

# Initial Environmental Examination

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April 2014

IND: Jammu and Kashmir Urban Sector Development Investment Program - Urban Transport Subproject—Construction of New Mehjoor Bridge on the Downstream Side of (Dilapidated Mehjoor Bridge) and Construction of two Grade Separators at J&K Bank Junction on Maulana Azad Road & Radio Kashmir Crossing on Residency Road in Srinagar City

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

## **CURRENCY EQUIVALENTS**

(as of 9 April 2014)

Currency unit	–	rupee (INR)
INR1.00	=	\$0.01672
\$1.00	=	INR 59.781

## **ABBREVIATIONS**

ADB	-	Asian Development Bank
ASI	-	Archeological Survey of India
BOD	-	Biochemical Oxygen Demand
CBD	-	Central Business District
CTE	-	Consent to Establish
CTO	-	Consent to Operate
DSC	-	Design and Supervision Consultancy
CPCB	-	Central Pollution Control Board
DO	-	Dissolved oxygen
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 & K	-	Jammu and Kashmir
JKUSDIP	-	Jammu and Kashmir Urban Sector Development Investment Programme
LCV	-	Light Commercial Vehicle
LHS	-	Left Hand Side
MA	-	Maulana Azad
MFF	-	Multi –Tranche Financing Facility
MLD	-	Million liter per day
MoEF	-	Ministry of Environment and Forests
MRH	-	Mean Relative Humidity
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
PM <sub>2.5</sub>	-	Particulate Matter below 2.5 micron particle size

PM <sub>10</sub>	-	Particulate Matter below 10 micron particle size
PMC	-	Project Management Consultant
PUC	-	Pollution Under Control
RCC	-	Reinforced Cement Concrete
REA	-	Rapid Environmental Assessment
RHS	-	Right Hand Side
ROW	-	Right of Way
RSPM	-	Respirable Suspended Particulate Matter
SMC	-	Srinagar Municipal Corporation
SPCB	-	State Pollution Control Board
SPM	-	Suspended Particulate Matter
SPS	-	Safeguards Policy Statement
STP	-	Sewage Treatment Plant
TDS	-	Total dissolved solids
TMP	-	Traffic Management Plan
ToR	-	Terms of Reference
TRC	-	Tourist Reception Center
TSS	-	Total suspended solids
V/C ratio	-	Volume to Capacity ratio

## **WEIGHTS AND MEASURES**

cm	-	centimeter
crore	-	100 lakhs = 10,000,000
lakh	-	100 thousand = 100,000
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 <sup>-6</sup> meter
μg/m <sup>3</sup>	-	micrograms per cubic meter
μS/cm	-	micro Siemens per centimeter
NTU	-	Nephelo turbidity unit
ppm	-	parts per million

### **NOTE{S}**

In this report, "\$" refers to US dollars.

“INR” and “₹” refer to Indian rupees

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## EXECUTIVE SUMMARY

1. Economic Reconstruction Agency (ERA) has undertaken Jammu and Kashmir Urban Sector Development Investment Program (JKUSDIP), financed by the ADB through Multi-Tranche Financing Facility (MFF). The total estimated cost of the program is about US \$485 million, out of which \$300 million will be financed by ADB. The primary objective of JKUSDIP is to promote economic development in the State of Jammu and Kashmir (J&K) through expansion of basic services such as water supply, sewerage, sanitation, drainage, solid waste management, urban transport and other municipal functions in Srinagar, Jammu and other important urban centers of the State. JKUSDIP will also strengthen the service delivery capacity of the responsible state urban agencies and urban local bodies through management reform, capacity building and training. The programme is to be implemented in 3 to 7 tranches over a period of 8 years. Each tranche constitutes a separate loan. Tranche I and Tranche II of JKUSDIP are under implementation. One of the subprojects identified under Tranche 3 of JKUSDIP is (Construction of New Mehjoor Bridge on the Down-Stream Side of (Dilapidated Mehjoor Bridge), Construction of Grade Separator at Radio Kashmir crossing along Sonwar RR axis and at TRC- JK Bank Crossing along Dalgate - Lal Chowk axis in Srinagar City).

2. **Subproject Scope:** The major objectives of constructing New Mehjoor Bridge at Jawahar Nagar: (i) Decongestion of traffic between airport road and Natipora Newa Road. (ii) It will provide a better route for transporting building material like bricks, stones and sand etc. from Lasjan area to Srinagar city. (iii) It will improved long-term traffic management in the Srinagar City.(iv) Provide a better connectivity to all type of traffic including heavy vehicles to Srinagar city and areas across the Flood Spill Channel. This project will benefit by way of connecting the area from Lasjan, Padshahi bagh area to main city there by reducing the distance by about 5-6 km. Further this will to large extent help in decongestion of heavy traffic on the airport road and Natipora Newa Road which is bound for Lasjan and Athwajan. The plying of heavy vehicles over the bridge will benefit the school going children of the sub project area, as it will reduce their travel time by about 15-20 minutes in reaching to their schools which are mostly on the left bank of Flood spill channel.

3. The Grade Separator subproject will improve the existing traffic management in Srinagar City by construction of grade separators. The major objectives of constructing the grade separators are: (i) decongestion of traffic on the road junctions from Sonwar to Lal chowk; (ii) quick access to the city center from the outer city areas; and (iii) improved long-term traffic management in the Srinagar City.

4. **Categorization.** Subproject components followed environmental criteria specified in the revised Environmental Assessment and Review Framework (EARF)<sup>1</sup> adopted for the Tranche 2 of JKUSDIP. Subproject is classified as Environmental Category B as per Asian Development Bank Safeguard Policy Statement (ADB SPS) as no significant impacts are envisioned. This initial environmental examination (IEE) is prepared based on the concept of proposed works and following existing legislations of Government of India and Government of Jammu and Kashmir; and requirements of ADB SPS. This IEE will be updated for any change in the scope after the finalization of the detailed project report (DPR) however already provides (i) basic information about the environmental conditions of the subproject area of influence, (ii) environmental impacts identified and assessed as part of the planning and design process, (iii)

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

recommended actions to reduce those impacts to acceptable levels and to implement these in the environmental management plan (EMP) including who has to implement and monitor implementation of mitigation measures.; and (iv) guidance on how environmental monitoring has to be carried out including observations on- and off-site, document checks, and interviews with workers and beneficiaries.

5. **Implementation Arrangements.** Economic Reconstruction Agency (ERA) will be responsible for ensuring compliance to environmental requirements of ADB as well as central and state governments. ERA's safeguard unit will monitor the implementation of environmental covenants with the assistance of Project Management Consultants (PMC) and Design and Supervision Consultants (DSC).

6. **Description of the Environment.** The subproject sites are located in an existing road network in centre of Srinagar City and not within or adjacent to environmentally sensitive areas such as cultural heritage site, protected area, wetland, buffer zone of protected area, and special area for protecting biodiversity. **No water courses are adjacent/ traversing to the subproject sites. However, the proposed new Bridge at Jawahar Nagar is on flood spill channel (the spill channel usually remain dry throughout the year and only carries excess discharge of River Jhelum in peak rainy season i.e May-June).**

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

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

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

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

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

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

13. **Conclusions and Recommendations.** The citizens of Srinagar City will be the major beneficiaries of this subproject with the improved road connectivity facilities. Therefore the proposed subproject is unlikely to cause significant adverse impacts and net environmental benefits to citizens of Srinagar City will be positive. The potential impacts that are associated with design, construction and operation can be mitigated to standard levels without difficulty through proper engineering design provided that the EMP will form part of the contract documents and its provisions implemented and monitored to their full extent.

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





## **I. INTRODUCTION**

1. Economic Reconstruction Agency (ERA) has undertaken Jammu and Kashmir Urban Sector Development Investment Program (JKUSDIP), financed by the ADB through Multi-Tranche Financing Facility (MFF). The total estimated cost of the program is about US \$485 million, out of which \$300 million will be financed by ADB. The primary objective of JKUSDIP is to promote economic development in the State of Jammu and Kashmir (J&K) through expansion of basic services such as water supply, sewerage, sanitation, drainage, solid waste management, urban transport and other municipal functions in Srinagar, Jammu and other important urban centers of the State. JKUSDIP will also strengthen the service delivery capacity of the responsible state urban agencies and urban local bodies through management reform, capacity building and training. The program is to be implemented in 3 to 7 tranches over a period of 8 years. Each tranche constitutes a separate loan. Tranche I and Tranche II of JKUSDIP are under implementation. One of the subprojects identified under Tranche 3 of JKUSDIP is Construction of New Mehjoor Bridge on the Down-Stream Side of (Dilapidated Mehjoor Bridge) & Construction of Grade Separators at Radio Kashmir crossing along Sonwar RR axis and at TRC- JK Bank Crossing along Dalgate - Lal Chowk axis in Srinagar City.

2. The major objectives of constructing the bridge at Jawahar Nagar: (i) decongestion of traffic between airport road and Natipora Newa Road. (ii) It will provide a better route for transporting building material like bricks, stones and sand etc. from Lasjan area to Srinagar city. (iii) It will improved long-term traffic management in the Srinagar City.(iv) Provide a better connectivity to all type of traffic including heavy vehicles to Srinagar city and areas across the Flood Spill Channel. This project will benefit by way of connecting the area from Lasjan, Padshahi bagh area to main city there by reducing the distance by about 5-6 km. Further this will to large extent help in decongestion of heavy traffic on the airport road and Natipora New a Road which is bound for Lasjan and Athwajan. The plying of heavy vehicles over the bridge will benefit the school going children of the sub project area ,as it will reduce their travel time by about 15-20 minutes in reaching to their schools which are mostly on the left bank of Flood spill channel.

3. The construction of proposed New Mehjoor Bridge at Jawahar Nagar is expected to have the following benefits:

- (i) 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;
- (ii) reduced traffic also results in land gains which can be utilized to enhance the pedestrian space and increase pedestrian amenity;
- (iii) reduced traffic congestion, conflicts and land gains result in a safer and efficient circulation of traffic; and
- (iv) Future development & events need will have better access to and from the City.

4. The construction of proposed grade separators will improve the existing traffic management in Srinagar City. The major objectives of constructing the grade separators are: (i) decongestion of traffic on the road junctions from Sonwar to Lal chowk; (ii) quick access to the city center from the outer city areas; and (iii) improved long-term traffic management in the Srinagar City.

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

6. This initial environmental examination (IEE) is prepared based on the concept of proposed works and following existing legislations of Government of India and Government of Jammu and Kashmir; and requirements of ADB SPS. ADB rapid environmental assessment checklist for road projects was used to screen the subproject for environmental impacts and to determine the scope of IEE investigation (**Appendix1**)

7. This IEE will be updated for any change in the scope after the finalization of the detailed project report (DPR) however already provides (i) basic information about the environmental conditions of the subproject area of influence, (ii) environmental impacts identified and assessed as part of the planning and design process, (iii) recommended actions to reduce those impacts to acceptable levels and to implement these in the environmental management plan (EMP) including who has to implement and monitor implementation of mitigation measures.; and (iv) guidance on how environmental monitoring has to be carried out including observations on- and off-site, document checks, and interviews with workers and beneficiaries.

## II. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

### A. ADB Policy

8. 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.

9. **Screening and Categorization.** The nature of the environmental assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project, the sensitivity, scale, nature and magnitude of its potential impacts and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental 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.

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

- (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.

10. **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.

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

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

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

12. 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.

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

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

15. **Air (Prevention and Control of Pollution) Act of 1981, as amended.** Activities having potential to emit air pollutants have to obtain CTE from SPCB before starting implementation

and CTO before commissioning the project. Emissions shall comply with standards notified by the Central Pollution Control Board. The occupier of the project/facility has the responsibility to adopt necessary air pollution control measures for abating air pollution. The following require CTE and CTO from SPCB: (i) diesel generators; and (ii) hot mix plants, wet mix plants, stone crushers etc, if installed for construction.

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

17. **Ancient Monuments and Archaeological Sites and Remains Rules of 1959 and J & K Ancient Monuments Preservation (Amendment) Act of 2010.** These laws designate areas within a radius of 100 meters (m) from the “protected property” as “prohibited area” and upto 200m from the boundary of protected 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 site, remains, and monuments protected by ASI or the State Department of Archaeology. Some archaeological, historical monuments, and religious places like Burzham archaeological site, historical Jamia Masjid, Pathar Masjid, Hazratbal Shrine, and Chati Padshahi Gurudwara, etc. are located in Srinagar City. However the subproject site is beyond the prohibited and regulated areas.

18. **Jammu and Kashmir Preservation of Specified Trees Act of 1969 and Rules of 1969.** If cutting/ pruning of scheduled trees is required during preparation of sites, permission will be obtained by ERA from the Floriculture/Sericulture/Revenue 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.** This act applies to all the building and other construction activities to which the provisions of Factories Act, 1948 and Mines Act, 1952 do not apply. The J&K State Government, in pursuance of this act, has constituted a Welfare Board of building and other construction workers. This law aims to provide for regulation of employment and conditions of service of the building and other construction workers as also their safety, health and welfare measures in every establishment which employs ten or more workers. This act provides for registration of each establishment within a period of sixty days from the commencement of work and registration of building workers as beneficiaries under this Act. Compliance to provisions of health and safety measures for the construction workers in conformity with International 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	Responsibility
The EIA notification, 2006 (and its subsequent amendments in 2009) provides for categorization of projects into category A and B, based on extent of impact	The sub project is not covered in the ambit of the EIA notification. As a result, the categorization, and the subsequent environmental assessment and clearance requirements, either from the state or the central Government is not triggered	NA
The Wildlife Conservation Act, 1972, as amended and J and K Wildlife (Protection) Act 1978, as amended, provide for protection and management of Protected Areas	The wildlife protection act is not applicable to the proposed subproject.	NA
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.	The subproject area does not fall within the prohibited/ regulated area or is situated close to any such site of archeological importance.	NA
Jammu and Kashmir Forest (Conservation) Act, 1997, as amended. The Jammu And Kashmir Preservation of Specified Trees Act, 1969 and Rules of 1969, as amended.	Based on preliminary design, permission from sericulture/ floriculture /forest/revenue department/ concerned deputy commissioner for the scheduled species such as chinar ( <i>Platanus orientalis</i> ) and mulberry ( <i>Morus sp.</i> ) However to be assessed again during detailed design stage.	If cutting/ pruning of trees are required based on detailed design, ERA will obtain the clearance.
Water (Prevention and control of pollution) Act, 1974, as amended Air (prevention and control of pollution) Act, 1981, as amended and	Consent to Establish (CTE) and Consent to Operate (CTO) from the J&K SPCB for setting up of hot mix plants, wet mix plants, stone crushers and diesel generators.	To be obtained by the Contractor, prior to construction.
Noise Pollution (Regulation and Control) Rules, 2000, as amended.	Contractors have to take measures for abatement of noise pollution ensuring that the existing noise levels do not exceed the standards specified under this rule.	Contractor
Building and Other Construction Workers (Regulation of Employment and Conditions of service) Act of 1996 and Rules 1998 provide for regulation of employment and conditions of service of the building and other construction workers as also their safety, health and welfare measures in every establishment which employs ten or more workers.	Registration of each establishment within a period of sixty days from the commencement of work and registration of building workers as beneficiaries under this Act. Compliance to provisions of health and safety measures for the construction workers in conformity with ILO convention No.167 concerning safety and health in construction	Contractor

### III. DESCRIPTION OF THE PROJECT

#### A. Existing Condition

21. The present system of transportation in Srinagar City is highly inadequate with the area under transportation use being only 3% against 10 to 14% in metro cities. The length of roads above 12-m width is approximately 233 km but the conditions of these roads are below

desirable standards. Traffic flows at different locations are observed beyond the capacity of the existing roads, thereby reducing the level of service on the road and causing congestion.

22. The Flood Spill Channel was constructed in 1904 to relieve the strain on the Jhelum in the city of Srinagar. By taking 2/3rd of the total flow in the river it helps the river Jhelum to regulate its water level while passing through the city of Srinagar. The new Jawahar Nagar bridge is proposed to be constructed on downstream side of the existing bridge. The spill channel usually remains dry most of the year and carries excess discharge only in peak rainy season of May-June. The existing Mehjoor Bridge having served its life is under-strutted timber, having 7 spans of 17.10 m with total length of 119.40 m. The Timber Bridge was damaged in fire and has been repaired many times by under-pining to arrest the sag in the spans and extra strutting. The decking of the damaged bridge is highly distressed though has also been repaired for safe light vehicular traffic many a times. The condition of the bridge does not allow the plying of heavy traffic on the bridge. This bridge has outlived its expected life and cannot be repaired now for plying of heavy Traffic. It is proposed to construct a new bridge on downstream side of the existing bridge. The proposed foundation of the bridge will be built by sinking of wells with superstructure of pre stressed girders and slab to be covered with BT.

23. All major government, commercial and transport terminals are located in the Central Business District (CBD). The CBD extends from Dal Gate to Batamaloo and passes through Jehangir Chowk. Airport road meets this road perpendicularly at Jehangir Chowk. The location of the High Court and the Secretariat on the west of Jehangir Chowk makes this intersection a very important hub. Apart from smaller bus stands scattered all over the city, the main bus terminal and several taxi and auto stands are located at the CBD. Several schools and colleges are also located in the CBD and vicinity. Even though the roads are widened to its maximum possible extent (i.e., from four to six lane at different locations), the number of conflicting usages and the high vehicular and pedestrian volumes result into considerable congestion and delays to pedestrians and vehicles.

24. The Srinagar-bound traffic from Jammu and southern part of valley enters the city from Sonwar side (the east) through Srinagar bypass, Natipora road or the Airport road to reach the CBD area. Congestion at these junctions are caused by traffic to and coming from the airport and other areas like Hyderpora, Sanat Nagar, Rawalpura, Downtown areas, Hazratbal and Nishat; and along Dal Gate, J.K Bank, Radio Kashmir, and Bakshi stadium intersections.

25. The road corridor has also frequent VIP movement. To pass the VIP traffic, civilian traffic movement is stopped for half an hour or so.

26. The number of conflicting usages and the high vehicular and pedestrian volumes act as barrier to redevelopment and growth of the area. The fragmentation of activities, in particular the public transport ranks, is not an efficient, convenient and safe operation. This has resulted in inefficient use of valuable land, in a prime location within the City. This inefficient use of land also inhibits the development and growth of the area. Lack of defined and dedicated commercial space to cater for demand, results in businesses operating at undesirable locations, exacerbating problems of congestion and urban degradation.

27. The proposed subproject is part of the long term plan of State Government to improve urban transport facility in the City. The BRT, widening of road and improved mobility plan would require more land acquisition as such resulting in increased resettlement impacts. The existing road carriageway has been widened to the maximum possible limits at critical points on the road. Considering the existing traffic demand and future growth of traffic there is need for a

grade separated facility on this road. Hence, construction of grade separator at Radio Kashmir crossing along Sonwar RR axis on Residency road and at TRC- JK Bank Crossing along Dalgate - Lal Chowk axis on MA road has been proposed in Srinagar City

28. Keeping the existing road width and other conditions, it is recommended to provide a two lane grade separator along Residency Road (Sonwar axis). Since there is a fountain within the TRC Circle it is recommended to provide three spans of viaduct of 49 m (17 +15+17) with Central 15 m span covering the fountain and 17 m span on either side as obligatory spans for the traffic with Two spans of 18 m for turning purposes.

29. To develop proper slip roads along the grade separator footpaths will have to be modified and some extra land to the extent of 4 m on Emporium side (left side) has to be acquired along the grade separator on emporium side of the approach. Similarly a corridor of 1m from TRC complex land (right side) for a length of about 100 m shall also have to be acquired for footpath. The land at both places is owned by the government as such shall not pose any difficulty.

## **B. Proposed Subproject and Components**

30. The subproject area is located on the southern part of Srinagar City (**Figure 1**). The major objectives of constructing the Bridge at Jawahar Nagar are:

- (i) To connect the two sides across Flood spill channel.
- (ii) Improved long-term traffic management in the Srinagar City.

31. The proposed Bridge at Jawahar Nagar is expected to have the following benefits:

- (i) 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;
- (ii) reduced traffic congestion, conflicts and land gains result in a safer and efficient circulation of traffic; and
- (iii) Future development and events need will have better access to and from the City.

32. The major objectives of constructing the grade separators are:

- (i) decongestion of traffic on the road junctions from Sonwar to Lal Chowk; and Dalgate to Lal Chowk.
- (ii) quick access to the city center; and
- (iii) improved long-term traffic management in the Srinagar City.
- (iv) The proposed grade separator is expected to have the following benefits:
- (v) immediate positive impact on the area by significantly reducing the number of vehicles routing through the area
- (vi) reduction of traffic is expected to reduce the number of accidents and potential conflicts that occur with the area thus saving human life as well as the economy of the region;
- (vii) reduced traffic also results in land gains which can be utilized to enhance the pedestrian space and increase pedestrian amenity;

- (viii) 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;
- (ix) reduced traffic congestion, conflicts and land gains result in a safer and efficient circulation of traffic; and
- (x) future development and events need will have better access to and from the City.

33. The proposed grade separators are planned at Radio Kashmir crossing along Sonwar RR axis on Residency Road and at TRC- J&K Bank Crossing along Dalgate - Lal Chowk axis on MA Road in Srinagar

34. The descriptions shown in **Table 2(a) and 2(b)** are based on the present proposals, which are expected to be substantially correct, although certain details may change as development of the subproject progresses.

35. The design of the bridge and grade separator 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 2**.

**Table 2 (a): Design features of New Mehjoor Bridge**

Design feature	Description
Total Length	120 m
Carriageway Width	7.5m
Loading	2 – lanes of IRC Class – A or single lane of 70R <sup>3</sup>
Seismic Zone	Zone V
Cross Sections	Double lane carriage way with two foot paths on either sides with Street Lighting
Span Arrangement	One continuous module of 4 spans, 25 m each as the arrangement of spans.
Super-structure	Pre-cast pre-stressed concrete girders with monolithic Reinforced Cement Concrete (RCC) deck slab over the girders for general section and for individual carriage ways and ramp sections pre-stressed concrete deck slab has been proposed.
Foundation	Pile Foundation of 1200 mm diameter piles
Life span of sub project	<b>50 years</b>

IRC: Indian Road Congress; RCC: Reinforcement Cement Concrete.

<sup>3</sup> 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.



**Table- 2(b) Design features of Grade Separator**

Design feature	Description (J&K Bank Junction on M.A Road)	Description (Radio Kashmir Junction on Residency Road)
Total Length	193 m (Towards Lal Chowk) +18 m+26m (obligatory Span) + 18m +85m (towards Dalgate) = 340 m	193 m Towards Lal Chowk +18m +49m +18m+130 m (towards Sonwar) =408m.
Carriageway Width	7.5m + 0.5 m median Crash Barrier	7.5m
Vertical Clearance	5 m	5 m
Loading	IRC Class A or single lane of 70R	IRC Class A or single lane of 70R
Seismic Zone	Zone V	Zone V
Cross Sections	Dual way carriageway with 7.5 m width	Dual way carriageway with 7.5 m width
Foundation	Pile Foundation	Pile Foundation
Life span of sub project	50 years	50 years

IRC: Indian Road Congress; RCC: Reinforcement Cement Concrete

### C. Implementation Schedule

36. The implementation schedule of the subproject is given in **Table-3** below:

**Table-3: Implementation schedule of Bridge at Jawahar Nagar and Grade Separators**

Procurement Activity	Tentative Time Schedule
Approval of SAR	December 2013
Completion of detailed Engineering design	December 2013
Issue of invitation of bids	December 2013
Contract award	March 2013
Commencement of contract	April 2014
Completion of contract	August 2016

### D. Alternatives of Proposed Subproject

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

- (i) Option 1 - Do nothing – This will not address the underlying problem of the traffic congestion and conflicts between vehicles and pedestrians.
- (ii) Option 2 - Do Minimum – This option involves grade improvements to improve safety but still does not address the underlying problem of traffic congestions.
- (iii) 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.
- (iv) Option 4 - Current preferred option. This offers the best balanced solution by providing the desired outcomes with least impacts on environment, minimum land acquisition and better economic benefits.

Figure 1A: Location of the Bridge (marked in yellow)





Figure 1B: Map showing the location of the subproject (marked red)



## IV. DESCRIPTION OF THE ENVIRONMENT

### A. Physical Resources

#### 1. Administrative Boundaries

38. The subproject sites are located in the built-up area of Srinagar city. Srinagar, the summer capital of Jammu and Kashmir, is situated at an average altitude of 1,600 meter above mean sea level (MSL) and located in the heart of oval shaped valley of Kashmir. Srinagar city is situated around 34° 05' N latitude and 74° 56' E longitudes. It is well connected by air and road.

#### 2. Topography, Drainage, and Natural Hazards

39. **Topography.** The subproject area stretches from southwest to northwest direction in the city of Srinagar. Physiographically, it constitutes a part of the flood plain of Jhelum, which is largely flat and featureless with sub-recent alluvial deposits. The topography shows gentle terrain slope from East to West. General elevation of the subproject corridor varies between 1,585m and 1, 590m above mean sea level.

40. **Drainage.** Srinagar city is located on a flatter terrain. Therefore, the drainage system of the city relies on lift system through drainage pumping stations, which lift storm water from wet well and discharge into the adjoining water bodies. Majority of the drains are covered with RCC slabs with manholes provided at suitable intervals to facilitate maintenance of the drainage system. The city has presently about sixty five drainage pumping stations.

41. As per storm water drainage master plan, Srinagar city is divided into three drainage zones. The details of the drainage zones are as below.

- (i) Zone- I: This zone includes areas from Pampore to Gaw kadal, Dalgate to Nehru park. Civil line areas, Raj bagh, Jawahar nagar to Alochi bagh and areas across flood spill channel including Ram bagh, Natipora, Barzulla etc. The subproject location falls within this Zone
- (ii) Zone- II: The zone includes areas from Amira kadal to Parimpora /Shallateng, including areas of New and Old Sectt. Batamalloo, Bemina, Nawa kadal, Nawa bazaar and Safa Kadal etc.
- (iii) Zone –III: This zone includes areas from Dalgate to Noorbagh on one side and Dalgate to Naseem bagh and areas around Iddgah, Nowshera, Ali Jan road, Soura, Buchpora etc.

42. There are about 50 existing drainage schemes having about 119 km of primary and secondary storm water drains. In addition to such drains, there are substantial lengths of tertiary drains/ deep drains. List of such existing drainage schemes is given in **Table- 4** below:

**Table-4: Zone wise list of drainage schemes in Srinagar city.**

Sr. no	Name of drainage scheme	Length of drain (m)
<b>Storm water drainage zone 1:</b>		
1	Drainage Scheme Old barzula	2016
2	Drainage Scheme Rajbagh	8889
3	Drainage Scheme Ikhrajpora, Lal mandi, Jawahar nagar, Iqbal park	5414
4	Drainage Scheme Polytechnic	3939
5	Drainage Scheme Saria balla	966
6	Drainage Scheme Solina	998

Sr. no	Name of drainage scheme	Length of drain (m)
7	Drainage Scheme Sonwar bagh; Dewatering Station	1180
8	Drainage Scheme Pandrathan; Dewatering Station	2200
9	Drainage Scheme Rawal pora; Dewatering Station	4695
10	Drainage Scheme Nowgam, Methan, Gulshan nagar	582
11	Drainage Scheme Barzulla; Dewatering Station	10367
12	Drainage Scheme Natipora; Dewatering Station	1945
13	Drainage Scheme Budshah nagar	1617
14	Drainage Scheme Chanapora	7116
15	Drainage Scheme NH Bye pass	2225
16	Drainage Scheme Rambagh area	563
17	Drainage Scheme Kacherpora	550
<b>Storm water drainage zone II:</b>		
18	Drainage Scheme Syed Hamidpura, Nawab bazar, Jamallatta	2541
19	Drainage Scheme Chotta bazaar, Guru Bazar.	1198
20	Drainage Scheme Daresh Kadal, Zampa kadal, Kaka saria, Karan nagar	1110
21	Drainage Scheme Batmaloo, Nursing garh, Bal garden, Shutrashahi	4678
22	Green sewer	1960
<b>Storm water drainage zone III:</b>		
23	Drainage Scheme Bahao- U- deen Sahib	700
24	Drainage Scheme Imppts to nallah Maar	4538
25	Drainage Scheme Khanyar	3670
26	Drainage Scheme Hawal, Alamgari Bazar, Mureed pura	3335
27	Drainage Scheme Budoo Bagh	555
28	Drainage Scheme Bhagwanpora, Noor Bagh	1647
29	Drainage Scheme Brari Nambal	1190
30	Drainage Scheme Iddgah, Ganderpora, Laigar Doori, Saidpaora	1225
31	Drainage Scheme Rathpora	1204
32	Drainage Scheme Interior Dana mazar	390
33	Drainage Scheme Shaheen Colony Guzarbal Noorbagh.	1130
34	Drainage Scheme Zoonimar	885
35	Drainage Scheme Jamia Masjid	400
36	Drainage Scheme Soura, Buchpora, Vicharnag & its adjoining schemes	6709
37	Drainage Scheme Lal Bazar, Qurershi mohalla/Bota kadal	3647
38	Drainage Scheme Zahidpora Hawal	1095
39	Drainage Scheme Bishember Nagar	2650
40	Drainage Scheme Mandir bagh and adjoining drains	990
41	Drainage Scheme Rattan Rani	1100
42	Dewatering Station Shora Khan	4950
43	Dewatering Station Court road	1530
44	Dewatering Station Abi Guzer	1085
45	Drainage Scheme Golf course Dewatering Station	1805
46	Dewatering Station Khidmat Press; Dewatering Station	840
47	Drainage Scheme Barber shah; Dewatering Station	738
48	Drainage Scheme Sonwar ; Dewatering Station Davis	2790
49	Drainage Scheme Shah mohalla, Awanta bhawan	769
50	Bilal colony	347
<b>Total</b>		<b>118663</b>

43. **Storm water drainage pumping stations:** Three types of drainage Schemes viz. Lift, Gravity & Lift-cum-gravity schemes exist in the city. Approximately 89 drainage pumping stations exist in Srinagar city having 69 permanent/temporary dewatering stations and few mobile units which are being utilized during flash floods in various areas of Srinagar city. Zone wise details of the drainage pumping stations are given in Table-5.

**Table-5: Existing storm water drainage pumping stations in Srinagar city**

Area	Number of pumping stations			
	Lift	Gravity	Lift / Gravity	Total
Zone I	17	2	4	23
Zone II	14	3	16	33
Zone III	5	13	7	25
S&D-I	2	3	3	8
<b>Total</b>	<b>38</b>	<b>21</b>	<b>30</b>	<b>89</b>

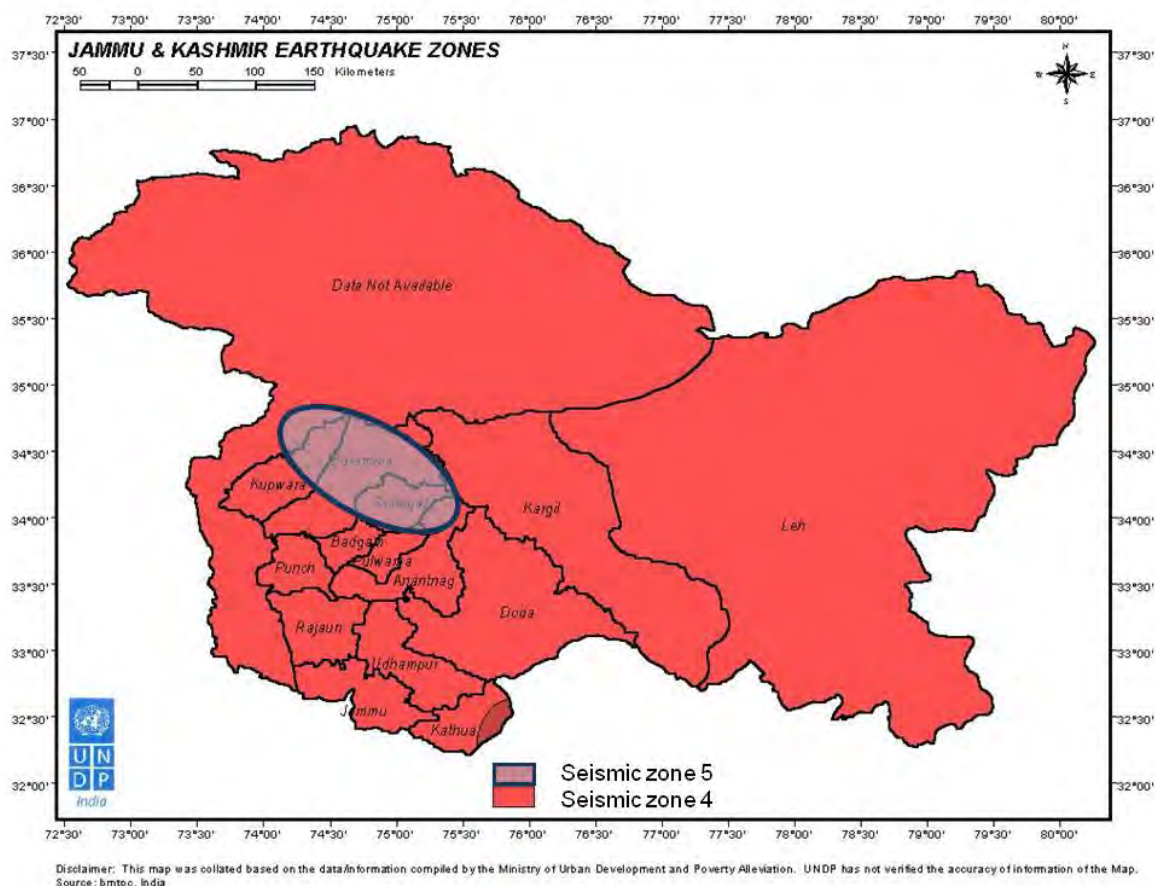
44. **Natural Hazards.** The Indian subcontinent has a history of devastating earthquakes. The major reason for the high frequency and intensity of the earthquakes is that India is driving into Asia at a rate of approximately 47 mm/year. Geographical statistics of India show that almost 54% of the land 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.

45. 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.

46. The project is located in a seismically active part of Kashmir valley. Keeping in view the maximum credible earthquake magnitudes in the region, the site area is classified in **Zone-V** 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. Architectural shape for pier cap and frame type pier has been proposed for better aesthetic look. As Srinagar falls in seismic zone –V, So seismic restrainers in longitudinal as well as in transverse directions over the pier cap have been proposed.

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





**Figure-2: Jammu and Kashmir earthquake zones.**

48. **Floods.** The subproject area is located in the central business district, Srinagar where floods are not a regular phenomenon, owing to its topography and presence of natural drainage in the form of river Jhelum and numerous water channels. The construction of Doodhganga-flood spill channel in 1904 by then Maharaja relieved the strain on the Jhelum in the city of Srinagar there by making the city safer from floods. This flood channel takes 2/3rd of the total flow from the river thus helps the river Jhelum to regulate its water level while passing through the city thus saves it from being flooded.

49. Besides natural drainage, the subproject area is well knitted with a system of drains and pumping stations which lift storm water from the drains and discharge into the adjoining water bodies. Approximately 89 drainage pumping stations exist in Srinagar city having 69 permanent/temporary dewatering stations and few mobile units which are being utilized during flash floods in various areas of Srinagar city. Majority of the drains are covered with RCC slabs with manholes provided at suitable intervals to facilitate maintenance of the drainage system. As per storm water drainage master plan, Srinagar city is divided into three drainage zones with the sub-project area falling in zone-I comprising areas from Pampore to Gaw kadal, Dalgate to Nehru park. Civil line areas, Raj bagh, Jawahar nagar to Alochi bagh and areas across flood spill channel including Ram bagh, Natipora, Barzulla etc. In order to make the drainage more efficient, different drainage projects have been proposed under trench-2 of JKUSDIP.

### 3. Geology, Geomorphology and Soils

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

- (i) The Panjal
- (ii) The Zaskar
- (iii) The Tertiary Groups

51. These three Geological divisions form the basis of the four 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 (32.17°N. Latitude) to the lofty Karakoram mountains in the north. The Tertiary Groups include the valley of Kashmir and other river Valleys.

52. The oval valley of Kashmir is longitudinal. There is a high wall of mountains round the valley. These rise to a height of 5500 metres above sea level. The only outlet of the valley is Baramulla where the Jehlum flows out through a narrow gorge. The entire drainage of the valley of Kashmir and its surrounding areas has only this outlet. In the north, Kashmir has many volcanic rock formations. These are mostly stratified and several thousand metres thick. There are many layers of sedimentary rocks which are found in Liddar valley, Baramulla district and Banihal Verinag section of the Pir Panjal range. Limestones and shales are common. The rock layers have many fossils. Near Yarkand to the extreme north, shales have been found showing that the region was under sea in the geological past.

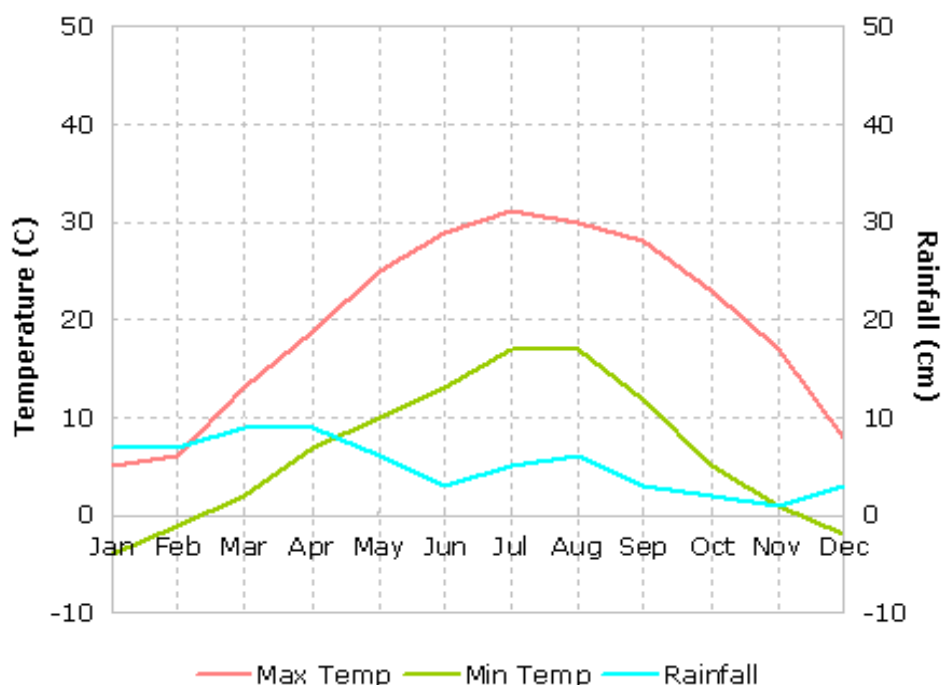
53. **Soils.** In the regions of Jammu and Kashmir the soils are loamy and there is little clay content in them. Poor in lime but with a high content of magnesia, the soil is treated with chemical fertilisers and enriched with green manure and legume before cultivation. There is sufficient organic matter and nitrogen content in the alluvium of the Kashmir valley as a result of plant residue, crops stubble, natural vegetation and animal excretion. The valley of Kashmir has many types of soils like: Gurti (clay), Bahil (Loam), Sekil (Sandy), Nambaal (Peats), Surzamin, Lemb, Floating garden soils and Karewa soils. No wonder, in Kashmir, soil is virtually worshipped as a miracle of divinity as it is a source of wealth of the land.

54. The proposed alignments of New Mehjoor Bridge and Grade Separator subproject are located within Srinagar District, which primarily comprises of old alluvium up to large depths. These deposits along the entire alignment come under more recent period of geological formation (Valley Floor Deposits). As such the strata at the proposed bridge location can broadly be categorized under natural alluvium/ water laid deposits (Alluvial Deposits), which generally include silty-clay or clayey-silt type soil in intermixed layers with potential seams of fine to coarse sand. Such alluvial deposits are also sometimes associated with matrix of highly decomposed organic silts/peat in Kashmir valley; however, the subproject area has not been reported to have any such deposits. The proposed bridge and grade separators have been designed on the basis of soil bore-log investigation.

### 4. Climate

55. The climate of Srinagar city, in general, is characterized by temperate summer and cold/mild winters. Annual rainfall in the city is of the order of less than 26 inches – most of it in winter and spring seasons. Weather Graph for Srinagar is shown in **Figure-3** below.





**Figure-3: Weather graph of Srinagar**

Note: These are average maximum and average minimum temperature for Srinagar. The highest temperature in Srinagar for the month is usually higher than the average maximum temperature. Similarly, the lowest temperature in Srinagar for the month is usually lower than the average minimum temperature.

Source: Indian Meteorological Department

56. **Temperature:** June, July and August are the hottest months while December and January are the coldest. The temperature varies from cold in winter with minimum temperature touching even -3.7 °C to mild hot in summers when the temperature shoots up to 30 °C. The mean maximum and minimum temperature (°C) recorded at meteorological observatory (Rambagh, Srinagar) during 2005 - 2010 are summarized in **Table 6:**

**Table-6: Mean maximum and minimum temperature of Srinagar city**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Year 2005</b>												
Max. Temp. (°C)	7.5	6.5	14.7	20.7	21.8	29.3	28.9	30.4	29.3	22.7	15.8	9.9
Min. Temp. (°C)	-0.3	0.7	5.3	7.1	9.9	14.4	18	16.9	13.7	5.8	-0.2	-3.3
<b>Year 2006</b>												
Max. Temp. (°C)	4.3	13.4	16	21.1	28.2	27.6	30.9	28.7	25.9	22.9	15	8.4
Min. Temp. (°C)	-1.3	3.3	4.7	7.2	13.3	14.7	19.3	18.3	12.3	8	3.5	0
<b>Year 2007</b>												
Max. Temp. (°C)	10	12	14.7	25.6	25.5	27.8	29.8	30.1	27.3	24.1	17.1	9.9
Min. Temp. (°C)	-2.5	2.9	3	8.9	11.9	16	17.8	17.8	13.3	3.9	-1.1	-2
<b>Year 2008</b>												
Max. Temp. (°C)	5.5	8.7	20	20.1	25.6	29.6	29.9	29.5	26.5			
Min. Temp. (°C)	-2.5	-1.4	5.3	7.7	11.5	18.3	19.1	17.8	11.3			
<b>Year 2010</b>												
Max. Temp. (°C)	10.9	9.8	20.7	21.3	22.7	25.7	28.9	28.5	26.6	23.8	18.6	11.3
Min. Temp. (°C)	-1.5	0.4	6.5	9.0	11.1	13.5	17.7	18.8	13.3	7.3	2.2	-3.7

Source: Indian Meteorological Department, Srinagar

57. **Rainfall:** The area experiences rain fall during winter and early summer from western disturbances. The month's total rainfall (MTR in millimeters) recorded at meteorological observatory at Rambagh, Srinagar during 2001 to 2010 is shown in **Table 7**.

**Table-7: Rainfall data of Srinagar (Month's Total Rainfall in mm)**

Months/ Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2001	21.3	46.1	56	57	37	52.8	80.8	67.8	33.5	15.9	36	18
2002	35.5	105.8	105.1	77.7	47.3	82.2	16.8	75.3	54.5	8.2	0	8.9
2003	28.7	180	173.4	127.6	91.4	20.4	97.9	19.8	62.4	8.7	14.6	59.4
2004	79.2	38.1	9.6	145.4	86.6	36.7	58.3	62.3	12	61.3	33.2	12.5
2005	86.6	188.5	104.8	48.1	63.6	8.3	115.5	15.6	16.8	18.6	14.4	0
2006	134	63.3	48.2	52.7	26.3	33.9	103.3	171.3	93.3	15.3	73.5	72.2
2007	8.1	52.6	210.3	1.5	46.2	50.9	54.9	47.4	14	0	0	15.9
2008	76.3	105	9.4	81.5	52.3	24.7	33.1	65.3	22.5	--	--	--
2010	24.1	88.9	61.0	126.8	186.4	45.3	69.8	132.1	16.9	51.4	2.0	43.0

Source: Indian Meteorological Department, Srinagar

58. **Humidity:** The humidity levels in the area are observed as maximum up to 95% in the months of July and August and minimum humidity levels between 30% – 40% prevail during December and January months. The mean relative humidity (MRH %) recorded at meteorological observatory at Rambagh, Srinagar during 2006 to 2008 at 08:30a.m. and 05:30p.m. Indian Standard Time (I.S.T) are presented in **Table-8** below.

**Table-8: Monthly Relative Humidity Data of Srinagar City**

Months	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
MRH % 2006 (Max and Min)	91	88	80	66	66	70	77	82	81	82	89	80
	79	61	52	42	44	46	54	61	60	61	68	74
2007 (Max and Min)	90	87	77	60	71	77	75	77	77	68	81	87
	54	60	52	34	47	50	55	52	52	42	53	65
2008 (Max and Min)	89	87	69	73	70	73	75	76	76	NA	NA	NA
	70	63	40	52	53	51	53	51	49	NA	NA	NA
2010 * (Max), 8.30 hr	88	87	71	77	78	74	75	85	78	77	85	90

\* In 2010, only Mean data at 08:30a.m. available, Source: Indian Meteorological Department, Srinagar

## 5. Air Quality

59. In the area along the proposed subproject, vehicular traffic is major contributor for air pollution. In order to establish ambient air quality in the subproject corridor, baseline data was generated by the Environmental Monitoring Laboratory of Economic Reconstruction Agency (ERA) in July and September 2013. The air quality data with respect to RSPM (PM<sub>10</sub>), SO<sub>2</sub> and NO<sub>2</sub> were measured at specified sites along the subprojects corridors and the results are presented in **Table-9** below.

**Table-9: Ambient Air Quality Data**

S.No	Location	Parameters		
		RSPM (Pm <sub>10</sub> ) (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )
1.	Near Proposed Mehjoor Bridge Site	87.23	4.22	5.79
2.	Near TRC	142.59	8.21	10.25
	<b>NAAQ Standards</b>	<b>PM<sub>10</sub>=100</b>	<b>80</b>	<b>80</b>

PM<sub>10</sub>= Particulate matter below 10µ particle size; RSPM: Respirable Suspended Particulate Matter; SO<sub>2</sub>= Sulphur dioxide; NO<sub>2</sub>= Nitrogen dioxide; NAAQS: National Ambient Air Quality Standards of Govt. of India

60. The result of the tests concludes that the values obtained for NO<sub>2</sub> and SO<sub>2</sub> are within the permissible limits at the site, however, at TRC the value of Respirable suspended particulate matter (PM<sub>10</sub>) are above the National Ambient Air quality Standards (NAAQ) set by the CPCB India. The primary reason for this is the heavy traffic in the vicinity of sites near the proposed subproject areas.

61. The National Ambient Air Quality Standards have been revised by Ministry of Environment and Forests, Government of India on 16th September 2009, wherein the Respirable Suspended Particulate Matter (RSPM) has been further divided into PM<sub>10</sub> and PM<sub>2.5</sub>. The air quality monitoring equipment presently available with J and K ERA can measure the total particulate matter below 10μ particle size. However, separate values for PM<sub>10</sub> and PM<sub>2.5</sub> 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

62. The proposed subprojects will pass through already existing road network area with mixed land use pattern and number of commercial establishments. Ambient noise levels during day time were measured by the environmental monitoring laboratory of ERA in September 2013, in the subproject area, and the results are shown in **Table- 10**.

**Table-10: Ambient Noise Quality Data**

S. No.	Location	Site type	Day time noise level dB(A) L <sub>eq</sub>	Day Time Noise Quality Standards <sup>4</sup> (MoEF/CPCB) (dB(A) L <sub>eq</sub> )
1.	Near Proposed Mehjoor Bridge Site.	Commercial area	56.6	65
2.	Near TRC ( Tourist Reception Center)	Commercial area	70.8	65

dB(A) L<sub>eq</sub> = the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

63. The ambient noise levels Near TRC (Tourist Reception Centre) observed to be higher than the permissible limits that may be attributed to traffic jams and frequent blowing of horns. At this location traffic volume is quite high and the areas are crowded with commercial and private transport and other activities, however the ambient noise level at proposed New Mehjoor Bridge is within permissible limit standards set by MoEF/CPCB.

64. The night time noise level data could not be generated owing to security reasons. Further, the execution of proposed subproject shall be done during day time only, therefore ruling out the possibility of any noise generation during night time. In case, any works are to be carried out during night time then the baseline data shall be generated prior to start of any such work.

<sup>4</sup> Standards specified in the schedule of Noise Pollution (Regulation And Control) Rules, 2000 of Government of India The Principal Rules were published in the Gazette of India, vide S.O. 123(E), dated 14.2.2000 and subsequently amended vide S.O. 1046(E), dated 22.11.2000, S.O. 1088(E), dated 11.10.2002, S.O. 1569 (E), dated 19.09.2006 and S.O. 50 (E) dated 11.01.2010 under the Environment (Protection) Act, 1986.

## B. Water Resources

### 1. Surface Water

65. **New Mehjoor Bridge:** No water courses are adjacent/ traversing to the subproject sites. However, the proposed new Bridge at Jawahar Nagar is on flood spill channel (the spill channel usually remain dry throughout the year and only carries excess discharge of River Jhelum in peak rainy season i.e May-June).

66. The Jhelum River is about 1 Km away upstream from the proposed bridge site. proposed subproject is not expected to have any impact on the surface water quality of flood spill channel and Jhelum river. **Grade Separators:** The Jhelum river (from Abdullah bridge side) is about 270 m away from the proposed subproject at Radio Kashmir crossing and 640 m from the J&K Bank junction.

67. The water channel known as a Tchunt kul is an outflow channel of Dal Lake (Dalgate side) and flows into Jhelum river at zero bridge side and is approximately 30 m away at Radio Kashmir crossing (takeoff point from Sonwar side) and 25 m at proposed subproject at J&K Bank site (takeoff point from Dalgate side). The water channel is located adjacent to the proposed subproject and drains into Jhelum river at Zero bride. Water channel usally remains stagnant and no fishing activity is reported. Sampling site has been selected near out let channel at Zero bridge.

68. Due to the nature and locality of the subproject there is unlikely to any significant impacts on water bodies.

69. Proposed subproject is not expected to have any impact on the surface water quality however; the water qualitytyty of river Jhelum and spill channel has been analyzed in July and September 2013 by the environmental monitoring laboratory of ERA and is presented in **Table-11**.

**Table-11: Ambient Surface Water Quality Data**

Sampling Site		Temperature °C	pH	Conduct-ivity µS/cm	DO mg/l	BOD mg/l	TDS mg/l	TSS mg/l	Turbidity (NTU)
Flood Spill Channel	Upstream	24	8	436	1.6	11	270	85	4.2
	Downstream	24	8	441	1.6	12	274	85	4.2
Jhelum River Near Zero Bridge	Upstream	19	8.0	260	7.0	2.0	158	136	2.1
	Downstream	20	8.0	267	6.6	2.0	160	140	2.2
<b>Surface water standards (As per IS:2296)</b>									
Category A		-	8.5	-	6	2	500	-	-
Category B		-	8.5	-	5	3	-	-	-
Category C		-	8.5	-	4	3	1500	-	-
Category D		-	8.5	1000	4	-	-	-	-
Category E		-	8.5	2250	-	-	2100	-	-

DO= dissolved oxygen; BOD= biochemical oxygen demand; TDS= total dissolved solids; TSS= total suspended solids; °C= degree Celsius; µs/cm= micro Siemens per centimetre; mg/l= milligram per litre; NTU= nephalo turbidity units.

70. It is clear that water quality of Jhelum is fit for drinking after conventional treatment followed by disinfection.

71. As per water quality standards for various water classes based on use (i.e. class A, B, C, D, E), the water of river Jhelum falls in category A/B and is suitable for drinking purposes after conventional treatment followed by disinfection. Whereas, the water analysis of Jhelum Flood Spill Channel shows, depleted dissolved oxygen condition and higher values of BOD level and is not fit for consumption as per surface water standards.

72. As per water quality standards for various water classes based on use (i.e. class A, B, C, D, E), the water of river Jhelum falls in category A/B and is suitable for drinking purposes after conventional treatment followed by disinfection.

## **2. Geo-hydrology and Groundwater**

73. The depth of water table around Mehjoor Nagar Bridge area is reported to be 0.5 m average below NSL i.e Flood Spill Channel bed level and the depth of water table along the grade separators are reported to be between 5 and 10 m. Public water supply is the major source of potable water for the settlements throughout the subproject area. No tube wells fall in the corridor of impact of the subproject

74. Water table was measured inside the borehole with reference to the Natural soil Level (NSL) on the day of field investigations, and was encountered at a relatively shallow depth at all boring locations. A potential seasonal variation of  $\pm 0.5\text{m}$  may be expected. In view of above, there is a prospect for seepage water to get intruded at location of working area, during any open excavation, below NSL.

## **C. Ecological Resources**

75. **Terrestrial ecology and Biodiversity.** Since the subproject stretch is located within Srinagar city, no sensitive ecological areas are located along the stretches or vicinity of subproject areas.

76. **Forest Areas and Trees.** The subproject is located within Srinagar city and there is no forest within or adjacent to the subproject.

77. A total of 16 trees (mainly Mulberry trees) are required to be removed for the construction of proposed New Mehjoor Bridge. Mulberry (*Morus alba*) is a scheduled tree of the state and shall require prior permission from the concerned authorities for their cutting. All possible efforts shall be made to avoid unnecessary cutting of trees. The matter regarding permission has been taken up with concerned authority and these trees are owned by State government. Compensatory plantation in the ratio of 1:2 will be carried out after completion of the proposed subproject by any concerned state department (like social forestry/ horticulture/ floriculture).

78. Along the corridor of Radio Kashmir towards residency road side, there are 8 Chinara and 5 Mulberry trees on LHS and towards Sonwar side 4 Chinars on LHS and 3 Chinars on RHS are located at inner edge of footpath. Subsequently, at J&K Bank junction 6 Chinars on LHS and 3 Chinars on RHS are located at inner edge of footpath from Maulana Azad Road to Dalgate side. Both Chinara and Mulberry trees are sufficiently away from the alignment of the proposed subproject. Further, alignment of the proposed subproject has been adjusted in such a way that no cutting of these scheduled trees are required or envisaged. However, pruning (minor branches) of 4 Chinara trees are required

79. Conservation of these trees during construction stage of the subproject has been formulated and discussed in anticipated potential impacts and EMP section

80. **Wild fauna.** No wild animals are reported around the subproject site as there is no forest close to the subproject site.

81. **Rare or Endangered Species.** No rare or endangered animal or plant species are reported in the subproject impact zone.

82. **Protected Area.** There is no protected area within or adjacent to the proposed subproject area.

83. **Fisheries.** No fish species are found in flood spill channel due to the stagnant nature and water characteristics of the channel (refer surface water quality analysis of spill channel Table 11) and spill channel usually remain dry throughout the year. The Jhelum river is about 1Km from proposed bridge site and from Abdullah bridge side near TRC is about 270 m away from the Radio Kashmir junction and 640 m from the proposed grade separator at MA Road junction. No interference with fishery activities is envisaged by execution of the proposed subproject.

84. The common fish species found in River Jhelum include *Schizothorax curvifrons* *Schizothorax esocinus* *Schizothorax plagiosomus* *Schizothorax labiatus* *Schizothorax niger* and *Cyprinus carpio*. Commercial fishing activity usually carried out by fishermen at number of places of the Jhelum river in the Srinagar city.

85. The water channel (from zero bridge side) connecting Jhelum river to Dal lake (Dalgate side) is approximately 55 m away from the proposed site both at J&K Bank and Radio Kashmir junction, however no fishing activity is reported from this water channel which is a stagnant waterbody.

## **D. Economic Development**

86. Jammu and Kashmir's economy is predominantly dependent on agriculture and allied activities. The Kashmir valley is also known for its sericulture and cold-water fisheries. Wood from Kashmir, popularly known as Kashmir Willow, is used to make high-quality cricket bats. Kashmiri saffron is also very famous and brings the state a handsome amount of foreign exchange. Agricultural exports from Jammu and Kashmir include apples, barley, cherries, corn, millet, oranges, rice, peaches, pears, saffron, sorghum, vegetables, and wheat, while manufactured exports include handicrafts, rugs, and shawls.

### **1. Economic Benefits**

87. **Construction New Mehjoor Bridge:** Estimated Economic Internal Rate of Return (EIRR) is 15.49% for the Mehjoor Bridge subproject.

88. The main evaluation has indicated that the proposed New Mehjoor Bridge under Tranche-3 for Srinagar is found to be economically viable, with the calculated EIRR values exceeding the economic opportunity cost of capital of 12%. The sensitivity analysis also demonstrated the robustness of this result, with the subproject component economically viable even when the combination of changed assumptions was tested

89. **Grade Separators:** Estimated Economic Internal Rate of Return (EIRR) is 26.6% for J&K Bank junction grade separator and 23.8% for Radio Kashmir Junction grade separator.

90. The main evaluation has indicated that the proposed two grade separator under Tranche-3 for Srinagar are found to be economically viable, with the calculated EIRR values exceeding the economic opportunity cost of capital of 12%. The sensitivity analysis also demonstrated the robustness of this result, with the subproject component economically viable even when the combination of changed assumptions was tested.

91. Furthermore, for the proposed New Mehjoor Bridge, the calculated EIRR value is considered minimum estimates of economic return, as there are a number of economic benefits of reduced pollution, a cleaner city, reduction in accidents and improved environment.

92. Employment generation, during construction and operation period is another major project benefit to the economy.

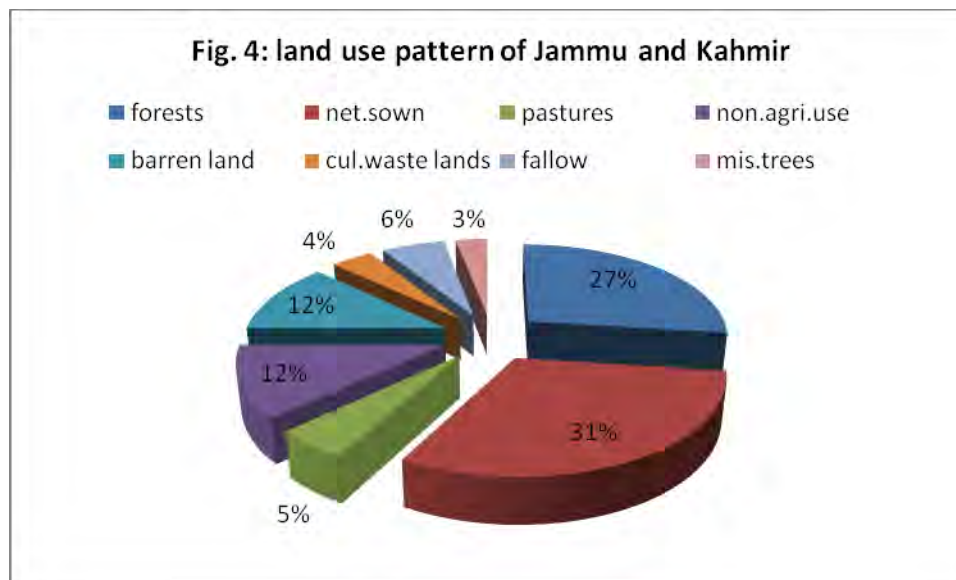
93. Horticulture plays a vital role in the economic development of the state. With an annual turnover of over Rs. 300 crore, apart from foreign exchange of over Rs. 80 crore, this sector is the next biggest source of income in the state's economy. The region of Kashmir is known for its horticulture industry and is the wealthiest region in the state. Horticultural produce from the state includes apples, apricots, cherries, pears, plums, almonds, walnuts etc.

94. **Land use Pattern.** As per Master Plan for Srinagar (2001-2021), 27.70% area of Srinagar city is developed (various types of constructions), 5.4% under defense use, 55.10% under agriculture, horticulture and rocky land, and 11.66% is covered by water bodies and floating gardens. The land-use pattern along grade separators mainly comprise of TRC ground, Golf course, Floriculture & Emporium parks, Government offices etc, and at proposed site of New Mehjoor bridge comprise of flood spill channel, bund road, residential areas in the vicinity. The proposed subproject is located within the urban city areas and its implementation will not require any change in the existing land use pattern, because alignment of the bridge and grade separators (**refer Appendix-4**) is in the same area where there is existing road network. However, at Radio Kashmir crossing 1367.74 m<sup>2</sup> of land would be required for developing the slip roads of which 1300 m<sup>2</sup> of land on Emporium side and 67.74 m<sup>2</sup> of land from TRC side. The land belongs to the State Government. The broad land uses of Srinagar local area are summarized in Table-12 below.

**Table-12: Broad land uses of Srinagar Local Area**

Sl.No.	Type of Land use	Percentage
1	Developed area including public, semi public, utilities services, graveyards and cremation grounds etc.	27.70
2	Defence use	5.54
3	Agriculture, plantation, cultivation of trees, orchards, farms and rocky land	55.10
4	Water bodies, river, mullahs and floating gardens	11.66
	<b>Total</b>	<b>100</b>

95. Overall land use pattern of Jammu and Kashmir is shown in Figure- 4.



Source: Land use pattern of Jammu and Kashmir as per Digest of Statistics(1999-2000), Govt. of Jammu and Kashmir

96. **Commercial Activities.** The land use along the proposed grade separators alignment mainly comprises of Government Departments, J&K bank corporate headquarter, TRC, Radio Kashmir Srinagar, Tourist taxi stand, Kashmir houseboat owners association (KHOA) office etc. The Residency Road, Maulana Azad road, Lal Chowk, Sonwar, Rajbagh are all commercial and business hubs. The adjoining areas of proposed bridge site like Jawhar Nagar with varied commercial markets and business establishments, whereas the areas of Lasjan and Padshahi Bagh areas mainly having a movement of commercial heavy vehicles. The Mehjoor Nagar areas have mixed market area.

97. **Industrial Development.** Kashmir region in general is poor in industrialization. However, as per the Master Plan for Srinagar 2001-2021, about 295 hectares land is under the use of industrial purpose of which 155 hectares is by service industries. Major but small scale industrial units in the city include silk factories, woolen mills, Khadi and Village industries, spinning mills, telephone factory, carpet making, food processing units, brick and tile factory, cottage industries, etc. However, such units have not been recorded in the immediate vicinity of the subproject area.

98. **Agriculture.** There are no agricultural activities carried out in the subproject impact zone. About 21,488 hectares of land is presently under agricultural use in Srinagar local area. Due to the spread of urbanization, the agricultural activities are decreasing. The net area proposed under agricultural activities by the Master plan 2001-2021 is 23.27% of the Srinagar local area. Rice fields in small pockets are situated in Padshahi Bagh area approximately 1 km from the proposed site of New Mehjoor Bridge. However, no agricultural activity has been recorded in immediate vicinity of Grade Separator site.

99. **Infrastructure Facilities.** Since the subproject sectors are situated in Srinagar city. The infrastructure facilities like schools, hospitals, college, drinking water supply system, electricity and communication in the subproject area are satisfactory.

100. **Water supply.** Broadly, the existing water supply system in Srinagar City consists of five sub systems. These sub systems are based on five number of intake works and water treatment



plants of the existing water supply system. They are, Water Supply System based on Nishat water treatment plant – 19 MLD, Water Supply System Based on Alusteng water treatment plant - 6.8 MLD, Water Supply System Based on Doodganga water treatment plant -7.75 MLD, Water Supply System Based on Rangil water treatment plant – 20 MLD, Water Supply System Based on Pokhribal Water Treatment Plant – 4 MLD. Total installed capacity is 57.55 MLD but actual operating capacity is 40.28 MLD. The five water treatment plants as a whole serve mostly the entire population of Srinagar City.

101. **Sewerage System.** Srinagar city is proposed to be managed through an elaborate network of sewer lines in the form of trunk sewers, lateral sewers and house connections spread over more than 10 zones that collects millions of liters of raw domestic sewage on daily basis for treatment through STPs (Sewerage Treatment Plants) augmented by IPS's (Intermediate Pumping Stations) at various locations. Currently, part of Srinagar city around Dal Lake and Old city are catered to by a Sewerage system. 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 to house hold to ensure operational efficiency of this vital public system.

102. **Drainage.** As per storm water drainage master plan, Srinagar city is divided into three drainage zones. There are about 50 existing drainage schemes having about 119 km of primary and secondary storm water drains. In addition to such drains, there are substantial lengths of tertiary drains/ deep drains.

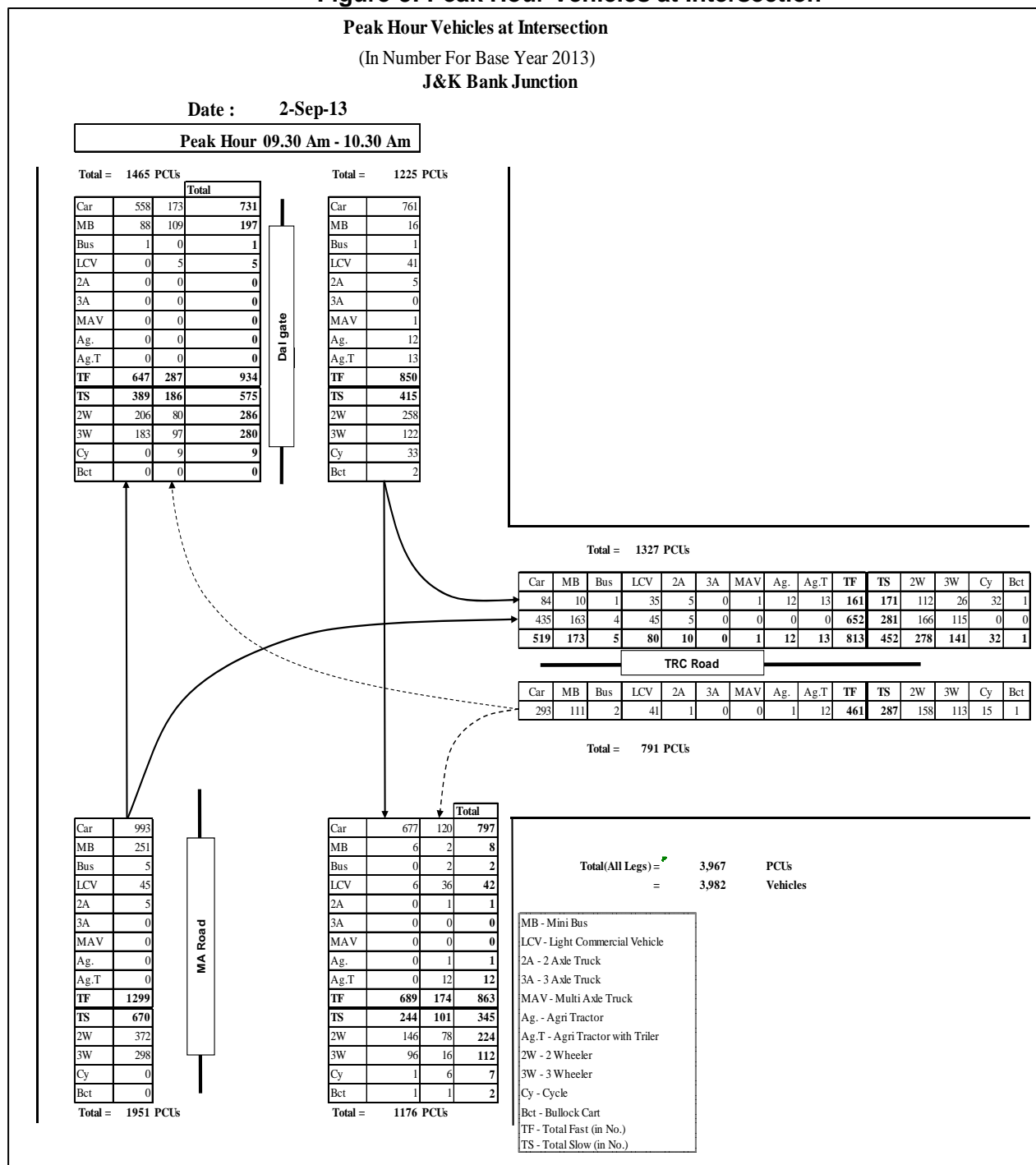
103. **Solid Waste.** Estimated quantity of solid waste generation in Srinagar is 450 grams per capita per day. Taking March 2006 populations as 1.035 million, the total quantity of municipal solid waste (MSW) generated in Srinagar in 2006 was 467 MT. During peak tourist season of summer, these figures increase by 3 to 4% due to garbage generated by tourists. It is estimated that less than 50% of waste is collected and disposed at the dumping site at Achan. The total solid waste generated in 2009 in the Srinagar city, including those from the fruit and vegetable market was 680 tons/day i.e. about 0.5 kg/head/day. (In 2020 it shall be about 880 tons/day).

104. **Transportation.** Srinagar city is connected with Jammu and rest of India. National Highway - 1A connects Ambala to Srinagar via Jammu. Srinagar is also well connected by air and laying of railway track is in progress. Transportation system of Srinagar city is characterized by radial form of development with East-West and North-South corridors forming major radials and National Highway Bypass is the only bypass. 43% of the arterial and sub arterial road network within the town has carriage way width less than 7.0 m. 32% of the road length has carriageway width of 7.0 m, while 25% of the road has carriage way width of more than 7.0 m. Srinagar City like any other historical city has very complex road network. Pedestrian pathways at Lal Chowk, the Central Business District (CBD), are insufficient and encroached upon by vendors.

105. The traffic surveys were conducted to assess the traffic flow characteristics. Heavy traffic flows are observed from 8 a.m. to 8 p.m. Distinct peaking of traffic is observed in the morning and evening. Share goods vehicles and slow moving vehicles is low, while the passenger fast moving vehicles including cars, van/taxis, auto rickshaws, mini Bus and two wheelers are predominant modes of transport. Passenger fast vehicles constitute for more than 90% of the traffic on road, cars and taxis constitute more than 50% of traffic on road, there are no heavy vehicles and it is mostly LCV plying on this corridor. In slow moving vehicles category, cycles are predominate and other categories are almost negligible. An average speed of 10-20 Km/h is observed along the corridor during peak hours. Intersection delays observed along corridor in

peak hours primarily due to heavy traffic. Peak traffic flows with turning movements are analyzed. The existing flow of traffic is estimated and analyzed.

106. Turning Movement count has been conducted at J&K bank Junction on MA Road during morning and Evening peak hours on 02.09.2013 (Monday) is shown below in **Figure-3**. The various vehicle types having different sizes and characteristics were converted into Equivalent Passenger Car Units. The Passenger Car Unit (PCU) factors recommended by Indian Road Congress in "Guidelines for Capacity of Urban Roads in Plains" (IRC-106-1990) have been used for conversion. Due to consistent traffic growth observed on these Junction and other Junctions, traffic flows at different locations are observed beyond the capacity of the existing roads, thereby reducing the level of service on the road and causing congestion. The situation warrants for enhancing capacity of the road. The existing road carriageway has been widened to the maximum possible limits at critical points on the road. Considering the existing traffic demand and future growth of traffic there is a need for Grade separators at two locations. Hence two Grade Separators of 8.5 meter width overall have been proposed

**Figure-3: Peak Hour Vehicles at Intersection**

## Peak Hour Vehicles at Intersection

(See Volume for Base Year 2017)

J&amp;K Bank Intersection

Date: 1-8-13

Peak Hour: 4:30 PM - 5:30 PM

Total: 603 PCEs

Total													
Car	HOV	Bus	LCV	2A	3A	MAV	Ag	AgT	TF	TR	TR	TR	TR
11	64	20	50										
HOV	114	0	0	0	0	0	0	0	0	0	0	0	0
Bus	2	0	0	0	0	0	0	0	0	0	0	0	0
LCV	0	0	27	27									
2A	0	0	0	4	4								
3A	0	0	0	0	0								
MAV	0	0	0	0	0								
Ag	0	0	0	0	0								
AgT	0	0	0	0	0								
TF	181	54	10	45									
TR	18	27	10	18									
TR	0	12	25	40									
TR	0	27	20	70									
Cy	0	0	0	0	0								
Bus	0	0	0	0	0								

Total: 712 PCEs

Total													
Car	HOV	Bus	LCV	2A	3A	MAV	Ag	AgT	TF	TR	TR	TR	TR
114	102												
HOV	114	0	0	0	0	0	0	0	0	0	0	0	0
Bus	2	0	0	0	0	0	0	0	0	0	0	0	0
LCV	0	0	27	27									
2A	0	0	0	4	4								
3A	0	0	0	0	0								
MAV	0	0	0	0	0								
Ag	0	0	0	0	0								
AgT	0	0	0	0	0								
TF	181	54	10	45									
TR	18	27	10	18									
TR	0	12	25	40									
TR	0	27	20	70									
Cy	0	0	0	0	0								
Bus	0	0	0	0	0								

Total: 476 PCEs

Car	HOV	Bus	LCV	2A	3A	MAV	Ag	AgT	TF	TR	TR	TR	TR
244	272	4	0	0	0	0	0	0	0	0	0	0	0
HOV	244	0	0	0	0	0	0	0	0	0	0	0	0
Bus	4	0	0	0	0	0	0	0	0	0	0	0	0
LCV	0	0	27	27									
2A	0	0	0	4	4								
3A	0	0	0	0	0								
MAV	0	0	0	0	0								
Ag	0	0	0	0	0								
AgT	0	0	0	0	0								
TF	181	54	10	45									
TR	18	27	10	18									
TR	0	12	25	40									
TR	0	27	20	70									
Cy	0	0	0	0	0								
Bus	0	0	0	0	0								

TRC

Car	HOV	Bus	LCV	2A	3A	MAV	Ag	AgT	TF	TR	TR	TR	TR
84	0	0	0	0	0	0	0	0	0	0	0	0	0
HOV	84	0	0	0	0	0	0	0	0	0	0	0	0
Bus	0	0	0	0	0	0	0	0	0	0	0	0	0
LCV	0	0	27	27									
2A	0	0	0	4	4								
3A	0	0	0	0	0								
MAV	0	0	0	0	0								
Ag	0	0	0	0	0								
AgT	0	0	0	0	0								
TF	181	54	10	45									
TR	18	27	10	18									
TR	0	12	25	40									
TR	0	27	20	70									
Cy	0	0	0	0	0								
Bus	0	0	0	0	0								

Total: 507 PCEs

Total: 84 PCEs

Car	HOV	Bus	LCV	2A	3A	MAV	Ag	AgT	TF	TR	TR	TR	TR
7	0	0	0	0	0	0	0	0	0	0	0	0	0
HOV	7	0	0	0	0	0	0	0	0	0	0	0	0
Bus	0	0	0	0	0	0	0	0	0	0	0	0	0
LCV	0	0	27	27									
2A	0	0	0	4	4								
3A	0	0	0	0	0								
MAV	0	0	0	0	0								
Ag	0	0	0	0	0								
AgT	0	0	0	0	0								
TF	181	54	10	45									
TR	18	27	10	18									
TR	0	12	25	40									
TR	0	27	20	70									
Cy	0	0	0	0	0								
Bus	0	0	0	0	0								

Absolute bridge

Car	HOV	Bus	LCV	2A	3A	MAV	Ag	AgT	TF	TR	TR	TR	TR
388	47	0	0	0	0	0	0	0	0	0	0	0	0
HOV	388	0	0	0	0	0	0	0	0	0	0	0	0
Bus	0	0	0	0	0	0	0	0	0	0	0	0	0
LCV	0	0	27	27									
2A	0	0	0	4	4								
3A	0	0	0	0	0								
MAV	0	0	0	0	0								
Ag	0	0	0	0	0								
AgT	0	0	0	0	0								
TF	181	54	10	45									
TR	18	27	10	18									
TR	0	12	25	40									
TR	0	27	20	70									
Cy	0	0	0	0	0								
Bus	0	0	0	0	0								

Total: 1176 PCEs

Total: 20 PCEs

Car	HOV	Bus	LCV	2A	3A	MAV	Ag	AgT	TF	TR	TR	TR	TR
10	0	0	0	0	0	0	0	0	0	0	0	0	0
HOV	10	0	0	0	0	0	0	0	0	0	0	0	0
Bus	0	0	0	0	0	0	0	0	0	0	0	0	0
LCV	0	0	27	27									
2A	0	0	0	4	4								
3A	0	0	0	0	0								
MAV	0	0	0	0	0								
Ag	0	0	0	0	0								
AgT	0	0	0	0	0								
TF	181	54	10	45									
TR	18	27	10	18									
TR	0	12	25	40									
TR	0	27	20	70									
Cy	0	0	0	0	0								
Bus	0	0	0	0	0								

Total: 48 PCEs

Car	HOV	Bus	LCV	2A	3A	MAV	Ag	AgT	TF	TR	TR	TR	TR
4	30	0	0	0	0	0	0	0	0	0	0	0	0
HOV	4	30	0	0	0	0	0	0	0	0	0	0	0
Bus	0	0	0	0	0	0	0	0	0	0	0	0	0
LCV	0	0	27	27									
2A	0	0	0	4	4								
3A	0	0	0	0	0								
MAV	0	0	0	0	0								
Ag	0	0	0	0	0								
AgT	0	0	0	0	0								
TF	181	54	10	45									
TR	18	27	10	18									
TR	0	12	25	40									
TR	0	27	20	70									
Cy	0	0	0	0	0								
Bus	0	0	0	0	0								

Peak Hour Lane

• 1.00

PCEs

Vehicles

HOV - Mini Van
LCV - Light Commercial Vehicle
2A - 2 Axle Truck
3A - 3 Axle Truck
MAV - Multi-Axle Truck
Ag - Agri Tractor
AgT - Agri Tractor with Trailer
TF - Tractor Puller
TR - Tractor Puller
Cy - Cycle
Bus - School Bus
TF - Tractor Puller (in No.)
TR - Tractor Puller (in No.)

107. Share of goods vehicles and slow moving vehicles is low, while the passenger fast moving vehicles including cars, van / taxis, auto rickshaws, Mini Bus and two wheelers are predominant modes of transport. Passenger fast vehicles constitute for more than 90 % of the traffic on road, cars and taxis constitute more than 50 % of traffic on roads. In goods vehicle category, there are no heavy vehicles and it is mostly light commercial vehicles (LCV) plying on this corridor. In slow moving vehicles category, cycles are predominant and other categories are almost negligible.

## E. Social and Cultural Resources

108. **Demography.** Jammu and Kashmir has a Muslim majority population. It is not the only Muslim majority state or territory in India, but shares this characteristic with the tiny union territory of Lakshadweep (total area being 11 square miles). 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 (inclusive of Megh Bhagats) 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 profile of Jammu and Kashmir state is presented in **Table-13** below:

**Table-13: 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%
<b>Jammu and Kashmir</b>	<b>10,143,700</b>	<b>66.97%</b>	<b>29.63%</b>	<b>2.03%</b>	<b>1.36%</b>
<b>Statistics calculated from the 2001 Census India District Profiles</b>					
There are roughly 1.5 million refugees from Indian Administered Kashmir in Azad Kashmir and Pakistan. An estimated 50–100,000 Kashmiri Muslims and 150–300,000 Kashmiri Pandits have been internally displaced due to militancy.					

*Census 2001, records a population of 971,357 for Srinagar urban agglomeration.*

109. In Jammu and Kashmir, the principal spoken languages are Kashmiri, Urdu, Dogri, Pahari, Balti, Ladakhi, Gojri, Shina and Pashto. However, Urdu written in the Persian script is the official language of the state. Many speakers of these languages use Hindi or English as a second language.

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

111. Notable higher education or research institutes in Jammu and Kashmir include Sher-e-Kashmir Institute of Medical Sciences Soura Srinagar, National Institute of Technology Srinagar, Government College of Engineering and Technology, Jammu and the Government Medical College of Jammu. University-level education is provided by University of Jammu, University of Kashmir, Sher-e-Kashmir University of Agricultural Sciences and Technology Jammu, Sher-e-Kashmir University of Agricultural Sciences and Technology Kashmir, Shri Mata Vaishno Devi University Jammu, Islamic University of Science and Technology Kashmir, Baba Ghulam Shah Badshah University Jammu, SSM College of Engineering and Technology Kashmir, and various Government Degree Colleges.

112. **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. As a consequence, houseboats became popular among those who were unable to purchase land in the Valley and has now become an integral part of the Kashmiri lifestyle.

113. The Dumhal is a famous dance in the Kashmir valley, performed by men of the Wattal region. The women perform the Rouff, another traditional folk dance. Kashmir has been noted for its fine arts for centuries, including poetry and handicrafts. Shikaras, traditional small wooden boats, and houseboats are a common feature in various lakes and rivers across the Valley. Shikaras are a common feature in lakes and rivers across the Kashmir valley.

114. Kahwa, traditional green tea with spices and almond, is consumed all through the day in the chilled winter climate of Kashmir. Most of the buildings in the Valley and Ladakh are made from softwood and is influenced by Indian, Tibetan, and Islamic architecture.

115. 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, along with Accession Day, which commemorates the accession of Jammu and Kashmir to the Dominion of India. 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.

116. Some archaeological, historical monuments and religious places like Burzham archaeological site, historical Jamia Masjid, Pathar Masjid, Hazratbal Shrine, and Chati Padshahi Gurudwara, etc. are located in Srinagar city. However these sites are located far away from the proposed subproject which will have no impact on any of such places and therefore no adverse impact is anticipated.

117. The Kashmir division of J&K State has ideal tourist spots with scenic beauty, adventure tourism, ecotourism, pilgrimage tourism, and other historical places and monuments which attract large number of tourists. Major tourist places in Srinagar city include Dal Lake, Mughal gardens, Hazratbal Shrine, Shankar Acharya Temple, etc. Dal Lake is 1 km, Mughal Gardens 10-15 km, Hazratbal Shrine 8 km, and Shankar Acharya Temple 6 km away from the subproject area; hence no such impact on these sites is anticipated.

118. **Sensitive Environmental Receptors.** Some of the sensitive environmental receptors exist along the alignment of proposed New Mehjoor bridge and grade separator that includes Mosque, Radio Kashmir, School, J&K Bank and Residential houses near Jawahar Nagar side (LHS) and a Hotel towards Mehjoor Nagar side (RHS) of the bridge approaches. The details of the existing sensitive environmental receptors are given in **Table-14**. During finalization of design all the sensitive receptors are saved judiciously. The impact may be temporary only during construction phase due to air and noise pollution.

**Table-14: Sensitive environmental receptors along the subproject alignment**

S.No	Name of sensitive receptor	Alignment (RHS/LHS) <sup>5</sup> vis-à-vis the flow in the proposed subproject	Distance (m) from the alignment
1	Radio Kashmir Srinagar	LHS	20
2	Mosque-TRC	RHS	55
3	Burn Hall School	LHS	350
4.	J&K Bank Headquarter	LHS	60
5.	Residential Houses	LHS (Near Jawahar Nagar side of bridge-Approach side)	100
6.	Hotel	RHS (Near Mehjoor Nagar side of bridge-Approach side)	52

LHS-Left Hand Side RHS- Right Hand Side

## V. ANTICIPATED IMPACTS AND MITIGATION MEASURES

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

120. **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.

121. 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-15:**

**Table-15: Summary of Quantifiers and Qualifiers Used for Assessment Purposes**

Duration (time-scale)	Short-term	Impact restricted to construction (0-2year).
	Medium-term	Impact will continue throughout operation (3-50 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%)

<sup>5</sup> LHS-Left Hand Side RHS-Right Hand Side

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

### A. Planning and Design Phase

123. 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 bridge & grade separators are: (i) minimum land acquisition; (ii) improvement on intersections; (iii) adequate vertical clearance; (iv) sufficient carriageway width; (v) conforming to Indian Road Congress (IRC) and Ministry of Road Transport and Highways (MORTH), Transport provisions and specifications; (vi) most suitable construction methodology; and (vii) site constraints.

124. Salient design features are presented in **Table-16 A & 16 B**.

**Table-16 A: Salient design features of proposed New Mehjoor Bridge**

Parameter	Design Consideration
Carriage way width	Keeping in mind the longer period use of structure two lane bridge is considered as better option for the construction of bridge at Jawahar Nagar.
Alignment of proposed bridge at Jawahar Nagar	Since the bridge is not trafficable as such the traffic assessment could not be done, however keeping in view the area to be covered a Two lane bridge is designed.
sections	Since the bridge is not trafficable as such the traffic assessment could not be done, however keeping in view the area to be covered by a Two lane bridge is designed.
Span arrangement	Keeping in view the construction methodology and alignment approximately 25 m simply supported 4 span arrangements has been proposed. Where ever restriction like over intersecting roads and integrating to other structures span arrangements have been adjusted according to the requirement.
Super-structure:	Since the bridge is not trafficable as such the traffic assessment could not be done, however keeping in view the area to be covered a Two lane bridge is designed. Superstructure is proposed of Pre Stressed Concrete Voids Slab having total width of 11.70 m which includes carriage way width of 7.5 m and 1.5 m foot path on either side. Asphaltic concrete wearing coat shall be provided as per Clause 2702.1 of MORT&H specifications.
Sub-structure	It is proposed to have 4 spans of 25 m each as the arrangement of spans .The foundation of the proposed Bridge shall be RCC Piles Bored in situ of 1200 mm dia. with sub structure of RCC Circular /Plate pier. Design of foundation is based on the Hydraulic data available and keeping in view the HFL and other design aspects the level of the superstructure has been fixed.  As Srinagar falls in seismic Zone V, seismic restrainers in longitudinal as well as in transverse directions over the pier cap have been proposed. Frame-type pier is chosen to provide better stability/load distribution, easy molding, uses less concrete, is economical, and provides more safety in high seismic zones. As a result, this design has been selected for main corridor.
Foundation:	On the basis of information collected for structures constructed and being constructed in Srinagar, pile foundation has been proposed for all foundations.
Location.	The subproject bridge is proposed to be constructed on downstream side of existing Old Mehjoor Bridge connecting two sides of Flood spill channel
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



Parameter	Design Consideration
Air Quality <sup>6</sup>	The subproject site is located within the CBD 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 bridge carriageway. Pollutants settling on the road surface, litter will be washed off during rain. Runoff from the subproject will produce a highly variable discharge in terms of volume, quality, in most instances will have no discernible 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.
Land use	The sub-projects will not require any land acquisition. The bridge will be constructed on the banks of flood spillway channel for which Govt. land is already available.
Traffic flow and access	Due to the location and nature of the subproject, there will be least interference with accesses. A Traffic Management Plan ( <b>Appendix 2</b> ) has been developed to provide vehicle, 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, 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 traffic police for the implementation of Traffic Management Plan.
Infrastructure and services	There are few 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 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.
Landscape character, and sense of place <sup>7</sup>	The subproject is considered to be compatible with 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, bridges in the area and also with some additional urban design features (e.g. lighting, etc)

<sup>6</sup>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 (CO<sub>2</sub>) and secondary pollutants such as hydrocarbons (HC), nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO) and sulphur dioxide (SO<sub>2</sub>). 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.

<sup>7</sup>Aesthetics refer to the visual quality of an area as imparted by the physical properties of an area, such as scale, color, 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-16 B: Salient design features of the proposed grade separators.**

Parameter	Design Consideration	
	Grade Separator at J&K Bank Junction	Grade Separator at Radio Kashmir Crossing (TRC Junction)
Carriage way width	Keeping in mind the longer period use of structure 7.5 m + 0.5 m median crash Barrier single carriage way (2 way traffic) is considered as a better option	Keeping in mind the longer period use of structure 7.5 m divided carriage way is considered as better option
*Vertical clearance	Vertical clearance of 5.0 m has been provided considering existing bridge on Dal Lake along MA road which is about 114 m from the junction.	Vertical clearance of 5.0 m has been provided considering existing bridge on Sonwar Side along Residency road which is about 148 m from the junction.
Alignment of elevated carriageway	Alignment of proposed grade separator is guided by the existing road alignment.	Alignment of proposed grade separator is guided by the existing road alignment.
Cross sections	7.5 m + 0.5 m median crash barrier carriageway over single pier arrangement for grade separator has been considered the best option to restrict the requirement of land acquisition to minimum.	7.5 m carriageway over single pier arrangement for grade separator has been considered the best option to restrict the requirement of land acquisition to minimum.
Span arrangement	Keeping in view the construction methodology and alignment, span of 26 m is proposed to clear the junction with viaduct opening of grade separator with two spans of 18 m each on either side of the obligatory span of 26 m.	Keeping in view the construction methodology and alignment, span of 17+15+17=49 m is proposed to clear the junction with viaduct openings of grade separator with 18 m ducts on either side.
Super-structure:	Pre-cast, pre-stressed concrete girders with monolithic RCC deck slab over the girders have been proposed for viaduct section of grade separator.	Pre-cast pre-stressed concrete girders with monolithic RCC deck slab over the girders have been proposed for viaduct section of grade separator
Sub-structure	Super structure shall be supported over the RCC pier cap and frame type 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. Architectural shape for pier cap and frame type pier has been proposed for better aesthetic look. As Srinagar falls in seismic zone -V, So seismic restrainers in longitudinal as well as in transverse directions over the pier cap have been proposed.	Super structure shall be supported over the RCC pier cap and frame type 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. Architectural shape for pier cap and frame type pier has been proposed for better aesthetic look. As Srinagar falls in seismic zone -V, So seismic restrainers in longitudinal as well as in transverse directions over the pier cap have been proposed.
Foundation:	RCC pile foundation.	RCC pile foundation.
Location.	Moulana Azad road grade separator at J&K Bank Headquarter having total length of 340 Meters. Construction of obligatory span of 26 m with end spans of 18 m each for turning purposes as per arrangement of spans.	Residency road grade separator at Radio Kashmir crossing having total length of 408 Meters. Construction of 2 no obligatory spans of 17 m with central span of 15 m to cover the fountain and end spans of 18 m each for turning purposes as per arrangement of spans.
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 grade separators have	

Parameter	Design Consideration	
	Grade Separator at J&K Bank Junction	Grade Separator at Radio Kashmir Crossing (TRC Junction)
	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 <sup>8</sup>	The subproject site is located within the CBD and is characterized by high volumes of traffic that cut through the intersections. The project is expected to result in an improvement in minimizing traffic congestion and in general road capacity. The proposed geometric design will minimize steep gradients and sharp turns and encourage vehicles to travel at a constant, efficient speed.	
Drainage and hydrology	The subproject components are not expected to have any negative impact on the drainage and hydrology of the area. 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 discernible 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.	
Land use and livelihoods	<p>The land use in the project corridor comprises of built up area and transportation area.</p> <p>The built up areas consist of government buildings and commercial establishments such as restaurants. The transportation area constitutes of existing roads in the subproject area.</p> <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; avoiding land acquisition in the commercial area where ever possible to minimize the large scale physical displacement; and (iv) use of frame type pier design<sup>9</sup> with proper geometrics adopted so as to minimize requirement of additional right of way (ROW)</p>	<p>The land use in the project corridor comprises of built up area and transportation area.</p> <p>The built up areas consist of government buildings and commercial establishments such as restaurants. The transportation area constitutes of existing roads in the subproject area.</p> <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; avoiding land acquisition in the commercial area where ever possible to minimize the large scale physical displacement; and (iv) use of frame type pier design with proper geometrics adopted so as to minimize requirement of additional right of way (ROW).</p>

<sup>8</sup> 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 (CO<sub>2</sub>) and secondary pollutants such as hydrocarbons (HC), nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO) and sulphur dioxide (SO<sub>2</sub>). 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.

<sup>9</sup> Frame type pier design is chosen to provide better stability /load distribution, easily moulding, uses less concrete, economical and provides more safety in high seismic zones (subproject area falls in Seismic Zone-5) as a result this design has been selected for main corridor. Circular type piers have been chosen for link roads because these comprise of two lanes with less available space. These types of piles have less surface area thus requiring less area for construction. Hence this design was selected for link roads of the subproject.

Parameter	Design Consideration	
	Grade Separator at J&K Bank Junction	Grade Separator at Radio Kashmir Crossing (TRC Junction)
Traffic flow and access	Due to the location and nature of the subproject, there will be interference with accesses. A Traffic Management Plan ( <b>Appendix 2</b> ) 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, road signals 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 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 <sup>10</sup>	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 are deemed to encroach on privacy, the design team will consider appropriate design measures to ensure privacy is maintained (e.g., erecting fiber or steel sheets along the guard railing of the grade separator) in consultation with public.	

\*Vertical Clearance: Refer Appendix- 4 for alignment of grade separators.

125. The following table (**Table-17**) 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.

<sup>10</sup> Aesthetics refer to the visual quality of an area as imparted by the physical properties of an area, such as scale, color, 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-17: Summary of Anticipated Potential Environmental Impacts during Planning and Design Stage**

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
Existing Situation	<ul style="list-style-type: none"> <li>Heavy congestion of traffic restricts the flow of vehicles leading to massive traffic jams.</li> <li>This together with a lack of adequate enforcement creates an unsafe environment for residents, pedestrians and commuters. The number of conflicting usages, the high vehicular, pedestrian volumes acts as a barrier to redevelopment and growth of the area.</li> <li>In addition the area serves as a gateway into the City, and detracts from the many positives that the real City has to offer. This is important in view of the growing number of tourists.</li> </ul>	<ul style="list-style-type: none"> <li>The subproject will improve traffic flow through the area in a safe and efficient manner.</li> </ul>	High ( - )	Local/ Regional	Medium-term	Full Mitigation Definite	High ( + )
Planning initiatives	Planning initiatives have been identified as: <ul style="list-style-type: none"> <li>decongestion of traffic at these important junctions</li> <li>smooth and quick access to the adjoining areas; and</li> <li>improved long-term traffic management in the city centre.</li> </ul>	<ul style="list-style-type: none"> <li>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.</li> </ul>	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 in a way which supports government strategies for economic and social development, whilst being environmentally and economically sustainable.	<ul style="list-style-type: none"> <li>The subproject will significantly reduce the number of vehicles routing through the road by providing additional space.</li> <li>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.</li> <li>Reduced traffic also results in land gains, which can be utilized to enhance the pedestrian space and increase pedestrian amenity.</li> <li>The reduced traffic congestion, conflicts, and land gains result in a more safe and efficient circulation of traffic, which is expected to facilitate the</li> </ul>	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
		<p>reorganization and rationalization of the public transport system and commercial activities.</p> <ul style="list-style-type: none"> <li>The future developmental and event needs (tourism) will have better access to and from the City.</li> </ul>					
Alternatives	<p>The following alternatives have been considered:</p> <ul style="list-style-type: none"> <li>Option 1 - Do nothing – This will not address the underlying problem of the traffic congestion and conflicts between vehicles and pedestrians.</li> <li>Option 2 - Do Minimum – This option involves at grade improvements to improve safety but still does not address the underlying problem.</li> <li>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</li> <li>Option 4 - Current preferred option. This offers the best balanced solution.</li> </ul>	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 ( - )

## B. Construction Phase

126. Table-18 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-18: Summary of Activities and Facilities, Resource Use, and Produced Outputs during Construction Phase**

Activities and Facilities	Inputs/Resource Use	Outputs/Waste Production
<ul style="list-style-type: none"> <li>Construction camp and its associated facilities (including lay-down areas)</li> <li>Storage camps and lay-down areas</li> <li>Materials and equipment stockpiles</li> <li>Handling and storage of hazardous materials including chemicals additives, gravel, cement, concrete and lubricants</li> <li>Source of water</li> <li>Vegetation clearance</li> <li>Bulk earthworks, grading and contouring.</li> <li>Drilling and blasting</li> <li>Movement of construction staff, equipment and materials</li> <li>Importation of selected materials/base layer construction.</li> <li>Construction of a surfaced layout</li> <li>Sub-base and base layers (Excavations, Grading, Importation of fill materials and selected gravel materials for sub-base and base layers, Application of water, Compaction and Disposal of spoil material (excess excavated soil)</li> <li>Construction of wearing course (Asphalt layer, Bitumen seal, Concrete and Paving block)</li> <li>Temporary detours</li> <li>Noise and vibrations</li> <li>Dust suppression</li> <li>Waste production and temporary storage/disposal i.e. used fuels, waste concrete and bitumen, spoil materials and general waste</li> <li>Stabilization of slopes and erosion prevention</li> <li>Use of asphalt/bitumen (and associated storage and mixing areas, chemicals)</li> <li>Concrete batching plant (and</li> </ul>	<ul style="list-style-type: none"> <li>Bitumen</li> <li>Cement</li> <li>Chemical additives used in concrete / asphalt (i.e. retarders)</li> <li>Paving blocks/bricks</li> <li>Aggregate (sand and stone)</li> <li>Gravel (fill material for embankments/selected material for sub-base and base layers)</li> <li>Water</li> <li>Drinking, cooking and sanitation at construction camps</li> <li>Water for dust suppression</li> <li>Water applied to base and sub-base layers during compaction</li> <li>Water for application to sub-base and base layers prior to compaction</li> <li>Petrochemicals</li> <li>Other chemicals/lubricants/paints</li> <li>Construction vehicles, machinery and equipment</li> <li>Temporary energy supply to construction camps</li> <li>Topsoil used during revegetation and rehabilitation</li> <li>Plant material for re-vegetation (seeds, sods, plant specimens)</li> <li>Materials for slope stabilisation</li> <li>Fabric</li> <li>Labour</li> <li>Recruitment of construction workforce</li> <li>Skills training</li> <li>Public movement control</li> <li>need barriers (not just danger tape) to protect people from trenches during construction</li> </ul>	<ul style="list-style-type: none"> <li>Old asphalt (removed from road carriageway during road upgrade)<sup>11</sup></li> <li>Waste concrete and other construction rubble</li> <li>Waste bitumen<sup>12</sup></li> <li>Used fuels, lubricants, solvents and other hazardous waste</li> <li>General waste</li> <li>Contaminated soil</li> <li>Soil contaminated with bitumen</li> <li>Soil contaminated with petrochemicals (i.e. oils and lubricants) and other chemicals</li> <li>Sewage and grey water (temporary construction camp sanitation)</li> <li>Spoil material (excess soil removed during excavations)</li> <li>Noise and vibrations (construction vehicles and machinery)</li> <li>Lighting at construction camps, equipment yards and lay-down areas</li> <li>Plant material removed from servitude/right-of-way during vegetation clearance</li> <li>Smoke and fumes</li> <li>Burning of waste</li> <li>Burning of vegetation cover</li> <li>Fires used for cooking and space heating (construction camps)</li> <li>Vehicle exhaust emissions</li> </ul>

<sup>11</sup> 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.

<sup>12</sup> 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
associated storage and mixing areas, chemicals) <ul style="list-style-type: none"> <li>• Rehabilitation of disturbed areas</li> <li>• Interaction between construction workforce and local communities</li> <li>• Management of the passing pedestrians and points of congestion</li> <li>• Reminders to affected people of construction with timeframes</li> </ul>		

127. The following table (**Table-19**) 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-19: Summary of Anticipated Potential Environmental Impacts During Construction Phase**

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
Climate	<ul style="list-style-type: none"> <li>The nature and intensity of rainfall events in an area, has implications for storm water management.</li> <li>Smoke from burning activities could be wider spread on windy days especially when dust could be blown off site.</li> </ul>	<ul style="list-style-type: none"> <li>Seasonal climatic variations will be considered during scheduling of construction activities in the area</li> <li>Excavations and other clearing activities will only be done during agreed working times and permitted weather conditions.</li> <li>Storm water control during construction phase as per the method approved by the Engineer.</li> <li>Seeding of topsoil and subsoil to prevent wind and water erosion of soil surfaces.</li> <li>No open fires permitted on site</li> </ul>	Low ( - )	Site	Short-term	Full Mitigation Probable	Low ( - )
Air Quality	<ul style="list-style-type: none"> <li>Sensitive receptors (e.g. TRC mosque, Radio Kashmir, School at Sonwar side, J&amp;K Bank, residential houses at Jawahar Nagar Side and Hotel towards Mehjoor Nagar side of Bridge) may be affected temporarily by increased traffic and related impacts during the construction phase.</li> <li>Fugitive dust can also impact roadside air quality during construction. Exhaust fumes from construction machinery, and potential smoke from cooking fires.</li> <li>Burning of waste and cleared vegetation</li> <li>Odors from use of toilet 'facilities' other than provided facilities.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure compliance with the Air Act.</li> <li>Ensure compliance with emission standards</li> <li>Guidelines that deal with the control of air pollution on site have been outlined in the Environmental Management Plan (EMP)</li> <li>Monitoring of air pollution levels in potential problem areas will be undertaken.</li> <li>Management (including storage, transport, handling and disposal) of hazardous substances used during construction.</li> <li>Dust control measures have been included in the EMP.</li> <li>Dust generating construction activities will be avoided during strong winds.</li> <li>Soil loads in transit will be kept covered</li> <li>Stockpiles of soil will be kept covered or have suitable dust palliative applied such as water.</li> <li>A suitable dust palliative (water) will be applied if dust levels rise above acceptable levels.</li> <li>Regular servicing vehicles off site in order to limit gaseous emissions.</li> <li>No open fires permitted on site</li> <li>Temporary toilet facilities will be provided on site and will be maintained on a daily basis.</li> </ul>	High ( - )	Local	Short-term	Partial Mitigation Probable	Medium (-)
Soil Erosion	<ul style="list-style-type: none"> <li>During excavation of pile boring, the bore hole are likely to cave-in/ collapse.</li> </ul>	<ul style="list-style-type: none"> <li>Suitable provisions must be made beforehand for sufficiently deep-seated casing (retrievable or sacrificial).</li> </ul>	Medium (-)	Site	Short-term	Full Mitigation Probable	Low ( - )

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
	<ul style="list-style-type: none"> <li>Excavated material (silt/ soil) boring activities may find its way into existing storm water drainage.</li> </ul>	<ul style="list-style-type: none"> <li>Check dams/ silt fences should be used to filter the sediments. It must be properly installed prior to grading. Any sediment that is tracked onto roads must be cleared immediately.</li> <li></li> </ul>					
Geology	<ul style="list-style-type: none"> <li>Strong water flows into open excavations may occur, causing sidewall collapse.</li> <li>Layers of mixed fill cover natural ground surface in many places.</li> <li>Contamination from spillage of petroleum products, spent engine oil and oil leaks from construction vehicle maintenance taking place on site.</li> <li>Contamination through use of toilet 'facilities' other than provided facilities.</li> </ul>	<ul style="list-style-type: none"> <li>The design of the site drainage system is adequate to control runoff from the subproject site in line with topographical features of the site.</li> <li>Rehabilitate all sites during construction including construction camps, stockpile area, temporary access and hauling routes, as soon as possible after the disturbance has ceased.</li> <li>Contractor to exercise strict care in the disposal of construction waste, with proof of disposal at an approved site provided after offloading each waste load and this is logged/ registered.</li> <li>Contaminated water will be contained and disposed off site at an approved disposal site at Achan Landfill in Srinagar.</li> <li>The contractor will dispose of waste from the oil interceptors at Achan Landfill in Srinagar.</li> <li>Cement, concrete and chemicals will be mixed on a concrete plinth and provisions will be made to contain spillages or overflows into the soil.</li> <li>No vehicle maintenance to be allowed on site.</li> <li>If oil spills occur the contaminated soil will be disposed of at the Landfill site at Achan in Srinagar.</li> <li>Temporary toilet facilities will be provided by contractor on site and maintained on a daily basis.</li> <li>Topsoil and subsoil will be protected from contamination.</li> <li>Subsoil and overburden in all construction and lay down areas to be stockpiled separately and returned for backfilling in the correct soil horizon order.</li> </ul>	Medium ( - )	Site	Short-term	Full Mitigation Probable	Low ( - )
Drainage and hydrology	<ul style="list-style-type: none"> <li>The proposed development is situated within an existing built up area where road infrastructure and drainage</li> </ul>	<ul style="list-style-type: none"> <li>No stockpiling of any material will be allowed towards Sonwar bridge side and toward J&amp;K bank bridge side of water channel.</li> <li>Temporary embankment steel sheets should be</li> </ul>	Low ( - )	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
	<p>facilities already exist. No wetlands occur within the subproject location</p> <ul style="list-style-type: none"> <li>• River Jhelum is located 270 m from Radio Kashmir crossing and 640 m from J&amp;K bank junction.</li> <li>• Water channel (Tcunt Kul) which is usually remains stagnant most of the year is approximately 30 m away at Radio Kashmir crossing (takeoff point from Sonwar side) and 25 m at proposed subproject at J&amp;K Bank site (takeoff point from Dalgate side). Due to the nature and locality of the subproject there is unlikely to any significant impacts on water resources within the immediate area.</li> <li>• Excavated material on the road surface may be washed off during rain as runoff.</li> </ul>	<p>provided at Sonwar side (LHS of bridge ) and J&amp;K Bank side (corner area of bridge on both LHS/RHS)</p> <ul style="list-style-type: none"> <li>• No workforce activity like urination, defecation etc will be strictly prohibited near water channel or any water body of the subproject.</li> <li>• Training/ workshop at site should be conducted for work force management and sound environmental practices.</li> <li>• The site surface to be engineered and shaped in such a way that rapid and efficient evacuation of runoff is achieved.</li> <li>• Improve existing alignments and drainage systems.</li> <li>• Provide containment areas for potential pollutants at construction camps, refueling, depots, asphalt plants and concrete batching plants.</li> <li>• Waste management practices will be implemented.</li> <li>• The transport, storage, handling and disposal of hazardous substances will be controlled and managed.</li> <li>• Check dams/ silt fences should be used to filter the sediments. It must be properly installed prior to grading. Any sediment that is tracked onto roads must be removed immediately and sediments shall not be removed by washing/ flushing with water.</li> </ul>					
Biodiversity Fauna and Flora	<ul style="list-style-type: none"> <li>• The proposed development 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 there is unlikely any significant impacts on biodiversity within the area</li> </ul>	<ul style="list-style-type: none"> <li>• All Chinar/Mulberry trees should be marked (horizontal strip) with safe reflective paint prior to commencement of works.</li> <li>• Chinar and Mulberry trees in the construction zone will be covered/ wrapped with protective green mesh fiber cloth around base tree trunk area by 6 feets in height.</li> <li>• No stockpiling of any construction will be allowed around or close to Chinar/ Mulberry trees</li> <li>• Make-shift steel barricading should be provided around Chinar/Mulberry trees in active work zone</li> </ul>	Low ( - )	Site	Short-term	Full Mitigation Probable	Low ( + )

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
	<ul style="list-style-type: none"> <li>15 no. Chinar (Platanus orientalis) and 5 no. of Mulberry (Morus sp.) trees are located within inner edge of existing footpath along proposed subproject at Radio Kashmir crossing corridor. No cutting of Chinar and Mulberry trees are envisaged, however pruning (minor branches) of 4 Chinar trees is required for vertical clearance of the proposed subproject.</li> </ul>	<ul style="list-style-type: none"> <li>where foundation/ excavation takes place.</li> <li>Permission will be obtained by ERA, if required for pruning (minor branches) of 4 Chinar trees from the sericulture/ floriculture/forest/revenue department or concerned deputy commissioner prior to start of civil works.</li> <li>Any landscaping to be undertaken will be done with locally indigenous species and low maintenance requirements.</li> </ul>					
Land Uses	<ul style="list-style-type: none"> <li>Due to the location and nature of the subproject, there will be interference with access</li> <li>Existing public transport facilities and operations will be affected by the road closure and detours.</li> <li>Transport operations, commercial establishments and various Department offices are located within the area of construction and will therefore need to be relocated during construction. This may impact livelihoods.</li> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>ERA has consulted with various organizations, departments, etc within the area and will be continued during the construction phase.</li> <li>Critical roads (e.g. in front of fire and police stations and hospitals) will have a sign of "Keep Clear".</li> <li>ERA will make provisions for vehicle and pedestrian access to maintain community linkages.</li> <li>Consult with local departments, organizations, etc regarding location of construction camps, access and hauling routes, and other likely disturbances during construction.</li> <li>Provide clear and realistic information regarding detours and alternative accesses for local communities and businesses in order to prevent unrealistic expectations.</li> <li>Provide clear and realistic information regarding employment opportunities and other benefits for local communities in order to prevent unrealistic expectations.</li> <li>Make use of local labor, materials, goods and services as far as possible</li> <li>Provide walkways and metal sheets where required to maintain access across for people and vehicles.</li> <li>Increase workforce in front of critical areas such</li> </ul>	High ( - )	Local	Short-term	Partial Mitigation Probable	Medium ( - )

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
		<p>as institutions, place of worship, business establishment, hospitals, and schools.</p> <ul style="list-style-type: none"> <li>• Consult businesses and institutions regarding operating hours and factoring this in work schedules.</li> <li>• Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.</li> </ul>					
Infrastructure and Services	<ul style="list-style-type: none"> <li>• There is likely to have temporary disruption of infrastructure and services during the construction of the proposed grade separators.</li> <li>• There are a number of existing infrastructure and services (roads, telecommunication lines, traffic signals, power lines and various pipelines within the vicinity of the subproject.</li> </ul>	<ul style="list-style-type: none"> <li>• Utility shifting will be undertaken prior to commencing construction of the grade separators.</li> <li>• Keep construction related disturbances to a minimum.</li> <li>• Consult with affected service providers regarding impacts on access to infrastructure and services and alternatives.</li> <li>• Consult with affected communities or businesses prior to foreseeable disruptions, for example notifying residents of a temporary severance of water supply.</li> <li>• Provide backup or alternative services during construction-related disruptions, for example by providing generators for power supply.</li> <li>• Provide access points to infrastructure and services.</li> <li>• Monitor complaints by the public.</li> </ul>	Medium ( - )	Local	Short-term	Full Mitigation Probable	Low ( - )
Traffic	<ul style="list-style-type: none"> <li>• Increased volume of construction vehicles on the roads may lead to increased wear and tear of roads in the vicinity of the subproject site.</li> <li>• Road safety concerns due to slow moving construction vehicles.</li> <li>• Traffic flow within the vicinity will be affected.</li> <li>• The temporary road closure will result in a decrease in overall network performance in terms of queuing delay, travel time/speed.</li> </ul>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Negotiations with privately-owned public transport operators regarding the affected public transport facilities and routing.</li> <li>• Negotiations with business owners and social service operations regarding the loss of parking</li> </ul>	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"> <li>• The road closure will impact on a public transport operations and routing.</li> <li>• On street parking and loading bays will be affected by the proposed road closure.</li> <li>• Pedestrian movements will be affected by the road closure.</li> </ul>	<ul style="list-style-type: none"> <li>• and loading bays.</li> <li>• 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.</li> <li>• The City Traffic Police will be available on site in the monitoring of traffic in the early stages of the operations during road closure.</li> <li>• 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:               <ul style="list-style-type: none"> <li>– Adjustments to traffic signal settings, signs and markings</li> <li>– Adjustments to accommodation of pedestrians</li> <li>– Adjustments necessary to public transport operators.</li> </ul> </li> <li>• 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.</li> <li>• Construction routes clearly defined.</li> <li>• Access of all construction and material delivery vehicles will be strictly controlled.</li> <li>• Enforcement of speed limits.</li> <li>• Deliveries will not be allowed during peak traffic hours</li> </ul>					
Health and Safety	<ul style="list-style-type: none"> <li>• Danger of construction related injuries.</li> <li>• Open fires in construction camp can result in accidents</li> <li>• Safety of workers and general public must be ensured.</li> </ul>	<ul style="list-style-type: none"> <li>• Implement good housekeeping practices at the construction camp.</li> <li>• Strict health and safety measures to be implemented and audited on a regular basis.</li> <li>• Secure enclosed construction site.</li> <li>• Use of reputable contractors.</li> </ul>	High ( - )	Site and Local	Short-term	Partial Mitigation Possible	Low ( - )

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
	<ul style="list-style-type: none"> <li>• Poor waste management practices and unhygienic conditions at temporary ablution facilities can breed diseases.</li> <li>• Standing water due to inadequate storm water drainage systems, inadequate waste management practices, pose a health hazard by providing breeding grounds for disease vectors such as mosquitoes, flies and snails.</li> <li>• The use of hazardous chemicals in the construction of a road can pose potential environmental, health and safety risks.</li> <li>• The upgrading of roads may involve the stripping and demolition of old asphalt layers.</li> <li>• Road safety may be affected during construction, especially when traffic is detoured.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide warning signs of hazardous working areas.</li> <li>• Excavations to be clearly demarcated and barriers (not just danger tape) erected to protect pedestrians from open trenches.</li> <li>• Workers will be thoroughly trained in using dangerous equipment.</li> <li>• Workers have the right to refuse work in unsafe conditions.</li> <li>• Undertake waste management practices.</li> <li>• Control speed and movement of construction vehicles</li> <li>• Improved signage, speed control, walkways and crossings will reduce health and safety risks due to construction.</li> <li>• Exclude public from the site</li> <li>• Ensure all workers are provided with and use Personal Protective Equipment. Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas</li> <li>• Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;</li> <li>• Provide medical insurance coverage for workers;</li> <li>• Provide clean eating areas where workers are not exposed to hazardous or noxious substances;</li> <li>• Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted;</li> <li>• Ensure moving equipment is outfitted with audible back-up alarms;</li> <li>• Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as</li> </ul>					

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
Noise and Vibrations	<ul style="list-style-type: none"> <li>• Sensitive receptors (e.g. TRC mosque, Radio Kashmir, School at Sonwar side, J&amp;K Bank, residential houses at Jawahar Nagar Side and a Hotel towards Mehjoor Nagar side of Bridge) may be affected temporarily by increased traffic, construction machinery and related noise impacts</li> <li>• Use of heavy vehicles and equipment may generate high levels of noise.</li> <li>• Vibrations resulting from bulk earthworks and compaction of base layers may create significant disturbances to nearby people and businesses.</li> <li>• Disturbance from afterhours work.</li> </ul>	<p>appropriate.</p> <ul style="list-style-type: none"> <li>• Locate concrete batching, asphalt, crushing plants, lay down areas and construction camps away from construction site.</li> <li>• Restrict construction activities to reasonable working hours near sensitive receptors.</li> <li>• Keep adjacent landowners informed of unusually noisy activities planned.</li> <li>• Regulate roadworthiness of vehicles.</li> <li>• Ensure that machinery is in a good state of maintenance.</li> <li>• Silencers must be fitted and maintained to all machinery on site.</li> <li>• Monitor noise levels in potential problem areas.</li> </ul>	High ( - )	Local	Short-term	Partial Mitigation Probable	Medium ( - )
Conservation of Water Fountain (at Radio Kashmir Junction)	<ul style="list-style-type: none"> <li>• Protection of fountain during construction. Possibility of deterioration of fountain.</li> </ul>	<ul style="list-style-type: none"> <li>• Water fountain will be provided with protective cover of steel barricading. Apart from that fountain will be covered/ wrapped with high strength polythene sheets.</li> <li>• No stockpiling of any material will allowed around or at fountain area.</li> <li>• Contractor to exercise strict care in disposing construction waste in fountain area.</li> </ul>	Low (+)	Site	Short-term	Definite Mitigation	Low (+)
Aesthetics, Landscape Character, and Sense of Place	<ul style="list-style-type: none"> <li>• The presence of heavy duty vehicles and equipment, temporary structures at</li> <li>• construction camps, stockpiles, asphalt may result in impacts on aesthetics and landscape character</li> </ul>	<ul style="list-style-type: none"> <li>• Storage areas will be properly fenced off.</li> <li>• All domestic solid waste will be collected from a central point of disposal and fed into the city waste collection system.</li> <li>• Contractor to exercise strict care in disposing construction waste, with proof of disposal at the approved site provided after offloading each waste load and this to be logged/registered.</li> <li>• Identification of suitable waste disposal site with enough capacity to hold additional waste to be produced by the proposed road construction</li> </ul>	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
		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 a frequent basis.					
Workers Conduct	• Construction workers on site disrupting adjacent land uses by creating noise, generating litter, and possible loitering.	• 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	• 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. • Labor 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.	• 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. • The contractual documentation will ensure that at least 50% of all labor is from surrounding communities	Medium ( + )	Local	Short-term	Partial Mitigation Probable	High ( + )
Archaeological and Cultural Characteristics	• The proposed development will not require demolition of ASI- or state-protected monuments and buildings	• Ensure that construction staff members are aware of the likelihood of heritage resources being unearthed and of the scientific importance of such discoveries. • 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	Low ( - )	Local	Short-term	Full Mitigation Definite	Low ( - )

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

### C. Operation and Maintenance Phase

128. **Table-20** 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-20: Summary of Activities and Facilities, Resource Use, and Produced Outputs during Operation and Maintenance Phase**

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

129. The following table (**Table-21**) 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-21: Summary of Anticipated Potential Environmental Impacts During Operation and Maintenance Phase**

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
Climate	<ul style="list-style-type: none"> <li>The nature and intensity of rainfall events in an area, has implications for storm water management.</li> <li>The corrosive nature of climatic conditions may impact on road infrastructure, including road side signage and safety barriers.</li> </ul>	<ul style="list-style-type: none"> <li>The designed storm water drainage system will control run-off from site.</li> <li>Provide warning signs and suggested speed limits during dangerous conditions.</li> <li>Regular road side maintenance.</li> </ul>	Low ( - )	Site	Medium-term	Partial Mitigation Probable	Low ( + )
Air Quality	<ul style="list-style-type: none"> <li>Air pollutants can be inhaled directly from the air, or ingested from touching surfaces or objects where pollutants have settled.</li> <li>Air pollution may increase over time due to gradual increases in traffic volumes on the road.</li> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure compliance with emission standards applicable to the area through which the road is aligned.</li> <li>Enforce speed limits and regulate roadworthiness of vehicles during operation of the road.</li> <li>Monitoring of air pollution levels in potential problem areas will be undertaken.</li> </ul>	Medium ( - )	Local	Medium-term	Partial Mitigation Unsure	Low ( - )
Geology	<ul style="list-style-type: none"> <li>Roadside soils may be affected by airborne pollutants emitted by vehicle exhausts, leaking petrochemicals during accidents and breakdowns.</li> </ul>	<ul style="list-style-type: none"> <li>Develop emergency response procedures to deal with the containment and cleanup of hazardous spills.</li> <li>Design of site drainage system in line with topographical features of the site will control runoff.</li> </ul>	Medium ( - )	Site	Long-term	Full Mitigation Possible	Low ( - )
Drainage and hydrology	<ul style="list-style-type: none"> <li>Pollutants settling on the road surface may be washed off during rain as runoff.</li> <li>Runoff from roads produces a highly variable discharge in terms of volume and quality.</li> </ul>	<ul style="list-style-type: none"> <li>Design of site drainage system in line with topographical features of the site will control runoff.</li> <li>Waste management practices will be implemented during operation of the road.</li> </ul>	Low ( - )	Local	Long-term	Partial Mitigation Definite	Low ( + )
Land Uses	<ul style="list-style-type: none"> <li>The construction of grade separators will have positive impacts both on a local and regional context in terms of road improvements and an improved transportation regime.</li> <li>Reduced traffic results in land gains, which can be utilized to enhance the pedestrian space and increase</li> </ul>	<ul style="list-style-type: none"> <li>Special events management such as festivals and holidays will require extra policing and barriers to control movement of pedestrians during peak traffic</li> </ul>	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>pedestrian amenity.</p> <ul style="list-style-type: none"> <li>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.</li> <li>The proposed development is expected to bring about positive economic benefits in the medium- to long- term.</li> <li>Local road side businesses, public transport, education and health facilities, etc are likely to benefit from the subproject.</li> <li>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.</li> <li>Access into and through the area will be improved.</li> <li>The future developmental and event needs (festivals and holidays) will have better access to and from the City.</li> <li>The proposed development is likely to impact positively on commercial activities within the subproject area and surrounds through improved access and rationalization of the area available for commercial activities.</li> </ul>						
Traffic	<ul style="list-style-type: none"> <li>Bridge and Grade separators will reduce number of vehicles passing through these junctions, thus relieving over all traffic congestion in the area.</li> <li>The reduction is expected to reduce the number of accidents and potential conflicts that occur within the</li> </ul>	<ul style="list-style-type: none"> <li>No mitigation required</li> </ul>	High ( + )	Regional	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>area, thus saving human life.</p> <ul style="list-style-type: none"> <li>Reduced traffic also results in land gains, which can be utilized to enhance the pedestrian space and increase pedestrian amenity.</li> <li>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.</li> <li>Traffic increase relate to impacts such as noise and air pollution (refer to discussion below).</li> </ul>						
Health and Safety	<ul style="list-style-type: none"> <li>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.</li> <li>The reduced traffic congestion, conflicts and land gains will result in a more safe and efficient circulation of traffic.</li> </ul>	<ul style="list-style-type: none"> <li>Undertake regular road maintenance to avoid unacceptable degradation of carriageway and road shoulder that may create dangerous road conditions.</li> <li>Impose speed limits through urban areas.</li> <li>Provide pedestrian walkways and crossings.</li> <li>Provide roadside safety signage.</li> <li>Monitor road accident statistics, state of fencing and roadside vegetation</li> </ul>	High ( + )	Local	Long-term	Partial Mitigation Probable	High ( + )
Noise and Vibration	<ul style="list-style-type: none"> <li>Noise pollution caused by existing road traffic, and additional traffic through grade separators and new Mehjoor bridge.</li> <li>Expected increase in noise due to increased traffic is not expected to impact significantly on the current ambient noise levels.</li> <li>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</li> </ul>	<ul style="list-style-type: none"> <li>Encourage vehicles to travel at a constant, efficient cruising speed.</li> <li>Ensure appropriate road surface design and regular maintenance to minimize frictional road noise and vibrations, especially for heavily used roads near sensitive receptors.</li> <li>Regulate roadworthiness of vehicles.</li> <li>Monitor noise levels in potential problem areas.</li> </ul>	Medium ( - )	Local	Long-term	Partial Mitigation Possible	Low to 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
	proximity to sensitive roadside receptors						
Conservation of Water Fountain (at Radio Kashmir Crossing)	<ul style="list-style-type: none"> <li>Water fountain to be checked for proper functioning and water flow/pressure should be maintained.</li> <li>Landscape area around fountain managed properly.</li> <li>Beautification measures for Fountain</li> </ul>	<ul style="list-style-type: none"> <li>Random checking in presence of Engineer, EE and Contractor for non-stop functioning of fountain with constant water flow/ pressure.</li> <li>Ensure fountain has been maintained to its original pristine splendor.</li> <li>Ensure landscaping carried out with grass cover along with flowering plants.</li> <li>Implementation of beautification measures by way of installing lighting etc</li> </ul>	High (+)	Local	Long-term	Medium Mitigation	High (+)
Aesthetics, Landscape Character, and Sense of Place	<ul style="list-style-type: none"> <li>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.</li> <li>The construction of bridge and grade separators will increase the quality of the tourism experience being offered, by enhancing the sense of place of the subproject area that originally attracted tourists (it is anticipated that the subproject will result in improved safety and aesthetics).</li> </ul>	<ul style="list-style-type: none"> <li>The proposed construction of bridge and grade separators at important junctions will be similar in construction and design to existing bridge and road 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.</li> <li>Provide waste disposal facilities and enforce anti-littering campaigns.</li> <li>Provide assistance with cleaning and maintenance of roadside buildings soiled or stained by air pollutants.</li> <li>Monitor housekeeping, littering and illegal dumping.</li> </ul>	Low ( + )	Local	Long-term	Partial Mitigation Probable	Medium ( + )

## D. Cumulative Environmental Impacts

130. Table-22 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.

**Table-22: 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"> <li>The proposed subproject will reduce number of vehicles passing through these junctions and old bridge, thus relieving over all traffic congestion in the area which would result in reduced number of accidents and potential conflicts, thus saving human life as well as the economy of the region.</li> <li>In addition, the barriers that the congestion 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.</li> </ul>	<ul style="list-style-type: none"> <li>Refer to tables above</li> </ul>	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"> <li>In order to promote the national imperative of promoting public transport, it is essential to provide a safe, efficient, reliable, accessible, convenient and coordinated public transport system.</li> <li>The proposal for construction of bridge and grade separator goes a long way in achieving some of the goals of a good public transport system.</li> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>Refer to tables above</li> </ul>	High ( - )	Site/Local	Long-term	Full Mitigation Definite	High ( + )
The rationalization and revitalisation of land uses	<ul style="list-style-type: none"> <li>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.</li> <li>Improved gateway to the Srinagar City</li> </ul>	<ul style="list-style-type: none"> <li>Refer to tables above</li> </ul>	High ( - )	Site/Local	Long-term	Full Mitigation Definite	High ( + )



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

131. Table-23 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-23: Summary of Anticipated Potential Environmental Impacts of the No Build Options**

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
Climate	<ul style="list-style-type: none"> <li>No obvious impacts</li> </ul>	<ul style="list-style-type: none"> <li>n/a</li> </ul>					
Air Quality	<ul style="list-style-type: none"> <li>Will remain the same</li> <li>No impacts on sensitive receptors during construction</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>	Medium ( - )	Local			Medium ( - )
Geology	<ul style="list-style-type: none"> <li>No obvious impacts</li> </ul>	<ul style="list-style-type: none"> <li>n/a</li> </ul>					
Drainage and hydrology	<ul style="list-style-type: none"> <li>No obvious impacts</li> </ul>	<ul style="list-style-type: none"> <li>n/a</li> </ul>					
Land Use	<ul style="list-style-type: none"> <li>The subproject area both at these junctions and bridge site will remain fragmented with high volumes of traffic, pedestrians and commercial activities competing for limited space.</li> <li>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.</li> <li>The fragmentation of activities, in particular the public transport ranks, will remain inefficient, inconvenient and unsafe.</li> <li>Lack of defined and dedicated trading space to cater for demand will continue to result in trading operating at undesirable locations, exacerbating problems of congestion and urban degradation.</li> <li>Private sector participation and investment will continue to be inhibited, which in turn inhibits the possible redevelopment of the area to be able to realize its full potential, including that of tourism.</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>	High ( - )	Local	Long-term		High ( - )
Traffic	<ul style="list-style-type: none"> <li>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</li> <li>The high risk of accidents to traffic users and pedestrians will remain especially in case of old Mehjoor bridge which is already in dilapidated condition.</li> <li>Access to future developmental and event needs to and</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>	High ( - )	Local	Long-term		High ( - )

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
	from the City will continue to be a problem.						
Health and Safety	<ul style="list-style-type: none"> <li>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.</li> <li>This together with a lack of adequate enforcement will continue to create an unsafe environment for residents, pedestrians and commuters resulting to accidents.</li> <li>Old Mehjoor bridge which is in dilapidated condition will continue to possess risk to pedestrian and vehicular traffic.</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>	High ( - )	Local	Long-term		High ( - )
Noise Pollution	<ul style="list-style-type: none"> <li>Noise pollution will remain the same and increase during peak rush hours.</li> <li>No impacts on sensitive receptors during construction</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>	Medium ( - )	Local	Long-term		Medium ( - )
Aesthetics, Landscape Character and sense of place	<ul style="list-style-type: none"> <li>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</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>	Medium ( - )	Local	Long-term		Medium ( - )

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

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

132. 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.

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

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

134. 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**

135. The interested and affected parties were identified during the course of initial environmental examination. Key methods employed included individual interviews, field level observations, community consultations and discussions, interviews through a pre-drafted interview schedule. Key respondents included project affected persons who only include owners of houses/residences and commercial shops/establishments, etc. who will suffer temporary access disruptions during subproject implementation due to the proposed construction of grade separators. In addition to a number of informal consultations conducted regularly in the project corridor, people, selected on a stratified basis to ensure diversified representation, were formally interviewed with the help of an interview schedule. The records of public consultations like issues discussed and feedback received along with details of date, time, location and list of are annexed as **Appendix-3**.

### **C. Future Consultation and Disclosure**

136. The public consultation and disclosure program will remain a continuous process throughout the subproject implementation and shall include the following:

#### **D. Consultation During Detailed Design**

137. 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.

138. 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.

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

#### **E. Consultation During Construction:**

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

141. Smaller-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.

#### **F. Project Disclosure**

142. 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 signage, etc.

143. 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.

144. 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 placed which are conveniently accessible to citizens as a means to disclose the document and at the same time creating wider public awareness. Electronic version of the IEE will be placed in the official website of the ERA and the official website of ADB after approval of the IEE by ADB. The PIU will issue Notification on the locality-wise start date of implementation of the subproject. The notice will be issued by the PIU in local newspapers one month ahead of the implementation works. Copies of the IEE will be kept in the PMU/PIU office and will be distributed to any person willing to consult the IEE.

### **VII. GRIEVANCE REDRESSAL MECHANISM**

145. 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:

- (i) If the affected person has any complaint or grievance, he/she is free to lodge his/her complaint with the Project Manager, PIU, JKUSDIP, ERA who will make efforts to address the complaint on ground level itself. The Project Manager will make efforts to redress the grievance within 1 week from the receipt of the grievance.
- (ii) In case the affected person is not satisfied or his grievance is not redressed he can take the matter to Director Safeguards who will ensure that grievance is redressed within 2 weeks.
- (iii) If Director Safeguards cannot resolve the complaint or the affected person is not satisfied with resolution/ decision, he/she can take the matter to the Chief Executive Officer of ERA.
- (iv) Affected persons, at any moment of time are free to approach the court of law at their own will and expenses.

146. 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>.

147. 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 subproject sites.

## **VIII. ENVIRONMENTAL MANAGEMENT PLAN**

148. The EMP designed for New Mehjoor Bridge and Grade Separators in Srinagar City will guide the environmentally-sound construction of the subproject and ensure efficient lines of communication between the DSC (Engineer), contractors, and PMU/PMC. The EMP identifies the three phases of development as: (i) Site Establishment and Preliminary Activities; (ii) Construction Phase; and (iii) Post Construction/Operational Phase.

149. 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.

150. 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 India<sup>13</sup> 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).

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

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

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

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

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

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

#### **1. ERA (PMU and PIU)**

155. This agency:

- (i) Complies with all applicable legislation and is conversant with the requirements of the EMP;

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<sup>13</sup> 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."

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

## **2. Project Management Consultants (PMC)**

156. This agency:

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

## **3. The Engineer (DSC)**

157. This agency:

- (i) Complies with all applicable legislation and is conversant with the requirements of the EMP;
- (ii) 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.
- (iii) Enforces and monitors compliance the requirements of the EMP on site;
- (iv) Assesses the Contractor's environmental performance in consultation with the Environmental Expert (of DSC) ;
- (v) Documents in conjunction with the Contractor, the state of the site prior to commencing construction activities.

## **4. Environmental Expert of Engineer (DSC)**

158. This individual:

- (i) Briefs the Contractor about the requirements of the Environmental Specification and/ or EMP, as applicable;
- (ii) Advises the Engineer about the interpretation, implementation and enforcement of the Environmental Specification and other related environmental matters;[
- (iii) Monitors and report on the performance of the contractor/project in terms of environmental compliance with the EMP to the Engineer and ERA; and
- (iv) Provides technical advice relating to environmental issues to the Engineer.

## **5. The Contractor**

159. This individual/agency

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

## B. Capacity Building

160. Training and orientation programmes shall be organized by the Environmental Experts of Engineer (DSC), PMC 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.

161. **Table-24** outlines the site establishment and preliminary activities.

**Table-24: 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 applicable Acts must be forwarded by the contractor to PMU/PIU (in relation to stone crusher plant, hot mix plants, batching plant, diesel generators, etc.)	Engineer	Prior to moving onto site and during construction
		For Cutting of Mulberry trees at both approaches of new Mehjoor bridge, prior permission from sericulture/horticulture/revenue department should be taken	PIU/ Engineer/ EE	Prior to moving onto site
		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 damage shall occur due to construction.	Engineer	Prior to moving onto site and during construction



	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		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 and mitre drains to prevent erosion and point source discharge of run-off.	Engineer	Prior to moving onto site.
3.	Setting up of Construction Camp <sup>14</sup>	Choice of site for the Contractor's camp requires the Engineer's permission and must take into account location of local residents, businesses and existing land uses, including flood zones and slip / unstable zones. A site plan must be submitted to the Engineer for approval.	Engineer and EE	During surveys and preliminary investigations and prior to moving onto the site
		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 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"> <li>• site office</li> <li>• ablution facilities</li> <li>• designated first aid area</li> <li>• eating areas</li> <li>• staff lockers and showers (where</li> </ul>	Engineer	During set-up

<sup>14</sup> Careful planning of the construction camp can ensure that time and costs associated with environmental management and rehabilitation are reduced.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		water and waterborne sewers are available) <ul style="list-style-type: none"> <li>• storage areas</li> <li>• batching plant (if required)</li> <li>• refuelling areas (if required)</li> <li>• maintenance areas (if required)</li> <li>• crushers (if required)</li> </ul>		
		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 of 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 <sup>15</sup>	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
		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	EE	During site set-up and ongoing

<sup>15</sup> Storage areas can be hazardous, unsightly and can cause environmental pollution if not designed and managed carefully

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		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		
		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
5.	Materials Management Sourcing <sup>16</sup>	Contractors shall prepare a source statement indicating the sources of all materials (including topsoil, sands, natural gravels, crushed stone, asphalt, clay liners etc), and submit these to the Engineer for approval prior to commencement of any work.	Engineer and EE	On award of contract
		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 <sup>17</sup>	Ensure that all site personnel have a basic level of environmental awareness training	EE	During staff induction and ongoing
		Staff operating equipment (such as excavators,	EE and Contractor	During staff induction,

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

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

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		loaders, etc.) shall be adequately trained and sensitized to any potential hazards associated with their task		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
		<p>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:</p> <ul style="list-style-type: none"> <li>• No alcohol / drugs to be present on site;</li> <li>• Prevent excessive noise</li> <li>• Construction staff are to make use of the facilities provided for them, as opposed to ad-hoc alternatives (e.g. fires for cooking, the use of surrounding bush as a toilet facility are forbidden)</li> <li>• No fires to be permitted on site</li> <li>• Trespassing on private / commercial properties adjoining the site is forbidden</li> <li>• Other than pre-approved security staff, no workers shall be permitted to live on the construction site</li> <li>• No worker may be forced to do work that is potentially dangerous or for what he / she is not trained to do</li> </ul>	EE	During staff induction, followed by ongoing monitoring
6.	Social Impacts <sup>18</sup>	Open liaison channels shall be established between the Site owner, the developer, operator, the contractors and interested and affected parties such that any queries, complaints or suggestions can be dealt with quickly and by the appropriate person(s).	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	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.	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	Engineer and EE	During surveys and

<sup>18</sup> It is important to take notice of the needs and wishes of those living or working adjacent to the site. Failure to do so can cause disruption to work.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		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.		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 <sup>19</sup>	Vehicles travelling along the access roads must adhere to speed limits to avoid creating excessive dust.	EE	Ongoing.
		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 minimized 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 storm water 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.	Storm water <sup>20</sup>	To prevent storm water damage, the increase in storm water run-off resulting from construction activities must be estimated and the drainage system assessed accordingly. A drainage plan must be submitted (by Contractor) to the Engineer for approval and must include the location and design criteria of any temporary stream crossings (sitting and return period etc).	Engineer	During surveys and preliminary Investigations.
		During site establishment, storm water 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 storm water and promote infiltration.	Engineer and EE	During site setup.
11.	Water Quality <sup>21</sup> .	No stockpiling of any material will be allowed	Engineer and EE	During site setup.

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

<sup>20</sup> Serious financial and environmental impacts can be caused by unmanaged storm water.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		towards Sonwar bridge side and toward J&K bank bridge side of water channel.		
		Temporary embankment steel sheets should be provided at Sonwar side (LHS of bridge ) and J&K Bank side (corner area of bridge on both LHS/RHS)	Engineer and EE	During site setup.
		No workforce activity like urination, defecation etc is strictly prohibited near water channel or any water body of the subproject.	Engineer and EE	During site setup.
		Site establishment and prelim activity for the new Mehjoor bridge should be restricted to lean period.	Engineer and EE	During site setup.
		Storage areas that contain hazardous substances must be bundled with an approved impermeable liner	Engineer and EE	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 minimize 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	Engineer and EE	During site setup.
		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 storm water 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 Water Fountain (at Radio Kashmir Junction)	Water fountain will be provided protective cover of steel barricading. Apart from that main fountain will be covered/ wrapped with high strength polythene sheets.		
		Due care to be taken by the machine operator/ workforce to maintain the sanctity of fountain. No stockpiling of material to be allowed around/ in the fountain area.		
13.	Conservation of the Natural Environment <sup>22</sup>	No vegetation may be cleared without prior permission from the Engineer.	Engineer and EE	During site setup and ongoing.
		All Chinara/Mulberry trees along corridor should be marked (horizontal strip) with safe reflective paint prior to commencement of works at grade separator site.	Engineer and EE	During site set-up
		Chinar and Mulberry trees in the construction zone of grade separator site will be covered/ wrapped with protective green mesh fiber cloth around base trunk area by 6 feet in height.	Engineer and EE	During site setup and ongoing.
		No stockpiling of any construction will be allowed around or close to Chinara/ Mulberry trees	Engineer and EE	During site setup and ongoing.
		Make-shift steel barricading should be provided	Engineer and EE	Ongoing.

<sup>21</sup> Incorrect disposal of substances and materials and polluted run-off can have serious negative effects on groundwater quality

<sup>22</sup> Alien plant encroachment is particularly damaging to natural habitats and is often associated with disturbance to the soil during construction activities. Care must be taken to conserve existing plant and animal life on and surrounding the site.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		around Chinar/Mulberry trees in active work zone where foundation/ excavation takes place at grade separator site.		
		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
		Permission for cutting of Mulberry trees (New Mehjoor Bridge) and pruning (minor branches) of Chinar trees (radio Kashmir crossing and J&K Bank junction) shall be acquired from the concerned departments of floriculture/ sericulture/horticulture/ revenue and DC prior to commencement of works.	Engineer and EE	Prior to commencement of works
14.	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
15.	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.
16.	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"> <li>• stringing of power lines</li> <li>• earthworks / earthmoving machinery on steep slopes above houses / infrastructure</li> <li>• risk to residences along haulage roads / access routes</li> </ul>	Engineer and EE	24 hours prior to activity in question

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

162. Table-25 outlines management of construction activities and workforce.

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

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
1.	Access to Site	Contractors shall ensure that all side and mitre 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 storm water damage as soon as these develop.	Engineer	Weekly inspection.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		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	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 conduct section, must be followed at all times	Contractor and Engineer	Ongoing monitoring.
4.	Dust and Air Pollution <sup>23</sup>	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.

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



	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		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 (nominally 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 re-vegetation 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.
		Storm water 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. <sup>24</sup>	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 re-vegetated 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 erosion. Check dams/ silt fences should be used to filter the sediments. It must be properly installed prior to grading. Any sediment that is tracked onto roads must be removed immediately and sediments shall not be removed by washing/ flushing with water.	Engineer and Contractor	Immediately after the creation of the embankment.
6.	Storm water	The Contractor shall not in any way modify nor damage the banks of flood spill channel at bridge site or within the designated area, unless required as part of the construction project specification. Where such disturbance is unavoidable, modification of water bodies shall be kept to a minimum in terms of: <ul style="list-style-type: none"> <li>Removal of riparian vegetation</li> </ul>	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	Engineer	Monitoring throughout the duration of the project.

<sup>24</sup> Estimated total volume of unused excavated material to be disposed is 26,257 cubic meters.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		not be placed in storm water channels, drainage lines or rivers.		
		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 storm water 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 storm water outfall points shall be constructed rather than a few large outfall points.	Engineer and Contractor	As directed by the engineer
		Storm water outfalls shall be designed to reduce flow velocity and avoid stream bank and soil erosion.	Engineer and Contractor	As directed by the engineer
		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 <sup>25</sup>	No stockpiling of any material will be allowed towards Sonwar bridge side and toward J&K bank bridge side of water channel.	Engineer and Contractor	Ongoing monitoring.
		Temporary embankment steel sheets should be provided at Sonwar side (LHS of bridge ) and J&K Bank side (corner area of bridge on both LHS/RHS)	Engineer and Contractor	Ongoing monitoring.
		All major work activities should be done in lean period at bridge site of spill channel.	Engineer and Contractor	Ongoing monitoring.
		No workforce activity like urination, defecation etc is strictly prohibited near water channel at grade separator site and flood spill channel of bridge site.	Engineer and Contractor	Ongoing monitoring.
		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 site.	Contractor	Regular monitoring (refer to the environmental monitoring program)
		Every effort shall be made to ensure that any chemicals or hazardous substances do not contaminate the soil or ground water on site.	Contractor	Regular monitoring (refer to the environmental monitoring program)
		Care must be taken to ensure that run-off from	Contractor	Regular monitoring

<sup>25</sup> Water quality is affected by the incorrect handling of substances and materials. Soil erosion and sediment is also detrimental to water quality. Mismanagement of polluted run-off from vehicle and plant washing and wind dispersal of dry materials into rivers and watercourses are detrimental to water quality.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		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 to a regular municipal sewer.		(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	All Chinar/Mulberry trees should be marked (horizontal strip) with safe reflective paint prior to commencement of works. Chinar and Mulberry trees in the active construction zone will be covered/ wrapped with protective green mesh fiber cloth around base trunk area by 6 feet in height. No stockpiling of any construction will be allowed around or close to Chinar/ Mulberry trees Make-shift steel barricading should be provided around Chinar/Mulberry trees in active work zone where foundation/ excavation takes place.	Engineer	Ongoing monitoring.
		Gathering of firewood, fruit, plants, crops or any other natural material on site or in areas adjacent to the site or near Chinar/Mulberry trees is prohibited.	Contractor	Ongoing monitoring.
		The hunting of birds and animals on site and in surrounding areas is forbidden.	Contractor	Ongoing monitoring.
		Immediate re-vegetation 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.
9.	Conservation Water Fountain (at Radio Kashmir Crossing)	Water fountain will be provided protective cover of steel barricading.	Engineer, EE and Contractor	Location as directed by the engineer
		Due care to be taken by the workforce to maintain the sanctity of fountain. No stockpiling of material to be allowed around/ in the fountain area.	Engineer, EE and Contractor	Location as directed by the engineer
10..	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	Contractor	As necessary

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		the project. Stockpiles may further be protected by the construction of berms or low brick walls around their bases		
		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 may be washed on site	Contractor	Ongoing monitoring.
		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.
11.	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 waste and making sure that staffs are aware of their uses.	Contractor	Ongoing monitoring.
		All waste must be removed from the site and transported to a disposal site. 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.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
12.	Social Impacts <sup>26</sup>	Contractor's activities and movement of staff to be restricted to designated construction areas.	Engineer	Ongoing.
		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 institutions, place of worship, business establishment, hospitals, and schools.	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"> <li>noise generated by jackhammers, diesel generator sets, excavators, drilling</li> <li>dewatering pumps</li> </ul>	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	

<sup>26</sup> Regular communication between the Contractor and the interested and affected parties is important for the duration of the contract.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		A complaints register (refer to the Grievance Redress 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	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: - documenting details of such communications <ul style="list-style-type: none"> <li>• submitting these for inclusion in complaints register</li> <li>• bringing issues to Engineer's attention immediately</li> <li>• taking remedial action as per Engineer's instruction</li> </ul>	Contractor	Ongoing monitoring.
		Selected staff are to be made available for formal consultation with the interested and affected parties in order to: <ul style="list-style-type: none"> <li>• explain construction process</li> <li>• answer questions</li> </ul>	Contractor	Ongoing monitoring.
13.	Cultural Environment	Possible items of historical or archaeological value include old stone foundations, tools, clayware, jewellery, remains, fossils etc.	Engineer	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.
14.	Environment Safeguard Officer	Contractor shall appoint one each Environment Safeguard Officer who shall be responsible for assisting contractor in implementation of EMP, community liaison, consultations with interested/affected parties, reporting and grievance redressal on day-to-day basis.	Engineer and EE	Person to be appointed before start of construction activities and remain available through the project duration.

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

163. Table-26 outlines the post-construction activities..

**Table-26: 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 is to be checked for spills of substances such as oil, paint etc. and these shall be cleaned up.	Engineer	Subproject 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 re-vegetation specification that forms part of this document.	Engineer	Subproject completion
		The Contractor must arrange the cancellation of all temporary services.	Engineer	Subproject completion

	Activities	Management/Mitigation	Responsible Monitoring for	Frequency
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 re-vegetation/ landscaping 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 re-vegetation/ landscaping specification, (except for seeding alien vegetation).	Engineer	Subproject completion
		Compensatory plantation shall be carried in the ratio of 1:2 ratio of New Mehjoor Bridge subproject		
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	Engineer and EE	On completion of

	Activities	Management/Mitigation	Responsible Monitoring for	Frequency
		access across these blocked.		construction
		Access or haulage roads that were built across watercourses must be rehabilitated by removing temporary bridges and any other materials placed in/or near to watercourses. Revegetation of banks or streambeds must be as necessary to stabilize these and must be approved by the Engineer.	Engineer and Contractor	On completion of construction
		All areas where temporary services were installed are to be rehabilitated to the satisfaction of the Engineer	Engineer and Contractor	On completion of construction
		Water fountain area including the landscape area to be maintained to its pristine splendor and to check proper functioning this should be done in presence of Engineer, EE and Contractor.		

EE = Environmental Expert of Engineer (DSC)

### C. Environmental Monitoring Programme

164. **Table-27** outlines the environmental monitoring program to ensure implementation of the management and mitigation measures specified in the EMP. The table shall be read within the context of the body of the entire EMP for New Mehjoor Bridge at Jawahar Nagar & Grade Separators in Srinagar City.

**Table-27: Environmental Monitoring Programme**

Aspect	Parameter	Standards	location	duration / frequency	Implementation	Supervision
<b>1. Site establishment and preliminary activities</b>						
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) PUC certificates for vehicles engaged in construction activity.	Air Act Water Act Noise Act	-	prior to moving onto site and during construction	Contractor	Engineer/EE/ PMU/ PMC
	Copy of EMP	EARF and ADB SPS	subproject site, offices, website, library, etc.	at all times	Contractor, Engineer and EE	PMU/ PMC
Access to site	Existing conditions	EMP	all access and haul roads	prior to moving onto site	Engineer, EE and Contractor	PMU/ PMC
	Road closures and traffic rerouting	Traffic Management Plan and EMP	all affected roads	one week in advance of the activity	Engineer and EE	PMU/ PMC
	Notifications and road signages	Traffic Management	all affected roads	one week in advance of	Engineer and EE in	PMU/ PMC



Aspect	Parameter	Standards	location	duration / frequency	Implementation	Supervision
		Plan and EMP		the activity	coordination with the Contractor and Traffic Police	
Construction camp	Approval of location facilities	EMP	as identified	prior to moving onto site	Contractor with the Engineer and EE	PMU/ PMC
Equipment Lay-down and Storage Area	Approval of location facilities	EMP	as identified	prior to moving onto site and during site set-up	Contractor with the Engineer and EE	PMU/ PMC
Materials management – sourcing	Approval of sources and suppliers	EMP	as identified	prior to procurement of materials	Contractor with the Engineer and EE	PMU/ PMC
Education of site staff	Awareness Level Training - Environment - Health and Safety	EMP and records	-	during staff induction, followed by scheduled as determined	Contractor with the Engineer and EE	PMU/ PMC
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/PMC	PMU/ PMC
	GRM Register	EMP	subproject site	prior to moving onto site and ongoing	Contractor with the Engineer, EE, PIU	PMU/ PMC
Noise	Baseline Data for noise level in dB(A) $L_{eq}$	National Noise Standards	Two locations (each at New Mehjoor Bridge & Grade Separator sites) near construction sites as identified by the Engineer	prior to site set-up	Engineer and EE in coordination with the Environmental Monitoring Laboratory of ERA	PMU/ PMC
Air quality	(PM <sub>10</sub> , PM <sub>2.5</sub> ), sulfur dioxides (SO <sub>2</sub> ), nitrogen dioxide (NO <sub>2</sub> )	National Ambient Air Quality Standards	Two locations (each at New Mehjoor Bridge & Grade Separator sites) near construction sites as identified by the Engineer	prior to site set-up	Engineer and EE in coordination with the Environmental Monitoring Laboratory of ERA	PMU/ PMC
Soil erosion	Soil erosion management measures	EMP	as identified by the engineer	during site set-up and throughout the duration of the subproject	Contractor with the Engineer and EE	PMU/ PMC
Storm-water	Storm-water	EMP	as identified by	during site	Contractor with	PMU/ PMC

Aspect	Parameter	Standards	location	duration / frequency	Implementation	Supervision
	management measures		the Engineer	set-up and throughout the duration of the subproject	the Engineer and EE	
Water quality	Ph, temp, DO, TDS,TSS, BOD,	Water Quality Standards	Two locations (each at New Mehjoor Bridge & Grade Separator sites) near construction sites as identified by the Engineer subproject sites <sup>27</sup>	prior to site set-up	Engineer and EE in coordination with the Environmental Monitoring Laboratory of ERA	PMU/ PMC
Conservation of Natural Environment	Existing conditions	EMP	subproject sites	prior to site set-up	Contractor with Engineer and EE	PMU/ PMC
Waste management procedure	Disposal sites	EMP	as determined	prior to site set-up and ongoing throughout the subproject	Contractor with Engineer and EE	PMU/ PMC
Cultural environment	Chance finds	ASI Act and EMP	as determined	prior to site set-up and ongoing throughout the subproject	Contractor with Engineer and EE	PMU/ PMC
<b>2. Construction phase</b>						
Access to Site	Qualitative characteristics	Pre-subproject condition and EMP	all access and haul roads	refer to EMP (table on management of construction and workforce activities)	Contractor	Engineer
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	PM <sub>10</sub> , PM <sub>2.5</sub> , SO <sub>2</sub> , NO <sub>2</sub>	National Ambient Air Quality	two locations(each at New	once in four months (three times	Contractor in close coordination	PMU/ PMC

<sup>27</sup> 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
		Standards	Mehjoor Bridge & Grade Separator sites) near construction sites as identified by the Engineer .	in a year)	with the Engineer and Environmental Monitoring Laboratory of ERA	
Soil erosion	Soil erosion management measures	EMP	subproject sites	ongoing	Contractor	Engineer
Storm-water	Soil erosion management measures	EMP	subproject sites	ongoing	Contractor	Engineer
Water quality	Ph, temp, DO, TDS,TSS, BOD,	National Ambient Water Quality Standards	two locations (each at New Mehjoor Bridge & Grade Separator sites) near construction sites as identified by the Engineer .	once in four months (three times in a year)	Contractor in close coordination with the Engineer and Environmental Monitoring Laboratory of ERA	PMU/ PMC
Water Fountain (at Radio Kashmir Crossing)	Implementation of protective measures	EMP	Subproject site (at Radio Kashmir crossing)	ongoing	Contractor with Engineer and EE	PMU/PMC
Conservation of Natural Resources	Implementation of protective measures of scheduled trees	EMP	subproject sites	ongoing	Contractor with Engineer and EE	PMU/PMC
	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
Social impacts	Public Consultations, Information Disclosure, Communication Strategy	EARF, ADB SPS and EMP	subproject sites	ongoing	Contractor with the Engineer, EE, PIU	PMU/ PMC
	GRM Register	EMP	subproject sites	ongoing	Contractor with the Engineer, EE, PIU	PMU/ PMC
Cultural environment	Chance finds	ASI Act and EMP	subproject sites	ongoing	Contractor	Engineer
Noise quality	Noise Level in dB(A) $L_{eq}$	National Noise standards	two locations (each at New Mehjoor Bridge & Grade Separator sites) near construction	once in four months (three times in an year)	Contractor in close coordination with the Engineer and Environmental Monitoring	PMU/ PMC

Aspect	Parameter	Standards	location	duration / frequency	Implementation	Supervision
			sites as specified by the engineer (DSC).		Laboratory of ERA	
<b>3. Post-construction activities</b>						
Construction camp	Pre-existing conditions	EMP	construction camp	subproject completion	Contractor	Engineer
Conservation of natural resources	Pre-existing conditions for Chinara trees	EMP	subproject sites	subproject completion	Contractor	Engineer
Water Fountain (at Radio Kashmir crossing)	Pre-existing condition and fully functional	EMP	Subproject site (Radio Kashmir Crossing)	Subproject completion	Contractor with Engineer and EE	PMU/ PMC
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/ PMC
<b>4. Operation and maintenance (defect liability period)</b>						
Air quality	PM <sub>10</sub> , PM <sub>2.5</sub> , SO <sub>2</sub> , NO <sub>2</sub>	National Ambient Air Quality Standards	two locations (each at New Mehjoor Bridge & Grade Separator sites) as specified by the ERA.	once in 6 months (defect liability period)	Environmental Monitoring Laboratory of ERA	PMU/PMC
Noise quality	Noise Level in dB(A) L <sub>eq</sub>	As per National Noise standards	two locations(each at New Mehjoor Bridge & Grade Separator sites) as specified by the ERA	once in 6 months (defect liability period)	Environmental Monitoring Laboratory of ERA	PMU/PMC
Water Quality	Ph, temp, DO, TDS,TSS, BOD,	Water Quality Standards	two locations (each at New Mehjoor Bridge & Grade Separator sites) as specified by the ERA	once in 6 months (defect liability period)	Environmental Monitoring Laboratory of ERA	PMU/PMC
Water Fountain (at Radio Kashmir Crossing)	Pre-existing condition, fully functional & beautification measures	EMP, Visual check	Radio Kashmir Crossing	Bi-monthly defect liability period	Contractor with Engineer and EE	PMU/PMC
Conservation of natural resources	Pre-existing conditions for Chinara and Mulberry trees	EMP	subproject sites	subproject completion	Contractor with Engineer and EE	PMU/PMC

EE= Environmental Expert of Engineer (DSC)

## D. Environmental Management and Monitoring Cost

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

166. 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.

167. The activities identified in environmental monitoring program mainly includes site inspections and informal discussions with workers and local people and this will be the responsibility of PMU and PMC with the assistance of DSC, costs of which are part of project management.

168. Table-28A & 28B presents the estimated cost to implement the EMP.

**Table-28A: Indicative Cost for EMP Implementation of New Mehjoor Bridge**

Component	Description	Number	Rate 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			These consents are to be obtained by contractor on his own cost.
Public consultations and information disclosure	construction phase	Lump sum	300,000	300,000	
Baseline Monitoring	Site preparation and preliminary activities				
Air		Four	7,000 per sample	28,000	Contractor's cost
Noise		Four	1,000 per sample	4,000	Contractor's cost
Dust Suppression at subproject sites	construction and defect liability phases	lump sum	500,000	500,000	Contractor's Cost
Traffic management	Safety Signboards, delineators, traffic regulation equipments, flagman, temporary diversions, etc				Included in engineering cost
Compensation for cutting of trees <sup>28</sup>	Compensation for tree-cutting with requisite permits	lump sum	250,000	250,000	
Compensatory plantation <sup>29</sup>	16 x 2 = 32 (@ 1:2)	lump sum	25,000	25,000	
Construction Monitoring					
Air	Once in four months at two	18	7,000 per	126,000	

<sup>28</sup> 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.

<sup>29</sup> 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	Rate per Unit (INR)	Cost (INR)	Source of Funds
	locations (for three years, total 18 samples)		sample		
Noise	Once in four months at two locations (for three years, total 18 samples)	18	1,000 per sample	18,000	
Defects Liability Period (6 months)					
Air	Once at two locations	2	7,000 per sample	14,000	
Noise	Once at two locations	2	1,000 per sample	2,000	
<b>TOTAL (INR)</b>				<b>1,267,000</b>	

**Table-28 B: Indicative Cost for EMP Implementation Grade Separators**

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			These consents are to be obtained by contractor on his own cost.
Public consultations and information disclosure	construction phase	Lump sum	50,000	50,000	
Baseline Monitoring	Site preparation and preliminary activities				
Air		Two	7,000 per sample	14,000	Covered under Engineering design and cost
Noise		Two	1,000 per sample	2,000	Covered under Engineering design and cost
Water		Two	7,000 per sample	14,000	Covered under Engineering design and cost
Dust Suppression at subproject sites	construction and defect liability phases	lump sum	5,00,000	5,00,000	Contractor's Cost
Traffic management	Safety Signboards, delineators, traffic regulation equipments, flagman, temporary diversions, etc				Covered in engineering cost
Capacity building	Program 1 covering ERA officials, PMC and DSC staff	One Program	1,50,000	1,50,000	Covered under project cost
	Program 2 covering staff of PIU, DSC and contractor	Two Program	25,000	50,000	

<b>Construction Monitoring</b>					
Water fountain (at Radio Kashmir Junction)	Protective measures for water fountain like steel barricading.	Lump sum	2,00,000	2,00,000	Covered in Engineering cost
Conservation of natural resources (Scheduled trees of Chinara and Mulberry trees)	Protective measures like mesh clothes, polythene sheets, temporary make shift steel barricading, reflective paint.	Lump sum	1,50,000	1,50,000	Covered in Engineering cost
Air	Once in four months at two locations (for two years, total 12 samples)	12	7,000 sample per	84,000	Covered in Engineering cost
Noise	Once in four months at two locations (for two years, total 12 samples)	12	1,000 sample per	12,000	Covered in Engineering cost
Water	Once in four months at two locations (for two years, total 12 samples)	12	7,000 sample per	84,000	Covered in Engineering cost
<b>Defects Liability Period (6 months)</b>					
Air	Once at two locations	2	7,000 sample per	14,000	
Noise	Once at two locations	2	1,000 sample per	2,000	
Water	Once at two locations	12	7,000 sample per	14,000	
<b>TOTAL (INR)</b>				<b>13,40,000</b>	
<b>Table 28a (12,67,000) + Table 28b (13,40,000)</b>				<b>INR 26,07,000</b>	

## IX. CONCLUSION AND RECOMMENDATIONS

169. The process described in this document has assessed the environmental impacts of all elements of the infrastructure proposed for the construction of grade separators in Srinagar 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.

170. The public participation processes undertaken during project design to ensure 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.

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

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

173. 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.

174. 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.

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



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

### ROADS & HIGHWAYS

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

**Sector Division:** Urban Transport

**Sub-Project:** New Mehjoor Bridge on the Down-stream Side of (Dilapidated Mehjoor Bridge) at Jawahar Nagar and Grade Separators at: Radio Kashmir Crossing on Residency Road in Srinagar City. J&K Bank Crossing on Maulana Azad Road in Srinagar City

Screening Questions	Yes	No	Remarks
A. Project Siting Is the project area adjacent to or within any of the following environmentally sensitive areas?			
Cultural heritage site		√	Burzhama archaeological site (distance 20km-22km), historical Jamia Masjid (distance 5km-7km), Pathar Masjid (distance 4km), Hazratbal Shrine (distance 13km) and Chati Padshahi Gurudwara (distance 6km) However, these sites are located far away from the proposed subproject which will have no impact on any of such places and therefore no adverse impact is anticipated.
Protected Area		√	Dachigam national park (20-22km away from the proposed subproject sites)
Wetland		√	No
Mangrove		√	Not Applicable
Estuarine		√	Not Applicable
Buffer zone of protected area		√	Dachigam national park (20-22km away from the proposed subproject sites)
Special area for protecting biodiversity		√	Dachigam national park (20-22km away from the proposed subproject sites)
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
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. Proper containment with silt trap will be provided to check sediment flow in to the Flood spill channel. Proposed Grade separators do not cross any perennial water body. However there may be a minor increase in sediment load of rainfall run off for short duration 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 and other associated construction activities is anticipated. This impact shall be temporary, site specific and reversible in nature.
risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?		√	No such impact is anticipated. However, proper mitigation measures shall be taken to avoid any unanticipated health and safety issues.

Screening Questions	Yes	No	Remarks
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. No blasting activity is required in the proposed subproject
dislocation or involuntary resettlement of people?		√	No such impact is anticipated.
dislocation and compulsory resettlement of people living in right-of-way?		√	No such impact is anticipated.
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.
hazardous driving conditions where construction interferes with pre-existing roads?	√		Traffic blockages are 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.
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?	√		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 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.	√		Community safety risks due to both accidental and natural causes can be anticipated in extreme cases. However, these have to be taken due care of while designing the various project components.

Climate change & 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"> <li>Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes.</li> </ul>		√	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-V as per seismic zonation map of India.
<ul style="list-style-type: none"> <li>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).</li> </ul>		√	No
<ul style="list-style-type: none"> <li>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)?</li> </ul>		√	No
<ul style="list-style-type: none"> <li>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)?</li> </ul>		√	No

## **APPENDIX 2:TRAFFIC MANAGEMENT PLAN (TMP)**

1. The following is a draft guideline for TMP which is to be finalized before implementation in consultation with the PIU, DSC and line departments (like Traffic Police Department, Srinagar).
2. A traffic management plan (TMP) has been formulated to cope with road traffic disruptions likely to be encountered with the commencement of work on proposed construction of New Mehjoor Bridge at Jawahar Nagar & Grade Separators on Maulana Azad Road at J&K Bank Junction and Residency Road at Radio Kashmir Junction. It calls for co-ordinated actions from the authorities and the different services responsible for road/traffic management on a given road or network.
3. The TMP, managed by a coordinating authority relies on:
  - A structured organization at an operational level, comprising of :
  - Decisional organization involving authorities,
  - Functional organization involving the services who implement the decisions made.
  - Specific organization means related to the transmission of information to end users, co-ordinate measures related to traffic management and road traffic information.

### **Principles for Traffic Management Plan**

4. One of the prime objectives of this TMP is to ensure the safety of all the road-users along the work zone and to address the following issues:
  - (i) The safety of pedestrians, bicyclists, and motorists travelling through the construction zone;
  - (ii) Protection of work crews from hazards 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 adjoining properties; and
  - (v) Addressing issues that may delay the Project works.

### **Operating Policies for TMP**

#### **Analyze the impact due to street closure**

5. Apart from the capacity analysis, a final decision to close a particular street and divert the traffic would involve the following steps:
  - (i) Approval from the ward office or community to use the local streets as detours;
  - (ii) Consultation with businesses, community members, Traffic Police, Department of Roads, etc, regarding the mitigation measures necessary at the detours where the road is diverted during the constructions;
  - (iii) Determination of the maximum number of days allowed for road-closure and incorporation of such provisions into the contract documents;
  - (iv) Determine if additional traffic control or temporary improvements are needed along the detour route;
  - (v) Consider how access will be provided to the worksite;
  - (vi) Contact emergency service, school officials and transit authorities to determine if there are impacts to their operations; and

- (vii) Develop a notification program to the public so that the closure is not a surprise. As part of this program, the public shall be advised of alternate routes that commuter can take or will have to take as result of the traffic diversion.

6. If full road-closure of certain streets within the area is not feasible due to inadequate capacity of the street or public opposition, the full closure can be restricted to weekends with the construction commencing from Friday night up to Sunday morning prior to the morning peak period.

### **Public awareness and notifications**

7. As per discussions in the previous sections, there will be travel delays during the construction as is the case for most construction projects, albeit, in a reduced scale if the utilities and traffic management are properly coordinated. There are additional grounds for travel delays in the area as most of the streets lack sufficient capacity to accommodate additional traffic from diverted traffic as result of street closures to accommodate the works.

8. The awareness campaign and the prior notification for the public will be a continuous activity which the project will pursue to compensate for the above delays and minimize public claims as result of these problems. These activities will take place sufficiently in advance of the time when the road-blocks or traffic diversions take place at the particular streets. The reason for this 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.

9. In order to ensure that TMP is drawn up in a homogeneous manner, the area covered by the TMP can be split into two levels:

- (i) The main network, directly concerned by the traffic disruptions that are to be dealt with,
- (ii) The alternative network, made up of alternative roads to the main route, which in this case comprises mainly motorways.

10. In order to achieve smooth traffic movement with the above traffic diversion plan following measures are required:

- (i) Existing foot-paths along the subproject road to be leveled with carriageway to the extent possible.
- (ii) Enforcement of one-way system requires adequate traffic police. Although the TMP stands discussed with traffic department but details of deployment of traffic police can be given only after traffic diversion plan is approved.
- (iii) Parking of vehicles shall be banned along the subproject road during construction.
- (iv) Parking of Vehicles will be banned on the subproject road.
- (v) Removal of temporary and permanent encroachments is very important for successful traffic management.
- (vi) Smooth road for quick dispersal of traffic shall be provided.

### **Traffic Monitoring Strategy**

11. 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.
- (iii) 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.
- (iv) 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.

#### **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 signage will be placed at intersections.
- (v) Adjustments necessary to public transport operators:
- (vi) 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.

### APPENDIX 3: PUBLIC CONSULTATION

#### Construction of New Mehjoor Bridge at Jawahar Nagar across Flood Spill Channel in Srinagar City.

##### 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 and noise.
- Information on perceived losses from the proposed subproject during execution stage in terms of increase in traffic congestion, 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 and time of Consultation:** 23.09.2013 at 11.00 AM

**Location:** Jawhar Nagar, Bund road towards Mehjoor.

2. **Date and time of Consultation:** 24.09.2013 at 11.00 AM

**Location :** Mehjoor Nagar.

##### Public Consultation Details

S.N	Issues Discussed	Feedback received	Remarks
1	Awareness and extent of knowledge about the subproject	Generally all 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 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. In addition people belong to labour force wanted that they shall be provided employment during the subproject execution.	It needs to be ensured that the contracting firm for the subproject employees to the maximum possible extent the local work force during the execution of the subproject.
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 accumulation of 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 shall be in place before the construction works are started so that problems like traffic congestion, air and noise pollution shall be contained to the minimum.	Practical and efficient traffic management plan needs to be put in place before the start of construction works
5	Presence of any	There is no historical/ cultural site in the	-

S.N	Issues Discussed	Feedback received	Remarks
	historical/cultural site in the vicinity	corridor of the subproject.	
6	Presence of any protected area/wetland in or adjoining the construction site.	There is no protected area/wetland 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 very eager about the start of construction works.	

**List of participants**

S.N	NAME	ADDRESS	OCCUPATION
1	FAYAZ AHMAD BHAT	PADHSHAI BAGH	BUSINESS
2	NAZIR AHMAD WANGOO	LASJAN SRINAGAR	PRIVATE EMPLOYEE
3	SHALIYA SHAFIQ	MEHJOOR NAGAR	STUDENT
4	MUSHTAQ AHMAD	PADHSHAI BAGH	BUSINESS
5	SHOWKAT AH. RATHER	PADHSHAI BAGH	BUSINESS
6	RIYAZ AHMAD DAR	PADHSHAI BAGH	BUSINESS
7	NISR AHMAD DAR	PADHSHAI BAGH	GOVT. EMPLOYEE
8	BASHIR AHMAD DAR	LASJAN	GOVT. EMPLOYEE
9	NISAR AHMAD RATHER	LASJAN	BUSINESS
10	MOHD LATEEF RATHER	LASJAN	BUSINESS
11	MOHD RAFIQ DAR	JAWHAR NAGAR	SHOPKEEPER
12	RIYAZ AHMAD BHAT	JAWHAR NAGAR	SHOPKEEPER
13	AMIR AHMAD KHAN	JAWHAR NAGAR	STUDENT
14	MUNTAZIR FAYAZ	JAWHAR NAGAR	STUDENT
15	MOHD LATEEF RATHER	PADHSHAI BAGH	DRIVER
16	AJAZ AHMAD BHAT	RAJ BAGH	CONTRACTOR
17	MOHD RAFIQ DANDROO	MEHJOOR NAGAR	BUSINESS
18	RIZWAN AHMAD WAGAY	MEHJOOR NAGAR	STUDENT
19	AB. REHMAN DAR	KURSOO GHAT	SHOPKEEPER
20	GH. NABI DAR	KURSOO GHAT	SHOPKEEPER
21	MANZOOR AH. FASHO	MEHJOOR NAGAR	SHOPKEEPER
22	MOHD SHAFI TANTRAY	GANDERBAL	GOVT. EMPLOYEE
23	MAQSOOD AH. BHAT	MEHJOOR NAGAR	SHOPKEEPER
24	MOHD MAQBOOL	MEHJOOR NAGAR	BUSINESS
25	SHAHID RASHID	MEHJOOR NAGAR	PHOTOGRAPHER
26	RIYAZ AHMAD	MEHJOOR NAGAR	SHOPKEEPER
27	AB. RASHID BHAT	MEHJOOR NAGAR	GOVT. EMPLOYEE
28	GH. MOHD GHASI	MEHJOOR NAGAR	BUSINESS
29	MOHD SUBHAN GHASI	MEHJOOR NAGAR	DRIVER
30	SAHIL LONE	MEHJOOR NAGAR	STUDENT
31	SAJAD AHMAD LONE	MEHJOOR NAGAR	STUDENT
32	GH NABI MAQROO	MEHJOOR NAGAR	PROPERTY DEALER
33	HARMEET SINGH	MEHJOOR NAGAR	BUSINESS
34	ALI MOHD RESHI	MEHJOOR NAGAR	BUSINESS
35	GH NABI SHEIKH	MEHJOOR NAGAR	SHOPKEEPER
36	NAZIR AHMAD KHAN	BARAMULLA	SHOPKEEPER



S.N	NAME	ADDRESS	OCCUPATION
37	GH QADIR MAQROO	MEHJOOR NAGAR	RETIRED GOVT. EMPLOYEE
38	GH MOHD MAQROO	MEHJOOR NAGAR	SHOPKEEPER
39	AB. AZIZ MAQROO	MEHJOOR NAGAR	RETIRED GOVT. EMPLOYEE
40	AB. SAMAD MALIK	MEHJOOR NAGAR	RETIRED GOVT. EMPLOYEE

**Present Issues:**

- (i) There are is problem of connection of people as the present Wooden Bridge has been damaged.
- (ii) Heavy vehicles cannot ply on the existing old Mehjoor Bridge thus depriving people of better business opportunities.
- (iii) Too much of time is wasted while travelling from one side of the flood spill channel to other side via other available routes which are prone to traffic jams there is very high noise, dust generation and other environmental pollutions.

**Future Prospects:**

- (i) The construction of bridge at Jawahar Nagar will cater to prime need of the area in particular and Srinagar city in general.
- (ii) The Proposed sub project would distribute the traffic and help to ease out the massive traffic congestions which result in frequent jams particularly during morning and evening hours to the surrounding area.
- (iii) It will drastically reduce the travel time and noise, air and other environmental pollutions in the area.
- (iv) Will help business community in increasing their business.
- (v) The project will increase pedestrian safety reducing the vulnerability to accidents as the proper pedestrian crossings will be developed and other signages installed.



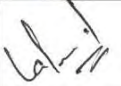



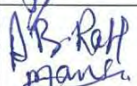
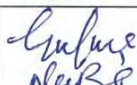
**Summary of outcomes:**

- (i) The various issues related to proposed subproject for development of Jawahar Nagar have been discussed at various locations like Jawahar Nagar, Padshahi Bagh and Lasjan.
- (ii) Some of the local people are aware about the upcoming work. Most of the people are in favour of the upcoming subproject.
- (iii) The major problems faced by them are related to easy access to the city Center. Public desired for implementation of better measures to reduce noise, dust and air pollution during the construction phase.
- (iv) People also wished that local people be given opportunities during the project tenure.
- (v) People expected that their problems shall be addressed and solutions for them shall be implemented during the subproject execution.
- (vi) People are ready to extend all types of support during execution of the subproject.
- (vii) People suggested that adequate safety measures should be provided.
- (viii) ERA ensured 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.

**Public Consultation Record**  
**Public Consultation**

Name of the sub-projects:- Construction of New Mehjoor-  
Bridge on the Down Stream Side of Dilapidated Mehjoor Buz  
Location: - Jawhar Nagar, Bund Road Towards Mehjoor Bridge  
Date: - 23/09/2013

S.No	Name	Address	Occupation	Signature
1.	Fayaz Ahmad Rshat	Pachhshahi Bagh.	Businessman	Fayaz
2.	Nazir Ahmed Wango	Lasjan Srinagar.	Private Employee.	Nazir
3.	Shahliya Shafiq.	Mehjoor Nagar	Student.	SHALIYA
4.	Murshad Ahmad	Pachhshahi Bagh.	Businessman.	Murshad
5.	Shaukat M. Rather	Pachhshahi Bagh	Shopkeeper	Shaukat
6.	Rizog M. Dar	" "	Businessman	Rizog
7.	Nisar M. Dar	Pachhshahi Bagh	Govt. Employee	NISAR
8.	Bashir M. Dar.	Lasjan	Govt. Employee	Bashir
9.	Nisar. M. Rather	Lasjan.	Businessman	N. Rather
10.	Mohd. Lateef Rather	Lasjan.	Businessman	M. Lateef
11.	Mohd. Rafiq Dar	Jawhar Nagar	Shopkeeper	Rafiq
12.	Rizog M. Dar	Jawhar Nagar	Shopkeeper	Rizog

S.No	Name	Address	Occupation	Signature
13.	Amer Ali Khan	Jawhar Nagar	Student	
14.	Munazir Jagan	Jawhar Nagar	Student	
15.	Mohd. Latief Rabbani	Dadshibagar	Driver	
16.	Ayaz Ahmed Rabbani	Rajbagh	Contractor	
17.	Mohd. Rafiq Dandoo	Mehjoor Nagar	Businessman	
18.	Rizwan Sh. Waghay	Mehjoor Nagar	Student	
19.	Ab. Rehman Dar	Kursoo Ghant	Shopkeeper	
20.	Gh. Nabi Dar	Kursoo Ghant	Shopkeeper	
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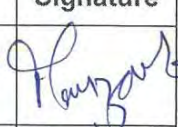
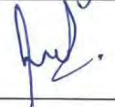
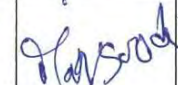
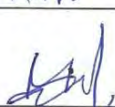
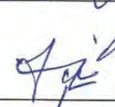


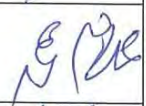

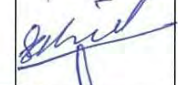
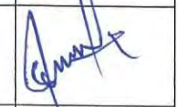
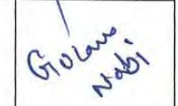


## Public Consultation

Name of the sub-projects:- Construction of New Mehjoor-Bridge  
on the Down Stream Side of (Dilapidated Mehjoor Bridge)

Location: - Mehjoor Nagar

Date: - 24/09/2013

S.No	Name	Address	Occupation	Signature
1.	M. Mehjoor M. fashor	mehjoor nagar Imran wali	Shopkeeper	
2.	Mohel Shafi Sastry	Graneterbali	Govt. Employee	
3.	Maqsood. M. Sult	mehjoor nagar	Shopkeeper	
4.	Mahid. Maqsood	mehjoor nagar	Businessman	
5.	Shahid. Rashid.	mehjoor nagar	photographer.	
6.	Razaq Ali.	mehjoor nagar	shopkeeper	
7.	Ab. Rashid. Malik	mehjoor nagar	Govt. Employee	
8.	Sh. Mahid. Ghansi	mehjoor nagar	Businessman.	
9.	Mahid. Subhan Ghansi	mehjoor nagar	Driver.	
10.	Sahid. Same.	mehjoor nagar	Student.	
11.	Sajad Ali Same	mehjoor nagar	Student	
12.	Sh. Nabil. Maqsood	mehjoor nagar	property dealer.	

S.No	Name	Address	Occupation	Signature
13.	Harneet Singh	Lauram Colony Muljpur Nagar	Business	Hu
14.	M. Mahesh Reddy	Muljpur Nagar	Businessman	MAHESH
15.	Gh. Nalini Shetty	Muljpur Nagar	Shopkeeper	G. Nalini
16.	Nazim Ali Khan	Baru milla	Shopkeeper	Nazim, Khan
17.	Gh. Gadiy Nayyar	Muljpur Nagar	Retired Employee	G. Gadiy
18.	Gh. Mohd Nayyar	Muljpur Nagar	Shopkeeper	G. Mohd
19.	Ab. Aziz Nayyar	Muljpur Nagar	Shopkeeper	Ab. Aziz
20.	Ali. Sameer Malik	Muljpur Nagar	"	Ali. Sameer
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				



### Crossing on Residency Road in Srinagar City

#### Issues discussed

#### Photographs of Public Consultation (Proposed New Mehjoor Bridge at Jawahar Nagar)



## APPENDIX 4: PUBLIC CONSULTATION

### Construction of Grade Separators on Maulana Azad Road at J&K Bank Junction and Residency Road at Radio Kashmir Junction

#### Issue 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 and noise.
- Information on perceived losses from the proposed subproject during execution stage in terms of increase in traffic congestion, 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 and time of Consultation:** 30-10-2013 at 10:30 am

**Location:** TRC and Dalgate

#### Public Consultation Details

S.No	Issues Discussed	Feedback received	Remarks
1	Awareness, extent of knowledge and attitude about the subproject	During consultation & dissemination process about the proposed subproject, people have shown keen interest about the proposed subprojects.  Generally all the people consulted were not 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 process
2	Information on the benefits of the subproject in terms of environmental and economic enhancement.	Frequent traffic jams at these junctions especially peak hours in morning/ evening will be reduced by large extent for the traffic coming to and from adjoining areas. The local work force shall be provided employment during construction stage.	It needs to be ensured that the contracting firm for the subproject to employ local work force to the maximum possible extent during the execution of the subproject.
3	Information on perceived benefits from the proposed subproject including reduction in traffic congestion, travel time, fuel cost, noise and air pollution.	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 accumulation of 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, interferences to existing utilities etc.	People desired that an efficient traffic management plan shall be in place before the construction works are started so that problems like traffic congestion, air and noise pollution shall be contained to the minimum.	Practical and efficient traffic management plan needs to be put in place before the start of construction works
5	Is noise level disturbing at present and source of noise	People admitted that resulting frequent traffic congestion is directly related to irritating noise	

S.No	Issues Discussed	Feedback received	Remarks
	Status of air quality in locality and source of pollution	coming from vehicles, blowing of horns and emission from vehicle exhausts.	
6	Concerns about adverse environmental impacts in the area	Increased noise, vehicular emissions resulting from frequent traffic congestions, smoke emanating from vehicle exhausts, dust etc.	
7	People were asked whether they are in favour of carrying construction work at night considering its benefits	In general people were in favour of carrying most of construction at "night hours" since traffic movement is negligible at night hours.	
8	Presence of any historical/cultural site in the vicinity	There is no historical/cultural site in the corridor of the subproject.	-
9	Presence of any protected area/wetland in or adjoining the construction site or any knowledge of presence of rare/ endangered species of the flora and fauna in the area which may be affected by execution of the project.	There is no protected area/wetland or any presence of rare/ endangered species in the corridor of the subproject.	
10	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 very eager about the start of construction works.	

**Present Issues:**

- (i) Frequent traffic congestions on these intersections are the main problem for travelers.
- (ii) Frequent and heavy traffic jams affect the people especially in rush hours.
- (iii) Too much of time is wasted while travelling through the area and due to traffic jams there is very high noise and other environmental pollutions like emissions from vehicles.

**Future Prospects:**

- (i) The construction of grade separators will cater to prime need of the Srinagar city.
- (ii) The grade separator would help to ease out the massive traffic congestions which result in frequent jams particularly during morning and evening hours.
- (iii) It will drastically reduce the travel time and noise, air and other environmental pollutions in the area.
- (iv) The project will increase pedestrian safety reducing the vulnerability to accidents as the proper pedestrian crossings will be developed and other signages installed.

**Summary of outcomes:**

- (i) The various issues related to proposed subproject for development of grade separator have been discussed at two locations at TRC and Dalgate (near J&K Bank).
- (ii) Some of the local people are aware about the upcoming work. People are in favour of the upcoming subproject.
- (iii) The major problems faced by them are related to traffic congestion, noise from plying vehicles and elevated levels of air pollutants.



- (iv) Public desired for implementation of better measures to reduce noise, dust and air pollution during the construction phase.
- (v) People also wished that local people be given opportunities during the project tenure.
- (vi) People expected that their problems shall be addressed and solutions for them shall be implemented during the subproject execution.
- (vii) People are ready to extend all types of support during execution of the subproject.
- (viii) People suggested that adequate safety measures should be provided. ERA ensured 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.

#### List of people in public consultation

S.No	Name	Address	Occupation
1	Malik Ghulam Qadri	Lal Chowk	Govt. Employee
2	Sahiba Irshad	Dalgate	Student
3	Hilal Ahmad	Khanyar	Rikshaw Driver
4	Reaiz Ahmad Dar	Gassu Hazratbal	Govt. Teacher
5	Mohammad Aslam	Dalgate	Rikshaw Driver
6	Abdul Rehman	Nishat	Govt. Employee
7	Fayaz Ahmad	Natipora	Taxi Driver
8	Manzoor Ahmad	Sonwar	Taxi Driver
9	Mohammad Yousuf	Padshahi Bagh Srinagar	Taxi Driver
10	Ghulam Rasool	Rajbagh	Taxi Driver
11	Muzaffar Islam	Dalgate Srinagar	Driver
12	Ghulam Nabi Akhoon	Dalgate Dal	President (Tourist Taxi Stand) TRC
13	Mohammad Yaqoob	TRC (Kashmir Houseboat Owners Association)	President (KHOA)
14	Shafat Hussain	Munawarabad	Travel Operator
15	Mushtaq Ahmad	Rajbagh	Driver (Taxi)
16	Inayat Ullah	Shaheed gunj	Student
17	Afiya Khandey	Lal Bazaar	Student
18	Ghulam Nabi	Maisuma	Govt. Employee
19	Syed Qadri	Brein Nishat	Student
20	Sanah Ullah	Dalgate	Fruit Vendor

**Photographs of Public Consultation (Proposed Grade Separators)**

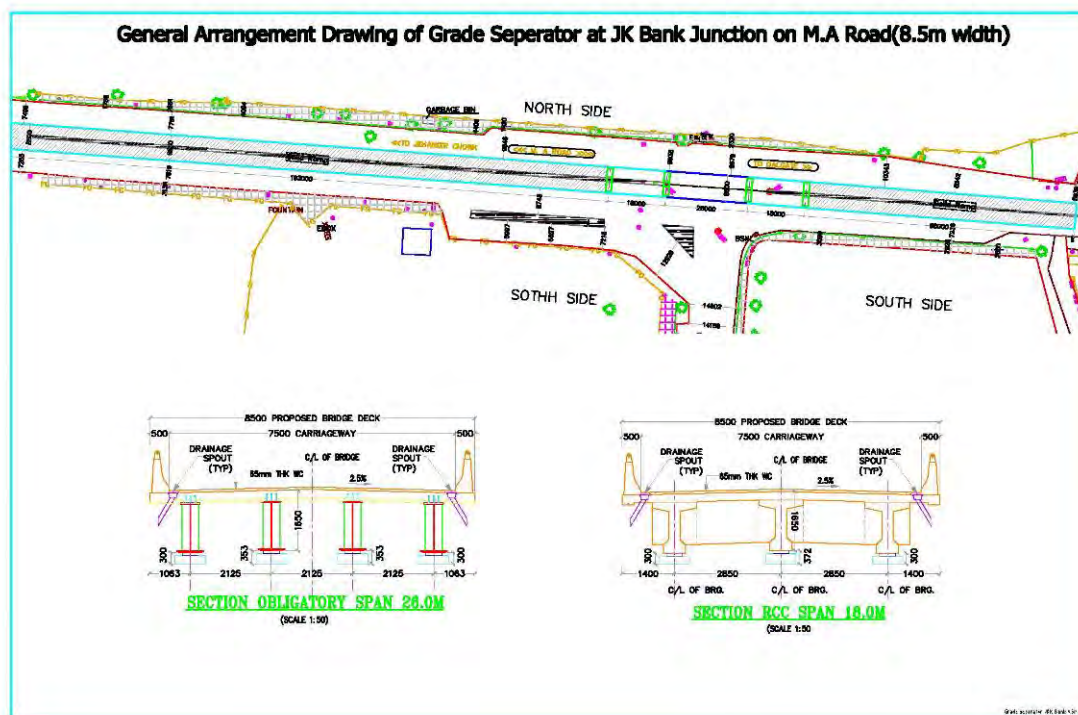
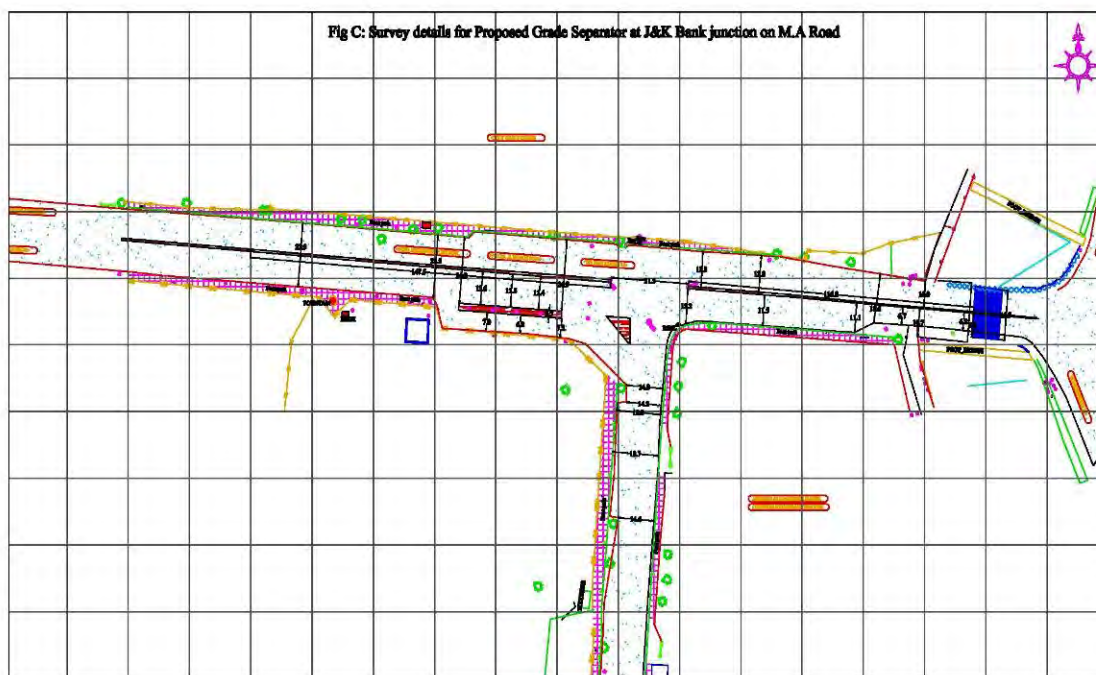


PUBLIC CONSULTATION

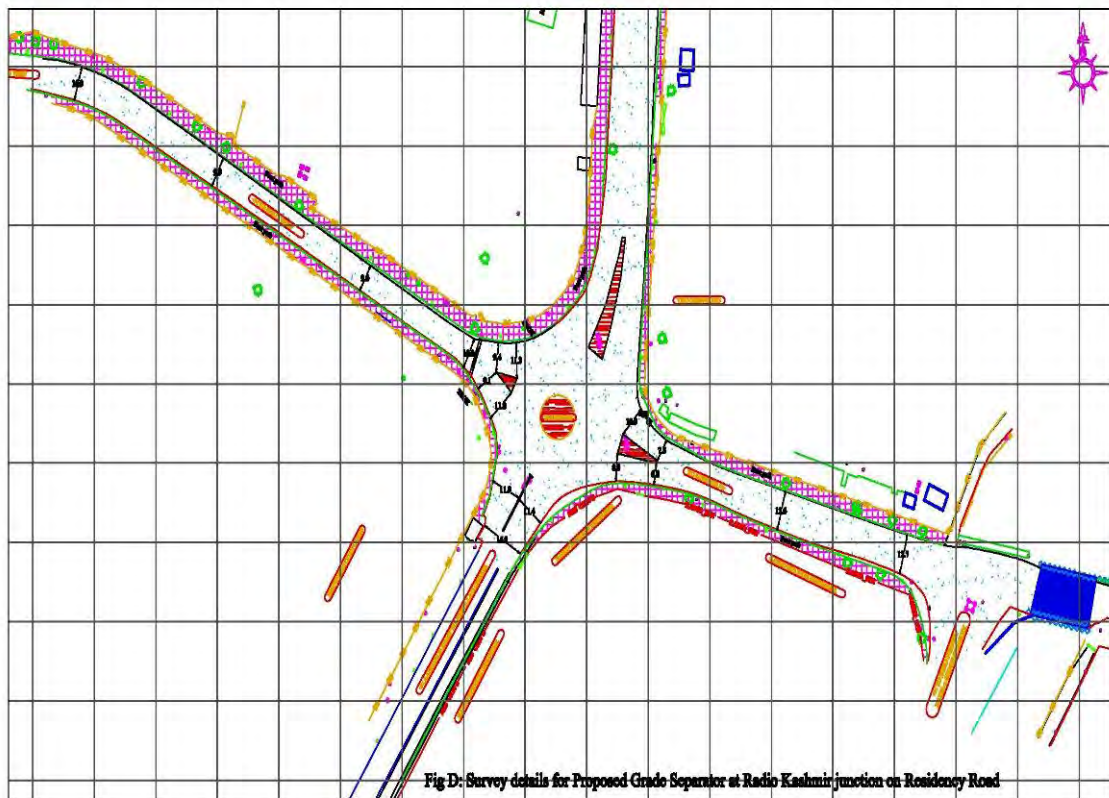
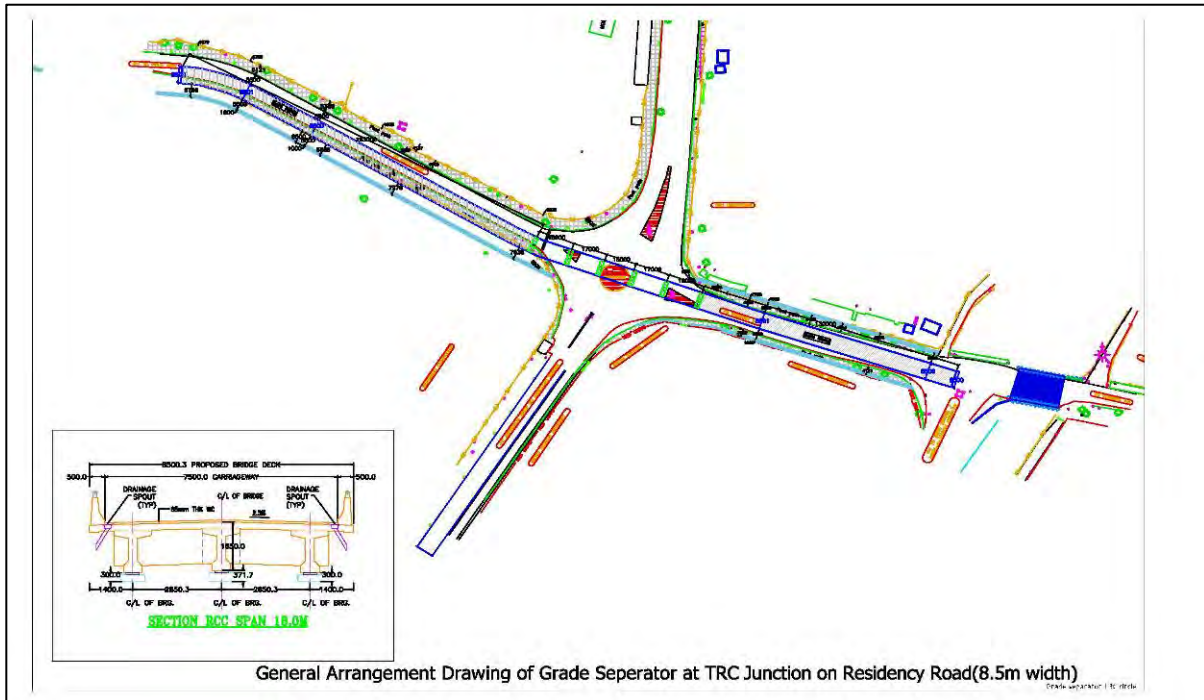
Name of the Subproject: <u>Construction of Grade Separators at</u>			
<u>Radio Kagla's Crossing to J.K. Bank Junction - Srirangam</u>			
Place: <u>TRC, Dalgate</u>		Date: <u>30/10/2013</u>	Time: <u>10:30 am</u>
S. No	Name	Occupation	Signature
1	Mushtaq Ghulam Qadir	Govt. Service	
2	Sahiba Bishwal	Student	
3	Hilal Ahmad	Auto-rickshaw Driver	
4	REYAZ AHMAD DMC	Govt. Teacher	
5	Mohammad Aslam	Vickerman Drive	
6	Abdul Rehman	Govt. Employee	
7	Sayaz Ahmad	Taxi Driver	
8	Mansoor Ahmad	Taxi Driver	
9	Mohammad Young	Taxi Driver	
10	Ghulam Rasool	Taxi Driver	
11	Muzaffar Man.	Driver	
12	Ghulam Nabi Akhoun	Tourist <sup>Stand</sup> <del>Accident</del> <sup>Accident</sup> <del>Accident</del>	
13	Mohammad Yaqoob		
14	Enayat Hussain	Travel agent	
15	Mushday Ahmad	Driver	
16	Zayaf Ullah	Student	
17	Afiya Khawaja	Student	
18	Ghulam Nabi	Govt. Employee	
19	Syed. Razi	Student	
20	Shahid Ullah	Vendor Point	



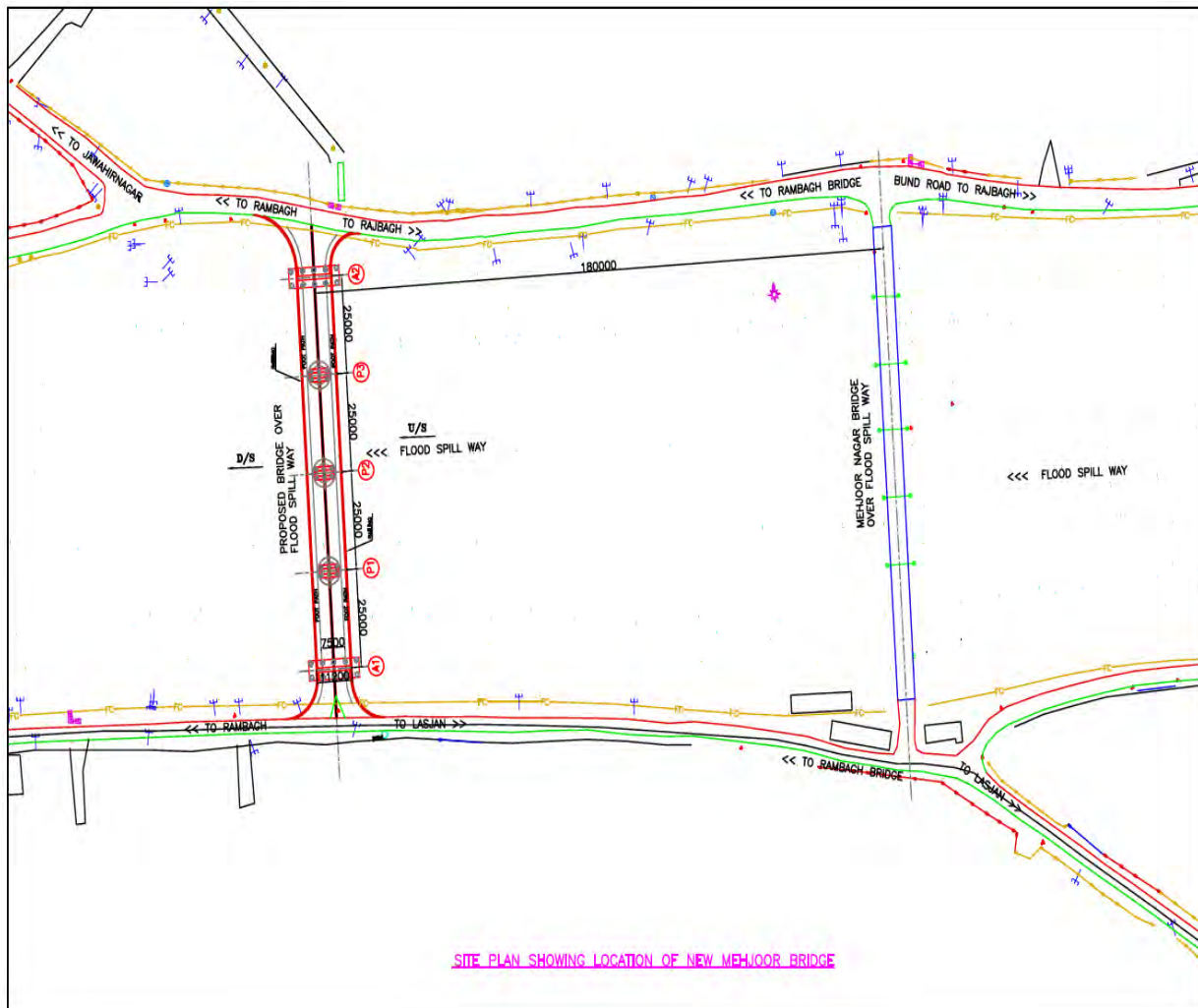
# APPENDIX- 5:ALIGNMENT OF GRADE SEPARATOR AT J&K BANK JUNCTION



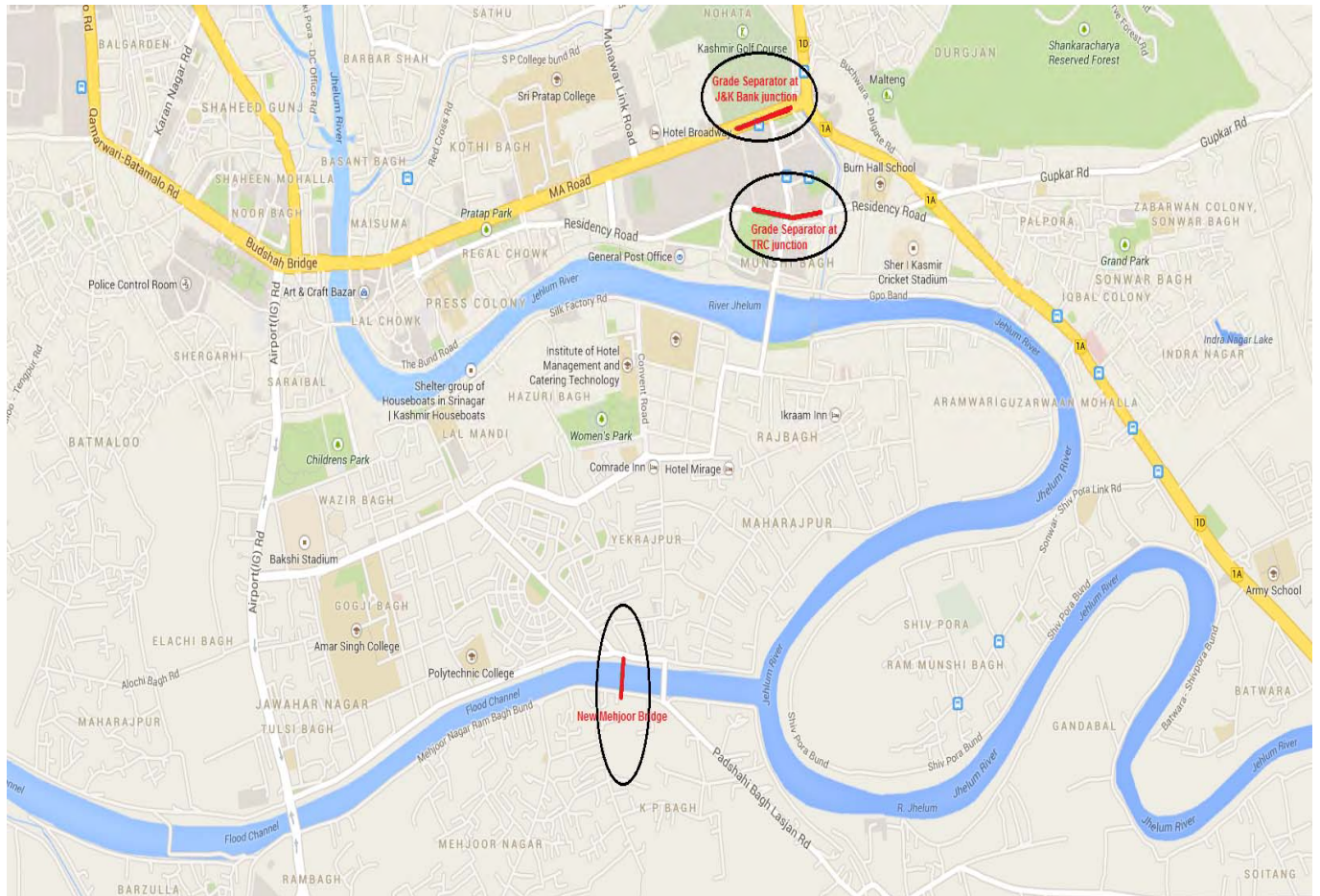
### Alignment of Grade Separator at Radio Kashmir Junction



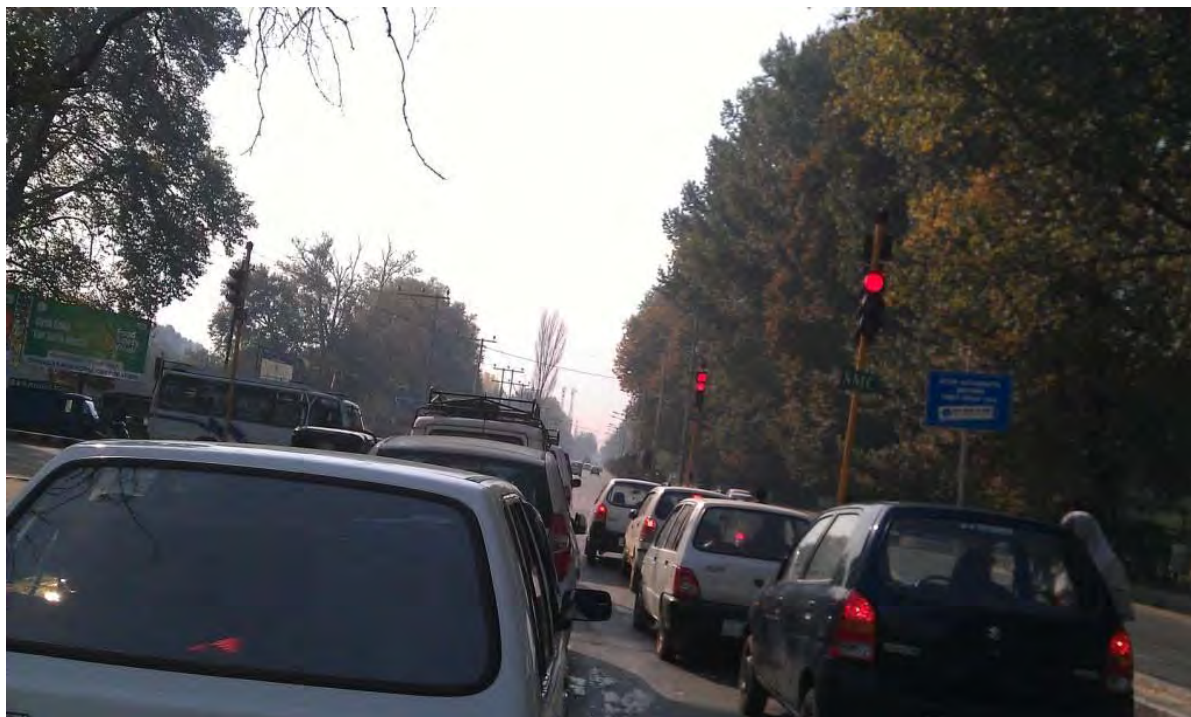
### Alignment of New Mehjoor Bridge at At Jawahar Nagar







**APPENDIX-6:PHOTOGRAPHS SHOWING ALIGNMENT AT J&K BANK JUNCTION**





### Photographs Showing Alignment at Radio Kashmir Crossing



**Photographs of proposed New Mehjoor Bridge site at Jawahar Nagar**



**Existing partly damaged old Mehjoor Bridge**



**Proposed Jawahar Nagar site (Jawahar Nagar side Corridor)**



**Proposed Jawahar Nagar site (Mehjoor Nagar side Corridor)**



**APPENDIX-7:PHOTOGRAPHS PORTRAYS TRAFFIC CONGESTION DURING PEAK HOURS**



**Radio Kashmir Junction J&K Bank Junction**



**Jawahar Nagar Bund Road Old Mehjoor Bridge**