu city as a whole.

12. 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. The IEE includes the activities undertaken during project design to engage the stakeholders; and planned information disclosure measures and process for carrying out consultation with affected people and facilitating their participation during project implementation.

13. The subproject's Grievance Redressal Mechanism provides 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.

14. Therefore, as per ADB SPS, 2009 the subproject is classified as environmental Category B and does not require further Environmental Impact Assessment. As per Indian laws, the proposed subproject does not require an Environmental Clearance.

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 millions, 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 and 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.

2. The program is to be implemented in 4 to 7 tranches over a period of 8 years. Each tranche constitutes a separate loan. Tranche I (Project-1) of JKUSDIP (Loan 2331-IND) is under implementation. One of the subprojects identified under Tranche 2 (project-2) of JKUSDIP is the construction of Bikram Chowk Flyover and widening/strengthening of road from Bikram Chowk to Convent School on Bikram Chowk-Satwari Chowk road corridor, Jammu to improve urban transportation system.

3. The major objectives of constructing the flyover and widening of road are: (i) decongestion of traffic on the road junctions from Bikram Chowk to Green Belt junction; (ii) improved connectivity to different areas in southern part of Jammu (iii) quick access to the airport from the city area; and (iv) improved long-term traffic management in the Jammu City. The proposed flyover is expected to have the following benefits:

- (i) immediate positive impact on the area by significantly reducing the number of vehicles routing through the road at grade by approximately 40%;
- (ii) reduction of traffic is expected to reduce the number of accidents and potential conflicts that occur within the area thus saving human life as well as the economy of the region;
- (iii) reduced traffic also results in land gains which can be utilized to enhance the pedestrian space and increase pedestrian amenity;
- (iv) pedestrian sidewalks and footpaths will be improved and increased in size together with the general urban design elements to create an environment that is conducive to pedestrian activity;
- (v) reduced traffic congestion, conflicts and land gains result in a safer and efficient circulation of traffic; and
- (vi) future development and events need will have better access to and from the City.

4. The legal framework and principles adopted for addressing environmental issues in the proposed subproject have been guided by the existing legislation and policies of the Government of India, Government of Jammu and Kashmir, Asian Development Bank and the Environmental Assessment Review Framework (EARF) adopted for Tranche 2 of JKUSDIP. ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguard Policy Statement (SPS), 2009. According to the SPS, environmental assessment is required for all subprojects under a MFF modality.

5. An environmental assessment using ADB's Rapid Environmental Assessment (REA) Checklist for Roads and Highways (**Appendix 1**) was conducted for the proposed construction

of flyover from Bikram Chowk to Government Women College, Gandhi Nagar on Bikram Chowk-Satwari Chowk road. The length of the corridor is about 1.5 kilometers and it comprises of (i): widening of present six lane to eight lane road width in 1.5 km stretch from Bikram Chowk to Presentation Convent School and (ii): Construction of 1.3 km long four lane flyover from existing Tawi bridge upto gate of Government Women Degree College located on Bikram Chowk-Satwari Chowk road. Results of the assessment show that the proposed development is unlikely to cause significant adverse impacts. Thus this Initial Environmental Examination (IEE) report has been prepared in accordance to ADB SPS's requirements for environment Category B projects.

6. The IEE has been prepared to meet the following objectives:

- (i) to provide critical facts, significant findings, and recommended actions;
- (ii) to present the national and local legal and institutional framework within which the environmental assessment has been carried out;
- (iii) to provide information on the existing geographic, ecological, social and temporal context including associated facilities within the subproject's area of influence;
- (iv) to assess the subproject's likely positive and negative direct and indirect impacts to physical, biological, socio-economic and physical cultural resources in the subproject's area of influence;
- (v) to identify mitigation measures and any residual negative impacts that cannot be mitigated;
- (vi) to describe the process undertaken during project design to engage stakeholders and the planned information disclosure measures and the process for carrying out consultation with affected people and facilitating their participation during project implementation;
- (vii) to describe the subproject's grievance redressal mechanism for resolving complaints about environmental performance;
- (viii) to present the set of mitigation measures to be undertaken to avoid, reduce, mitigate or compensate for adverse environmental impacts;
- (ix) to describe the monitoring measures and reporting procedures to ensure early detection of conditions that necessitate particular mitigation measures; and
- (x) to identify who is responsible for carrying out the mitigation and monitoring measures.

II. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

1. ADB Policy

7. 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.

8. **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.

9. **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.

10. **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.

2. National and State Laws

11. 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.

12. **EIA Notification.** The GoI 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. Projects are categorized as A or B depending on the scale of the project and the nature of its impacts. Category A projects require Environmental Clearance from the National Ministry of Environment and Forests (MoEF). Category B projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA). The proposed subproject is not listed in the EIA Notification of 2006 "Schedule of Projects Requiring Prior Environmental Clearance" thus EC is not required.

13. **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 Project having potential to generate sewage or trade effluent will come under the purview of this Act, its rules and amendments. Such projects have to obtain Consent to Establish (CTE) under Section 25/26 of the Act from State Pollution Control Board (SPCB) before starting implementation and Consent to Operate (CTO) before commissioning. The Water Act also requires the occupier of such subprojects to take measures for abating the possible pollution of receiving water bodies. The subproject is not included in the lists of activities requiring CTE and CTO under the Water Act. However, the construction plants shall require CTE and CTO from SPCB for hot mix plants, wet mix plants, stone crushers etc, if installed for construction. Emissions and discharges shall comply with standards notified by the Central Pollution Control Board.

14. **Air (Prevention and Control of Pollution) Act of 1981, as amended.** The subprojects having potential to emit air pollutants into the atmosphere have to obtain CTE under Section 21 of the Air (Prevention and Control of Pollution) Act of 1981 from SPCB before starting implementation and CTO before commissioning the project. 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. Emissions and discharges shall comply with standards notified by the Central Pollution Control Board.

15. **The Noise Pollution (regulation and control) rules, 2000, as amended.** Since the subproject corridor is located within the city, the construction activity and use of heavy machinery and vehicles may increase the ambient noise levels during the construction phase. It is considered necessary to regulate and control noise producing and generating sources with the objective of maintaining the ambient air quality standards in respect of noise. 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 the Noise Pollution (regulation and control) rules, 2000, as amended.

16. **Ancient Monuments and Archaeological Sites and Remains Rules of 1959 and J and K Ancient Monuments Preservation (Amendment) Act of 2010.** The Act and Rules designate the area within a radius of 100 meters (m) from the “protected property” as “prohibited area” and upto 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 location of the subproject site is beyond the prohibited and regulated areas.

17. **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.

18. **Jammu and Kashmir Forest Conservation Act, 1997, as amended.** Permission is required to be obtained for cutting of forestry trees from the forest department prior to commencement of construction works.

19. **Building and Other Construction Workers (Regulation of Employment and Conditions of service) Act of 1996 and Rules 1998, as amended.** The Government of India has enacted this Act and is also applicable to the state of J and K. 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 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 Labour Organization (ILO) convention No.167 concerning safety and health in construction. The contractors engaged for execution of the subproject shall comply to the provisions of this Act.

20. 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
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 this is not covered either under Category A or Category B of the 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.
The Wildlife Conservation Act, 1972, as amended and J and K Wildlife (Protection) Act 1978, as amended, provide for protection and management of Protected Areas	Clearance from state and national wildlife boards, Central Empowered Committee of Hon'ble Supreme Court of India and the State Wildlife Department, as applicable. The wildlife protection act is not applicable to the proposed subproject.
Jammu and Kashmir Forest (Conservation) Act, 1997, as amended.	Clearance from Forest department for cutting of trees. To be obtained by PIU prior to construction.
The Ancient Monuments and Archaeological Sites and Remains Act, 1958, and the rules, 1959 provide guidance for carrying out activities, including conservation, construction and reuse in and around the protected monuments.	Permission from the Archeological Survey of India for carrying out any construction activities within the prohibited and regulated areas of the ancient monuments and archeologically protected sites. The sub-project area does not fall within the prohibited/regulated area or is situated close to 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 and Noise Pollution (Regulation and Control) Rules, 2000, as amended.	Consent to Establish (CTE) and Consent to Operate (CTO) from the J and 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.
The Jammu And Kashmir Preservation of Specified Trees Act, 1969 and Rules of 1969, as amended.	Permission from Forest/ Revenue Department /Concerned Deputy Commissioner for cutting of scheduled trees. This act shall not be applicable as the cutting of scheduled trees is not envisaged.
Building and Other Construction Workers (Regulation of	Registration of each establishment within a period of

Applicability of Acts/Guidelines	Compliance Criteria
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.	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

III. DESCRIPTION OF THE PROJECT

A. Existing Condition

21. Jammu city has spatially grown very fast in last 3 to 4 decades predominately towards its southern and western direction. Most of this growth has been under unplanned residential use. Good commercial centres have not simultaneously developed in these new urbanized areas. The Central Business District (CBD) still remains the old city. The Gole market in Gandhi Nagar has developed as a city-level shopping centre. This has resulted in heavy traffic movement between the old city and the newly developed areas. Similarly, most of the offices/banks/industry are in Gandhi Nagar, Rail Head, Trikuta Nagar, Gangyal, Bari- Brahmana side. Hence, there is huge daily movement of office workers from Jammu (West) and old city towards Gandhi Nagar side. In essence, due to unplanned city structure and centralization of commercial areas/work centres at two or three locations, there is heavy daily intra-city movement of people. Besides, the area under roads is much less (approx. 4 to 5%) as compared to the requirement of 10 to 14%. Location of main Bus- stand is also in old city which is another source of congestion on all city roads in Jammu city.

22. The Bikram chowk- Satwari road not only is the main entry road for inter city traffic entering Jammu city from Punjab side but it also links two parts of Jammu city bisected by river Tawi flowing through it. A flyover stands constructed on part of the road corridor (BC Road) falling on other side of Tawi river providing grade separation at Jewel and KC chowks respectively.

23. Traffic studies indicate a very high degree of congestion, mainly on account of traffic conflicts at road junctions of Bikram chowk , Police lines chowk and Green belt chowks located on the sub-project road. Many a times during peak hours, long queue of vehicular traffic are seen stranded on the Tawi bridge because of congestion at Bikram chowk.

24. Considering the existing traffic demand and future growth of traffic there is a need for a grade separated facility as well as increasing the road capacity of this road.

B. Proposed Subproject and Components

25. The sub-project area is located in the southern part of Jammu city (**Figure-1**). The major objectives of widening this road from existing 6-lane width to 8-lane width and constructing 4-lane flyover on it are:

- (i) Increasing carrying capacity of this road corridor.
- (ii) Removing acute congestion at Bikram chowk, Police lines chowk and Green Belt road junctions, respectively by providing grade separation over them.
- (iii) Quick access to airport and smooth movement of traffic entering Jammu city from Pathankot side.

26. The proposed flyover and road widening is expected to have the following benefits:

- (i) decrease in travel time on the corridor, by cutting delays.
- (ii) drastic reduction in conflicts on sub project road junctions thus reducing accidents.
- (iii) improved pedestrian movement by providing footpaths and pedestrian subways.
- (iv) provision of four bus-bays shall help in checking the present practice of buses/mini buses stopping within the road carriage way, thus, providing relief to daily commuters using these modes.
- (v) immediate positive impact on the area by significantly reducing the number of vehicles routing through the road at grade by approximately 40%.
- (vi) reduced traffic also results in land gains which can be utilized to enhance the pedestrian space and increase pedestrian amenity.
- (vii) envisaged that pedestrian sidewalks and footpaths will be improved and increased in size together with the general urban design elements to create an environment that is conducive to pedestrian activity.

27. Widening of sub-project road from existing 6-lane width to 8-lane width and construction of flyover is guided by existing road alignment. Besides widening of right of way (ROW) has been proposed mostly through vacant lands under the possession of many government institutions located on both sides of the subproject road. In fact, there is no acquisition of private lands involved under this subproject.

28. The proposal is to start the flyover from near Tawi Bridge and pass along Kala Kendra, Polytechnic College, Police lines, Hotel Asia, Women College, etc and culminate just before the existing foot-over-bridge (FOB) located on this road opposite to Women Degree College. Only two properties are getting affected significantly, which have been proposed for rehabilitation in open State Road Transport Corporation (SRTC) land located on this subproject road.

29. The construction of flyover is with open type foundation, and pre-stressed superstructure. It has footpaths and crash barriers on both sides and entry and exit ramps at both ends to integrate the merging and diverging traffic. Approach ramps are of re-enforced earth (RE). Construction period is likely to be 36 months from the start of work.

30. **Table 2** shows the components of the subproject based on the present proposals which are expected to be substantially correct, although certain details may change as development of the subproject progresses.

Table 2: Description of the Proposed Flyover and Road widening in Jammu city.

Component	Function	Description	Location
General	Reduction of traffic congestion over the existing road. Increasing the carrying capacity of the sub-project road.	Flyover (partly dual carriageway) over a length of 1.3 km. 4 lane road on either side of flyover. Length of the road widening is 1.5 km.	The length of the corridor is 1.5 km. The take off point of flyover is near 3-lane Tawi Bridge and it terminates opposite to Women Degree College Gandhi Nagar
An upward ramp near 3-lane Tawi Bridge for traffic (left hand side) bound from Tawi Bridge to Satwari chowk	For diverting traffic bound towards Gole- market and Satwari chowk.	Ramp is provided to lift the traffic towards Satwari chowk.	Near 3- lane Tawi Bridge
A downward ramp	Leading traffic from flyover	To lead the traffic coming	Near Women College gate

Component	Function	Description	Location
opposite Women Degree College Gandhi Nagar for left hand side (LHS) traffic stream	to Army Cantonment road, Satwari chowk, Gole-market road.	via flyover from Jewel chowk/old city.	
An upward ramp opposite open PHE land (Green Belt) for right hand side (RHS) traffic stream	Leading traffic coming from Satwari side towards 4-lane Tawi Bridge.	To lead the traffic coming from Satwari chowk side via flyover.	Opposite to vacant PHE land/Paramjit filling station.
A downward ramp near 4-lane Tawi Bridge for RHS traffic bound from Satwari side towards Jewel chowk/old city	Leading traffic coming from Satwari side towards 4-lane Tawi bridge.	To lead traffic coming via flyover from Satwari chowk.	Culminating on 4-lane Tawi Bridge.
8-lane road widening of existing 6-lane road	To increase carrying capacity of road at grade to 8-lane width.	4-lane width of each carriage way on either side of flyover.	From Bikram chowk to Convent school (1.5 km length).
Provision of Street lighting	So as to make traffic movement possible during night time.	Both sides	Bikram chowk to Convent school.
2m wide drain cum footpath on both sides	For collection of storm water and path for pedestrian movement.	2m wide drain cum footpath.	Both sides from Bikram chowk to Convent school.

31. The design of the flyover is according to the Indian Road Congress (IRC) Codes, Ministry of Road Transport and Highways (MoRTH) Specifications and other relevant codes. The main design features are summarized in **Table 3** below.

Table 3: Design features of the subproject

Design feature	Description	
	Flyover	Road
Total Length	1300m	1500m
Carriageway Width	4-lane (17m)	8-lane road at grade (14m carriage way on either side of flyover)
Vertical Clearance	5.5m	--
Loading	4 – lanes of IRC Class – A or single lane of 70R3	--
Seismic Zone	Zone IV	Zone IV
Cross Sections	Two carriage way with two lanes configuration	14m carriage way with 2m footpath on either side of flyover.
Span Arrangement	20m span from centre to centre. 30m span where box girders are proposed at intersections.	--
Super-structure	Pre-cast, pre-stressed concrete girders with	--

³ Indian Road Congress (IRC) has evolved standards for bridges commensurate with traffic needs to Indian Highway system. These loadings were introduced first time in India in 1939 and at that time were of two types - one known as IRC standard loading and other IRC heavy loading, both consisting of distributed load and knife edge load. The IRC standard loading consisted of a uniformly distributed load of 1.13 tonnes per linear metre of each traffic lane plus a knife edge load of 6 tons for computing bending moment and 9 tons for computing shear force. The IRC heavy loading was similar to the first, the only difference being the uniformly distributed load was increased by 0.8 tonnes/m and the knife edge loads were increased by 1.0 ton each. In 1958, these loading were replaced by a set of wheel load trains known as the IRC Class AA, Class A and Class B loading. In 1966, an additional loading known as class 70-R was introduced by bringing certain modifications in the already existing Class AA, hence the ' R ' added, meaning revised. Class 70 R and Class AA loading specify a 70 tonnes tracked vehicle with only slight differences in the length of the loaded area. Thus, although the vehicles are practically identical with the same total load, the minimum spacing between vehicles specified for the two load classes are very different - for class 70 R it is 30 m and for class AA it is 90 m. Under Class 70R, in case of wheeled vehicles the latest loading consists of a 100 tonnes trailer combination. With the introduction of this revised load classification, the road authorities in the country have prescribed this new class 70 R loading also for road bridges on all important routes such as National Highways. For multilane bridges and culverts, one train of Class 70R tracked or wheeled vehicles whichever creates severer conditions should be considered for every two traffic lane widths.

	monolithic Reinforced Cement Concrete (RCC) deck slab over the girders for general section and for individual carriage ways.	
Foundation	Open Foundation	--
Life span of sub project	50 years	--

IRC: Indian Road Congress; RCC: Reinforcement Cement Concrete

C. Implementation Schedule

32. The implementation schedule of the subproject is given in **Table-4** below:

Table-4: Implementation schedule of the subproject

Procurement Activity	Tentative Time Schedule	Resettlement Activities
Invitation to bid	April 2012	
Completion of EA's technical evaluation	July 2012	
Completion of EA's financial evaluation	August 2012	
Contract award	September 2012	Completion of relocation of all displaced persons
Commencement of works	October 2012	
Completion of work	September 2015	
Total Construction Period	36 months	

Alternatives of Proposed Subproject

33. The following alternatives have been considered for the proposed subproject:

- Option 1 - Do nothing – This will not address the underlying problem of the traffic congestion and conflicts between vehicles and pedestrians.
- Option 2 - Do Minimum – This option involves grade improvements to improve safety but still does not address the underlying problem of traffic congestions.
- Option 3 - Route alignment options. These were discounted as the impacts on existing buildings and traffic flows at different locations are observed beyond the capacity of the existing roads.
- Option 4 - Current preferred option. This offers the best balanced solution by providing the desired outcomes with least impacts on environment and minimum land acquisition.

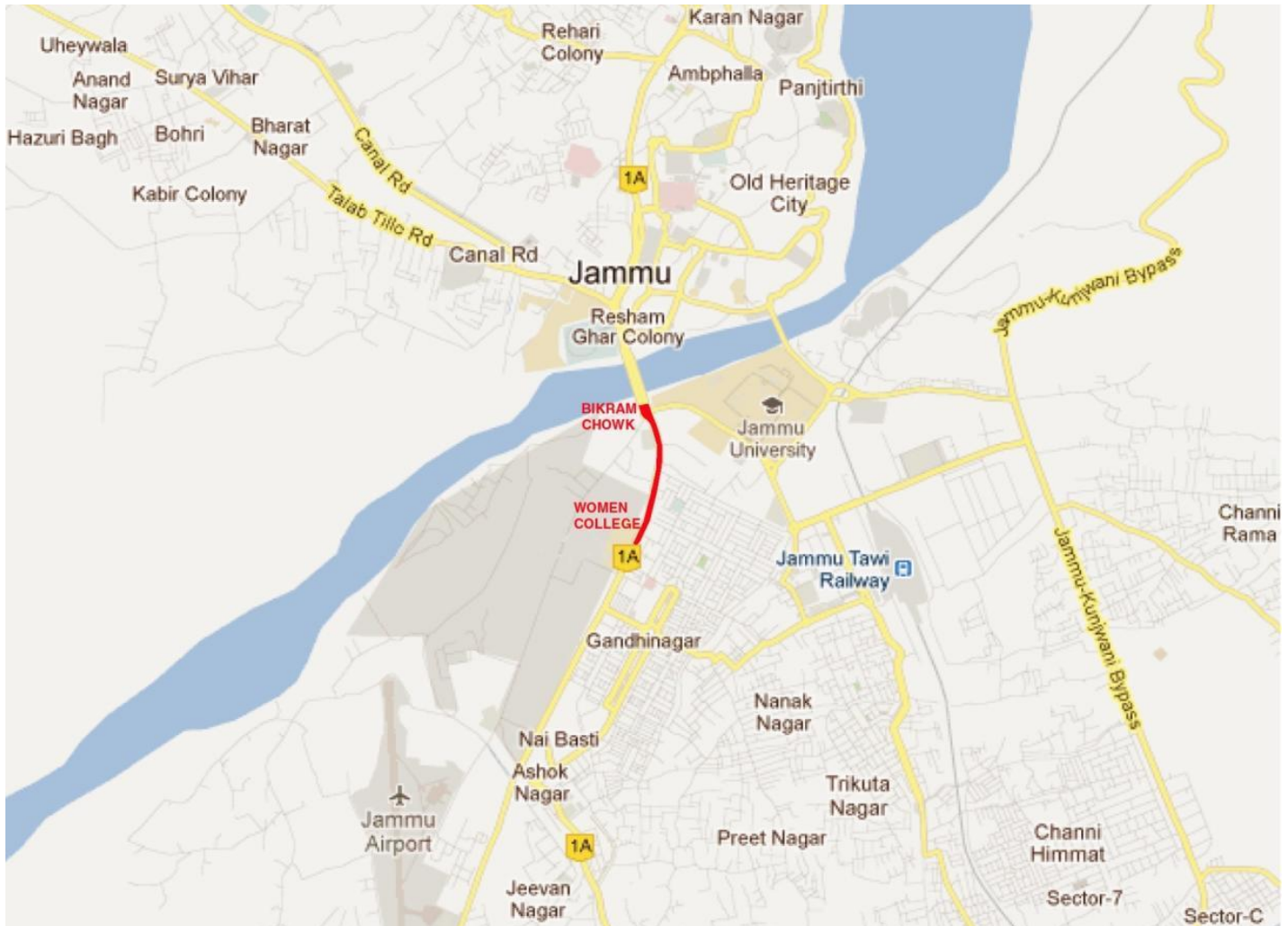


Figure 1: Map showing the location of the subproject (marked red) and other major road network of Jammu City (marked yellow)

IV. DESCRIPTION OF THE ENVIRONMENT

A. Physical Resources

1. Administrative Boundaries

34. 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.

35. 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.

2. Topography, Drainage, and Natural Hazards

36. **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 (subproject corridor is situated in this area) and Second the old city on lower reaches of Shivalik having an altitude of 307 to 450 m above msl..

37. **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 by J&K Economic Reconstruction Agency (ERA) and by the UEED under their ongoing schemes. Some of the remaining drainage works are proposed under Tranche – II of JKUSDIP.

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

- **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)
- **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) The subproject location falls within this Zone
- **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).

- 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).
- 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).

39. **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.

40. The state of Jammu & Kashmir is the western most extension of the Himalayan mountain range in India. Here it comprises of the Pir Panjal, Zaskar, 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.

41. 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.

42. The earthquake zonation map of Jammu and Kashmir is given in **Figure-2** below:

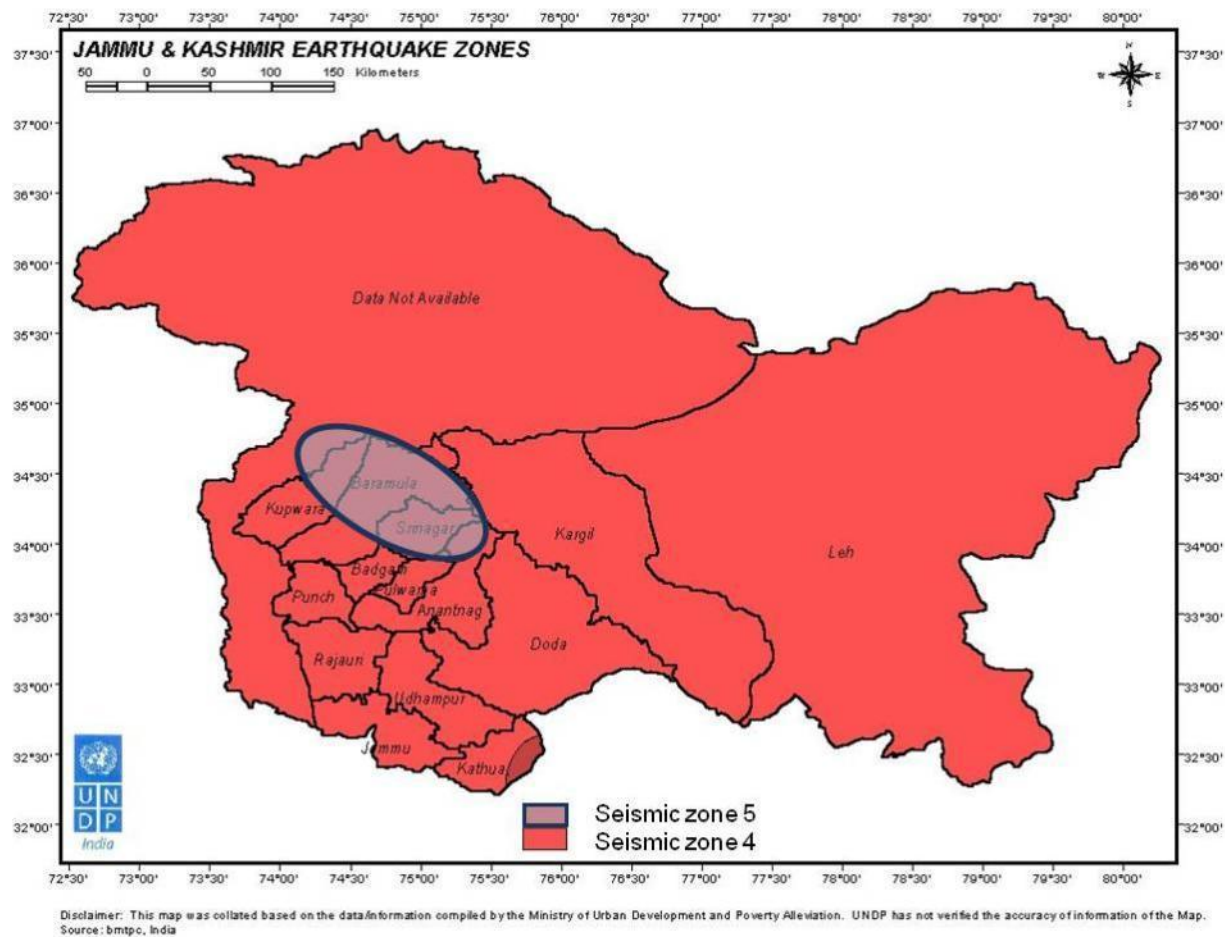


Figure-2: Jammu and Kashmir earthquake zones.

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

44. Besides natural drainage, the subproject area is well knit with a system of natural and artificial drains which carry storm water from various parts of the city and discharge into the river Tawi.

45. As per storm water drainage master plan, Jammu city is divided into five drainage zones with the sub-project area falling in zone-II comprising 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, Landoichoi nallah T-2, Landoichoi nallah T-3, Nai Basti (Rampura) nallah, Bikram Chowk nallah, University to Bikram Chowk nallah, Channi Himmat main nallah and T4 (Landoi choi) nallah. In order to make the drainage more efficient, different drainage projects in Jammu city were undertaken under Multi Sector Project for Infrastructure Rehabilitation in J and K (Loan 2151-IND) and rehabilitation of drainage in some more areas has been proposed under tranche-2 of JKUSDIP.

3. Geology, Geomorphology and Soils

46. **Geology and Geomorphology.** The Geology of the territories of Jammu, Kashmir and Ladakh have been divided into three different structural Zones:

- The Panjal
- The Zaskar
- The Tertiary Groups

47. 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.

48. Jammu borders Kashmir to the north, Ladakh to the east and Himachal Pradesh and Punjab to the south. In the west, it borders the Pakistan. Sandwiched between the Vale of Kashmir to the north and the Daman Koh Plains to the south, the Shivalik Range comprises most of the region of Jammu. The Pir Panjal Range, the Trikuta Hills and the low-lying Tawi River basin add beauty and diversity to the terrain of Jammu. The Pir Panjal range separates Jammu from the Kashmir valley.

49. District Jammu falls in sub-mountainous region at the foothills of the Himalayas. Shivalik range rises gradually in the northern part of the district and merges with the Indo-Gangetic plains in the south. 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 rain-fed. The area south of these roads is largely fed by canal and tube wells for irrigation purposes and is relatively more prosperous.

1. 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 Siwalik Hills.

2. 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.

50. The *Kandi* tract has got steep topographic slopes ranging between 1:90 and 1:120. General altitude of the *Kandi* ranges between 320 to 400 m above the mean sea level. Water levels are deep, resulting into very less number of ground water structures i.e. dug wells and tube wells. The *Kandi* imperceptibly merges with the *Sirowal* southwards. The *Sirowal* tract occupies the southern plainest tract of the district. Topographic gradient is reduced and becomes very gentle i.e. 1:250 to 1:300.

51. 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 Sub-Recent times, laid down by the present day streams the area. The geological succession occurring in the area is presented in **Table 5** below.

Table 5: Geological Succession of Jammu district

	<u>Geological Horizon</u>	<u>Lithology</u>	<u>Age</u>
	Alluvium, fan, terrace deposits <i>(Kandi and 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

52. **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.

4. Climate

53. 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.

54. **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)).

55. **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 mm⁴. The rainfall data for district Jammu for five years (from 2006 to 2010) is presented in the **Table-6**.

Table-6: Rainfall data of district Jammu (month's total rainfall in mm).

Year	Jan.	Feb.	March	April	May	June	July	August	Sept.	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

Source: Hydromet Division, India Meteorological Department

5. Air Quality

56. The sub project area is mostly urban area. Generally, the areas along roadside are experiencing heavy traffic load which is considered to be the major contributor for air pollution. 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. The ambient air quality data with respect to RSPM (PM₁₀), SO₂ and NO₂ was measured at specified sites along the subproject corridor and the results are presented in **Table-7** below. The data was collected during the month of October, 2010 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 along the roadsides for 8 hours during the peak traffic hours.

Table- 7: Ambient air quality data at various locations in sub-project corridor.

S.No.	Site /Location	Site Type	Parameters		
			RSPM (PM ₁₀) ⁵ (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)
1	Outside University Residential Quarters	Residential	90.33	14.15	56.64
2	Opposite Amar Singh Club near Bikram Chowk	Commercial	126.48	17.54	56.16
3	Near Gate of Women College Gandhi Nagar	Institutional	104.16	28.40	53.35
	NAAQ Standards⁶		PM₁₀ = 100	80	80

NAAQS= National ambient air quality standards of Government of India; NO₂= Nitrogen dioxide; PM₁₀= Particulate matter below 10µ particle size; RSPM= Respirable suspended particulate matter; SO₂= Sulphur dioxide

⁴ Source: Central Ground Water Board - Ground water information booklet, Jammu district.

⁵ PM_{2.5} will be provided later as the equipment to measure PM_{2.5} 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 sub-project.

⁶ 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 16th September 2009.

57. The result of the tests concludes that at two spots the values for RSPM are above the NAAQ standard set by the CPCB India. The primary reason for this is the heavy traffic plying in the vicinity of all the selected sites

58. 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 PM10 and PM2.5. The air quality monitoring equipment presently available with J and K ERA can measure the total particulate matter below 10 μ particle size (i.e. PM10). However, separate values for PM10 and PM2.5 cannot be determined. The requisite equipment shall be procured by ERA for separate measurement of these parameters and baseline data shall be generated for these 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.

6. Ambient noise levels

59. 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 sub-project area is considered to be the major cause of noise pollution. The existing noise levels at various locations along the sub project corridor have been presented as baseline data in the **Table -8**. The noise levels were monitored during day time in October 2010 and during day and night time in June 2011 by the Environmental Monitoring Laboratory of J&K ERA.

Table -8: Ambient noise quality data at various locations in subproject corridor

S.No.	Site/ Location	Site type	Day time noise levels dB(A) Leq	Night time noise levels dB(A) Leq	Noise quality standards ⁷ (dB(A) Leq)
October 2010					
1.	Opposite Amar Singh Club near Bikram Chowk	Commercial	73.0	--	Day = 65 Night= 55
2.	Near Gate of Women College Gandhi Nagar	Silence zone	76.2	--	Day = 50 Night= 40
June 2011					
1.	Bikram Chowk	Commercial	75.97	52.99	Day = 65 Night= 55
2.	Opposite the gate of Women College Gandhi Nagar	Silence zone	74.50	43.09	Day = 50 Night= 40

dB(A) Leq = the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

60. 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 the spots during day time are higher than the permissible standards. This may be attributed to the heavy traffic movement coupled with frequent traffic jams and blowing of horns in the subproject

⁷ 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.

corridor. However, the noise levels measured during night time at one spot reflect that the noise level remained slightly above the permissible limit specified for silence zone, whereas at the other spot the night time noise level remained within the permissible limit.

7. Water Resources

i. Surface Water

61. The starting point of the proposed subproject is located on the left bank of river Tawi. The subproject does not cross any water body and except for river Tawi there is no water body in the close vicinity of corridor of impact. River Tawi 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.

ii. Geohydrology and Groundwater

62. The depth of water table along the subproject corridor is reported to be between 5 and 10 m as per the studies conducted by Central Ground Water Board (**Figure-3**). Public water supply is the major source of potable water for the settlements throughout the project area. Execution of proposed subproject is not expected to have any impact on the ground water resources of the area.

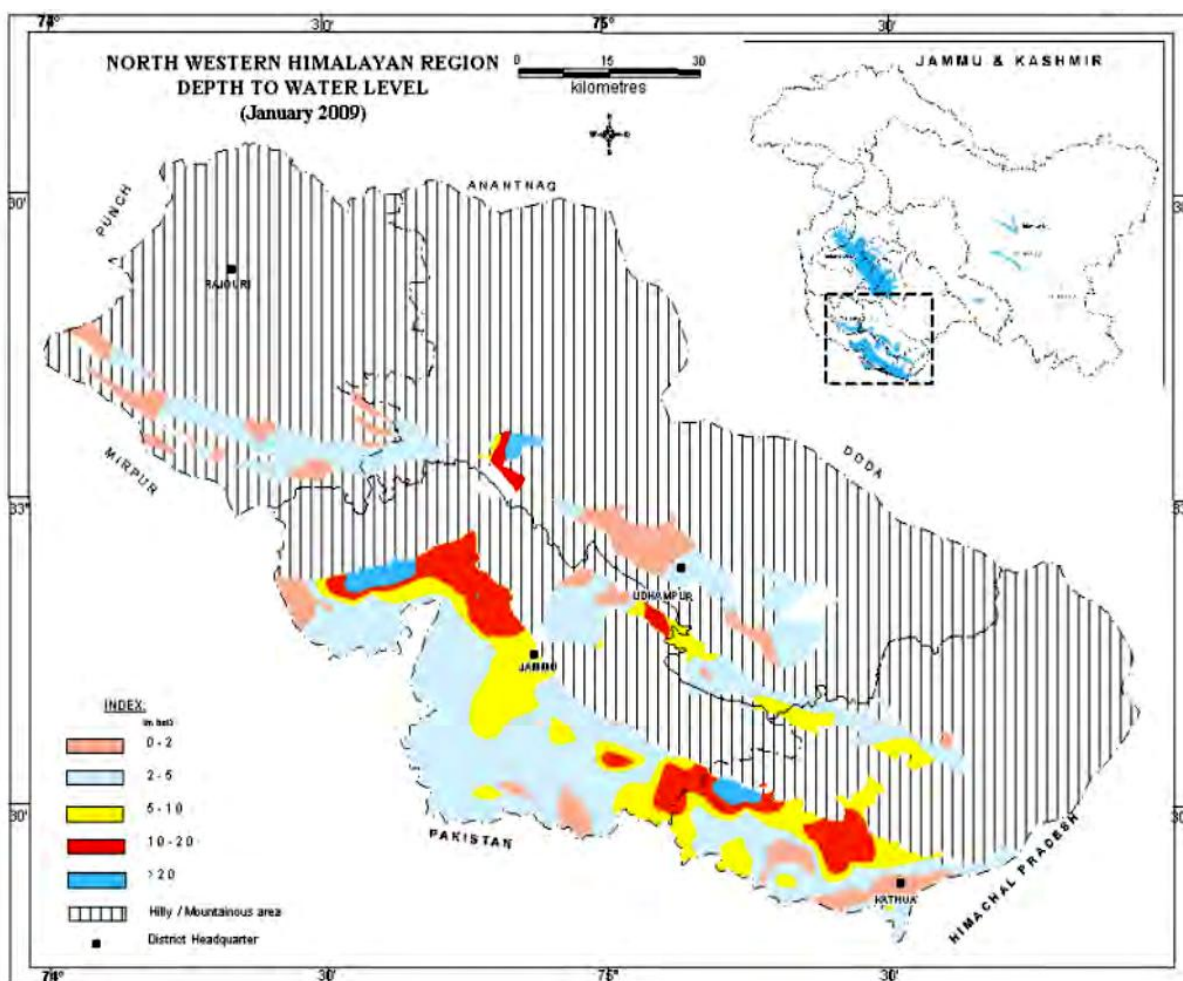


Figure-3: Depth of water level in Jammu District

Source: Central Ground Water Board (Ground Water Information Booklet Jammu District, Jammu & Kashmir).

B. Ecological Resources

63. **Terrestrial ecology and Biodiversity.** Since, the subproject stretch is located within built-up area of Jammu city, no sensitive ecological areas are located along the subproject corridor.

64. **Forest Areas and Trees.** The subproject is located within Jammu city and there is no forest within or adjacent to the subproject corridor. However, a total of 284 trees of different species like *Eucalyptus lanceolatus*, *Alstonia scholaris*, *Leucaena leucocephala*, *Callistemon* sp., *Ficus religiosa*, *Mangifera indica*, *Acacia* sp. and some ornamental plantations are required to be removed for execution of the proposed subproject. Out of 284 trees, a total of 21 are private trees and the rest 263 are social forestry trees planted as avenue plantations. The cost for cutting of fruit bearing trees has been evaluated by the Horticulture Department whereas the permission for cutting of 263 avenue trees along with cost of cutting and compensatory afforestation at a rate of 1:2 has been obtained from the forest department. All possible efforts shall be made to avoid unnecessary cutting of these trees. Important tree species found along subproject corridor are depicted in **Table-9**. Along the sub project corridor the shrubs like *Justicia adhatoda*, *Zizyphus oxyphylla*, *Ricinus communis*, etc. are also observed.

Table –9: Type of trees found in subproject area

Sr. No.	Local name	Botanical name
1	Poplar	<i>Populus alba</i>
2	Vilayti Safeda (Laseen)	<i>Leucaena leucocephala</i>
3	Shesham	<i>Dalbergia sissoo</i>
4	Kikar	<i>Acacia modesta</i>
5	Drek	<i>Melia Azedarach</i>
6	Ashoka	<i>Polyalthia longifolia</i>
7	Ber	<i>Zizyphus jujuba</i>
8	Bottle brush	<i>Callistemon</i> sp.
9	Gulmohar	<i>Delonex regia</i>
10	Arjun	<i>Terminalia arjuna</i>
11	Kachnar	<i>Bauhinia variegata</i>
12	Jamun	<i>Syzygium cumini</i>
13	Mango	<i>Mangifera indica</i>
14	Peepal	<i>Ficus religiosa</i>
15	Sat-patra	<i>Alstonia scholaris</i>
16	Bod	<i>Ficus benghalensis</i>
17	Araucaria	<i>Araucaria</i> sp.
18	Morepankh	<i>Platycladus orientalis</i>
19	Sirish/Sareen	<i>Albizia lebbbeck</i>
20	African Kakri	<i>Kigelia pinnata</i>
21.	Safeda	<i>Eucalyptus lanceolatus</i>

65. The cutting of non-forestry trees does not require replantation, however, compensatory afforestation at the rate of 1:2 (i.e. planting two trees for each tree cut) shall be carried out after completion of the proposed subproject by any concerned state department (like social forestry/ horticulture/ floriculture). The trees identified for cutting in the subproject corridor do not belong to any of the threat categories as specified by IUCN (International Union for Conservation of Nature and Natural Resources) and BSI (Botanical Survey of India).

66. **Wild fauna.** No wild animals are reported in and around the subproject corridor as the same is located in the city area and there is no forest close to the subproject site.

67. **Rare or Endangered Species.** No rare or endangered animal or plant species are reported in the subproject impact zone. The trees which are required to be removed for execution of the subproject are not endangered.

68. **Protected Area.** There is no protected area within or in close vicinity of the subproject corridor. The outer boundary fencing of Ramnagar wildlife sanctuary is located more than 3.30 km away from the start point of proposed flyover subproject. The area falling between the wildlife sanctuary and the starting point of the proposed subproject constitutes of Jammu city which is a fully urban area.

69. **Fisheries.** The aquatic biology of river Tawi comprises of phytoplanktons (eg. *Diatoma elongatum*, *Pediustrum duplex*, *Tetraedron minimum*, *Nitzschia palea*, *Gomphonema gracile*, *Gomphonema constrictum*, *Navicula cupsidata*, *Cymbella tumida*, *Pediastrum tetras*, *Oedogonium vulgare*, *Ocsillatoria curviceps*, *Anabaena spiroides*.etc.), zooplanktons (*Polyartha vulgaris*, *Cyclops ladakanus*, etc), and benthos (*Chironmus* sp., *Tubifex* sp., etc), besides macro-fauna like small crustaceans, amphibians, fish and insects. The common fish species in river Tawi include *Garra gotyla*, *Garra lamta*, *Labeo dero*, *Labeo bata*, *Glyptothorax* sp., *Glyptosternum* sp., *Barilius vagra*, *Barilius bendelisis*, *Puntius conchoni*, *Puntius ticto*, *Puntius sophore*, *Oreochromis mossambicus*, *Channa punctatus*, *Channa gachua*, *Channa orientalis*,

Heteropneustes fossilis, *Clarias batarachus*, etc. No fishing activity has been observed in river Tawi which is located near to the start point of the proposed subproject. Further, no impact of the proposed subproject is anticipated on the aquatic ecology of river Tawi.

C. Economic Development

70. 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.

71. 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 by inferior cereals and pulses. Nearly 75 per cent of the country's temperate fruits, mainly apples, are grown in the state.

72. 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.

73. Horticulture also plays a vital role in the economic development of the state. With an annual turnover of over INR 300 crore, apart from foreign exchange of over INR 80 crore, 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.

74. **Land use Pattern.** Jammu is known as a city of temples and is the summer capital of Jammu and Kashmir state. The proposed landuse distribution of Jammu city as per the master Plan (2001-2021) is given in the **Table –10** below.

Table –10: Jammu local area land use distribution – proposed

Sl. No.	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
	Total Developed area (ha)	28,792	100

Source: Jammu Master Plan 2001 -2021

75. The landuse 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 and commercial establishments such as shops and petrol pumps. The transportation area constitutes of existing roads in the subproject area.

76. The execution of proposed subproject shall involve impact on some residential and commercial activity and conversion of 13,149.65m² of commercial/ residential/ public utility/ land under government departments into transportation landuse. The two affected parties (Paramjeet filling Station and Alson Motors) suffering significant impact on land, and subsequently requiring relocation, shall be rehabilitated on the land of SRTC (State Road Transport Corporation) near Bikram Chowk (on 1658.22 m² of land) which can be treated as conversion of government owned corporation land used as transport yard into commercial landuse. Apart from these minor changes, there shall not be any significant change in the landuse of the subproject area. The details of land to be acquired for the execution of proposed subproject and rehabilitation of affected parties is given in **Table-11**.

Table-11: Details of the land to be acquired for the subproject

S.No	Ownership	Area to be acquired (m ²)	Approximate Percentage
1.	State Land (with Government Departments)	10208.25	68.94
2.	State Land leased out to 04 properties including 01 Govt department and 3 displaced persons (DPs)	2858.9	19.31
3.	State Land under encroachment (02 DPs)	44.25	0.29
4.	State land under Squatters (02 DPs)	38.25	0.27
5.	Land required for the relocation of 02 DPs (at SRTC yard)	1658.22	11.19
Total		14807.87	100

DP= Displaced Person; SRTC= State Road Transport Corporation

77. **Commercial Activities.** The subproject area is located in Jammu city and the predominant activities in the impact zone are of mixed type including police establishments, government departments, petrol pumps, club, hotel, shops, educational institutions as well as residential houses. Varied types of commercial activities in the form of wholesale, retail or small scale services are carried out in this area.

78. Four commercial establishments/shops will experience direct negative impact. They include 02 petrol pump owners and 2 squatter shopkeepers who are running a Canteen and Tyre repairing shop. Of the two petrol pumps impacted, 01 petrol pump getting fully impacted will be relocated to SRTC Premises just opposite to its present location on the other side of the road. The other petrol pump will suffer temporary disruption to its business as a strip of land is to be acquired from it. However, this would be a temporary impact on its business till the infrastructure of the pump is readjusted. One out of the 02 Squatter shops i.e. a canteen located inside SRTC premises will be shifted to a different corner within the same premises while as the other i.e. the tyre repairing shop will suffer minor impact and will continue to operate from the same location. All the 04 displaced persons (DPs) will suffer temporary impact during a transitional period within which they will shift/adjust their setup. There could be temporary disruption of business for certain number of days for which DPs will be provided assistance for this transitional period on a case-to-case basis as per the provisions of the Entitlement Matrix in agreed resettlement framework (RF).

79. One out-of-use commercial building, which is closed since long, will also suffer significant impact as whole land with the property owner will be required for widening. The owner of the said building will also be relocated by EA (Executing Agency) inside the SRTC

premises and all eligible compensation as per the provisions of the entitlement matrix of the agreed RF will be disbursed to him.

80. A total of 21 employee DPs (20 from petrol pump and 01 from canteen inside SRTC premises) will suffer indirect impact due to impact on the employer. The one-on-one consultations were conducted with their employers and it was revealed that they will retain these employees and the employees also had no apprehension of losing their jobs. The confirmation by the petrol pump owner for retention of 20 employees has been documented in the resettlement plan (RP).

81. A detailed Resettlement Plan has been prepared for rehabilitation and resettlement of parties affected by execution of proposed subproject.

82. The proposed construction of flyover and widening of road will provide better and smooth connectivity to various areas and shall also improve the environmental and aesthetic conditions in Jammu city.

83. **Industrial Development.** In Jammu district a number of industrial areas are being developed. The information available with the Jammu and Kashmir Industries Department regarding various industrial areas is given in **Table-12**. The majority of industries in Jammu district are small-scale units. The dominant units belong to general engineering, food-stuff, textiles, etc. However, such units have not been recorded in the immediate vicinity of the subproject corridor.

Table-12: Industrial areas in Jammu district with number of units and land area.

S. No.	Location	Number of Units	Land under industrial area (in Kanal)
1.	Digiana	106	137.09
2.	Jammu Cantonment	34	96
3.	Bari Brahmana Industrial Complex	464	6152
4.	Gangyal	336 (units have been allotted land)	988
5.	Birpur	156 (units have been allotted land)	306
6.	Akhnoor	21	--

1 Kanal = 505.39 m²

Source: Official website of J&K Industries Department.

84. **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, no agricultural activities are carried out in the subproject impact zone.

85. **Infrastructure Facilities.** Since the subproject is situated in the heart of Jammu city. The infrastructure facilities like schools, hospitals, colleges, drinking water supply system, electricity and communication in the subproject area are satisfactory. The important infrastructural facilities existing around the subproject area include:

- i. Educational Institutions (Government Degree College for Women, Gandhi Nagar; Government Polytechnic College, Bikram Chowk; Presentation Convent School, Gandhi Nagar).
- ii. Government Establishments (Amar Singh Club, Kala Kendra, PHE Department, SRTC yard, Hindustan Petroleum Corporation Ltd., District police Lines).

- iii. Health care establishments (Madaan Nursing Home, Eye clinic, Jammu Health Care and Diagnostics Centre, SM Retina and Eye Centre).
- iv. Recreation facilities (Green Belt Park, Rotary park at Bikram Chowk, Park between two existing bridges over river Tawi).

86. Of the above listed infrastructure facilities in the area, small portions of open land and subsidiary structures only, like boundary walls, sheds, guard rooms, stores, etc., will be impacted. Since, 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.

87. **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. Although, river Tawi is a perennial river, flow in the river is lean except in monsoon period. The surface water flow in the river Tawi is used for irrigation and water supply purposes. Only 23 MGD (103 MLD) surface water is reserved for water supply purposes. This limited available water is already tapped at existing water supply head works at Sitlee, Dhountly and Boria (Intake well constructed under ADB Loan 2151-IND). Therefore, there is no further availability of surface water from Tawi river. Due to limited availability of surface water from river Tawi, remaining requirement of drinking water is met from the ground water sources (tube wells). Ground water is main source for extended parts of Jammu city and part of the city areas located at higher elevations. Independent, isolated small water supply systems have been developed from time to time for these areas, which includes local productions (tube wells), storages (overhead tanks) and distribution networks.

88. The Jammu Water Supply system has been divided into seven water supply zones. Zones 1 to 5 are on the right bank of river Tawi (Jammu West) which comprises of old city and extensions. Zone 6 comprises of areas on left bank of river Tawi (Jammu East) and zone 7 comprises of industrial township of Bari Brahmana. Each zone is further divided into sub-zones and each sub-zone is further divided into sub-subzones for water supply management (there are about 59 and 49 isolated sub-subzones in the west and east Jammu respectively). Each sub-subzone has its own tube well(s) or being fed by gravity pipeline from higher level located service reservoirs, overhead tanks and independent distribution network. Various water supply improvement works (production, storage and distribution) have been undertaken under Multisector project for Infrastructure Rehabilitation in J and K (ADB Loan 2151-IND) and the remaining are proposed to be undertaken in future loans under JKUSDIP.

89. **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. 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.

90. **Drainage.** As per storm water drainage master plan, Jammu city is divided into five drainage zones. Zone-I and III are in west Jammu (right bank of river Tawi) whereas Zone-II, IV and V cover areas of east Jammu (left bank of river Tawi). 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. In addition to such primary drains, there are substantial lengths of secondary and tertiary drains/ deep drains. Following the master plan recommendations, part of drainage rehabilitation and improvement works have been taken up under ADB Loan 2151-IND by J&K Economic Reconstruction Agency (ERA) and by the UEED under their ongoing schemes. Some of the remaining drainage works are proposed under Tranche – II of JKUSDIP.

91. **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.

92. 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.

93. **Transportation.** Jammu is well connected with rest of India. National Highway - 1A connects Ambala to Srinagar via Jammu. Jammu is also well connected by air and rail. During old times, when the municipal limits were by and large confined to the old city only i.e. up to northern edge of Tawi river, Bikram Chowk- Satwari road was part of the NH-1A linking Jammu city with Lakhanpur near Punjab state border. It was then being maintained by Central Public Works Department (CPWD). However, with massive urbanization experienced by Jammu city towards its southern direction, the present municipal limits have been expanded up to Balole nallah (near Bari Brahmna industrial township) and the subproject road stretch i.e. Bikram Chowk to Satwari junction now falls within the municipal limits. It is now being maintained by state Public Works Department (PWD). It is catering to the following three distinct traffic flows:

- i. Intracity traffic originating from areas of Jammu South (i.e Gandhi Nagar, Shastri Nagar, Trikuta Nagar, Channi Himmat, Railway station, NH Bypass, Fruit Mandi, Transport Nagar, Rail Head Complex, etc.) and bound for old city and areas along Canal road and Talab Tillo side of Jammu city.
- ii. Intercity traffic especially army traffic coming from Punjab side and bound for border areas of Poonch and Rajouri passing through Jammu city limits.
- iii. Intercity traffic from rest of the country and bound for Katra Vaishno Devi shrine and other regions (located towards northern side i.e. on Banihal route) passing through Jammu city.

94. In view of the above, this road stretch is heavily traffic stressed despite being the widest road in Jammu city (6-7 lane wide in most of its stretch). More than that, there are six intersections connecting this road with other parts of city within 3.3 km length of the road, from Satwari Chowk to the river Tawi bridge near Bikram Chowk. These are:

- i. Bikram Chowk which is a 5-leg intersection of roads.
- ii. Police Lines junction – It is a T-junction connecting this road with important areas like Railway station, Narwal, Rail head area etc.
- iii. Green Belt junction is again a T-junction connecting Gandhi Nagar and other important areas with this road.
- iv. Gole market Gandhi Nagar junction – It is again a T-junction catering mostly to Gandhi Nagar and Nanak Nagar bound traffic.
- v. Last Mohr Gandhi Nagar is again a T-junction catering mostly to Shastri Nagar, Nanak Nagar bound traffic.
- vi. Satwari road junction – It is a four leg road intersection.

95. A detailed traffic volume survey for Bikram Chowk –Satwari Chowk corridor was conducted by Inter Continental Consultants and Technocrats (ICT) Pvt. Ltd. in 2006. The same data has been adopted for use in design of this sub-project after appropriate projections. As per section 4.1.6 of IRC (Pocket book of Highway Engineers), a compound growth rate of 7.5% per annum (in absence of any previous data) should be assumed. However, RITES, New Delhi, who examined flyover and widening proposal of this subproject road, have suggested a rate of 4% per annum up to 2020 and 3% per annum beyond 2020 for purposes of traffic projections respectively. The same projection rate has been adopted for this subproject proposal. The vehicle-wise percentage of the traffic plying on this corridor is depicted in the **Figure-4**.

96. It is observed that a combination of passenger fast moving vehicles like buses and matadors, load carrier like trucks, cars, van / taxis, auto rickshaws and two wheelers are predominant modes of transport. Cars and two wheelers constitute about 67% of total vehicles using. This road is daily followed by minibuses, buses, trucks and 3-wheelers.

97. The traffic surveys for duration of 24 /36 hours were conducted at several locations on the road to assess the traffic flow characteristics. In context of the travel corridor from Bikram Chowk to Green Belt Park, heavy traffic flows are observed. Distinct peaking of traffic is observed in the morning and evening. The **Table-13** shows the conflicting traffic streams on the junctions.

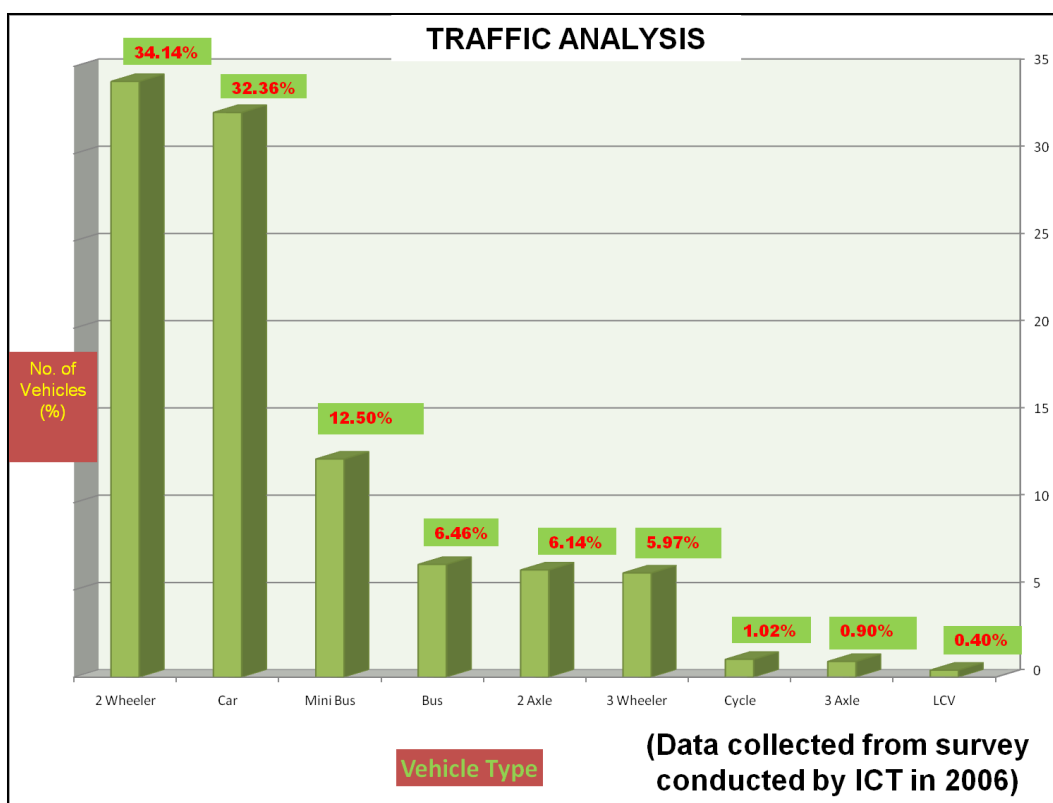


Figure-4: The vehicle-wise percentage of the traffic.

**Table-13: Major conflicting traffic streams on junctions
(Based on traffic volume study conducted in 2006)**

S.No	Name of junction	Traffic on main road		Conflicting traffic from branch roads		Remarks
		Traffic stream	Traffic flow (in PCU)	Traffic stream	Traffic flow (in PCU)	
1	Bikram Chowk	From Tawi bridge towards Satwari Chowk	2709	From University side and bound for old city	1288	Grade separation (flyover) proposed over these three junctions in view of the high intensity of the conflicting traffic
2	Police Line (near Asia Hold)	From Bikram Chowk towards Satwari road	2925	From Gandhi Nagar side and bound for old city	809	
3	Green Belt	From Bikram Chowk towards Satwari road	2295	From Gandhi Nagar side and bound for old city	448	
4	Main Gandhi Nagar Chowk	From Bikram Chowk towards Satwari road	2241	From Gole market side and bound for old city	95	Conflicting traffic intensity is low at these junctions. Hence installation of traffic signals shall suffice to regular traffic
5	Last Morh	From Bikram Chowk towards Satwari road	2177	From Gandhi Nagar side and bound for old city	54	
6	Satwari	From Bikram	-	-	-	Improvement of this intersection

	Chowk	Chowk towards Satwari road				is not part of this sub-project.
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PCU= Passenger car units

(The traffic volume indicated above is for peak Hour flow between 9 A.M. to 10 A.M. Traffic volume as indicated above in the table is based on the traffic survey conducted by ICT in 2006. Projections for traffic have been made at the rate of 4% per annum up to 2020 & 3% for 2020 onwards as suggested by RITES, New Delhi)

98. An average speed of 20-25 km/h is observed on the corridor within the sub-project stretch of road. Intersection delays are observed at Bikram Chowk in peak hours primarily due to conflicting traffic, parking of mini buses and loading /unloading of passengers near the intersections.

99. Detailed turning movement surveys of vehicle at all the six major road intersection locations on this stretch of road between Bikram Chowk to Satwari Chowk were undertaken by ICT in 2006. Same data has been projected at annual growth rate of 4% for 2010, 2015 & 2020 years and 3% from 2020 to 2025 respectively.

100. Peak hour traffic flows at four locations on the corridor at present and in future are presented in **Table-14**.

Table-14: Peak hour traffic at intersections

No.	Location	Peak hour traffic in different years ⁸ Passenger Car Unit (PCU)				
		2006	2010	2015	2020	2025
1	Bikram Chowk to Police Lines Chowk.	6741	7880	9573	11662	13411
2	Police Lines Chowk to Green Belt Chowk.	5724	6697	8128	9903	11487
3	Green Belt Chowk to Main Gandhi Nagar Chowk.	3966	4640	5632	6861	7959
4	Gandhi Nagar Chowk to last Morh Chowk.	3907	4571	5548	6759	7840

101. The above table shows that the projected traffic flow on the stretch of road between Bikram Chowk to Police Lines Chowk during peak hours (9 AM to 10AM) is 7880 PCU in year 2010 i.e more than 7200 PCU permissible for a divided 8 –lane road (see **Table 15**). However this volume of traffic goes on decreasing on other four road stretches as one moves from Bikram Chowk towards Satwari Chowk on this road. The table highlights that this road stretch needs to be widened to 8-lane width to cater to the future traffic load. The traffic projection on the stretch of road between Bikram Chowk to Police Lines Chowk is separately depicted in the **Figure-5** below.

⁸ For projection of traffic volume an annual growth of 4% is assumed up to 2020 and 3% annual growth beyond 2020 as suggested by RITES.

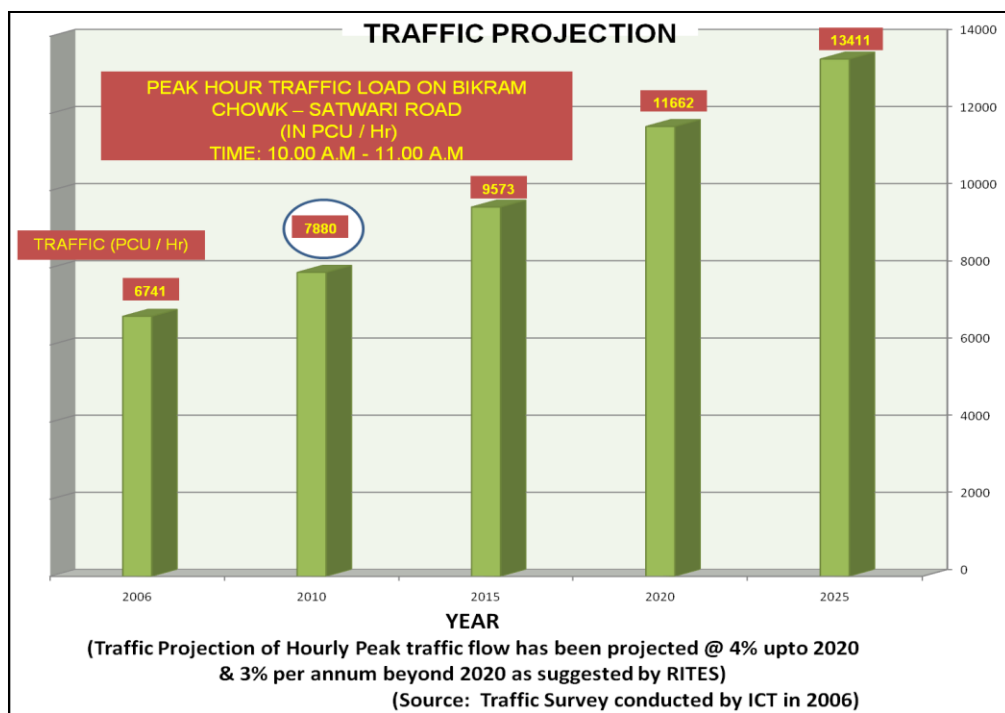


Figure- 5: Traffic projection on the stretch of road between Bikram Chowk to Police Lines Chowk

Table-15: Recommended design service volume for urban roads (in PCU/Hour)
(As per guidelines given in IRC: 106-1990)

S.No	Type of carriageway	Design service volume for different categories of urban roads (PCU/Hour)		
		Arterial	Sub-arterial	Collector
1	2-Lane (one way)	2400	1900	1400
2	2-Lane (Two way)	1500	1200	900
3	3-Lane (one way)	3600	2900	2200
4	4-Lane undivided (Two way)	3000	2400	1800
5	4-Lane divided (Two way)	3600	2900	-
6	6-Lane undivided (Two way)	4800	3800	-
7	6-Lane divided (Two way)	5400	4300	-
8	8-Lane divided (Two way)	7200	-	-

PCU= Passenger Car Unit

102. From the traffic survey, it has been found that at different locations on the corridor, the traffic flows are beyond the capacity of the roads resulting in reduction of level of service on the road and traffic congestion. The situation warrants for enhancing the capacity of the road. Considering the existing traffic demand and future growth of traffic, there is need for widening and grade separated facility on the road corridor.

103. Keeping in line with the above detailed rationale the specific objectives of the proposed subproject are to ensure:

- Decongestion of traffic on the junctions from Bikram Chowk to Green Belt;
- Quick access to Airport from city area;
- Improved connectivity to different city areas in southern Jammu;
- Improved long term traffic management in the city.

D. Social and Cultural Resources

104. **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-16**.

Table-16: Demographic status of Jammu and Kashmir

Division	Population	% Muslim	% Hindu	% Sikh	% Buddhist and other
Kashmir (53.9%)	5,476,970	97.16%	1.84%	0.88%	0.11%
Jammu (43.7%)	4,430,191	30.69%	65.23%	3.57%	0.51%
Ladakh (2.3%)	236,539	47.40%	6.22%	—	45.87%
Jammu and Kashmir	10,143,700	66.97%	29.63%	2.03%	1.36%

Statistics calculated from the 2001 Census India District Profiles

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

106. **Health and Educational Facilities.** Since the subproject sectors are situated in Jammu city. The infrastructure facilities like schools, hospitals, colleges, drinking water supply system, electricity and communication in the subproject area are satisfactory.

107. 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.

108. 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.

109. **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.

110. 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 herdsmen 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.

111. There are no archeological or historical monuments in the immediate vicinity of project 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, Bahu Fort is the nearest with a distance of about 2.19 Km from Bikram Chowk. 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 corridor. The distance of protected monuments/sites from the outer periphery of subproject corridor has been presented in **Table-17**.

Table-17: Distance of protected monuments/sites from the outer periphery of subproject corridor

S. No	A. State Protected monument/site	Distance from outer periphery of subproject site (in Kilometers)
1.	Bahu Fort	2.19
2.	Peer Mitha Tomb, Peer Mitha	1.94
3.	Shahi Mosque, Mast Garh	2.12
4.	Mubarak Mandi Complex	2.70
5.	Mosque at Chak Jaffer	12.22
6.	Royal Bowli at Nandini	18.60
	B. Archaeological Survey of India Protected monument/site	
7.	Fort at Akhnoor	22.61
8.	Remains of Ancient site (Pambaran) at Ambaran, Akhnoor	22.48

112. Jammu is known as 'City of Temples' and as such it is a famous tourist place. Every year a large number of pilgrims enter city to visit the temples. Roughly 7-10 million pilgrims visit Mata Vaishno Devi (about 50 Km from Jammu) and about 0.4 million pass through Jammu every year for Amarnath temple (which is in Srinagar). Besides, tourists also visit Bahu Fort (in Jammu city around 2.19 Km from Bikram Chowk), Raghunath temple (around 1.4 Km from Bikram Chowk), Mansar lake (around 62 Km from Jammu), Surinsar lake (around 35 Km from Jammu). Apart from these, a number of other shrines and temples are situated in Jammu city. The implementation of the subproject shall have no impact on any such site.

113. **Sensitive Environmental Receptors.** The sensitive environmental receptors existing along the alignment of proposed sub-project include religious places, educational institutions, health care centres, community property resources, etc. The details of the existing sensitive environmental receptors are given in the **Table-18** below.

Table -18: Sensitive environmental receptors along the sub-project alignment

S. No.	Name of sensitive receptor	Chainage of alignment (metre)	Distance from the edge of proposed alignment (metre)	Location (LHS/RHS)
1.	Temple	-100	Adjacent	LHS
2.	Temple	-45	Adjacent	RHS
3.	Statue of Lt. Gen. Bikram Singh	0.0	0.0	Bikram Chowk
4.	Temple	100	Adjacent	LHS
5.	Amar Singh Club	140 to 220	Adjacent	LHS
6.	Kala Kendra	160 to 300	Adjacent	RHS

7.	Govt. Polytechnic College	260	120	LHS
8.	Women College Gandhi Nagar	630 to 1170	Adjacent	RHS
9.	Surangal Dev Temple PHE Complex	810	25	LHS
10.	Green Belt Park	880	27.5	LHS
11.	Jammu Health Care & Diagnostics Centre	915 to 930	Adjacent	LHS
12.	Eye clinic (Dr. Sudhir Bhagotra)	1017	25	LHS
13.	SM Retina and Eye Centre	1017	100	LHS
14.	Presentation Convent School	1170 to 1380	Adjacent	RHS
15.	Madaan Nursing Home	1279	100	LHS

LHS= left hand side, RHS= right hand side

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

V. ANTICIPATED IMPACTS AND MITIGATION MEASURES

115. The present report assesses the impacts of the proposed activities on various environmental attributes of the subproject site.

116. **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.

117. 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-19**:

Table-19: Summary of Quantifiers and Qualifiers Used for Assessment Purposes

Duration (time-scale)	Short-term	Impact restricted to construction (0-3 year).
	Medium-term	Impact will continue throughout operation (4-50 years).
	Long-term	Impacts will exist beyond the life of the road (>50 years)
	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%)

118. Categorization of the subproject has been undertaken using ADB's REA Checklist for Roads and Highways.

Planning and Design Phase

119. Planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible. The concepts considered in design of the proposed flyover and road widening are: (i) minimum land acquisition; (ii) improvement on intersections; (iii) adequate vertical clearance; (iv) sufficient carriageway width and lanes; (v) conforming to Indian Road Congress (IRC) and Ministry of Road Transport and Highways (MORTH) provisions and specifications; (vi) most suitable construction methodology; and (vii) site constraints.

120. Salient design features are presented in **Table-20**.

Table-20: Salient design features of the subproject.

Parameter	Design Consideration
Carriage way width	Keeping in mind the traffic projections for next 15-20 years or so, present 6-lane road is to be widened to 8-lane width. To resolve acute traffic conflicts at 4 junctions, grade separation facility in the form of a 4 lane flyover has been proposed. This carriageway width shall cater to smooth movement of traffic.
Vertical clearance	Vertical clearance of 5.5m as per provisions of Indian Road Congress (IRC): 5 and IRC: 54 has been provided at all the road junctions below the flyover for crossing of traffic.
Alignment of flyover	Alignment of road widening and flyover is guided by existing road alignment and use of roadside vacant government lands on either side.
Cross sections	4-lane flyover proposed to be supported on a single pier between Bikram chowk to Police line road stretch to restrict the requirement of land acquisition to minimum.
Span arrangement	Keeping in view the construction methodology and alignment, 20 m simply supported span arrangement has been proposed. However at road junctions, span of 30m and 40m have been proposed for smooth flow of the intercepting traffic
Super-structure	Pre-cast, pre-stressed concrete girders with monolithic Reinforced Cement Concrete (RCC) deck slab over the girders have been proposed for general section of flyover. The girders are monolithic with end cross diaphragm to transfer the loads to sub structure. For individual carriage ways and ramp sections pre-stressed concrete deck slab has been proposed.
Sub-structure	Super-structure shall be supported over the RCC pier cap and pier. Dimension of pier cap in transverse direction has been restricted by projecting the super structure as cantilever to provide the required vertical clearance over service road for minimum land acquisition. As Jammu falls in seismic zone-IV, seismic restrainers in longitudinal as well as in transverse directions over the pier cap have been proposed. Circular type piers have been chosen for better aesthetic look.
Foundation	On the basis of information collected for structures constructed and being constructed in Jammu, open type foundation has been proposed.
Location	A Flyover has been proposed from Bikram Chowk to Government Women College, Gandhi Nagar and road widening from Bikram Chowk to Presentation Convent. The take off point of the Flyover is Tawi Bridge at Bikram Chowk and it terminates at gate of Government Women College, Gandhi Nagar. The length of the corridor is about 1.5 km. Flyover is located in southern part of the main city.
Climatic Conditions	Rainfall intensity and run off may have implications on road safety, affecting the visibility and the condition of the road. Furthermore, climatic conditions play an important role during dispersion of noise and air pollutants. Seasonal climatic conditions have been considered for scheduling of construction activities. The proposed flyover has been designed to minimize

	incidence of road surface flooding and improve road surface storm water drainage. Warning signs and suggested speed limits during dangerous conditions have been included.
Air Quality ⁹	The subproject site is located within the busiest route of Jammu city and is characterized by high volumes of traffic that cut through the area. The project is expected to result in an improvement to road capacity in addition to minimizing congestion. The proposed geometric design will minimize steep gradients and sharp turns and encourage vehicles to travel at a constant, efficient cruising speed.
Drainage and hydrology	The subproject has been designed to drain freely in order to prevent standing water on the road carriageway. Pollutants settling on the road surface and litter will be washed off during rain. 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 where road infrastructure already exists. 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. However, the subproject may affect existing roadside trees. Permission will be obtained from the Forest and Revenue Department /Concerned Deputy Commissioner prior to start of civil works. Any landscaping to be undertaken will be done with locally indigenous species and low maintenance requirements.
Land use and livelihoods	<p>The key efforts undertaken to minimize impacts are: (i) before the preparation of engineering design, a detailed survey of the properties was conducted with regard to their ownership with the objective that minimum proprietary land is utilized for the subproject; (ii) diverting the alignment towards the available government land to minimize impact on private properties and (iii) avoiding land acquisition in the commercial area where ever possible to minimize the large scale physical displacement.</p> <p>The subproject will still require acquisition of 14807.87 square meter (1.4807 hectares) of land, out of which 10208.25 sq.m. is State Land with Government departments, 2858.9 sq.m. is State Land leased out to 04 properties including 01 Government department and 3 (DPs), 44.25 sq.m. is State Land under encroachment (02 DPs), 38.25 sq.m. is State land under squatters (02 DPs) and 1658.22 sq.m. is land required for the relocation of 02 DPs (at SRTC yard). The two affected parties (Paramjeet filling Station and Alson Motors) suffering significant impact on land, and subsequently requiring relocation, shall be rehabilitated on the land of SRTC (State Road Transport Corporation) near Bikram Chowk. A Resettlement Plan has been prepared to address involuntary resettlement impacts.</p>
Traffic flow and access	Due to the location and nature of the subproject, there will be interference with accesses. A Traffic Management Plan (Appendix 2) has been developed to provide vehicle and pedestrian access and maintain community linkages. A communications strategy is of vital importance in terms of accommodating traffic during road closure. Local communities will be continuously consulted regarding location of construction camps, access and hauling routes and other likely disturbances during construction. The road closure together with the proposed detours will be communicated via advertising, pamphlets, radio broadcasts, road signages, etc. The implementation of the road detours will also be dependent on advance road signages indicating the road detour and alternative routes. 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, 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	The noise levels affecting sensitive receptors in proximity of the subproject site may improve

⁹ Roadside pollution is often localized and generally only affects a narrow band of roads along the sides of the road. The major source of roadside pollutants is vehicle exhaust emissions. Other pollution sources emanate from combustion of hydrocarbon fuels in air producing carbon dioxide (CO₂) and secondary pollutants such as hydrocarbons (HC), nitrogen oxides (NO_x), carbon monoxide (CO) and sulphur dioxide (SO₂). Emissions depend on the volume of traffic, the type of vehicle (including age, technology, and maintenance levels of the vehicle), fuel consumption and quality, engine temperature and road geometry. The highest emission rates are encountered in congested, slow moving traffic, and whenever vehicles shift gears, decelerate, accelerate or travel over steep gradients. There is also a tendency for emission rates to increase at high speeds.

	since there will be a separation of traffic through the area. Vibrations are much less likely to be a cause of disturbance than noise levels, but may become a problem when vehicles, especially heavy vehicles, travel over irregular road surfaces in close proximity to sensitive roadside receptors. The proposed geometric design will minimize steep gradients and sharp turns and encourage vehicles to travel at a constant, efficient cruising speed. The proposed road surface design will minimize frictional road noise and vibrations.
Aesthetics, landscape character, and sense of place ¹⁰	The subproject is considered to be compatible with the surrounding landscape and is not likely to impact negatively the existing visual quality or landscape character of the area; rather it is expected to improve the general environment through improved use of the area. The subproject will be similar in construction and design to existing roads and bridges in the area. There will be some additional urban design features (e.g. lighting, etc) to enhance the aesthetics of the structure and its placement in the area. Any areas where visual lines into educational institutions, hotel, residences, etc. are deemed to encroach on privacy, the design team will consider appropriate design measures to ensure privacy is maintained (e.g., erecting fibre or steel sheets along the guard railing of the flyover) in consultation with public.

121. The following table (**Table-21**) 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.

¹⁰ 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 road development with its immediate surroundings. Impacts are not restricted to the road reserve but the entire viewshed (area from where the road development 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-21: 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"> The number of conflicting usages and the high vehicular and pedestrian volumes, result in the City having considerable congestion and delays to pedestrians and vehicles. The high levels of traffic and the lack of suitable pedestrian space as a result of businesses, result in congested pedestrian walkways and overflow onto the road. This together with a lack of adequate enforcement creates an unsafe environment for residents, pedestrians and commuters. The number of conflicting usages and the high vehicular and pedestrian volumes acts as a barrier to redevelopment and growth of the area. In addition, the area serves as a gateway into the City, and detracts from the many positives that the real City has to offer. 	<ul style="list-style-type: none"> The subproject will improve traffic flow through the area in a safe and efficient manner. Relocation of displaced persons to suitable location prior to construction commencing as included in the Resettlement Plan. 	High (-)	Local/ Regional	Medium-term	Full Mitigation Definite	High (+)
Planning initiatives	Planning initiatives have been identified as: <ul style="list-style-type: none"> decongestion of traffic on the road junctions from Bikram Chowk to Green Belt Junction; quick access to the airport from the city area; and improved long-term traffic management in the Jammu City. 	<ul style="list-style-type: none"> The subproject will improve the traffic flow through the area in a safe and efficient manner. This will allow for the planning initiatives to be realized. 	High (-)	Local/ regional	Medium-term	Full mitigation definite	High (+)
Identification of transport needs and demands	The ERA vision is to provide safe, reliable, effective and efficient transport operations which will best meet the needs of the people at improving levels of service and cost	<ul style="list-style-type: none"> The subproject will significantly reduce the number of vehicles routing through the road by providing additional space in terms of flyover. 	High (-)	Local	Medium-term	Full mitigation definite	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
	in a way which supports government strategies for economic and social development, whilst being environmentally and economically sustainable.	<ul style="list-style-type: none"> The reduction of traffic is expected to reduce the number of accidents and potential conflicts that occur within the area, thus saving human life, as well as the economy of the City. Reduced traffic also results in land gains, which can be utilized to enhance the pedestrian space and increase pedestrian amenity. It is envisaged that pedestrian sidewalks and footpaths will be improved and increased in size together with general urban design elements to create an environment that is conducive to pedestrian activity. The reduced traffic congestion, conflicts and land gains result in a more safe and efficient circulation of traffic, which is expected to facilitate the reorganization and rationalization of the public transport system and commercial activities. The future developmental and event needs (tourism) will have better access to and from the City. 					
Alternatives	<p>The following alternatives have been considered:</p> <ul style="list-style-type: none"> Option 1 - Do nothing – This will not address the underlying problem of the traffic congestion and conflicts between vehicles and pedestrians. Option 2 - Do Minimum – This option involves at grade 	<ul style="list-style-type: none"> Approval of the IEE and Environmental Management Plan to ensure proposed mitigation measures are complied with. 	High (-)	Site	Short to Medium-Term	Partial Mitigation Definite	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>improvements to improve safety but still does not address the underlying problem.</p> <ul style="list-style-type: none"> • Option 3 - Route alignment options. These were discounted as the impacts on existing buildings and traffic flows at different locations are observed beyond the capacity of the existing roads • Option 4 - Current preferred option. This offers the best balanced solution. 						

Construction Phase

122. The flyover limbs are proposed to take off/culminate at some distance from the end point of both the bridges on river Tawi. As such, the proposed flyover shall not in any way impact the bridges, river bed or the water course. Hence any special construction methodology and mitigation measures are not required. As per the design, the landing point and take off points of the flyover are at a distance of 13.6m and 25.9m, respectively, from the river bund. The drawing showing starting point of flyover with distances from river bund is given in **Appendix-5**.
123. **Table-22** 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-22: 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"> Construction camp and its associated facilities (including lay-down areas) Storage camps and lay-down areas <ul style="list-style-type: none"> Materials and equipment stockpiles Handling and storage of hazardous materials including chemicals additives, gravel, cement, concrete and lubricants Source of water Vegetation clearance Bulk earthworks, grading and contouring. Drilling Movement of construction staff, equipment and materials Importation of selected materials/base layer construction. <ul style="list-style-type: none"> Construction of a surfaced layout Sub-base and base layers (Excavations, Grading, Importation of fill materials and selected gravel materials for sub-base and base layers, Application of 	<ul style="list-style-type: none"> Bitumen Cement Chemical additives used in concrete / asphalt (i.e. retarders) Paving blocks/bricks Aggregate (sand and stone) Gravel (fill material for embankments/selected material for sub-base and base layers) Water <ul style="list-style-type: none"> Drinking, cooking and sanitation at construction camps Water for dust suppression Water applied to base and sub-base layers during compaction Water for application to sub-base and base layers prior to compaction Petrochemicals Other chemicals/lubricants/paints Construction vehicles, machinery and equipment Temporary energy supply to construction camps Topsoil used during revegetation and rehabilitation Plant material for re-vegetation 	<ul style="list-style-type: none"> Old asphalt (removed from road carriageway during road upgrade)¹¹ Waste concrete and other construction rubble Waste bitumen¹² Used fuels, lubricants, solvents and other hazardous waste General waste Contaminated soil <ul style="list-style-type: none"> Soil contaminated with bitumen Soil contaminated with petrochemicals (i.e. oils and lubricants) and other chemicals Sewage and grey water (temporary construction camp sanitation) Spoil material (excess soil removed during excavations) Noise and vibrations (construction vehicles and machinery) Lighting at construction camps, equipment yards and lay-down areas Plant material removed from servitude/right-of-way during vegetation clearance

¹¹ The upgrading of roads may involve the stripping and demolition of old asphalt layers. Ideally, old asphalt shall be reused during construction of the new road in order to avoid large quantities of waste being produced. However, depending on the availability and cost of virgin aggregate in the area through which the road is aligned, reusing the old asphalt may be more costly than using virgin aggregate.

¹² Bitumen has relatively low levels of polycyclic aromatic hydrocarbons (PAHs) and is largely inert. However, certain other potentially hazardous chemical may be added to the bitumen or to the aggregate during the construction process in order to render the compound more workable. The objective is to use the least hazardous chemicals available and to locate asphalt plants, aggregate stockpiles and mixing areas where they do not pose a significant environmental risk.

Activities and Facilities	Inputs/Resource Use	Outputs/Waste Production
<ul style="list-style-type: none"> water, Compaction and Disposal of spoil material (excess excavated soil) - Construction of wearing course (Asphalt layer, Bitumen seal, Concrete and Paving block) • Temporary detours • Noise and vibrations • Dust suppression • Waste production and temporary storage/disposal i.e. used fuels, waste concrete and bitumen, spoil materials and general waste • Stabilization of slopes and erosion prevention • Use of asphalt/bitumen (and associated storage and mixing areas, chemicals) • Concrete batching plan (and associated storage and mixing areas, chemicals) • Rehabilitation of disturbed areas • Interaction between construction workforce and local communities • Management of the passing pedestrians and points of congestion • Implementation of the Resettlement Plan prior to start of construction • Reminders to affected people of construction with timeframes 	<ul style="list-style-type: none"> (seeds, sods, plant specimens) • Materials for slope stabilisation <ul style="list-style-type: none"> - Concrete - Fibre • Labour <ul style="list-style-type: none"> - Recruitment of construction workforce - Skills training • Public movement control <ul style="list-style-type: none"> - need barriers (not just danger tape) to protect people from trenches during construction 	<ul style="list-style-type: none"> • Smoke and fumes <ul style="list-style-type: none"> - Burning of waste - Burning of vegetation cover - Fires used for cooking and space heating (construction camps) - Vehicle exhaust emissions

124. The following table (**Table-23**) 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-23: 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"> The nature and intensity of rainfall events in an area, has implications for storm water management. Smoke from burning activities could be wider spread on windy days especially when dust could be blown off site. 	<ul style="list-style-type: none"> Seasonal climatic variations will be considered during scheduling of construction activities in the area Excavations and other clearing activities will only be done during agreed working times and permitted weather conditions. Storm water control during construction phase as per the method approved by the Engineer. Seeding of topsoil and subsoil to prevent wind and water erosion of soil surfaces. No open fires permitted on site 	Low (-)	Site	Short-term	Full Mitigation Probable	Low (-)
Air Quality	<ul style="list-style-type: none"> Sensitive receptors (e.g. health facilities, educational institutions, religious places) may be affected temporarily by increased traffic and related impacts during the construction phase. Fugitive dust can also impact roadside air quality during construction. Exhaust fumes from construction machinery, and potential smoke from cooking fires. Burning of waste and cleared vegetation Odors from use of toilet 'facilities' other than provided facilities. 	<ul style="list-style-type: none"> Ensure compliance with the Air Act. Ensure compliance with emission standards. Guidelines that deal with the control of air pollution on site have been outlined in the Environmental Management Plan (EMP). Monitoring of air pollution levels in potential problem areas will be undertaken. Management (including storage, transport, handling and disposal) of hazardous substances used during construction. Dust control measures have been included in the EMP. Dust generating construction activities will be avoided during strong winds. Soil loads in transit will be kept covered Stockpiles of soil will be kept 	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"> • A suitable dust palliative (water) will be applied if dust levels rise above acceptable levels. • Regular servicing of the vehicles off site in order to limit gaseous emissions. • No open fires permitted on site • Temporary toilet facilities will be provided on site and will be maintained on a daily basis. 					
Geology	<ul style="list-style-type: none"> • Strong water flows into open excavations may occur, causing sidewall collapse. • Layers of mixed fill cover natural ground surface in many places. • Contamination from spillage of petroleum products, spent engine oil and oil leaks from construction vehicle maintenance taking place on site. • Contamination through use of toilet 'facilities' other than provided facilities. 	<ul style="list-style-type: none"> • The design of the site drainage system is adequate to control runoff from the subproject site in line with topographical features of the site. • Rehabilitate all sites during construction including construction camps, stockpile area, temporary access and hauling routes, as soon as possible after the disturbance has ceased. • 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. • 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). _. • 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). 	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
		<ul style="list-style-type: none"> Cement, concrete and chemicals will be mixed on a concrete plinth and provisions will be made to contain spillages or overflows into the soil. No vehicle maintenance to be allowed on site. 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). Temporary toilet facilities will be provided by contractor on site and maintained on a daily basis. Topsoil and subsoil will be protected from contamination. Subsoil and overburden in all construction and lay down areas to be stockpiled separately and returned for backfilling in the correct soil horizon order. 					
Drainage and hydrology	<ul style="list-style-type: none"> The proposed development is situated within an existing built up area where road infrastructure already exists. No water courses, wetlands or estuaries occur within the subproject location. Nearest water course is that of River Tawi which is adjacent to the start point of proposed flyover. Due to the nature and locality of the subproject there is unlikely to have any significant impacts on water resources within the immediate area. 	<ul style="list-style-type: none"> The site surface has been engineered and shaped in such a way that rapid and efficient evacuation of runoff is achieved. Improve existing alignments and drainage systems. Provide containment areas for potential pollutants at construction camps, refueling, depots, asphalt plants and concrete batching plants. Waste management practices will be implemented. The transport, storage, handling and disposal of hazardous substances will be controlled and managed. 	Low (-)	Site	Short-term	Full Mitigation Probable	Low (+)
Biodiversity Fauna and	<ul style="list-style-type: none"> The proposed development is situated within an 	<ul style="list-style-type: none"> Permission will be obtained from the Forest /Revenue 	Low (-)	Site	Short-term	Full Mitigation	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
Flora	<p>existing built up area where road infrastructure already exists. 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 impacts on biodiversity within the area</p> <ul style="list-style-type: none"> The proposed construction of the flyover may however affect existing roadside trees. 	<p>Department /Concerned Deputy Commissioner for cutting of trees prior to start of civil works.</p> <ul style="list-style-type: none"> Any landscaping to be undertaken will be done with locally indigenous species and low maintenance requirements. 				Probable	
Land Uses	<ul style="list-style-type: none"> Due to the location and nature of the subproject, there will be interference with access. Existing public transport facilities and operations will be affected by the road closure and detours. Transport operations, commercial establishments and various Department offices are located within the area of construction and few of these will need to be relocated during construction. This may impact livelihoods. There will be disruptions to health services, education services, local businesses, transport services, pedestrian movements, due to traffic and construction related noise, visual, and air pollution. 	<ul style="list-style-type: none"> ERA has consulted with various interested and affected parties, departments, etc. within the area and will be continued during the construction phase. Critical roads (e.g. in front of police lines and health facilities) will have a sign of "Keep Clear". ERA will make provisions for vehicle and pedestrian access to maintain community linkages. Consult with local departments, organizations, etc regarding location of construction camps, access and hauling routes and other likely disturbances during construction. Provide clear and realistic information regarding detours and alternative accesses for local communities and businesses in order to prevent unrealistic expectations. Provide clear and realistic information regarding employment opportunities and other benefits for local communities in order to prevent unrealistic expectations. Make use of local labor, materials, goods and services as far 	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
		as possible. <ul style="list-style-type: none"> • Provide walkways and metal sheets where required to maintain access across for people and vehicles. • Increase workforce in front of critical areas such as educational institutions, place of worship, business establishments and health facilities . • Consult businesses and institutions regarding operating hours and factoring this in work schedules. • Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints. 					
Infrastructure and Services	<ul style="list-style-type: none"> • There is likely to have temporary disruption of infrastructure and services during the construction of the proposed flyover. • 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"> • Utility shifting will be undertaken prior to commencing construction of the flyover. • Keep construction related disturbances to a minimum. • Consult with affected service providers regarding impacts on access to infrastructure and services and alternatives. • Consult with affected communities or businesses prior to foreseeable disruptions, for example notifying residents of a temporary severance of water supply. • Provide backup or alternative services during construction-related disruptions, for example by providing generators for power supply. • Provide access points to infrastructure and services. • Monitor complaints by the 	Medium (-)	Local	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
Traffic	<ul style="list-style-type: none"> Increased volume of construction vehicles on the roads may lead to increased wear and tear of roads in the vicinity of the subproject site. Road safety concerns due to slow moving construction vehicles. Traffic flow within the vicinity will be affected. The temporary road closure will result in a decrease in overall network performance in terms of queuing delay, travel times/speeds. The road closure will impact on a public transport operations and routing. On street parking and loading bays will be affected by the proposed road closure. Pedestrian movements will be affected by the road closure. 	<p>public.</p> <ul style="list-style-type: none"> Traffic will be rerouted and roads will be closed according to the Traffic Management Plan (TMP). The objective of the TMP is to ensure safety of all the road-users along the work zone and to address: (i) protection of work crews from hazards associated with moving traffic; (ii) mitigation of the adverse impact to the road capacity and delays to the road-users; (iii) maintenance of access to adjoining properties; and (iv) issues that may delay the subproject works. Negotiations with privately-owned public transport operators regarding the affected public transport facilities and routing. Negotiations with business owners and social service operations regarding the loss of parking and loading bays. Clear roads signs will be erected for the full length of the construction period. Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints. The City Traffic Police will be available on site in the monitoring of traffic in the early stages of the operations during road closure. A traffic monitoring strategy will be implemented. This would include carrying out of traffic counts and onsite visits. Traffic monitoring during early stages of the road closure will be necessary to address: 	High (-)	Regional	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"> Adjustments to traffic signal settings, signs and markings Adjustments to accommodation of pedestrians Adjustments necessary to public transport operators. A communications strategy is of vital importance in terms of accommodating traffic during road closure. The road closure together with the proposed detour will be communicated via advertising, pamphlets, radio broadcasts, road signage, etc. The implementation of the road detour is also dependent on advance road signage indicating the road detour and alternative routes. Construction routes clearly defined. Access of all construction and material delivery vehicles will be strictly controlled. Enforcement of speed limits. Deliveries will not be allowed during peak traffic hours 					
Health and Safety	<ul style="list-style-type: none"> Danger of construction related injuries. Open fires in construction camp can result in accidents Safety of workers and general public must be ensured. Poor waste management practices and unhygienic conditions at temporary ablution facilities can breed diseases. Standing water due to inadequate storm water drainage systems and inadequate waste management practices, pose a health hazard by providing breeding 	<ul style="list-style-type: none"> Implement good housekeeping practices at the construction camp. Strict health and safety measures to be implemented and audited on a regular basis. Secure enclosed construction site. Hiring of reputable contractors. Provide warning signs of hazardous working areas. Excavations to be clearly demarcated and barriers (not just danger tape) erected to protect 	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>grounds for disease vectors such as mosquitoes, flies and snails.</p> <ul style="list-style-type: none"> • The use of hazardous chemicals in the construction of a road can pose potential environmental, health and safety risks. • The upgrading of roads may involve the stripping and demolition of old asphalt layers. • Road safety may be affected during construction, especially when traffic is detoured. 	<p>pedestrians from open trenches.</p> <ul style="list-style-type: none"> • Workers will be thoroughly trained in using dangerous equipment. • Workers have the right to refuse work in unsafe conditions. • Undertake waste management practices. • Control speed and movement of construction vehicles • Improved signage, speed control, walkways and crossings will reduce health and safety risks due to construction. • Exclude public from the site. • Ensure all workers are provided with and use Personal Protective Equipment. Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas • Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site; • Provide medical insurance coverage for workers; • Provide clean eating areas where workers are not exposed to hazardous or noxious substances; • 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; • Ensure moving equipment is outfitted with audible back-up alarms; • Mark and provide sign 					

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
		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.					
Noise and Vibrations	<ul style="list-style-type: none"> • Sensitive receptors (health facilities, educational institutions , religious places) may be affected temporarily by increased traffic and related impacts • Use of heavy vehicles and equipment may generate high levels of noise. • Vibrations resulting from bulk earthworks and compaction of base layers may create significant disturbances to nearby people and businesses. • Disturbance from afterhours work. 	<ul style="list-style-type: none"> • Locate concrete batching, asphalt, crushing plants, laydown areas and construction camps away from sensitive receptors. • Restrict construction activities to reasonable working hours where near sensitive receptors. • Keep adjacent landowners informed of unusually noisy activities planned. • Regulate roadworthiness of vehicles. • Ensure that machinery is in a good state of maintenance. • Silencers must be fitted and maintained to all machinery on site. • Monitor noise levels in potential problem areas. 	High (-)	Local	Short-term	Partial Mitigation Probable	Medium (-)
Aesthetics, Landscape Character, and Sense of Place	The presence of heavy duty vehicles and equipment, temporary structures at construction camps, stockpiles, asphalt may result in impacts on aesthetics and landscape character	<ul style="list-style-type: none"> • Storage areas will be properly fenced off. • All domestic solid waste will be collected from a central point of disposal and fed into the city waste collection system. • 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. 	Medium (-)	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
		<ul style="list-style-type: none"> • Identification of suitable waste disposal site with enough capacity to hold additional waste to be produced by the proposed road construction activities. • Use of recycled material is encouraged especially in the upgrading of existing road. • Guidelines regarding management of waste on site have been outlined in the EMP. • Retain mature trees on and around the site where possible. • Cluster construction activities on site on a specific area to avoid "sprawl". • Unwanted material and litter will be removed on frequent basis. 					
Workers Conduct	<ul style="list-style-type: none"> • Construction workers on site disrupting adjacent land uses by creating noise, generating litter, and possible loitering. 	<ul style="list-style-type: none"> • Ensure strict control of laborers, minimizing working hours to normal working times, control littering, and ensure no overnight accommodation is provided. 	Low (-)	Local	Short-term	Full Mitigation Definite	Low (-)
Employment Generation	<ul style="list-style-type: none"> • The subproject will provide employment opportunities for local people during construction. • Expectations regarding new employment will be high especially among the unemployed individuals in the area. • Laborers gathering at the site for work can be a safety and security issue, and must be avoided. • The training of unskilled or previously unemployed persons will add to the skills base of the area. 	<ul style="list-style-type: none"> • The use of labor intensive construction measures will be used where appropriate. • Employ local (unskilled) labor if possible. • Training of labor to benefit individuals beyond completion of the subproject. • Recruitment of labors will take place offsite. 	Medium (+)	Local	Short-term	Partial Mitigation Probable	High (+)
Archaeological and Cultural Characteristics	<ul style="list-style-type: none"> • The proposed development will not require demolition of ASI- or state-protected 	<ul style="list-style-type: none"> • Ensure that construction staff members are aware of the likelihood of heritage resources being 					

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
	monuments and buildings.	<p>uneearthed and of the scientific importance of such discoveries.</p> <ul style="list-style-type: none"> ASI or the State Department of Archaeology will be contacted if any graves be discovered and all activities will be ceased until further notice. 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. 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. 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. 					

Operation and Maintenance Phase

125. **Table-24** 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-24: 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"> • Signages • Safety barriers • Lighting • Storm water drainage system • Roadside vegetation • Cut and fill embankments • Vehicles and pedestrians using the road • Road accidents and breakdowns • Vehicle exhaust emissions • Noise and vibrations • Litter collection • Maintenance activities – Road reserve vegetation maintenance (pruning/cutting) – Repainting of road markings – Pothole repair, crack sealing and road shoulder repair – Resealing/resurfacing – Safety barriers repairs – Upkeep and repair of stormwater drainage system • Eradication and control of invasive vegetation species • Auxiliary activities and Infrastructure – Service stations – Roadside markets and shops – Taxi stops and ranks – Bus stops and terminals • Special event management required during operational phase, to manage pedestrian flow (e.g. festivals and holidays) 	<ul style="list-style-type: none"> • Manual de-weeding for eradication and control of invasive vegetation species • Labor • Vehicles and equipment used for inspections and maintenance • Bitumen and aggregate used during resurfacing/repair of potholes • Special event management of pedestrian movement through use of barriers, etc. 	<ul style="list-style-type: none"> • Vehicle exhaust emissions • Dust • Particulates from tires, brake, and road wear • Petrochemical products leaking from vehicles and entering stormwater • Potential for water resource contamination • Hazardous spills during road accidents and breakdowns • Illegal dumping, mainly in open spaces along the roadside • Litter, also entering stormwater system and causing blockages • General waste at roadside stopovers • Visual exposure of road infrastructure • Plant material (removed during maintenance of vegetation cover) • Noise and vibrations • Lighting

126. The following table (**Table-25**) 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-25: 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"> The nature and intensity of rainfall events in an area, has implications for storm water management. The corrosive nature of climatic conditions may impact on road infrastructure, including road side signage and safety barriers. 	<ul style="list-style-type: none"> The designed storm water drainage system will control run-off from site. Provide warning signs and suggested speed limits during dangerous conditions. Regular road side maintenance. 	Low (-)	Site	Medium-term	Partial Mitigation Probable	Low (+)
Air Quality	<ul style="list-style-type: none"> Air pollutants can be inhaled directly from the air, or ingested from touching surfaces or objects where pollutants have settled. Air pollution may increase over time due to gradual increases in traffic volumes on the road. The impacts on air quality to sensitive receptors may improve as a result of the subproject since there will be a separation of traffic through the area. 	<ul style="list-style-type: none"> Ensure compliance with emission standards applicable to the area through which the road is aligned. Enforce speed limits and regulate roadworthiness of vehicles during operation of the road. Monitoring of air pollution levels in potential problem areas will be undertaken. 	Medium (-)	Local	Medium-term	Partial Mitigation Unsure	Low (-)
Geology	<ul style="list-style-type: none"> Roadside soils may be affected by airborne pollutants emitted by vehicle exhausts, leaking petrochemicals during accidents and breakdowns. 	<ul style="list-style-type: none"> Develop emergency response procedures to deal with the containment and clean up of hazardous spills. Design of site drainage system in line with topographical features of the site will control runoff. 	Medium (-)	Site	Long-term	Full Mitigation Possible	Low (-)
Drainage and hydrology	<ul style="list-style-type: none"> Pollutants settling on the road surface may be washed off during rain as runoff. Runoff from roads produces a highly variable discharge in terms of volume and quality. 	<ul style="list-style-type: none"> Design of site drainage system in line with topographical features of the site will control runoff. Waste management practices will be implemented during operation of the road. 	Low (-)	Local	Long-term	Partial Mitigation Definite	Low (+)
Land Uses	<ul style="list-style-type: none"> The flyover will have positive impacts both on a local and regional context in terms of road improvements and an improved 	<ul style="list-style-type: none"> Special events management such as festivals and holidays will require extra policing and barriers to control movement of pedestrians 	High (+)	Local	Long-term	No Mitigation Required	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>transportation regime.</p> <ul style="list-style-type: none"> Reduced traffic results in land gains, which can be utilized to enhance the pedestrian space and increase pedestrian amenity. The proposed project is expected to facilitate closer interaction between the various land parcels and to allow an integrated development approach to the area thereby improving the overall quality of life. The proposed development is expected to bring about positive economic benefits in the medium- to long- term. Local road side businesses, public transport, education and health facilities, etc are likely to benefit from the subproject. It is envisaged that as a result of this project, pedestrian sidewalks and footpaths will be improved and increased in size together with general urban design elements to create an environment that is conducive to pedestrian activity. This will improve the safety of pedestrians while making markets more accessible. Access into and through the area will be improved. The future developmental and event needs (festivals and holidays) will have better access to and from the City. The proposed development is likely to impact positively on commercial activities within the 	during peak traffic flows.					

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
	subproject area and surroundings through improved access and rationalization of the area available for commercial activities.						
Traffic	<ul style="list-style-type: none"> • Significant reduction in the number of vehicles routing through the road at grade by approximately 40%. • The reduction in traffic is expected to reduce the number of accidents and potential conflicts that occur within the area, thus saving human life. • Reduced traffic also results in land gains, which can be utilized to enhance the pedestrian space and increase pedestrian amenity. • The reduced traffic congestion, conflicts and land gains result in a more safe and efficient circulation of traffic, which is expected to facilitate the reorganization and rationalization of the public transport system and commercial activities. • Traffic increase relate to impacts such as noise and air pollution (refer to discussion below). 	<ul style="list-style-type: none"> • No mitigation required 	High (+)	Regional	Long-term	No Mitigation Required	High (+)
Health and Safety	<ul style="list-style-type: none"> • The reduction of traffic is expected to reduce the number of accidents and potential conflicts that occur within the area, thus improving public safety of road users. • The reduced traffic congestion, conflicts and land gains will result in a more safe and efficient circulation of traffic. 	<ul style="list-style-type: none"> • Undertake regular road maintenance to avoid unacceptable degradation of carriageway and road shoulder that may create dangerous road conditions. • Impose speed limits through urban areas. • Provide pedestrian walkways and crossings. • Provide roadside safety signage. • Monitor road accident 	High (+)	Local	Long-term	Partial 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
		statistics, state of fencing and roadside vegetation					
Noise and Vibration	<ul style="list-style-type: none"> Noise pollution caused by existing road traffic, and additional traffic with the new flyover. Expected increase in noise due to increased traffic is not expected to impact significantly on the current ambient noise levels. Vibrations are much less likely to be a cause of disturbance than noise levels, but it may become a problem when vehicles, especially heavy vehicles, travel over irregular road surfaces in close proximity to sensitive roadside receptors 	<ul style="list-style-type: none"> Encourage vehicles to travel at a constant, efficient cruising speed. Ensure appropriate road surface design and regular maintenance to minimize frictional road noise and vibrations, especially for heavily used roads near sensitive receptors. Regulate roadworthiness of vehicles. Monitor noise levels in potential problem areas. 	Medium (-)	Local	Long-term	Partial Mitigation Possible	Low to Medium (-)
Aesthetics, Landscape Character, and Sense of Place	<ul style="list-style-type: none"> 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; rather it is expected to improve the general environment through better use of the area. The Flyover will increase the quality of the tourism experience being offered, by enhancing the sense of place of the subproject area (it is anticipated that the subproject will result in improved safety and aesthetics). 	<ul style="list-style-type: none"> The proposed flyover will be similar in construction and design to existing bridges in the area. There will be some additional urban design features (e.g. lighting, etc) to enhance the aesthetics of the structure and its placement in the area. Provide waste disposal facilities and enforce anti-littering campaigns. Provide assistance with cleaning and maintenance of roadside buildings soiled or stained by air pollutants. Monitor housekeeping, littering and illegal dumping. 	Low (+)	Local	Long-term	Partial Mitigation Probable	Medium (+)

Cumulative Environmental Impacts

127. **Table-26** 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. Cumulative impacts are identified, predicted in the same level of detail as the impacts discussed above.

Assessment of No-Go (No Build) Option

128. **Table-27** outlines potential impacts associated with the “No-Go” option. The No-Go option involves no additional commitment of resources. Choosing the No-Go option has the same effect as if the decision never occurred.

Table-26: 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
The removal of extraneous traffic and increasing pedestrian amenity.	<ul style="list-style-type: none"> The reduction of traffic by approximately 40% would result in reduced number of accidents and potential conflicts, thus saving human life as well as the economy of the region. In addition, the barriers that the sea of traffic currently creates is removed, thus allowing closer interaction between the various land parcels and allowing an integrated development approach to the area and improving the overall quality of life. 	<ul style="list-style-type: none"> Refer to tables above 	High (-)	Site/Local	Long-term	Full Mitigation Definite	High (+)
The rationalization and reorganization of public transport and commercial activities	<ul style="list-style-type: none"> 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. The proposal for construction of flyover and road widening goes a long way in achieving some of the goals of a good public transport system. The direct integration of different modes of road transport like buses, taxis, auto rickshaws, etc. results in coordination and integration of the various modes being achievable, as well as ensuring that the public transport system is commuter orientated and friendly in view of the high number of transfer trips. 	<ul style="list-style-type: none"> Refer to tables above 	High (-)	Site/Local	Long-term	Full Mitigation Definite	High (+)
The rationalization and revitalisation of land uses	<ul style="list-style-type: none"> The expected land gains as well as the reduction of traffic through the area allows for the area to be redeveloped and revitalized in a coordinated and integrated manner, ensuring connectivity between the various land uses, greater pedestrian/open spaces, general urban redesign of the appearance of the area to create a better quality environment for people. Improved gateway to the City 	<ul style="list-style-type: none"> Refer to tables above 	High (-)	Site/Local	Long-term	Full Mitigation Definite	High (+)

Table-27: 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"> No obvious impacts 	<ul style="list-style-type: none"> n/a 					
Air Quality	<ul style="list-style-type: none"> Will remain the same No impacts on sensitive receptors during construction 	<ul style="list-style-type: none"> None 	Medium (-)	Local			Medium (-)
Geology	<ul style="list-style-type: none"> No obvious impacts 	<ul style="list-style-type: none"> n/a 					
Drainage and hydrology	<ul style="list-style-type: none"> No obvious impacts 	<ul style="list-style-type: none"> n/a 					
Land Use	<ul style="list-style-type: none"> The subproject area will remain fragmented with high volumes of traffic, pedestrians and commercial activities competing for limited space. The number of conflicting usages and the high vehicular and pedestrian volumes will continue to act as a barrier to redevelopment and growth of the area. The fragmentation of activities, in particular the public transport ranks, will remain inefficient, inconvenient and unsafe. Lack of defined and dedicated trading space to cater for demand will continue to result in trading operating at undesirable locations, exacerbating problems of congestion and urban degradation. 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. 	<ul style="list-style-type: none"> None 	High (-)	Local	Long-term		High (-)
Traffic	<ul style="list-style-type: none"> The number of conflicting usages and the high vehicular and pedestrian volumes, will continue to result in considerable congestion and delays to pedestrians and vehicles The high risk of accidents to traffic users and pedestrians will remain. Access to future developmental 	<ul style="list-style-type: none"> None 	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
	and event needs to and from the City will continue to be a problem.						
Health and Safety	<ul style="list-style-type: none"> The high levels of traffic and the lack of suitable pedestrian space will continue to result in congested pedestrian walkways and overflow onto the road. This together with a lack of adequate enforcement will continue to create an unsafe environment for residents, pedestrians and commuters resulting to accidents. 	<ul style="list-style-type: none"> None 	High (-)	Local	Long-term		High (-)
Noise Pollution	<ul style="list-style-type: none"> Noise pollution will remain the same. No impacts on sensitive receptors during construction 	<ul style="list-style-type: none"> None 	Medium (-)	Local	Long-term		Medium (-)
Aesthetics, Landscape Character and sense of place	<ul style="list-style-type: none"> Likely to deteriorate as more land uses compete for limited space leading to visual degradation in terms of congestion, litter, and lack of pedestrian space 	<ul style="list-style-type: none"> None 	Medium (-)	Local	Long-term		Medium (-)

VI. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

A. Public participation during the preparation of the IEE

129. 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.

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

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

131. Different techniques of consultation with stakeholders were used during project preparation (interviews, public meetings, group discussions, etc). Questionnaire was designed and environmental information was collected. Apart from this, a series of public consultation meetings were conducted during the subproject preparation. Various forms of public consultations (consultation through adhoc discussions on site) have been used to discuss the subproject and involve the community in planning the subproject design and mitigation measures.

B. Notification of Potential Interested and Affected Parties

132. Since, the project corridor spans over 1.5 km only, as such means of mass information dissemination about the consultations were not necessary. However, 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 predrafted interview schedule. Key respondents included project affected persons, shopkeepers/businessmen from the project area, in addition to daily commuters consulted randomly. In addition to a number of informal consultations conducted regularly in the project corridor, a total of 30 people, selected on a stratified basis to ensure diversified representation, were formally interviewed with the help of an interview schedule from 20.06.2011 to 06.07.2011. Issues discussed and feedback received along with details of date, time, location and list of participants are given in **Appendix-3**. To ensure that people impacted directly due to the subproject are taken on board on issues relating to their compensation entitlements and rehabilitation a number of one to one formal meetings were organized by ERA with Paramjeet Filling Station, Alson Motors and members of the Divisional Level Committee formed by Government of J and K for the implementation of Resettlement Plans. The minutes of meeting conducted on 06.06.2011 with lists of participants is given in **Appendix-3**. Communication with interested and affected parties (I&APs) was by telephone and direct

communication in order to obtain the necessary background information to compile this report. The records of public consultations are annexed as **Appendix 3**.

C. Future Consultation and Disclosure

133. 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:

1. Consultation during detailed design

134. Focus-group discussions with affected persons and other stakeholders to hear their views and concerns, 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.

135. ERA will conduct information dissemination sessions at major intersections and solicit the help of the local community leaders/prominent citizens to encourage the participation of the people to discuss various environmental issues.

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

2. Consultation during construction:

137. Public meetings with affected communities (if any) and other stakeholders to discuss and plan work programs and allow issues to be raised and addressed once construction has started; and

138. 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.

3. Project disclosure

139. A communications strategy is of vital importance in terms of accommodating traffic during road closure. Local communities will be continuously consulted regarding location of construction camps, access and hauling routes and other likely disturbances during construction. The road closure together with the proposed detours will be communicated via advertising, pamphlets, radio broadcasts, road signages, etc.

140. Public information campaigns via newspaper/radio/TV, 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.

141. For the benefit of the community the Summary of IEE will be translated in the local language and made available at: (i) ERA office; (ii) District Magistrate Office; and, (iii) PMU/PIU. It will be ensured that the hard copies of IEE are kept at such places 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 distributed to any person willing to consult the IEE.

VII. GRIEVANCE REDRESSAL MECHANISM

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

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

143. 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 also lodge their complaints online at <http://www.jkgrievance.nic.in>.

144. 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 sub-project 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 sub-project sites.

VIII. ENVIRONMENTAL MANAGEMENT PLAN

145. 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/ PSC. The EMP identifies the three phases of development as: (i) Site Establishment and Preliminary Activities; (ii) Construction Phase; and (iii) Post Construction/Operational Phase.

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

147. A copy of the EMP must 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. It shall be noted that the Supreme Court of India¹³ mandates 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).

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

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

A. Institutional Arrangement

149. 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 Support Consultants (PSC). ERA will be the executing agency.

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

151. 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

¹³ Writ petition no 657 of 1995. The Supreme Court, in its order dated Feb.4, 2005, that "The Polluter Pays Principle means that absolute liability of harm to the environment extends not only to compensate 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."

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 PSC). 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/local laws and regulations and in accordance with ADB's environmental policy and guidelines.

152. ERA (PMU and PIU)

- Complies with all applicable legislation and is conversant with the requirements of the EMP;
- 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;
- 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 ;
- 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 fails to comply with the said environmental specifications.

153. Project Support Consultants (PSC)

- Conversant with the requirements of the EMP and all applicable legislation.
- Monitors the implementation of EMP on site and recommends requisite measures in case of non-compliances to ERA.
- Conducts monitoring through environmental monitoring laboratory in consultation with Safeguards Unit of ERA and the Engineer.

154. The Engineer (DSC)

- Complies with all applicable legislation and is conversant with the requirements of the EMP;
- Arranges information meetings for and consults with interested and affected parties about the impending construction activities;
- 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.
- Enforces and monitors compliance with the requirements of EMP on site;
- Assesses the Contractor's environmental performance in consultation with the Environmental Expert (of DSC) ;
- Documents in conjunction with the Contractor, the state of the site prior to commencing construction activities.

155. Environmental Expert of Engineer (DSC)

- Briefs the Contractor about the requirements of the Environmental Specification and/or EMP, as applicable;
- Advises the Engineer about the interpretation, implementation and enforcement of the Environmental Specifications and other related environmental matters;

- Monitors and reports on the performance of the contractor/project in terms of environmental compliance with the EMP to the Engineer and ERA; and
- Provides technical advice relating to environmental issues to the Engineer.

156. The Contractor

- Complies with all applicable legislation, is conversant with the requirements of the EMP, and briefs staff about the requirements of same;
- 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;
- 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;
- Provides environmental awareness training to staff;
- Bears the costs of any damages/ compensation resulting from non-adherence to the EMP or written site instructions;
- Conducts all activities in a manner that minimizes disturbance to directly affected residents and the public in general, and foreseeable impacts on the environment.
- Ensures that the Engineer is timely informed of any foreseeable activities that will require input from the Environmental Expert (of Engineer).
- Appoints one full time Environmental Safeguard Officer for implementation of EMP, community liaisoning, reporting and grievance redressal on day to day basis.
- Receives complaints/grievances from public, immediately implements the remedial measures and reports to the Engineer (DSC) within 48 hours.

B. Capacity Building

157. Training and orientation programmes shall be organized by the Environmental Experts of Engineer (DSC), PSC and ERA for the contractors, labourers, 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, public consultation and participation, health and safety measures, grievance redressal mechanism and implementation of EMP.

158. **Table-28** outlines the site establishment and preliminary activities.

Table-28: Site Establishment and Preliminary Activities

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
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
		Proof of compliance to Air Act must be forwarded by the contractor to PMU/PIU (in relation to hot mixing, stone crushers, diesel generators, etc.)	Engineer	Prior to moving onto site and during construction
		A copy of the EMP must be kept on site during the construction period	Environmental Expert of Engineer (EE)	At all times
2.	Access to Site	Access to site will be via existing roads. The Contractor will need to ascertain the existing condition of the roads and repair	Engineer	Prior to moving onto site and during

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		damage that shall occur due to construction.		construction
		The Local Traffic Police Department shall be involved in the planning stages of the road closure and detour and available on site in the monitoring of traffic in the early stages of the operations during road closure.	Engineer	Prior to moving onto site
		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
		The Contractors must comply with the recommendations from the traffic study. Layout design shall accommodate the impact on existing traffic flow patterns (e.g. access points).	Engineer	Prior to moving onto site
		The location of all affected services and servitudes must be identified and confirmed.	Engineer	Prior to moving onto site
		All roads for construction access must be planned and approved by the Engineer and its Environmental Expert ahead of construction activities. They shall not be created on an ad-hoc basis.	Engineer	Prior to moving onto site and during construction.
		No trees/shrubs/groundcover may be removed or vegetation stripped without the prior permission of the Engineer/Environmental Expert.	Engineer/EE	Before and during construction.
		Agreed turning areas for haulage vehicles are to be formalized and used by the Contractor. No turning maneuvers other than at the designated places shall be permitted.	Engineer	Prior to moving onto site.
		Contractors shall construct formal drainage on all temporary haulage roads in the form of side drains to prevent erosion and point source discharge of run-off.	Engineer	Prior to moving onto site.
3.	Setting up of Construction Camp ¹⁴	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
		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
		If the Contractor chooses to locate the camp site on private land, he must get prior permission from both the Engineer and the landowner.	Engineer	During site establishment and ongoing – weekly

¹⁴ 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
				inspections
		In most cases, on-site accommodation will not be required. The construction camp can thus be comprised of: <ul style="list-style-type: none"> • site office • ablution facilities • designated first aid area • eating areas • staff lockers and showers (where water and waterborne sewers are available) • storage areas • batching plant (if required) • refueling areas (if required) • maintenance areas (if required) • crushers (if required) 	Engineer	During set-up
		Cut and fill must be avoided where possible during the set up of the construction camp.	Engineer	During site set-up
		The camp must be properly fenced off and secured	Engineer	During site establishment and ongoing – weekly inspections
		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
		Under no circumstances may open areas or the surrounding bush be used as a toilet facility.	Engineer	Ongoing
		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
		Bins shall have liner bags for efficient control and safe disposal of waste	EE	Ongoing
		Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged.	EE	During site set-up and ongoing
4.	Establishing Equipment Lay-down and Storage Area ¹⁵	Choice of location for equipment lay-down and storage areas must take into account prevailing winds, distances to adjacent land uses, general on – site topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary	EE	During site set-up
		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

¹⁵ Storage areas can be hazardous, unsightly and can cause environmental pollution if not designed and managed carefully.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		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
		Equipment lay-down and Storage areas must be designated, demarcated and fenced if necessary.	EE	During site set-up
		Fire prevention facilities must be present at all storage facilities	EE	During site set-up
		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 area(s). 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
		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
		Fuel tanks must meet relevant specifications and be elevated so that leaks may be easily detected.	Engineer and Contractor	During site setup and monitored
		Material Safety Data Sheets (MSDSs) shall be readily available on site for all chemicals and hazardous substances to be used on site. Where possible the 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
		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 is made aware of the health risks associated with any hazardous substances used and has been provided with the appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training	EE and Contractor	Ongoing
		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

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
5.	Materials Management – Sourcing ¹⁶	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
		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
		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
6.	Education of site staff on general and Environmental Conduct ¹⁷	Ensure that all site personnel have a basic level of environmental awareness training.	EE and Contractor	During staff induction and ongoing
		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
		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
		All employees must undergo safety training and wear the necessary protective clothing.	EE and Contractor	During staff induction, followed by ongoing monitoring
		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"> • No alcohol / drugs to be present on site; • Prevent excessive noise • 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 bush as a toilet facility are forbidden) • No fires to be permitted on site • Trespassing on private / commercial properties adjoining the site is forbidden 	EE and Contractor	During staff induction, followed by ongoing monitoring

¹⁶ Materials must be sourced in a legal and sustainable way to prevent offsite environmental degradation.

¹⁷ These points need to be made clear to all staff on site before the subproject begin.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		<ul style="list-style-type: none"> Other than pre-approved security staff, no workers shall be permitted to live on the construction site No worker may be forced to do work that is potentially dangerous or for what he / she is not trained to do 		
6.	Social Impacts ¹⁸	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
		A communications strategy is of vital importance in terms of accommodating traffic during road closure. The road closure together with the proposed detour needs to be communicated via advertising, pamphlets, radio broadcasts, road signage, etc.	Engineer and EE	Prior to moving onto site and ongoing
		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
		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.
		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.
		Special attention shall be given to the screening of highly reflective materials on site.	EE	During site set-up
7.	Noise Impacts	Construction vehicles are to be fitted with standard silencers prior to the beginning of construction.	Contractor	
		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	
8.	Dust/Air Pollution ¹⁹	Vehicles travelling along the access roads must adhere to speed limits to	EE	Ongoing.

¹⁸ 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.

¹⁹ Establishment of the camp site, and related temporary works can reduce air quality.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		avoid creating excessive dust.		
		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
		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.
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.
		Wind screening and stormwater control shall be undertaken to prevent soil loss from the site.	Engineer and EE	During site set-up
		Procedures that are in place to conserve topsoil during the construction phase of the 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.	Engineer and EE	Daily monitoring during site set-up
10.	Stormwater ²⁰	To prevent stormwater damage, the increase in storm water run-off resulting from construction activities must be estimated and the drainage system assessed accordingly. A drainage plan must be submitted to the Engineer for approval and must include the location and design criteria of any temporary stream crossings (siting and return period etc).	Engineer	During surveys and preliminary Investigations.
		During site establishment, stormwater culverts and drains are to be located and covered with metal grids to prevent blockages if deemed necessary by the Engineer. (e.g. due to demolition work).	Engineer	During site setup.
		Temporary cut off drains and berms may be required to capture stormwater and promote infiltration.	Engineer and EE	During site setup.
11.	Water Quality ²¹ .	Storage areas that contain hazardous substances must be bunded with an approved impermeable liner	Engineer	During site setup.
		Spills in bunded areas must be cleaned up, removed and disposed of safely from the bunded area as soon after detection as possible to minimise pollution risk and reduced bunding capacity.	Engineer and EE	During site setup.
		A designated, bunded area is to be set aside for vehicle washing and maintenance. Materials caught in this bunded area must be disposed of to a suitable waste site or as directed by the	Engineer and EE	During site setup.

²⁰ Serious financial and environmental impacts can be caused by unmanaged stormwater.

²¹ 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
		Engineer		
		Provision shall be made during set up for all polluted run off to be treated to the Engineer's approval before being discharged into the stormwater system. (This will be required for the duration of the project.)	Engineer and EE	During site setup and to be monitored weekly
12.	Conservation of the Natural Environment ²²	No vegetation may be cleared without prior permission from the Engineer.	Engineer and EE	During site setup and ongoing.
		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
		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
13.	Set-up of Waste Management Procedure	The excavation and use of rubbish pits on site is forbidden	EE	Ongoing
		Burning of waste is forbidden.	EE	Ongoing
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.
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 to local residents or businesses.	Engineer	During site set-up
		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
		Flammable materials shall be stored as far as possible from adjacent residents / businesses.	Engineer and EE	Ongoing
		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"> • stringing of power lines • earthworks / earthmoving machinery on steep slopes above houses / infrastructure • risk to residences along haulage roads / access routes 	Engineer and EE	24 hours prior to activity in question

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

²² 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.

159. **Table-29** outlines management of construction activities and workforce.

Table-29: Management of Construction and Workforce Activities

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
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.
		Contractors shall ensure that access roads are maintained in good condition by attending to potholes, corrugations and stormwater damage as soon as these develop.	Engineer	Weekly inspection.
		If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have been spilt.	Contractor	When necessary
		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.
		Cognizance of vehicle weight / dimensions must be taken when using access constructed out of certain materials. e.g. paved surfaces / cobbled entranceways.	Engineer	Ongoing monitoring.
2.	Maintenance of Construction Camp	The Contractor must monitor and manage drainage of the camp site to avoid standing water and soil erosion.	Engineer	Ongoing monitoring.
		Run-off from the camp site must not discharge into neighbors' properties.	Engineer	Ongoing monitoring.
		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
		The Contractor is to ensure that open areas or the surrounding bush are not being used as a toilet facility.	Contractor	Weekly inspection
		The Contractor shall ensure that all litter is collected from the work and camp areas daily.	Contractor	Ongoing monitoring.
		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
		The Contractor shall ensure that all litter is collected from the work and camp areas daily.	Contractor	Ongoing monitoring.
		Eating areas shall be regularly serviced and cleaned to ensure the highest possible standards of hygiene and cleanliness.	Contractor	Daily monitoring.
		The Contractor shall ensure that his camp and working areas are kept clean and tidy at all times.	Contractor and Engineer	Weekly monitoring
3.	Staff Conduct	The Contractor must monitor the performance of 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 behavior that are unclear.	Contractor and Engineer	Ongoing monitoring.
		The rules that are explained in the worker	Contractor	Ongoing monitoring.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		conduct section, must be followed at all times	and Engineer	
4.	Dust and Air Pollution ²³	Vehicles travelling to and from the construction site must adhere to speed limits so as to avoid producing excessive dust.	Engineer	Ongoing monitoring.
		A speed limit of 30km/hr must be adhered to on all dirt roads.	Engineer	Ongoing monitoring.
		Access and other cleared surfaces must be dampened whenever possible and especially in dry and windy conditions to avoid excessive dust.	Engineer	Ongoing monitoring.
		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.
		Vehicles and machinery are to be kept in good working order and to meet manufacturers specifications for safety, fuel consumption, etc.	Contractor	Ongoing monitoring.
		Should excessive emissions be observed, the Contractor is to have the equipment seen to as soon as possible.	Engineer	As directed by the engineer.
		No fires are allowed on site except for the burning of firebreaks.	Engineer	Ongoing monitoring.
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.
		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.
		Top soiling and revegetation shall commence immediately after the completion of an activity and at an agreed distance behind any particular work front.	Contractor	As each activity is completed.
		Stormwater control and wind screening shall be undertaken to prevent soil loss from the site.	Engineer	Ongoing monitoring.
		Side tipping of spoil and excavated materials shall not be permitted – all spoil material shall be disposed of as directed by the Engineer. ²⁴	Engineer	Ongoing monitoring.
		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.
		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	Engineer	Immediately after the creation of the embankment/stripping of vegetation.

²³ Main causes of air pollution during construction are dust from vehicle movements and stockpiles, vehicle emissions and fires.

²⁴ Estimated total volume of unused excavated material to be disposed is 27,950 cubic meters.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		erosion.		
6.	Stormwater	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"> • Removal of riparian vegetation • Opening up of the stream channel 	Contractor	Ongoing monitoring.
		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 stormwater channels, drainage lines or rivers.	Engineer	Monitoring throughout the duration of the project.
		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.
		The use of high velocity stormwater pipelines shall be avoided in favor of open, high friction, semi-permeable channels wherever feasible.	Engineer and Contractor	As directed by the engineer
		A number of smaller stormwater outfall points shall be constructed rather than a few large outfall points.	Engineer and Contractor	As directed by the engineer
		Stormwater outfalls shall be designed to reduce flow velocity and avoid streambank and soil erosion.	Engineer and Contractor	As directed by the engineer
		During construction un-channeled 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.
		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.
7.	Water Quality ²⁵	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)
		Every effort shall be made to ensure that any	Contractor	Regular monitoring (refer

²⁵ 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
		chemicals or hazardous substances do not contaminate the soil or ground water on site.		to the environmental monitoring program)
		Care must be taken to ensure that run-off from vehicle or plant washing does not enter the 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)
		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 instead be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting etc.	Contractor	Regular monitoring (refer to the environmental monitoring program)
		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
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.
		Only trees that have NOT been marked beforehand are to be removed.	Contractor	Ongoing monitoring.
		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.
		The hunting of birds and animals on site and in surrounding areas is forbidden.	Contractor	Ongoing monitoring.
		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.
		Alien vegetation encroachment onto the site as a result of construction activities must be controlled during construction.	Contractor	Twice-monthly monitoring.
		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.
9.	Materials Management	Stockpiles shall not be situated such that they obstruct natural water pathways.	Engineer and Contractor	Location as directed by the engineer
		Stockpiles shall not exceed 2m in height unless otherwise permitted by the Engineer.	Engineer	Location as directed by the engineer
		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 bases.	Contractor	As necessary
		Stockpiles shall be kept clear of weeds and alien vegetation growth by regular de-weeding.	Contractor	Monthly monitoring
		All concrete mixing must take place on a designated, impermeable surface.	Contractor	Ongoing monitoring.
		No vehicles transporting concrete to the site	Contractor	Ongoing monitoring.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		may be washed on site		
		No vehicles transporting, placing or compacting asphalt or any other bituminous product may be washed on site.	Contractor	Monthly monitoring.
		Lime and other powders must not be mixed during excessively windy conditions.	Contractor	As necessary
		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.
		Hazardous substances / materials are to be transported in sealed containers or bags.	Engineer and Contractor	Ongoing monitoring
		Spraying of herbicides / pesticides shall not take place under windy condition	Contractor	As necessary.
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.
		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.
		Littering on site is forbidden and the site shall be cleared of litter at the end of each working day.	Contractor	Ongoing monitoring.
		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.
		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.
		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.
		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.
		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.
		A sump (earth or other) must be created for concrete waste. This is to be de-sludged regularly and the cement waste is to be removed to the approved disposal site	Engineer and Contractor	Ongoing monitoring.
11.	Social Impacts ²⁶	Contractor's activities and movement of staff to be restricted to designated construction	Engineer	Ongoing.

²⁶ 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
		areas.		
		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.
		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.
		Disruption of access for local residents must be minimized and must have the Engineer's permissions.	Engineer	Ongoing monitoring.
		Provide walkways and metal sheets where required to maintain access across for people and vehicles.	Contractor	Ongoing monitoring
		Increase workforce in front of critical areas such as educational institutions, place of worship, business establishment and health care establishments.	Contractor	Ongoing monitoring
		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.
		The Contractor is to inform neighbors in writing of disruptive activities at least 24 hours beforehand. This can take place by way of leaflets placed in the postboxes 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.
		Lighting on the construction site shall be pointed downwards and away from oncoming traffic and nearby houses.	Engineer	Ongoing monitoring.
		The site must be kept clean to minimize the visual impact of the site	Engineer	Weekly monitoring.
		If screening is being used, this must be moved and re-erected as the work front progresses.	Engineer	Ongoing monitoring.
		Machinery and vehicles are to be kept in good working order for the duration of the project to minimize noise nuisance to neighbors.	Contractor	Ongoing monitoring.
		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"> noise generated by jackhammers, diesel generator sets, excavators, etc. drilling dewatering pumps 	Engineer and Contractor	At least 24 hrs prior to the activity taking place.
		Noisy activities must be restricted to the times given in the Project Specification or General Conditions of Contract.	Engineer	Ongoing monitoring.
		The Engineer and Contractor are responsible for ongoing communication with those people that are interested in / affected by the project.	Engineer and Contractor	

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		A complaints register (refer to the Grievance 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.	Contractor and Engineer	Monthly monitoring.
		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.
		Queries and complaints are to be handled by: <ul style="list-style-type: none"> - documenting details of such communications • submitting these for inclusion in complaints register • bringing issues to Engineer's attention immediately • taking remedial action as per Engineer's instruction 	Contractor	Ongoing monitoring.
		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"> • explain construction process • answer questions 	Contractor	Ongoing monitoring.
		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
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.
		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.
13.	Environment Safeguard Officer	Contractor shall appoint one Environment Safeguard Officer who shall be responsible for assisting contractor in implementation of EMP, community liaisoning, 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.

ASI = Archeological Survey of India; EE = Environmental Expert of Engineer (DSC)

160. **Table-30** outlines the post-construction activities.

Table-30: Post Construction Activities

	Activities	Management/Mitigation	Responsible for Monitoring	Frequency
1.	Construction Camp	All structures comprising the construction camp are to be removed from site.	Engineer	Subproject completion
		The area that previously housed the construction camp	Engineer	Subproject

	Activities	Management/Mitigation	Responsible for Monitoring	Frequency
		is to be checked for spills of substances such as oil, paint etc. and these shall be cleaned up.		completion
		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
		The Contractor must arrange the cancellation of all temporary services.	Engineer	Subproject completion
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
		Open areas are to be re-planted as per the revegetation specification.	Engineer	Subproject completion
		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
		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
3.	Land Rehabilitation	All surfaces hardened due to construction activities are to be ripped and imported materials thereon removed.	Contractor	Subproject completion
		All rubble is to be removed from the site to an approved disposal site. Burying of rubble on site is prohibited.	Contractor	Subproject completion
		The site is to be cleared of all litter.	Contractor	Subproject completion
		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
		All embankments are to be trimmed, shaped and replanted to the satisfaction of the Engineer.	Engineer and Contractor	Subproject completion
		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
		The Contractor is to check that all watercourses are free from building rubble, spoil materials and waste materials.	Contractor	Subproject completion
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
		All residual stockpiles must be removed to spoil or spread on site as directed by the Engineer.	Engineer	Subproject completion
		All leftover building materials must be returned to the depot or removed from the site.	Contractor	Subproject completion
		The Contractor must repair any damage that the construction work has caused to neighboring properties.	Contractors	As directed by the Engineer.
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
		Temporary roads must be closed and access across these blocked.	Engineer and EE	On completion of construction
		Access or haulage roads that were built across watercourses must be rehabilitated by removing	Engineer and Contractor	On completion of construction

	Activities	Management/Mitigation	Responsible for Monitoring	Frequency
		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.		
		All areas where temporary services were installed are to be rehabilitated to the satisfaction of the Engineer	Engineer and Contractor	On completion of construction

EE = Environmental Expert of Engineer (DSC)

C. Environmental Monitoring Programme

161. **Table-31** 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-31: Environmental Monitoring Program

Aspect	Parameter	Standards	location	duration / frequency	Implementation	Supervision
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)	Air Act Water Act Noise Act	-	prior to moving onto site and during construction	Contractor	Engineer/EE/PMU/PSC
	Cutting Permit for Trees	Jammu and Kashmir Forest Conservation Act	-	prior to moving onto site	Engineer and PIU	PMU/PSC
	Copy of EMP	EARF and ADB SPS	subproject site, offices, website, library, etc.	at all times	Contractor, Engineer and EE	PMU/PSC
Access to site	Existing conditions	EMP	all access and haul roads	prior to moving onto site	Engineer, EE and Contractor	PMU/PSC
	Road closures and traffic rerouting	Traffic Management Plan and EMP	all affected roads	one week in advance of the activity	Engineer and EE	PMU/PSC
	Notifications and road signages	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/PSC
Construction camp	Approval of location and facilities	EMP	as identified	prior to moving onto site	Contractor with the Engineer and EE	PMU/PSC
Equipment Lay-down and Storage Area	Approval of location and facilities	EMP	as identified	prior to moving onto site and during site	Contractor with the Engineer and EE	PMU/PSC

Aspect	Parameter	Standards	location	duration / frequency	Implementation	Supervision
				set-up		
Materials management – sourcing	Approval of sources and suppliers	EMP	as identified	prior to procurement of materials	Contractor with the Engineer and EE	PMU/PSC
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/PSC
Social impacts	Public Consultations, Information Disclosure, Communication Strategy	EARF, ADB SPS and EMP	subproject site	prior to moving onto site and ongoing	Contractor with the Engineer, EE, PIU/PSC	PMU
	GRM Register	EMP	subproject site	prior to moving onto site and ongoing	Contractor with the Engineer, EE, PIU	PMU/PSC
Noise	Baseline Data for noise level in dB(A) Leq	National Noise Standards	two locations near construction sites as specified by the engineer	prior to site set-up	Contractor	Engineer/ EE/ PMU/PSC
Air quality	Baseline ambient data for particulate matters 10 and 2.5 (PM10, PM2.5), sulfur dioxide (SO2), nitrogen dioxide (NO2)	National Ambient Air Quality Standards	two locations near construction sites as specified by the engineer	prior to site set-up	Contractor	Engineer/ EE/ PMU/PSC
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/PSC
Stormwater	Stormwater 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/PSC
Water quality	Baseline qualitative characteristics	EMP	subproject sites ²⁷	prior to site set-up	Contractor with Engineer and EE	PMU/PSC
Conservation of Natural Environment	Existing conditions	EMP	subproject sites	prior to site set-up	Contractor with Engineer and EE	PMU/PSC
Waste	Disposal sites	EMP	as	prior to site	Contractor with	PMU/PSC

²⁷ Subproject sites include approved construction site, equipment lay-down and storage area, watercourses along the subproject site, open drainages

Aspect	Parameter	Standards	location	duration / frequency	Implementation	Supervision
management procedure			determined	set-up and ongoing throughout the subproject	Engineer and EE	
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/PSC
2. Construction phase						
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
Construction camp	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
Staff conduct	Site Records (Accidents, Complaints)	EMP	subproject sites	ongoing	Contractor	Engineer
Air quality	PM10, PM2.5, SO2, NO2	National Ambient Air Quality Standards	two locations near construction sites as specified by the engineer (DSC).	once in three months (four times in an year)	Contractor	Engineer/ EE/ PMU/PSC
Soil erosion	Soil erosion management measures	EMP	subproject sites	ongoing	Contractor	Engineer
Stormwater	Soil erosion management measures	EMP	subproject sites	ongoing	Contractor	Engineer
Water quality	Qualitative characteristics	EMP and pre-existing conditions	subproject sites	ongoing	Contractor	Engineer
Conservation of Natural Resources	Number of trees	Tree-cutting permit and EMP	subproject sites	ongoing	Contractor	Engineer
	Vegetation conditions	EMP	subproject sites	ongoing	Contractor	Engineer
Materials management	Qualitative characteristics	EMP	subproject sites	ongoing	Contractor	Engineer
Waste management	Qualitative characteristics	EMP	subproject sites	ongoing	Contractor	Engineer
	Disposal manifests	EMP	subproject sites	ongoing	Contractor	Engineer

Aspect	Parameter	Standards	location	duration / frequency	Implementation	Supervision
Social impacts	Public Consultations, Information Disclosure, Communication Strategy	EARF, ADB SPS and EMP	subproject sites	ongoing	Contractor with the Engineer, EE, PIU	PMU/PSC
	GRM Register	EMP	subproject sites	ongoing	Contractor with the Engineer, EE, PIU	PMU/PSC
Cultural environment	Chance finds	ASI Act and EMP	subproject sites	ongoing	Contractor	Engineer
Noise quality	Noise Level in dB(A) Leq	National Noise standards	two locations near construction sites as specified by the engineer (DSC).	once in three months (four times in an year)	Contractor	Engineer/ EE/ PMU/PSC
3. Post-construction activities						
Construction camp	Pre-existing conditions	EMP	construction camp	subproject completion	Contractor	Engineer
Vegetation	Pre-existing conditions	Tree-cutting Permit and EMP	subproject sites	subproject completion	Contractor	Engineer
Land rehabilitation	Pre-existing conditions	EMP	subproject sites	subproject completion	Contractor	Engineer
Materials and infrastructure	Pre-existing conditions	EMP	subproject sites	subproject completion	Contractor	Engineer
General	Records	EMP	subproject sites	subproject completion	Contractor with Engineer and EE	PMU/PSC
4. Operation and maintenance (defect liability period)						
Air quality	PM10, PM2.5, SO2, NO2	National Ambient Air Quality Standards	two locations as specified by the ERA.	once in 6 months (defect liability period)	Contractor	Engineer/ EE/ PMU/PSC
Noise quality	Noise Level in dB(A) Leq	As per National Noise standards	two locations as specified by the ERA	once in 6 months (defect liability period)	Contractor	Engineer/ EE/ PMU/PSC

EE= Environmental Expert of Engineer (DSC)

D. Environmental Management and Monitoring Cost

162. 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.

163. 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.

164. 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 PSC with the assistance of DSC, costs of which are part of project management.

165. **Table-32** presents the estimated cost to implement the EMP.

Table-32: 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.	Lump sum	500,000	500,000	
Dust Suppression at subproject sites	Application of dust suppression measures during construction phase.	Lump sum	10,00,000	10,00,000	Covered under engineering design and cost
Protection measures against noise pollution	Construction of noise walls (as per requirement)	Lump sum	5,00,000	5,00,000	Covered under engineering design and cost
Protecting privacy of public	Providing steel/fibre sheets along the sides of flyover to protect the privacy of educational institutions and private properties.	Lump sum	4,00,000	4,00,000	Covered under engineering design and cost
Traffic management	Safety Signboards, delineators, traffic regulation equipments, flagman, temporary diversions, etc	Wherever required throughout subproject corridor	Not applicable	Not applicable	Covered in engineering cost
Compensation for cutting of 284 trees ²⁸ (Compensation for tree-cutting with requisite permissions from concerned departments)	Fruit bearing trees= 21	21 trees	30,908 (Cost evaluated by Horticulture Department)	30,908	Covered in Rehabilitation & Resettlement Cost
	Non fruit bearing trees = 263	263 trees	4,45,382 (Cost evaluated by Social Forestry Department)	4,45,382	Covered in Rehabilitation & Resettlement Cost
Compensatory plantation ²⁹	Fruit bearing trees (@ 1:2) 21 x 2 = 42 trees	lump sum	70,000	70,000	Accounted for under provisional sum
	Non fruit bearing trees	Cost	1,12,700	1,12,700	Covered in

²⁸ Compensation for cutting of trees involves cost of requisite permits from the concerned departments and the cost which is required to be paid to the owner of the trees after assessment by Forest/Sericulture/Horticulture Department.

²⁹ Compensatory plantation involves the cost of plantation and maintenance of the trees in a ratio of 1:2 (i.e. planting double the number of trees actually cut).

Component	Description	Number	Cost per Unit (INR)	Cost (INR)	Source of Funds
		evaluated by Social Forestry Department			Rehabilitation & Resettlement Cost
Landscaping and beautification ³⁰	Landscaping of the areas in the subproject corridor with plantation of grasses, hedges and ornamental and avenue plants.	Lump sum	10,00,000	10,00,000	Covered under engineering design and cost
Baseline Monitoring	Site preparation and preliminary activities				
Air	Once before start of construction works	Two	7,000 per sample	14,000	Covered under engineering design and cost
Noise	Once before start of construction works	Two	1,000 per sample	2,000	Covered under engineering design and cost
Construction Monitoring					
Air	Once in three months at two locations (for three years)	24	7,000 per sample	1,68,000	Covered under engineering design and cost
Noise	Once in three months at two locations (for three years)	24	1,000 per sample	24,000	Covered under engineering design and cost
Defects Liability Period					
Air	Once at two locations	2	7,000 per sample	14,000	Covered under engineering design and cost
Noise	Once at two locations	2	1,000 per sample	2,000	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	10,00,000	10,00,000	
TOTAL (INR)				5282990	
TOTAL (USD)				112404.04	

Total Cost of EMP implementation = **INR 52,82,990/-**

{Cost of environmental management covered under engineering cost and provisional sum of the subproject
= **INR 31,94,000/-**

Cost of environmental management covered under rehabilitation and resettlement cost
= **INR 5,88,990/-**

Independent cost of environmental management (not covered under engineering cost and rehabilitation and resettlement cost)
= **INR 15,00,000/-}**³¹

³⁰ Landscaping involves plantation of grasses, hedges, and ornamental / avenue plants on available areas in the subproject corridor as a beautification measure.

³¹ These costs are covered works contracts.

IX. CONCLUSION AND RECOMMENDATIONS

166. The process described in this document has assessed the environmental impacts of all elements of the infrastructure proposed under the flyover and road widening subproject in Jammu City. 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.

167. The public participation processes undertaken during project design ensured stakeholders are engaged during the preparation of the IEE. The planned information disclosure measures and process for carrying out consultation with affected people will facilitate their participation during project implementation.

168. 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.

169. 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/PSC. 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.

170. 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.

171. 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.

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

Rapid Environmental Assessment (REA) Checklist

ROADS AND HIGHWAYS

Country/Project Title: India/J&K Urban Sector Development Investment Programme

Sector Division: Urban Transport

Screening questions	Yes	No	Remarks
A. Project setting Is the project area adjacent to or within any of the following environmentally sensitive areas?			The subproject corridor is not within or adjacent to any environmentally sensitive area. The nearest environmentally sensitive area is Ram Nagar Wildlife Sanctuary at a distance of about 3.3 km from the outer periphery of the sub project area. The sub project area is in eastern part of Jammu (Left Bank of Tawi River) and Wildlife Sanctuary is in western side.
▪ Cultural heritage site		√	The archaeologically protected monument closest to sub project area is 'Bahu Fort' at about 2.19 km distance from sub project area.
▪ Protected Area		√	None of the subproject component sites are adjacent to or within any protected area
▪ Wetland		√	None
▪ Mangrove		√	Not Applicable
▪ Estuarine		√	Not Applicable
▪ Buffer zone of protected area		√	Not Applicable
▪ Special area for protecting biodiversity		√	None of the subproject component sites are adjacent to or within any special area for protecting biodiversity
B. Potential Environmental Impacts Will the Project cause...			
▪ Encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?		√	No such impact is anticipated.
▪ Encroachment on precious ecology (e.g. sensitive or protected areas)?		√	No such impact is anticipated.
▪ Alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?		√	No such impact is anticipated. The proposed sub-project does not cross any perennial water body. However there may be a minor increase in sediment load of rainfall run off for short duration of construction phase only.
▪ Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?		√	No such impact is anticipated.
▪ Increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing?	√		A slight increase in local air pollution due to cutting and filling works, movement of construction vehicles and equipment, material handling at construction site, etc. is anticipated. This impact shall be temporary, site specific and reversible in nature. In the operation phase increase in air pollution will be on account of increased vehicular traffic.
▪ Risks and vulnerabilities related to occupational		√	No such impact is anticipated. However, proper

health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?			mitigation measures shall be taken to avoid any unanticipated health and safety issues.
▪ Noise and vibration due to blasting and other civil works?	√		Noise level is expected to increase during construction activities, but it will be temporary, localized and reversible. This shall be mitigated by taking necessary precautionary measures. In the operation phase also there will be increase in noise levels due to increased vehicular traffic.
▪ Dislocation or involuntary resettlement of people?	√		Resettlement Plan will be needed in accordance with agreed Resettlement Framework. The resettlement plan has been prepared.
▪ Dislocation and compulsory resettlement of people living in right-of-way?	√		Details provided in the Resettlement Plan.
▪ Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	No such impact is envisaged.
▪ Other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?		√	No such impact is anticipated. However, minor dust will be generated during construction period which will be localized and for short duration only. This dust emission will be controlled through EMP implementation.
▪ Hazardous driving conditions where construction interferes with pre-existing roads?	√		Traffic blockages may be expected during construction stage. Traffic management plan shall have to be properly implemented to avoid any such situation.
▪ Poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI's and HIV/AIDS) from workers to local populations?		√	No such impact is anticipated. Preference will be given to local laborers and migratory labour shall be employed in unavoidable circumstances only. Construction camps will have proper medical and sanitation facilities.
▪ Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?		√	No such impact is anticipated.
▪ Accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials?	√		Proper implementation of Traffic management plan shall be required for ensuring smooth flow of traffic and to avoid any such condition.
▪ Increased noise and air pollution resulting from traffic volume?	√		Slight increase in noise and air pollution resulting from traffic volume is anticipated during construction stage. This will be temporary, site specific and reversible in nature.
▪ Increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?		√	No such condition is anticipated.
▪ Social conflicts if workers from other regions or countries are hired?		√	No such conflicts are anticipated. Preference will be given to local laborers and migratory labour shall be employed in unavoidable circumstances only.
▪ Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	No such impact is anticipated.
▪ Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		√	No such impact is anticipated.
▪ Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project	√		Community safety risks due to both accidental and natural causes can be anticipated in extreme cases. However, these have to be taken due care

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.			of while designing the various project components.
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Climate change and disaster risk questions	Yes	No	Remarks
The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.			
<ul style="list-style-type: none"> 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 area is not subject to floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and localized climate changes. However, the sub-project area falls in seismic zone-IV as per seismic zone map of India.
<ul style="list-style-type: none"> Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (eg., increased erosion or landslides could increase maintenance costs, permafrost melting or increased soil moisture content could affect sub-grade). 		√	No
<ul style="list-style-type: none"> Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (eg., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)? 		√	No
<ul style="list-style-type: none"> Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by encouraging settlement in areas that will be more affected by floods in the future, or encouraging settlement in earthquake zones)? 		√	No

Traffic Management Plan

A traffic management plan (TMP) has been developed to cope with road traffic disruptions likely to be encountered with the commencement of work on flyover and road widening on 1.5 km stretch of road from Bikram Chowk to Convent school, Gandhi Nagar, Jammu. It calls for co-ordinated action from all the concerned agencies.

Objectives of Traffic Management Plan

The main objective of this TMP is to ensure the safety of all the road-users along the work zone and to address the following issues:

- i) Safety of pedestrians, bicyclists and motorists travelling through the work zone.
- ii) Protection of work force engaged in construction from dangers associated with moving traffic.
- iii) Mitigation of the adverse impact to the road capacity and delays to the road users.
- iv) Maintenance of access to the adjoining properties.
- v) Any other issues that may delay the project works.

Operating Policies for TMP**Analysis of the impacts due to construction**

- i) Approval from the concerned road side located Government institutions for creating temporary diversion detours through their open lands for traffic movement during construction of two pedestrian subways.
- ii) Consultation with business community members, Traffic Police, Roads & Building Department (P.W.D), etc. regarding the mitigation measures necessary especially construction of two pedestrian sub-ways, and in situ construction of box- girders to support flyover on road junctions.
- iii) Determination of maximum number of days for traffic diversion on detours during construction of two subways and box-girders on four road junctions.
- iv) Determine if additional traffic control or temporary improvements are needed along the detour links.
- v) Consider how access of materials (of heavy precast components/ other materials etc) is provided to the worksite.
- vi) Contact college/school officials, Transport Department, Jammu Municipal Corporation (JMC) to determine if there are impacts to their operations.
- vii) Develop a notification program to the public so that the diversion on detours or other adjoining roads is not a surprise for road users.

Public awareness and notifications

As expected, there will be travel delays during the construction phase but with proper mitigation measures its scale can be reduced if proper coordination is ensured between various Utility service providers and traffic management agencies. Since, it is the main arterial road in Jammu city catering to a very heavy traffic volume, awareness campaign and the prior notification for the public will be a continuous activity which the project will pursue to compensate for traffic delays and also is to allow sufficient time for the public and residents to digest the changes to their travel plans. ERA will notify the public about the road blocks and traffic diversion through the print, TV and radio media.

Proposed traffic management measures

The subproject road corridor is the main arterial link road in Jammu city connecting both parts of the city bisected by river Tawi. In view of the existing landuse and urban structure of Jammu city, it shall not be possible to fully divert the heavy traffic volume plying on this road to any other adjoining city road during construction of this subproject. Keeping it in mind and after weighing all other options, partly allowing continued traffic flow on the subproject corridor and part diversion on adjoining roads looks to be the most desirable option.

- After land acquisition, road length of 1.5 Kms stretch of Bikram chowk - Satwari road shall be widened on either side as per proposed ROW. Traffic will continue to ply on existing carriageway during the road widening period. Proper barricading shall be erected to demarcate the existing road (on which traffic would continue to flow) and widening portion for minimizing disturbance. Utility networks shall also be shifted side by side in such a manner so as to ensure uninterrupted services to the affected roadside properties.
- After permitting traffic flow on the widened road on either side of the median, about 15 m width in the middle of the road will be blocked for the traffic movement with barricading during construction of flyover. To and fro traffic on remaining 2-lanes (between Bikram chowk to Asia hotel) and 3-lanes (Hotel Asia onwards) on either side of the road outside the flyover construction zone shall continue.
- Heavy traffic vehicles like buses, trucks etc. from Jewel chowk to Tawi bridge shall be diverted towards Gujjar Nagar bridge on Tawi river from Pt. Prem Nath Dogra chowk. This traffic, which is mostly inter-city, could use National Highway bypass route to exit the city limits. Similarly 50% of minibuses from Jewel chowk (during peak hours) and bound towards railway station /Narwal/Bypass shall also be diverted towards Gujjar Nagar bridge.
- Construction of flyover (supported on a single pier) from Bikram chowk to police line chowk shall cause disturbance to traffic movement during construction period. As such, if required, some traffic (private cars only) from the subproject road could be diverted on road leading to Nehru market –Tawi bridge loop (near Hotel Asia) for right hand side (RHS) traffic. Similarly, some left hand side (LHS) traffic from the subproject corridor could be diverted through University Road to Green Belt chowk via Gandhi Nagar.
- During subway construction, detour roads shall be developed for diversion as indicated in the plans enclosed.
- Construction of Box girders at road junction would be taken up one by one for better traffic management.
- Traffic management plan involving barricading and diversions shall be discussed threadbare with Traffic Police Department and got approved.
- Parking of vehicles shall be banned along the subproject road during construction.
- Stopping of vehicles will be banned on the subproject road during construction period.

Traffic Monitoring Strategy

Traffic monitoring strategy that will be implemented during the construction of the sub-project is as follows:

i) On-site visits and traffic counts. On site visits will be carried out through relevant government authorities as required by project implementation unit (PIU)/ consultants/ other agencies, if any, relevant during the phase of construction for monitoring of vehicles that are diverted as part of the TMP.

ii) Adjustments to traffic signal settings. For the sub-project, temporary traffic control will be used to direct traffic around work zones during the working phase as given below:

- Different traffic signals in the form of cones, advanced warning signs, and flagmen, will be used during the construction phase.
- All workers exposed to traffic must be attired in bright, contrasting, highly visible upper body garments, similar to flagmen.
- Provisions for the movement of emergency vehicles in or around the construction site.

iii) Pedestrian accommodation. Every effort will be made to separate the movement of pedestrians from both the worksite activity and the adjacent traffic. Following steps will be adopted to accommodate pedestrians:

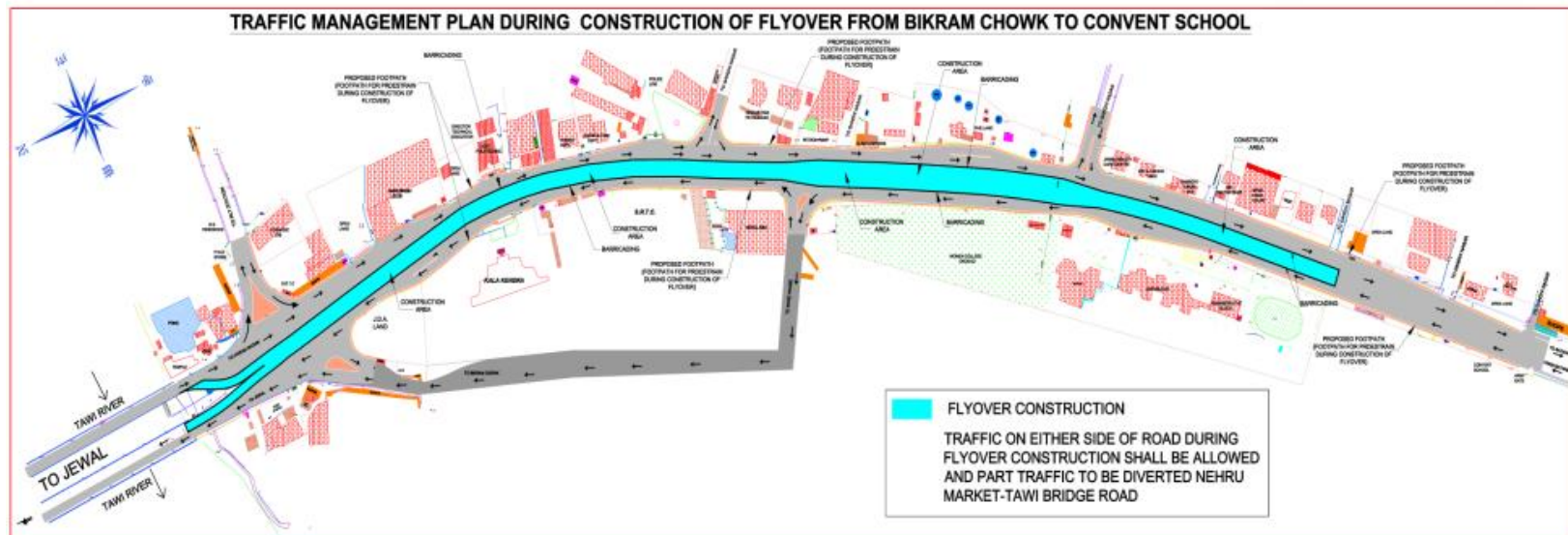
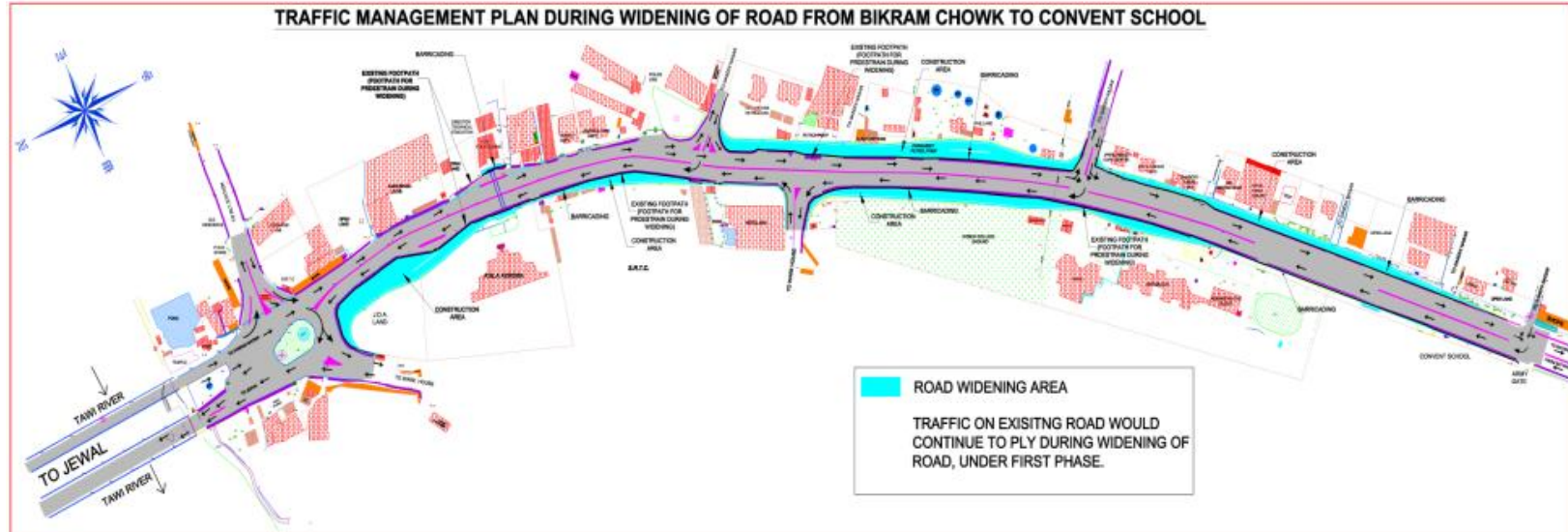
- Pedestrians will be provided with a reasonably safe, convenient and accessible path that replicates the most desirable characteristics of the existing sidewalk(s) or footpath(s).
- Provide pedestrian information throughout the construction period in the form of clearly defined advanced warning signages.
- Clearly define transition to pedestrian detour routes or alternate walking paths.
- Barriers and channelizing devices should be visible to pedestrians.
- Clearly separate the work area from pedestrians.

iv) Pedestrian protection.

- Positive protection to separate vehicles from pedestrians and pedestrians from work area.
- Use channelizing devices to delineate the route (must be detectable).
- Protect pedestrians from vehicular traffic (positive protection).
- Protect pedestrians from hazards such as excavated pits, holes, cracks and debris.
- Advanced signages will be placed at intersections.

v) Adjustments necessary to public transport operators. Different diversions will be used as part of traffic management plan in order to provide a smooth functioning of traffic during construction phase of the sub-project. However small adjustments will be necessary which are provided as follows:

- Following of diversions will increase the length of the travel therefore adjustments in terms of early departure are required from public transport operators.
- Adjustments in terms of speed at or near construction sites.
- Lane driving and avoidances of overtaking.
- Following of No Parking zones.
- Avoidance of unnecessary halting of vehicles.





Public Consultation**Sub Project: CONSTRUCTION OF BIKRAM CHOWK FLYOVER & WIDENING / STRENGTHENING OF ROAD FROM BIKRAM CHOWK TO CONVENT SCHOOL ON BIKRAM CHOWK – SATWARI CHOWK ROAD CORRIDOR, JAMMU.**

Various issues related to the proposed subproject for development of flyover and road widening were discussed at various locations throughout the subproject corridor. Discussions were held with the parties directly and indirectly affected by the subproject execution as well as the commuters frequently travelling through the subproject corridor. 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 favour 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

- Awareness and extent of knowledge about the subproject
- Information on the benefits of the subproject in terms of economic and environmental enhancement
- Information on perceived benefits from the proposed subproject including reduction in traffic congestion, travel time, fuel cost, noise and air pollution.
- Information on perceived losses from the proposed subproject during execution stage in terms of increase in traffic congestion, fuel cost, air and noise pollution etc.
- Presence of any historical/cultural site in the vicinity.
- Information on trees to be cut and measures to be taken for compensatory plantation.
- Presence of any protected area/wetland in or adjoining the construction site.
- Information on economic development in terms of rapid transit of goods and generation of direct employment during the execution of the subproject.

1. Date of Consultation with affected parties: 05.10.2010

Location: Different locations along the project corridor

2. Date of Consultation with commuters using the subproject corridor on daily basis: 20.06.2011 to 06.07.2011.**Summary of public consultation dated 05-10-2010 with affected persons****Present Issues:**

- The road is always congested with slow moving heavy traffic at various junctions where commuters/ passengers take buses to different parts of the city and to other districts. Due to absence of wide road along with absence of proper bus stands, pedestrian subways, the vehicles stop in an unorganized manner which causes the traffic jams.

- Due to frequent traffic jams and heavy plying of traffic, this road has become accident prone.
- Another major problem is the unorganized pedestrian crossings which increases the vulnerability of the pedestrians.
- Due to frequent traffic the time of people is wasted and they cannot avail different administrative, educational, and other services in time. The businessmen from adjoining areas also face problems in transportation of goods in time.
- The present road condition does not attend to the issues of pedestrian safety.

Future prospects:

- The improvement/widening of the road and proposed flyover will reduce traffic congestion and thus save the travel time and fuel. People can reach their respective destination in time thus their time and resources will be saved.
- Organized plying and halting of vehicles will reduce acute traffic jams and provide better commuting facility for the commuters.
- With the execution of proposed subproject the traffic plying will be diverted/distributed in an organized manner thus causing less traffic jams and reducing the load of heavy traffic.
- The project will increase pedestrian safety reducing the vulnerability to accidents as the proper pedestrian crossings and subways will be developed and red lights installed.

Suggestions of the participants:

- The project should be completed in shortest possible time and all physical work during the execution should result in minimum inconvenience to the commuters.
- Adequate safety measures for commuters should be in place during the execution to ensure safety of their life and properties.
- Dust and noise control measures should be implemented to avoid public inconveniences.
- Access to vital administrative, medical and educational facilities should be ensured during the execution of civil works.
- Disturbances to traffic should be minimized by implementation of proper traffic management measures.
- Adequate arrangements should be put in place to maintain privacy of the residential as well as educational establishments along the sides of proposed flyover during its operation stage.
- Adequate steps should be taken for the rehabilitation of the affected persons. The petrol pump owners operating from Government Land leased to them want alternate land to be provided to them by Government where they can re-establish their business and thus keep availing vast economic opportunities which the city is providing to them.
- The compensation disbursement to the affected persons should be as per the current market value and they should be provided the same well before the commencement of physical work/asset acquisition.

Summary of public consultation dated 20.06.2011 to 06.07.2011 with frequent commuters

S.No	Issues Discussed	Feedback received	Remarks
1	Awareness and extent of knowledge about the subproject	Generally most of the people consulted were well aware about the proposed subproject.	Public consultation in different forms like one to one consultation, circulations of questionnaire, group discussions, etc. need to be a continuous

S.No	Issues Discussed	Feedback received	Remarks
			process
2	Information on the benefits of the subproject in terms of economic and environmental enhancement	People are fed up with the frequent traffic jams and wanted that the subproject may be executed on a fast track so that this problem is eliminated.	Fast execution of the subproject is required to avoid public inconveniences.
3	Information on perceived benefits from the proposed subproject including reduction in traffic congestion, travel time, fuel cost and noise.	People in general were very enthusiastic about the benefits of the subproject in terms of reduction/ elimination of traffic jams, reduction in travel time and fuel cost and also an improvement in the air quality in terms of reduced emissions from vehicles and a reduction in the noise levels.	-
4	Information on perceived losses from the proposed subproject during execution stage in terms of increase in traffic congestion, air and noise pollution etc.	People desired that an efficient traffic management plan be put in place before the construction works are started so that problems like traffic congestion, air and noise pollution are minimized.	Practical and efficient traffic management plan needs to be put in place before the start of construction works.
5	Presence of any historical/cultural site in the vicinity	There is no historical/cultural site in the corridor of the subproject.	-
6	Presence of any protected area/wetland in or adjoining the construction site.	There is no protected area in the corridor of the subproject.	-
8	Information on economic development in terms of rapid transit of goods and generation of direct employment during the execution of the subproject	People were well aware about the benefits of the subproject in terms of facilitation via rapid transit of goods and other materials. In addition, people at large were aware about the fact that during the execution of the subproject a large number of skilled/semi-skilled people shall get employment and thus were in favour of construction works.	-
9	Privacy of people living in the subproject corridor	Adequate arrangements should be put in place to avoid breach of privacy of the residential as well as educational establishments along the sides of proposed flyover during its operation stage.	It needs to be ensured that proper steel/fibre sheets are erected on either side of the proposed flyover along guard railing so that the privacy of residential as well as educational establishments in the close vicinity of the subproject is protected.

List of participants

S. No.	Name	Address	Occupation
1.	Sarika Bhatti	Last Morh, Gandhi Nagar, Jammu	Lecturer in higher secondary school
2.	Kuldeep Kumar	Last Morh, Gandhi Nagar, Jammu	Government Employee, (Engineer)
3.	Babu Ram	Rani Bagh, Opp. Airport, Jammu	Government Employee
4.	Rishi Sharma	Upper Gadi Garh	Student
5.	Dushant Sharma	Rohi Morh, Gadi Garh, Jammu	Government Employee
6.	Vinod Kumar	Bakshi Nagar, Jammu	Engineer
7.	Mukesh Sharma	Muthi, Jammu	CAD Operator
8.	Neeraj	Bakshi Nagar, Jammu	Engineer
9.	Kanav Kerni	H. No-1, Link Road, Jammu	Engineer




S. No.	Name	Address	Occupation
10.	Vijay Kerni	H. No-1, Link Road, Jammu	Photo Officer
11.	Amardeep Singh	H. No-27, Sec-7, Channi Himmat, Jammu-180 015	Engineer
12.	Yatin Gupta	Shyan Vihar, Talab Tillo, Jammu	Student
13.	Parambeant Singh	31-New Adrash Enclave, Preet Nagar, Gangyal, Jammu	Central Government Employee (ESIC)
14.	Ujagar Singh	Preet Nagar, Gangyal, Jammu	Retd. Governmental Employee
15.	Sarabjeet Singh	New Adrash Enclave, Preet Nagar, Gangyal, Jammu	Governmental Employee
16.	Jaswant Singh	New Adrash Enclave, Preet Nagar, Gangyal, Jammu	Ex-Serviceman
17.	Vishal Sharma	451-A, Gandhi Nagar, Jammu	Student
18.	Mrs. Satveer Kour	Preet Nagar, Gangyal, Jammu	Lecturer
19.	Brinder Singh	Preet Nagar, Gangyal, Jammu	Lecturer
20.	Dr. Sushma	H. No-9, Krishna Nagar, Jammu	Assistant Surgeon
21.	Dr. Rajinder Kumar	Krishna Nagar, Jammu	Assistant Surgeon
22.	Dev Raj	H. No-7, Krishna Nagar, Jammu	Athlete Coach.
23.	Rajinder Singh	242-K, Resham Garh, Jammu	Asst. Professor
24.	Sanjay Kotwal	17-D, Bharat Nagar, Talab Tillo	Proffessor, SKAUST Jammu
25.	Mrs. Neesha	Krishna Nagar, Jammu	Government Employee
26.	Mrs. Sanjana Kaul	BSNL Quarters, Sunder Nagar, Talab Tillo, Jammu	Lecturer
27.	Mrs. Seema Kotwal	Bharat Nagar, Talab Tillo, Jammu	Housewife
28.	Ashish Gupta	173-Vikas Lane, Talab Tillo	Student
29.	Sanjeev Gupta	83-Rajinder Nagar, Jammu	Shopkeer
30.	Irdis Khan	IIIM Quarters, Canal Road, Jammu	Student
31.	Sanjay Parihar	Resident near Govt. Polytechnic College	Student
32.	Shameem	Resident near Govt. Polytechnic College	Student
33.	Mohd. Iqbal	Resident near Govt. Polytechnic College	Retd. Govt. Employee
34.	Parveena	Resident near Govt. Polytechnic College	House wife
35.	Capt. Mohan Singh	Paramjeet Filling Station	Petrol Pump owner
36.	Sham Lal	Paramjeet Filling Station	Petrol Pump attendant
37.	Hardayal	Paramjeet Filling Station	Petrol Pump attendant
38.	Tarsem Kumar	Paramjeet Filling Station	Petrol Pump attendant
39.	Rang Dev	Paramjeet Filling Station	Petrol Pump attendant
40.	Sumit Kumar	Paramjeet Filling Station	Petrol Pump attendant
41.	Rajinder Kumar	Paramjeet Filling Station	Petrol Pump attendant
42.	Tarlok Kumar	Paramjeet Filling Station	Petrol Pump attendant
43.	Rakesh Kumar	Paramjeet Filling Station	Petrol Pump attendant
44.	Vijay Kapoor	Batra Petrol Pump	Manager at Petrol Pump
45.	Chaman Lal	Batra Petrol Pump	Salesman
46.	Jewan Lal	Batra Petrol Pump	Helper
47.	Narinder Kumar	Batra Petrol Pump	Helper
48.	Tarlok Singh	Batra Petrol Pump	Helper at Batra Petrol Pump
49.	Lalit Sharma	Batra Petrol Pump	Helper at Batra Petrol Pump
50.	Parveen Kumar	Batra Petrol Pump	Helper at Batra Petrol Pump
51.	Darshan Lal	SRTC yard	Canteen owner at SRTC yard.

Summary:

1. The various issues related to proposed subproject for development of flyover have been discussed at various locations throughout the subproject corridor.
2. Some of the local people are aware about the upcoming work. Most of the people are in favour of the upcoming subproject.
3. The major problems faced by them are related to traffic congestion, noise from plying vehicles and elevated levels of air pollutants.

4. Due to absence of wide road along with absence of proper bus bays, pedestrian subways, the vehicles stop in an unorganized manner which causes the traffic jams. Unorganized pedestrian crossings which increases the vulnerability of the pedestrians.
5. Due to frequent traffic congestion, the time of people is wasted and they cannot avail different administrative, educational, and other services in time. The businessmen from adjoining areas also face problems in transportation of goods in time.
 - Consultations revealed that the improvement/widening of the road and proposed flyover will reduce traffic congestion and thus save the travel time and fuel. People can reach their respective destinations in time thus their time and resources will be saved.
 - Organized plying and halting of vehicles will reduce acute traffic jams and provide better commuting facility for the commuters.
 - With the execution of proposed subproject the traffic plying will be diverted/distributed in an organized manner thus causing less traffic jams and reducing the load of heavy traffic.
6. The project will increase pedestrian safety reducing the vulnerability to accidents as the proper pedestrian crossings and subways will be developed and red lights installed.
7. Public desired for implementation of better measures to reduce noise, dust and air pollution during the construction phase.
8. People also wished that local people be given opportunities during the project tenure.
9. People expected that their problems shall be addressed and solutions for them shall be implemented during the subproject execution.
10. People are ready to extend all types of support during execution of the subproject.
11. People suggested that adequate safety measures should be provided.
12. 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.

Minutes of Divisional Level Committee Meeting with affected parties suffering significant resettlement impacts and other stake holders

 <p>Government of Jammu and Kashmir J&K Economic Reconstruction Agency Hotel Tramboo Continental, Dal Gate Srinagar 38 A/B Gandhi Nagar Jammu</p>	 <p>Tele-fax: 0194-2501558, 0191-2434601 e-mail: directorcentral.jkera@rediffmail.com</p>
<p>The Chief Executive Officer, J&K Economic Reconstruction Agency, Srinagar.</p>	
<p>No.DC/ERA/2011/3685-98</p>	<p>Dated: 11-06-2011</p>
<p>Sub: Record- note of the meeting of Divisional Level Committee for implementation of Rehabilitation Plans for the sub-projects of ERA under JKUSDIP held on 06-06-2011.</p>	
<p>Sir, Enclosed kindly find record-note of the 1st meeting of Divisional Level Committee (of Jammu division) for implementation of Rehabilitation Plans (RPs) for the sub-projects of ERA under JKUSDIP held at Jammu on 06-06-2011 for reference and record.</p>	
<p>Yours faithfully,  (Khalid Muzaffar) Director Central (Member-Secretary)</p>	
<div style="border: 1px solid black; border-radius: 50%; padding: 10px; width: 150px; float: left; margin-right: 10px;"> <p>Commissioner, Jammu Division</p> <p>14/6/11</p> </div> <div style="border: 1px solid black; border-radius: 50%; padding: 10px; width: 150px; float: left;"> <p>Deputy Commissioner, Jammu</p> <p>14/6/11</p> </div> <div style="clear: both;"></div>	<p>Copy along with copy of the Record-note for information/necessary follow-up action to:</p> <ol style="list-style-type: none"> 1) Divisional Commissioner, Jammu. 2) Chief Conservator of Forests, Jammu. 3) IG Traffic, J&K, Srinagar. 4) Deputy Commissioner, Jammu. 5) Vice Chairman, Jammu Development Authority. 6) Commissioner, Jammu Municipal Corporation. 7) Chief Engineer, PW(R&B), Jammu. 8) Chief Engineer, EM&RE Jammu. 9) Chief Engineer, UEED, J&K, Srinagar. 10) Chief Engineer, PHE, Jammu. 11) Project Manager, JKUSDIP, ERA Jammu. 12) Collector Land Acquisition, ERA Jammu. 13) Assistant Commissioner Nazool Jammu. <p style="text-align: center;">14/6</p>

Record-note of the 1st meeting of Divisional Level Committee (of Jammu Division) for implementation of Rehabilitation Plans for Sub-projects of J&K ERA under Loan-II viz JKUSDIP held on 6th June 2011.

The 1st meeting of Divisional Level Committee (of Jammu division) for implementation of Rehabilitation Plans for Sub-projects of J&K ERA under loan-II viz JKUSDIP was held in the office of the Divisional Commissioner Jammu on 6th June 2011. The following participated in the meeting:

1) Pawan Kotwal, Divisional Commissioner, Jammu	Chairman
2) S.C.Sharma, Chief Conservator Forests, Jammu	Member
3) S.C Sawhney, Commissioner Municipal Corporation, Jammu	Member
4) Shahnaz Goni, Chief Engineer, EM & RE, Jammu	Member
5) D.L.Sharma, Chief Engineer, PW (R&B), Jammu	Member
6) Khalid Muzaffar, Director Central, J&K ERA	Member-Secy
7) Virender Sharma, SSP Traffic, Jammu (representing IG Traffic)	Member
8) Vinod Luthra, S.E PHE (Urban) Jammu (representing C.E PHE)	Member
9) Inderjeet, Assistant Commissioner (Revenue) Jammu (representing Deputy Commissioner, Jammu)	Member
10) N.H.Khan, Executive Engineer, UEED Jammu (representing Chief Engineer, UEED)	Member
11) N.K.Rohmetra, Project Manager, JKUSDIP, J&K ERA, Jammu	Spl-Invitee
12) Tanveer I.Malik, Collector, J&K ERA Jammu	Spl-Invitee
13) Anu Behl, Assistant Commissioner, Nazool Jammu	Spl-Invitee
14) S.S.Jamwal, General Manager, SRTC (representing M.D SRTC)	Spl-Invitee
15) Niyaz Ahmad Shah of Alson Motors	Spl-Invitee
16) Captain (rtd.) Mohan Singh of Paramjeet Filling Station	Spl-Invitee

The meeting perused the agenda-note prepared and circulated by the Director (Central), J&K ERA vide No.DC/ERA/2011/3639-51 dated: 01-06-2011. A copy of the same is appended with this note as Annexure-I.

The perusal of the agenda-note revealed as under:

- Construction of Expressway Corridor (Flyover) & Widening of Road from Bikram Chowk to Government College for Women, Gandhi Nagar in Jammu city is planned as part of program known as JKUSDIP being funded by the Asian Development Bank (ADB).
- The project involves acquisition of land to the extent of around 26 kanals and some structures built thereon.
- The notification for acquisition of land has been issued by the Collector Land Acquisition J&K ERA, Jammu on 30-04-2011.
- The project permanently dislocates two parties/establishments, namely Shri Niyaz Ahmad Shah of Alson Motors & Paramjeet Filling Station of Indian Oil Corporation.

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- The impact of the project on other parties/business establishments and institutions is limited to acquisition of land and demolition of some structures, mostly compound walling.
- J&K ERA intends to rehabilitate the displaced-persons as per the Resettlement-Plan agreed upon with the ADB. For this purpose the Agency proposes to acquire a piece of land presently in possession of J&K State Road Transport Corporation (SRTC) near Kala Kendra. The said land is located in the immediate vicinity of the establishments that are permanently displaced.

The Collector, ERA informed the Committee that the land in possession of the permanently displaced parties/establishments, namely Shri Niyaz Ahmad Shah of Alson Motors & Paramjeet Filling Station, is State-Land which was leased out to these parties some time back. This was confirmed by the Assistant Commissioner, Nazool, Jammu. The A.C Nazool further added that land measuring around 2 kanals & 3 marlas was leased out to Shri Niyaz Ahmad Shah of Alson Motors in March 1982 for a period of 40 years. The lease would expire in 2022. However the lessee applied for ownership rights of the land under Roshni Act. The application was granted to the extent of land measuring 1 kanal, 3 marlas & 236 sft, and the lessee was asked to deposit the cost of the same within a specified time-period which he failed to comply with. She (A.C Nazool) also intimated that the lessee had moved the Hon'ble High Court for grant of extension in the time specified for depositing the cost of land. The Divisional Commissioner asked Shri Niyaz Ahmed Shah to deposit the amount as per the directions of the Hon'ble High Court at the earliest so that his rehabilitation case could be processed.

While both the parties –Captain Mohan Singh of Paramjeet Filling Station & Shri Niyaz Ahmad Shah of Alson Motors-expressed their unqualified support to the project and the measures contemplated for their rehabilitation, the latter (Shri Niyaz Ahmad Shah) was not satisfied with the evaluation made by the R&B Department for the structure raised on the land, contending that the compensation assessed was on lower side. He informed the Committee that he had already made a representation in this behalf to the Chief Engineer (R&B) Jammu. The C.E (R&B), while acknowledging that the party had made such a representation, informed the Committee that he would re-examine the case and submit a detailed report in the matter within a week's time.

Upon threadbare discussion covering all aspects of the matter, the Committee observed/decided as under:

- The A.C. Nazool will initiate necessary action under law for resumption of portions of the leased-out land to various lessees by the Nazool Department which are coming in the alignment of the Flyover Project and shall also examine whether the lessees in this case were eligible for any compensation for the portion of the land resumed from them under law or as per the terms and conditions of the lease- deeds.
- The Chief Engineer, PW(R&B) Jammu will assess cost of all the structures to be acquired/ relocated and furnish the cost-estimates of same to Project Manager JKUSDIP, ERA Jammu within a week's time.

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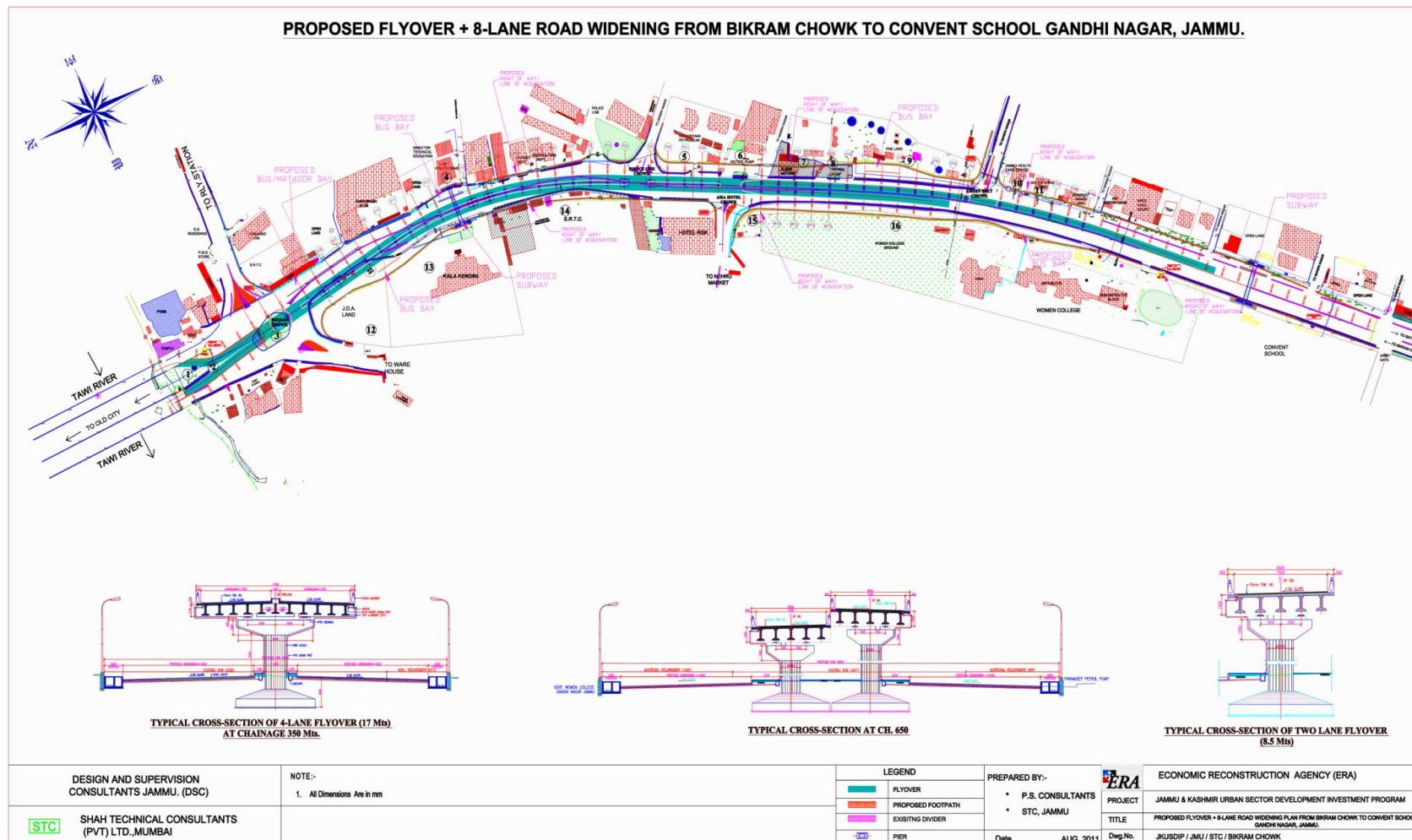

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- The displaced parties/ establishments, namely Shri Niyaz Ahmad Shah of Alson Motors & Paramjeet Filling Station of Indian Oil Corporation will be provided land on exchange basis in SRTC yard near Kala Kendra. The case for allotment of land in favor of Shri Niyaz Ahmad Shah of Alson Motors will, however, be processed only after the said party deposits cost for the plot of land earmarked for ownership rights under Roshni-Act.
- The Commissioner Municipal Corporation Jammu will formulate a proposal for relocation of the statue of General Bikram Singh at Bikram Chowk.

(Khatid Muzaffar)
Director Central
J&K ERA

Alignment of Proposed Flyover and Photographs of the area





Take off point of flyover at Bikram Chowk (adjacent to river Tawi)



Landing Point of Flyover at Bikram Chowk (adjacent to river Tawi)



River Tawi near take off point and landing point of flyover



Proposed flyover site at Bikram chowk



Start point of flyover at Bikram Chowk



Proposed flyover site at Green Belt junction



Police Lines Junction



Existing foot over bridge near to the termination point of subproject

Drawing showing starting point of flyover with distances from river bund

