Initial Environmental Examination

April 2015

IND: Jammu And Kashmir Urban Sector Development Investment Program “Upgradation and Upliftment of 27 No’s Existing Pumping Stations” in Srinagar City

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

CURRENCY EQUIVALENTS

(as of 22 April 2015)

Currency unit - rupee (INR)

INR 1.00 - $ 0.0159

$ 1.0 - INR 62.80

ABBREVIATIONS

ADB	-	Asian Development Bank
ASI	-	Archeological Survey of India
CBD	-	Central Business District
CTE	-	Consent to Establish
CTO	-	Consent to Operate
DSC	-	Design and Supervision Consultancy
CPCB	-	Central Pollution Control Board
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
GoI	-	Government of India
GRM	-	Grievance Redressal Mechanism
IA	-	Implementing Agency
IEE	-	Initial Environmental Examination
IST	-	Indian Standard Time
J & K	-	Jammu and Kashmir
JKUSDIP	-	J&K Urban Sector Development Investment Program
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
PIU	-	Project Implementation Unit
PMC	-	Project Management Consultancy
PMU	-	Project Management Unit
$PM_{2.5}$	-	Particulate Matter below 2.5 micron particle size
PM_{10}	-	Particulate Matter below 10 micron particle size
PUC	-	Pollution Under Control
RCC	-	Reinforced Cement Concrete
REA	-	Rapid Environmental Assessment
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
ToR	-	Terms of Reference

WEIGHTS AND MEASURES

cm	-	Centimeter
crore	-	100 lakhs = 10,000,000
lakh	-	100 thousand = 100,000
Km	-	Kilometer
Kmph	-	Kilometer per hour
lpd	-	liters per day
M	-	Meter
mg/l	-	milligrams per liter
mm	-	Millimeter
MSL	-	Mean sea level
µ	-	10^{-6} meter
µg/m^3	-	micrograms per cubic meter
µS/cm	-	micro Siemens per centimeter
NTU	-	Nephalo 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. During recent historical devastating floods of September 2014 in Kashmir Valley, most dewatering pumping stations got severely damaged and most of these pumping stations, located in Srinagar require revamping and up-gradation. Out of the 57 Permanent pumping stations mentioned under Table-2, 27 No of pumping stations are proposed to be undertaken for up gradation as listed under Table-3. There are compelling reasons for redesigning and up-gradation of electromechanical equipment's of these pumping stations. In this connection Commissioner of Srinagar Municipal Corporation vide letter no SMC/PS/COM/1160-62 DATED 16/04/2015 has requested J&K ERA to arrange financing for all the 76 No. of existing Pumping stations (List enclosed as Appendix 5) in view of damage rendered to these pumping stations during recent floods.

2. 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. 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 4 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 Upgradation and Upliftment of 27 No's Existing Drainage Pumping Stations in Srinagar City

3. **Subproject Scope:** The primary objective of Upgradation and Upliftment of 27 No's Existing Drainage Pumping Stations in Srinagar City are: are: i) Revamping of drainage pumping stations to ensure regular pumping of dry weather and storm water flow on sustained basis. ii) To reduce operational problem due to the frequent breakdowns, it will also reduce water logging and chances of flooding and public inconvenience during heavy rains and snow fall; iv) Efficient drainage system; iii) Improvement of local environment to reduce health risks to the inhabitants in the project areas arising due to the frequent water logging.

4. **Categorization:** Subproject components followed environmental criteria specified in the revised Environmental Assessment and Review Framework (EARF) 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) 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. The program is to be implemented in 4 to 7 tranches. Each tranche constitutes a separate loan. Tranche I (Loan 2331–IND) and Tranche II (Loan 2395-IND) is under implementation. One of the subprojects identified under Tranche 3, JKUSDIP is the "*Upgradation and Upliftment of 27 No's Existing Pumping Stations in Srinagar City*" in two lots (Lot-A 15 No's and Lot-B 12 No's) which will reduce the problem of water logging and flooding in subproject.

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 Program Management Consultants (PMC) and Design and Supervision Consultants (DSC).

6. **Description of the Environment:** The subproject sites are located in an existing drainage pumping stations in Centre of the Srinagar City and are 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.

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. 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 for both Lots (A&B) 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. **Conclusion and Recommendations:** The citizens of Srinagar City will be the major beneficiaries of this subproject with the improved drainage 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 this IEE, there are no significant impacts and the classification of the subproject as Category "B" is confirmed. No further special study or detailed environmental impact assessment (EIA) needs to be undertaken to comply with ADB SPS.

I. INTRODUCTION

1. Economic Reconstruction Agency (ERA) has undertaken the Jammu and Kashmir Urban Sector Development Investment Program (JKUSDIP), financed by the ADB through Multi-Tranche Financing Facility (MFF). The total estimated cost of the program is about US $485 million, out of which $300 million will be financed by ADB. The primary objective of JKUSDIP is to promote economic development in the State of Jammu and Kashmir (J&K) through expansion of basic services such as water supply, sewerage, sanitation, drainage, solid waste management, urban transport and other municipal functions in Jammu, Srinagar and other important urban centers of the State. JKUSDIP will also strengthen the service delivery capacity of the responsible state urban agencies and urban local bodies through management reform, capacity building and training.

2. The program is to be implemented in 4 to 7 tranches. Each tranche constitutes a separate loan. Tranche I (Loan 2331–IND) and Tranche II (Loan 2925-IND) is under implementation. One of the subprojects identified under Tranche 3 of JKUSDIP is the "Upgradation and Upliftment of 27 No's of existing Drainage Pumping Stations of Srinagar City in two Lots (Lot-A 15 No's and Lot-B 12 No's)".

3. The major objectives of the proposed construction (Upgradation and Upliftment) of 27 No's Existing Drainage Pumping Stations in Srinagar City are: i) to optimize working of existing drainage pumping stations to ensure regular pumping of dry weather and storm water flows on sustained basis, ii) to provide adequate working space as well as space for installation of pumping machineries, iii) reduce operational problem due to frequent breakdowns, iv) to reduce power consumption and maintenance expenditure, v) relocation of electrical and mechanical equipment above the new H.F.L., vi) establishment of efficient pumping stations by replacing out-lived pumping with latest designs and equipment's and in general improvement of local environment to reduce health risks and inconvenience to the inhabitants of the project areas.

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

5. An environmental assessment using Rapid Environmental Assessment (REA) for Urban Drainage (Appendix 1) was conducted for the proposed "Upgradation and Upliftment of 27 No's Existing Drainage Pumping Stations in Srinagar City". Results of the assessment show that the proposed development is unlikely to cause significant adverse impacts. Thus the Initial Environmental Examination (IEE) report has been prepared in accordance with ADB SPS's requirements for environment Category B projects.

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

   (i) To provide critical facts, significant findings, and recommended actions;
   (ii) To present the national and local legal and institutional framework within which the environmental assessment has been carried out;

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

II. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

A. ADB's Policy

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

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

(i) **Category A.** Projects could have significant adverse environmental impacts. An EIA is required to address significant impacts.
(ii) **Category B.** Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. An IEE is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.
(iii) **Category C.** Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.
(iv) **Category FI.** Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all Projects will result in insignificant impacts.

9. **Environmental Management Plan.** An EMP which addresses the potential impacts and risks identified by the environmental assessment shall be prepared. The level of detail

and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the Project's impact and risks.

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

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

B. National and State Laws

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

12. **EIA Notification.** The GoI EIA Notification of 2006 and 2009 (replacing the EIA Notification of 1994), sets out the requirement for environmental assessment in India. This states that Environmental Clearance (EC) is required for specified activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorized as A or B depending on the scale of the project and the nature of its impacts. Categories A projects require Environmental Clearance from the National Ministry of Environment and Forests (MoEF). Category B projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA). The proposed subproject is not listed in the EIA Notification of 2006 "Schedule of Projects Requiring Prior Environmental Clearance" thus EC is not required.

13. **Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments.** Control of water pollution is achieved through administering conditions imposed in consent issued under provision of the Water (Prevention and Control of Pollution) Act, 1974. These conditions regulate the quality and quantity of effluent, the location of discharge and the frequency of monitoring of effluents. Any component of the Project having potential to generate sewage or trade effluent will come under the purview of this Act, its rules and amendments. Such projects have to obtain Consent to Establishment (CTE) under Section 25/26 of the Act from State Pollution Control Board (SPCB) before starting implementation and Consent to Operate (CTO) before commissioning. The Water Act also requires the occupier of such subprojects to take measures for abating the possible pollution of receiving water bodies. The subproject is not included in the lists of activities requiring CTE and CTO under the Water Act. However, the following construction plants shall require CTE and CTO from SPCB for hot mix plants, wet mix plants, stone crushers etc., if installed for construction. Emissions and discharges shall comply with standards notified by the Central Pollution Control Board

14. **Air (Prevention and Control of Pollution) Act.** The subprojects having potential to emit air pollutants into the atmosphere have to obtain CTE under Section 21 of the Air (Prevention and Control of Pollution) Act of 1981 from SPCB before starting

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

15. **Ancient Monuments and Archaeological Sites and Remains Rules, of 1959 and J&K Ancient Monuments Preservation (Amendment) Act of 2010.** The Act and Rules designate areas within a radius of 100 meters (m) from the "protected property" as "prohibited area" and up to 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 Burzhama archaeological site, historical Jamia Masjid, Pathar Masjid, Hazratbal Shrine, and Chati Padshahi Gurudwara, etc. are located in Srinagar City. However the location of the subproject site is beyond the prohibited and regulated areas.

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

17. **Building and Other Construction Workers (Regulation of Employment and Conditions of service) Act of 1996 and Rules 1998.** The Government of India has enacted this Act and is also applicable to the state of J&K. This act applies to all the building and other construction activities to which the provisions of Factories Act, 1948 and Mines Act, 1952 do not apply. The State Government, in pursuance of this act, has constituted a Welfare Board of building and other construction workers. This law aims to provide for regulation of employment and conditions of service of the building and other construction workers as also their safety, health and welfare measures in every establishment which employs ten or more workers. This act provides for registration of each establishment within a period of 60 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 with the provisions of this Act.

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

Table 1: Applicable Environmental Regulations

Applicability of Acts/Guidelines	Compliance Criteria
The EIA notification, 2006 (and its subsequent amendments in 2009) provides for categorization of projects into category A and B, based on extent of impact	The subproject is not covered in the ambit of the EIA notification as this is not covered either under Category A or Category B of the notification. As a result, the categorization, and the subsequent environmental assessment and clearance requirements, either from the state or the Government is not triggered.
The Wildlife Conservation Act, 1972, as amended, J&K Wildlife (protection) Act 1978, as amended provide for protection & management of Protected Areas	Clearance from State and National Wildlife Board, Central Empowered Committee of Hon'ble Supreme Court of India and the State Wildlife Department, as applicable. The wildlife protection act is not applicable to the proposed subproject.
The Ancient Monuments and Archaeological Sites and Remains Act, 1958, and the rules, 1959 provide guidance for carrying out activities, including conservation, construction and reuse in and around the protected monuments.	Permission from the Archeological Survey of India for carrying out any construction activities within the ancient monuments and archeologically protected sites. The sub-project area does not fall within or is situated close to any such site of archeological importance
Water (Prevention and control of pollution) Act, 1974 as amended Air (prevention and control of pollution) Act, 1981, as amended	Consent to Establish (CTE) and Consent to Operation (CTO) from the J&K, SPCB for setting up of hot mix plants, wet mix plants, stone crushers and diesel generators. If required, Contractor to obtain consents, prior to construction works.
The Jammu And Kashmir Preservation Of Specified Trees Act, 1969	Permission from Sericulture/ Forest/Revenue Department /Concerned Deputy Commissioner for the scheduled species. The Jammu and Kashmir Preservation of Specified Trees Act, 1969 is not applicable to the proposed subproject
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

III. DESCRIPTION OF THE PROJECT

A. Existing Condition

19. Srinagar, the summer capital of Jammu & Kashmir, is situated at an average altitude of 1600 m above 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. Topographically, Srinagar city is located on a flatter terrain. Therefore, the drainage system of the city rely on lift system through drainage pumping stations, which lift surface water from wet well and discharge into the adjoining water bodies.

20. Government of Jammu and Kashmir through an order had assigned J&K Economic Reconstruction Agency to take up proposed subproject entitled "Upgradation and Upliftment of 27 No's Existing Drainage Pumping Stations in Srinagar City" These pumping stations are in highly dilapidated condition, which was further damaged by devastating flood in September 2014. As per drainage master plan of Srinagar city, the entire city is divided into 3 zones. In most part of the assigned area, no surface water collection network and disposal system existed. In some of the subzones, works are being executed under

Table 2. Status of Existing Drainage Pumping Station in Srinagar

Sr. No.	Name of pumping stations	Catchment area	No. of Pump	Flow in Cum/hr	Head in mtr	HP	Year of Installation	Require Replacement	Gen sets Capacity (KVA)	Remarks
1	2	3	4	5	6	7	8	9	10	11
1	AbiGuzar	10.4	2	1020	6	60	1984	YES	75	
				510	7	25	2007	NO		
2	AlluchiBagh	104	3	1020	11	60	1988	YES	75	
				510	11	30	1988	YES		
				510	11	30	1988	YES		
3	AmdaKadal	3.8	2	153	8	15	1990	YES		
				153	8	15	1992	NO		Diesel Engine
4	Barbarshah	20.7	3	510	8	25	1999	NO		
				510	8	25	1964	YES		
				204	8	15	1964	YES		Diesel Engine
5	Barzula Fly over	47.5	3	1020	9.5	75	1995	NO		
				306	11	40	1995	NO		
				510	12	41.2	1995	NO		Diesel Engine
6	Batamaloo	36	4		8.5	30	1968	YES	75	Being merged with Nursing-garh
				510	8.5	30	1968	YES		
				510	8.5	30	2006	NO		
				510	8.5	30	1968	YES		Diesel Engine
7	Bishamber Nagar	16.5	4	713	10	60	1985	YES	125	
				1020	10	70	1985	YES		
				510	10	35	1985	YES		
				1020	10	50	2006	NO		
8	Boulevard	With LAWDA	5	510	5	100	2000	NO	125	Lawda area
				510	5	100	2000	NO		
				1020	10	100	2000	NO		
				1020	10	50	2000	NO		
				1020	10	50	2000	NO		
9	BulBulBagh	With NHW	2							New Scheme
				153	5	15	1998	NO		
				153	5	15	1998	NO		Diesel Engine
10	Channapora	68	1	204	8	15	1982	YES		
11	Court Road	20	2	1020	10	60	1984	YES	75	
				510	10	30	1970	YES		

Sr. No.	Name of pumping stations	Catchment area	No. of Pump	Flow in Cum/hr	Head in mtr	HP	Year of Installation	Require Replacement	Gen sets Capacity (KVA)	Remarks
12	DareshKadal	121.95	3	2040	10	150	1965	YES	250	
				1020	10	60	1965	YES		
				1020	10	75	1965	YES		
13	Fruit Mandi	With NHW	2	306	19	15	1982	YES		New Scheme
				459	19	25	1982	YES		
14	Gani Memorial Std	21.4	3	153	12	15	1985	YES	14	Gani Memorial Std
				153	12	15	1990	YES		Diesel Engine
				306	12	25	2006	NO		
15	Gojwara	1	1	153	11	15	1990	YES		Diesel Engine
16	Golf Course	51.5	3	713	10	35	1964	YES		
				1020	10	60	1964	YES		Diesel Engine
				510	10	25	2006	NO		
17	Hussi Bhat	0.87	2	153	8	15	1990	YES		
				153	8	15	1990	YES		Diesel Engine
18	Ikrajpora	41.6	4	1020	11.5	60	1969	YES		
				1020	11.5	60	2007	NO		
				510	11.5	35	1969	YES		
				306	11.5	30	1969	YES		
19	Jogi Lanker	With LAWDA	2	510	9	30	2003	NO		
				510	9	30	2003	NO		
20	JVC	With NHW	2	306	16	50	2004	NO		New Scheme
				204	16	50	1985	YES		
21	KawajiAdda	47.5	2	1020	9	50	1986	YES		
				510	9	30	1986	YES		
22	KacharPora	5.5	2	306	16	50	2000	NO		
				306	16	30	2000	NO		Diesel Engine
23	Khanyar	79	2	714	10	35	1985	YES		
				510	10	20	1985	YES		
24	Khidmat Press	7.9	3	510	13.5	50	2004	NO	24	Khidmat Press
				306	13.5	30	1959	YES		
				306	13.5	30	1985	YES		
25	LalMandi	112.5	3	1020	11.5	60	1968	YES		
				510	11.5	30	1968	YES		
				306	11.5	25	1968	YES		
26	LalTrag	77	2	1020	14.5	60	1977	YES		

Sr. No.	Name of pumping stations	Catchment area	No. of Pump	Flow in Cum/hr	Head in mtr	HP	Year of Installation	Require Replacement	Gen sets Capacity (KVA)	Remarks
				1020	14.5	60	1999	NO		
27	Mehjor Nagar	50.2	1	510	9.5	40	2004	NO		
28	MandirBagh	2.75	3	510	8	30	2000	NO		
				306	8	20	1963	YES		
				204	8	15	1962	YES		Diesel Engine
29	Mughal Mashid	0.374	2	77	6	5	1985	YES		
				77	6	5	1985	YES		
30	NatiPora		1	306	20	60	2002	NO		
31	New Gadhanjipora	74	2	1020	8	50	1970	YES	50	
				510	8	30	1970	YES		
32	Noor Bagh		4	816					125	
		48.25			13.5	50	1980	YES		
				816	13.5	50	1980	YES		
				408	13.5	25	1980	YES		
				1020	13.5	65	1985	YES		
33	Nowpora Abbi	1.4	1	204	10	15	1999	NO		
34	N R Colony		2		10	100	2000	NO	34	N R Colony
				510	10	60	1985	YES		
35	Nursing Garh	15	2	510	5	30	1969	YES	30	Being merged
				510	5	30	NA	NO		
36	Old GadhanjiPora	68	3	510	11	25	1968	YES	75	
				510	11	30	1968	YES		
				1020	11	75	2004	NO		
37	Panderathan	20.95	3	816	13.5	50	1980	YES		
				816	13.5	50	1980	YES		
				408	13.5	25	1980	YES		
38	Polytechnic	71.5	4	1020	11.5	75	1969	YES	75	
				1020	11.5	60	1960	YES		
				510	11.5	30	1969	YES		
				510	11.5	30	1960	YES		
39	Qamarwari	16	4	1020	11	65	1989	YES	100	
				1020	11	70	1989	YES		
				1020	11	60	1989	YES		
				1020	11	70	1989	YES		
40	Radapora	12.5	2	510	10	20	2006	NO	40	Radapora
				357	10	20	2006	NO	63	Diesel Engine
41	Raj Bagh	36	4	510	11	15	1968	YES		Diesel

Sr. No.	Name of pumping stations	Catchment area	No. of Pump	Flow in Cum/hr	Head in mtr	HP	Year of Installation	Require Replacement	Gen sets Capacity (KVA)	Remarks
				510	11	30	1968	YES		Engine
				306	11	20	1968	YES		Diesel Engine
42	RathaPora		1	510	10	40	2006	NO		
43	Ratna Rani	14.25	2	1020	10	60	1999	NO		
				357	10	25	1995	NO		Diesel Engine
44	RawalPora	20	1	510	5	30	1988	YES		
45	Rie Tang	3	2	77	7.5	5	1984	YES		
				77	7.5	5	1991	YES		Diesel Engine
46	Rose Bal		2	77	7.5	5	1985	YES		
				77	7.5	5	1985	YES		Diesel Engine
47	Shaheen Colony	48	2	204	14	15	1964	YES		
				153	14	7.5	1989	YES		Diesel Engine
48	ShaumPora	2.3	2	77	7.5	5	1990	YES		
				77	7.5	5	1990	YES		Diesel Engine
49	Shiv Pora	285	1	1020	7	60	1999	NO		Small Drain
50	SHMS	22.5	3	612	12	30	1985	YES		
				306	12	20	1985	YES		
51	ShakoorMohalla	39.5	2	204	5	10	1968	YES		
				204	5	10	1968	YES		
52	Shora Khan	39.5	3	1020	10	30	1965	YES	75	
				510	10	30	1965	YES		Diesel Engine
				1020	10	30	1965	YES		
53	SonwarBagh	30	3	1020	12	50	1970	YES		
				510	12	25	1964	YES		
				510	12	25	1985	YES		Diesel Engine
54	Sonwar Davis	25.75	3	1020	10	60	1987	YES	100	54
				510	10	30	2000	NO		
				510	10	30	2000	NO		
55	Sayeed Hamid Pora	2	4	816	9	50	1975	YES	62.5	
				816	9	50	1975	YES		
				408	9	25	1975	YES		
				510	9	25	1982	YES		
				510	9	25	2007	NO		

Sr. No.	Name of pumping stations	Catchment area	No. of Pump	Flow in Cum/hr	Head in mtr	HP	Year of Installation	Require Replacement	Gen sets Capacity (KVA)	Remarks
56	Sornail Mohalla	2	1	77	8	7.5	1990	YES		Diesel Engine
57	Tengpora	N H W Bye Pass	2	510	12	30	1982	NO		
				153	12	7.5	1982	YES		Diesel Engine

B. Proposed subproject and Components

21. The proposed upgradation and upliftment of 27 No's existing drainage pumping stations are located in central part of Srinagar City (Table 3). The major objectives of the proposed subprojects are; i) to optimize working of existing drainage pumping stations to ensure regular pumping of dry weather and storm water flows on sustained basis, ii) to provide adequate working space as well as space for installation of pumping machineries, iii) reduce operational problem due to frequent breakdowns, iv) to reduce power consumption and maintenance expenditure, v) relocation of electrical and mechanical equipment above the new H.F.L., vi) establishment of efficient pumping stations by replacing out-lived pumping with latest designs and equipment's and in general improvement of local environment to reduce health risks and inconvenience to the inhabitants of the project areas.

Table 3: Location of Proposed 27 No of dewatering Pumping stations Lot wise

.

Lot-A (Pumping Stations left bank of River Jehlum)		Lot-B (Pumping Stations Right bank of River Jehlum)	
S. No	**Name**	**S. No**	**Name**
1	Alochi Bagh	1	Abiguzar
2	Darish Kadal	2	Barbarshah
3	Nursing Garh	3	Bishember nagar
4	Qamarwari	4	Mandir Bagh
5	Syed Hamidpora	5	Khidmat Press
6	SMHS	6	Shivpora
7	Patlipora	7	Court Road
8	Tengpora	8	Golf Club
9	Batamaloo	9	Sonvar Bagh
10	Kawaji Ada	10	Sonvar Davis
11	Old Gadhanjipora	11	Shora Khan
12	Ikhrajpora	12	Noor bagh
13	Rajbagh		
14	Polytechnic		
15	New Gadhehanjipora		

22. The primary benefit of the sub-project would result in overall improved environmental conditions of the area by avoiding water logging especially during rainy seasons thereby leading to better quality of life.

23. Table 4 shows the component of the subproject. The descriptions shown are based on the present proposals, which are expected to be substantially correct, although certain details may change as development of the subproject progresses.

Table 4: Description of the Proposed Drainage Pumping Stations in Srinagar.

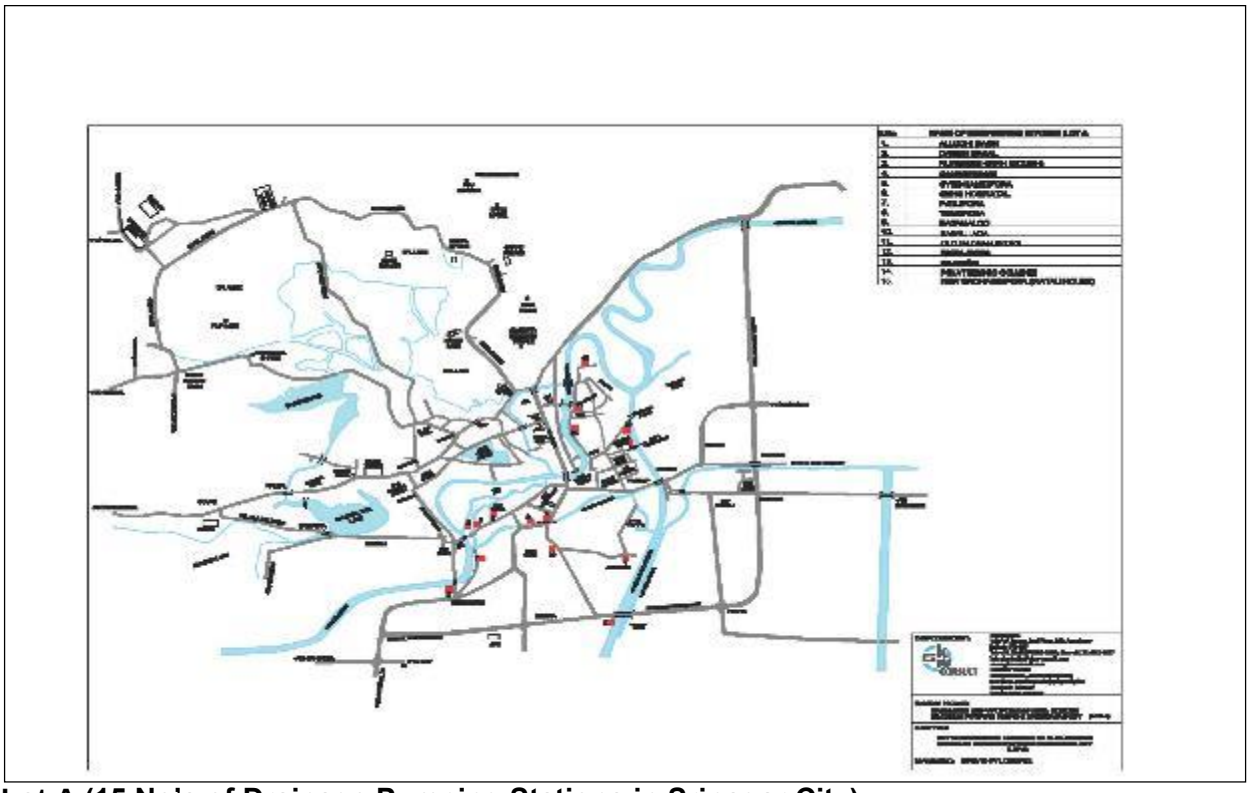
Component	Function	Description
Submersible Pumps	To lift Storm water Discharge and floating material	Replacement of pumps older than 20 years at designated pumping station
Pipe and Pipe fittings	Transport water from pump to the delivery point	Non Clog submersible Pump set coupled with motor complete with discharge head, with suitable duck foot bend with stainless guide rods including lifting arrangement discharge column assembly etc.
Valves	To control flow and water hammering	To control flow and water hammering for storm water discharge pumps 300m^3/hr
Level Indicator	To measure the water level in sump	To measure the water level in sump
Tools and Tackles	To maintain the operation and maintenance	To maintain the operation and maintenance
DG set	As back up for power breakup failure	Silent water cooled DG sets, producing required BHP under normal temperature pressure condition having four cylinders, 12 volt electric start arrangement, naturally aspired coupled to 70KVA and,3 phase,415 V,0.8 Power factor ,50 Hz alternators on a common base frame, complete with auto mains failure ,control panels, starting battery with leads ,fuels tank and sound proof acoustic enclosure and other accessories for maintaining regular power supply to pumping station in case of power breakdown
Transformer/ Stabilizer	Stabilized Power supply	Automatic voltage stabilizer,3 phase,50 Hz, alternating to maintain proper voltage supply to pumping station
Electric distribution panel	To control the individual pumping units	LT Panel suitable for operation on 415 V ,3 Phase ,50 Hz, alternating current ,indoor type, sheet clad, dust and vermin proof, totally enclosed, floor mounting ,single front ,fixed type and compartmentalized ,extensible on both sides, epoxy resin powder coated painted provided with aluminum bus-bars, one panel heater, cable terminations of all incoming and outgoing cables ,voltmeters, ampere meters, frequency meter, power factor meter etc
LT Cable	To give the supply for motors	PVC insulated sheathed armoured cable with aluminum conductor of required sizes from transformer to stabilizer, from stabilizer to incoming panel ,from panel to individual motor including for G sets
Electrification	To operate pumping units for 24 hours	Complete electrification with industrial with industrial dust and corrosion proof luminiare made of engineering plastics as per requirements
Earthing	Safety of equipment's	Earthing grid for all electrical equipments with earth plates of suitable sizes including earthing strips, accessories and providing masonry enclosure with cover having locking arrangement and watering pipe etc, charcoal and salt for earth electrode

24. The main design features are summarized in Table 5 below.

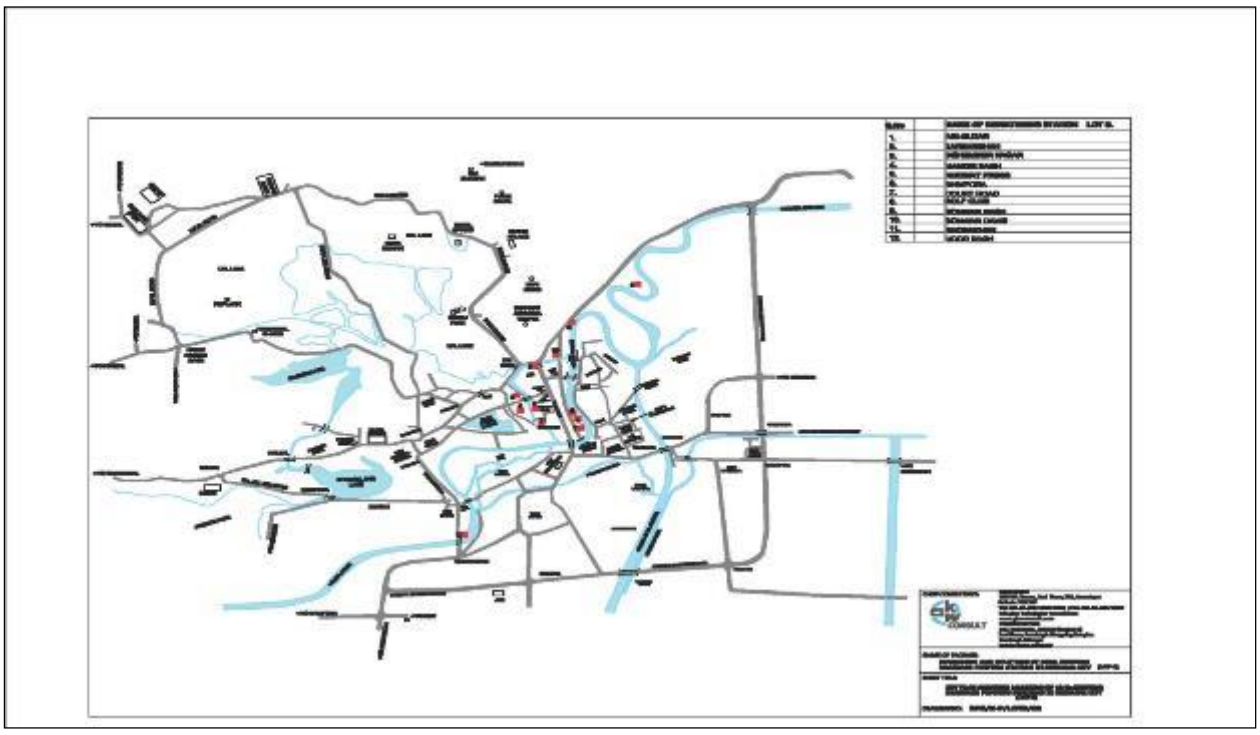
Table 5: Design features of the proposed subproject of Drainage Pumping Stations in Srinagar

Design Feature	Description
Design Year	2015
Replacement of pumping and electrical equipment for dry weather flow	All pump sets for dry weather flow will be replaced with new sewage pumps and allied equipment of required capacity with necessary electrical system.
Replacement of Storm water flow pumping equipment	All pump sets for storm water flow, which have completed 20 years or more will be replaced by new pumps along with allied accessories.
Power Supply	1. AVR'S to be provided 400V+/-10% against input voltage of 280 to 400V. 2. Generator set to be provided, where they lie defunct or do not exist.
Stand-by arrangement	1. 100% stand by pump sets for dry weather flow pumping. 2. No stand by pumps for storm water pumping.
Staff Welfare	One toilet unit at each pumping station is proposed.

Figure 1 : Map showing location of proposed upgradation of Pumping stations of Lot-A and Lot- B in Srinagar City.



Lot A (15 No's of Drainage Pumping Stations in Srinagar City)



Lot B (12 No's of Drainage Pumping Stations in Srinagar City)

C. Implementation Schedule

25. The proposed construction period of the sub-project is 15 months and indicative time line of implementation is as below:

Table 6: Implementation Schedule of the subproject

Activity	Tentative Time Schedule
Name of the Sub-Project	Upgradation and Uplifting of 27 No's of existing drainage pumping Stations in Srinagar City (Lot-A 15 No's and Lot-B 12 No's)
Approval of SAR	April 2015
Completion of detailed engineering design	30th April, 2015
Issue of invitation of bids	20th May 2015
Contract award	20th August 2015
Commencement of contract	1st September, 2015
Completion of Contract	30th November, 2016

D. Alternatives of Proposed Subproject

- Option 1 - Do nothing. This will not address the underlying problem of frequent water logging and surface water flooding
- Option 2 - Do minimum. This option involves at grade improvements to improve safety but still does not address the underlying problem of water logging in the area due to the change in HFL.
- Option 3 - Current preferred option. The upgradation and upliftment of these existing pumping stations is best balanced solution by providing the desired outcomes with least impact on environment..

IV. DESCRIPTION OF THE ENVIRONMENT

A. Physical Resources

1. Administrative Boundaries

26. 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

27. **Topography.** The subproject area is located in central part of the Srinagar city. Physio-graphically, Srinagar city 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 area varies between 1,585m and 1,590m above mean sea level.

28. **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 surface 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.

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

- Zone- I: This zone includes areas from Pampore to Gawkadal, Dalgate to Nehru park. Civil line areas - Raj bagh, Jawahar Nagar to Alochibagh and areas across flood spill channel including Ram bagh, Natipora, Barzulla etc.
- Zone- II: The zone includes areas from Amirakadal to Parimpora /Shallateng, including areas of New and Old Secretariat Batamalloo, Bemina, Nawakadal, Nawa bazaar and SafaKadal etc.
- 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.

30. There are about 50 existing drainage schemes having about 119 km of primary and secondary surface 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- 7** below:

Table-7: Zone wise list of drainage schemes in Srinagar city.

Sr. no	Name of drainage scheme	Length of drain (m)
Surface water drainage zone 1:		
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 Sariaballa	966
6	Drainage Scheme Solina	998
7	Drainage Scheme Sonwarbagh; 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
Surface water drainage zone II:		
18	Drainage Scheme Syed Hamidpora, 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

Sr. no	Name of drainage scheme	Length of drain (m)
Surface water drainage zone III:		
23	Drainage Scheme Bahu- ud- Din Sahib	700
24	Drainage Scheme Imptts to nallah Maar	4538
25	Drainage Scheme Khanyar	3670
26	Drainage Scheme Hawal, Alamgari Bazar, Mureedpura	3335
27	Drainage Scheme BudooBagh	555
28	Drainage Scheme Bhagwanpora, Noor Bagh	1647
29	Drainage Scheme Brari Nambal	1190
30	Drainage Scheme Iddgah, Ganderpora, LaigarDoori, 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/ Botakadal	3647
38	Drainage Scheme Zahidpora Hawal	1095
39	Drainage Scheme Bishember Nagar	2650
40	Drainage Scheme Mandirbagh 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, Awantabhawan	769
50	Bilal colony	347
Total		**118663**

31. **Surface 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-8** below

Table-8: Existing surface 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
Total	**38**	**21**	**30**	**89**

32. **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.

33. The state of Jammu & Kashmir is the western most extension of the Himalayan mountain range in India. Which comprise of the Pir Panjal, Zanskar, Karakoram and Ladakh ranges. The Main Boundary Thrust (MBT) underlies the Pir Panjal Range and is known as the Panjal Thrust in the region. The Zanskar ranges which are part of the Great Himalayan range are underlain by the Zanskar Thrust. The Kashmir Valley lies between the Pir Panjal and the Zanskar thrusts, making it very vulnerable to earthquakes. Other northern parts of Jammu & Kashmir are heavily faulted. Along the Zanskar 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.

34. 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.

35. The earthquake zonation map of Jammu and Kashmir is given in **Figure-3** below:

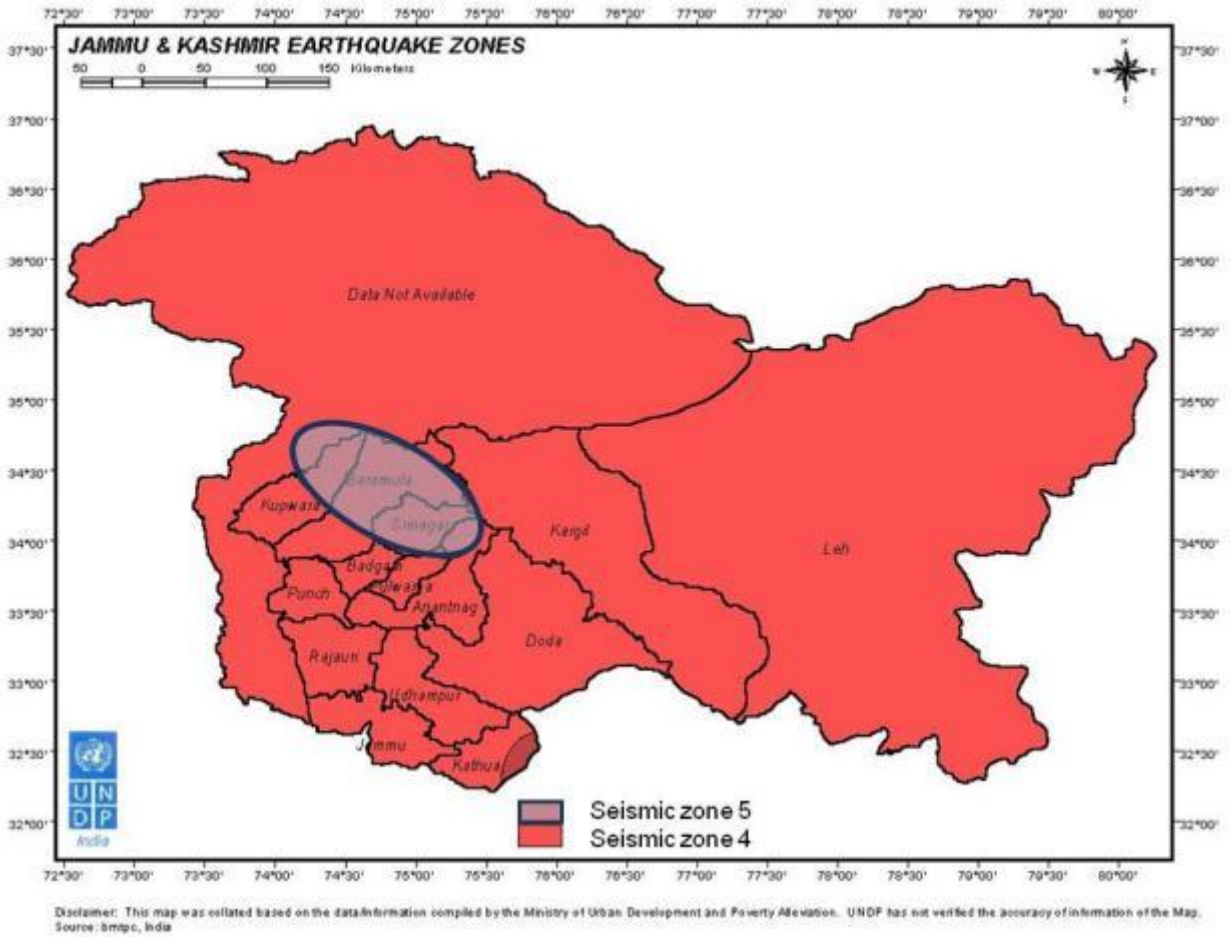


Figure-2: Jammu and Kashmir earthquake zones.

36. **Floods:** In Srinagar city, the 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 Jhelum 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

37. Besides natural drainage, the subproject area is well knitted with a system of drains and pumping stations which lift surface 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 Reinforced concrete cement (RCC) slabs with manholes provided at suitable intervals to facilitate maintenance of the drainage system. As per surface water drainage master plan, Srinagar city is divided into three drainage zones with the sub-project area falling in zone-I comprising areas from from Pampore to Gawkadal, Dalgate to Nehru Park. Civil line areas, Raj bagh, Jawaharnagar to Alochibagh and areas across flood spill channel including Ram bagh, Natipora, Barzulla etc. In order to make the existing drainage pumping stations more efficient, upgradation and upliftment of existing pumping stations have been proposed under Tranche-3 of JKUSDIP.

3. Geology, Geomorphology and Soils

38. **Geology and Geomorphology**. The Geology of the territories of Jammu, Kashmir and Ladakh have been divided into three different structural Zones:
    - The Panjal
    - The Zanskar
    - The Tertiary Groups

39. 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 Zankar includes the whole of the eastern region from Spiti and Lahol (32.170N. Latitude) to the lofty Karakoram mountains in the north. The Tertiary Groups include the valley of Kashmir and other river Valleys.

40. The oval valley of Kashmir is longitudinal. It is about 1700 metres above sea level. There is a high wall of mountains round the valley. These rise to a height of 5515 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. Lime stones 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.

41. **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 fertilizers 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.

4. Climate

42. 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.

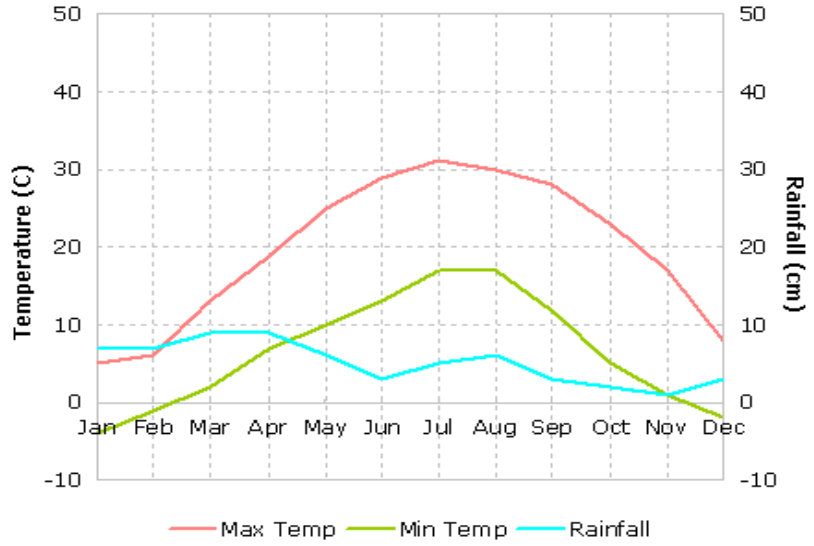


Figure-3: Weather graph of Srinagar

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

43. **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 average temperature touching -3.1 °C to mild hot in summers when the temperature shoots up to 31.1 °C. The mean maximum and minimum temperature (ºC) recorded at meteorological observatory (Rambagh, Srinagar) during Jan 2011 – March 2015 are summarized in Table 9:

Table 9: Mean maximum and minimum temperature recorded during 2011 – March 2015 of Srinagar city

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Year 2011												
Max. Temp. (°C)	07.9	09.5	17.1	18.6	27.7	30.3	29.8	30.1	27.8	22.3	15.7	10.4
Min. Temp. (ºC)	-02.7	01.5	03.9	07.0	12.6	16.7	18.3	18.1	14.1	06.9	02.8	-01.9
Year 2012												
Max. Temp. (°C)	04.8	09.7	16.2	19.9	23.8	27.4	30.9	29.9	26.3	21.2	16.8	09.0
Min. Temp. (ºC)	-03.1	00.2	04.3	08.2	10.1	14.1	18.6	19.1	14.5	05.8	01.6	-00.4
Year 2013												
Max. Temp. (°C)	07.8	10.8	18.3	20.0	24.9	29.4	31.1	28.8	27.6	24.4	15.9	10.7
Min. Temp. (ºC)	-02.2	00.9	05.4	08.3	11.4	16.9	19.3	19.1	13.9	09.7	0.6	-01.4
Year 2014												
Max. Temp. (°C)	05.5	09.9	12.3	19.0	23.9	29.4	30.4	29.3	24.8	21.8	14.8	10.7
Min. Temp. (ºC)	-0.1.4	00.5	03.4	07.7	11.3	15.2	19.2	16.9	13.7	8.7	2.0	-2.6
Year 2015												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max. Temp. (°C)	11.2	10.3	12.5									
Min. Temp. (ºC)	-2.0	1.4	3.7									

Source: Indian Meteorological Department (IMD), Srinagar Weather Station, April 2015

44. **Rainfall:** The area usually experiences rainfall during winter and early summer from western disturbances. The month's total rainfall (MTR in millimeters) recorded at meteorological observatory at Rambagh, Srinagar during Jan 2011 to March 2015 is shown in Table 10.

Table 10: Rainfall data of Srinagar during 2011-2015 (Month's Total Rainfall in mm)

Months/ Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
2011	54.2	100.9	100.8	105.8	20.1	27.0	37.1	68.4	46.5	29.1	24.1	33.1	647.1
2012	60.2	78.7	58.0	82.7	39.8	24.3	12.1	26.6	111.5	10.8	11.7	27.1	543.5
2013	58.7	111.9	69.4	102.0	51.8	54.1	79.8	88.8	34.2	18.5	04.1	16.6	689.7
2014	86.9	39.1	220.1	113.7	50.9	18.6	55.8	72.2	184.8	35.7	15.1	0.0	892.9
2015	5.6	164.9	294.6										

Source: Indian Meteorological Department (IMD), Srinagar Weather Station, April 2015

45. **Humidity:** The mean relative humidity (MRH %) recorded at meteorological observatory at Rambagh, Srinagar during Jan 2011 to March 2015 at 0830 hours and 1730 hours Indian Standard Time (IST) are presented in Table- 11 below.

Table 11: Monthly Relative Humidity Data of Srinagar City

Months/ Year	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
MRH 2011	084	087	075	075	066	065	073	076	077	081	087	088
(Max and Min)	060	066	052	058	044	047	051	050	054	057	064	064
2012	088	086	070	073	071	066	070	078	081	081	083	089
(Max and Min)	070	061	043	055	049	043	045	056	060	054	056	071
2013	087	088	074	074	069	071	072	080	078	078	082	086
(Max and Min)	063	058	043	053	045	046	047	060	051	055	054	065
2014	088	087	084	073	073	063	073	077	086	084	090	090
(Max and Min)	069	060	064	053	058	041	052	054	060	060	066	065
2015	086	088	082									
(Max and Min)	053	063	062									

Source: Indian Meteorological Department (IMD), Srinagar Weather Station, April 2015.

5. Air Quality

46. Ambient Air Quality of different locations of pumping stations in Srinagar City was carried by Environmental Monitoring Laboratory of Economic Reconstruction Agency (ERA) from Feb-April 2015. The air quality data with respect to RSPM (PM_{10}), SO_2 and NO_2 was measured at specified sites near the subproject area and the results are shown in Table-12 below.

Table-12: Ambient air quality data at various locations near pumping stations

S. No	Site Code	Location	Site Class	Parameters		
				RSPM$_{10}$ (µg/m^3)	***SO$_2$ (µg/m^3)***	***NO$_2$ (µg/m^3)***
NAAQS STANDARDS				***100***	***80***	***80***
1	S-A1	Allochibagh	Residential area	94.89	5.71	7.89
2	S-A2	Batamaloo	Commercial area	108.23	7.11	11.47
3	S-A3	Kawji Adda	Commercial area	145.13	7.81	10.52
4	S-A4	Nursing Garh	Commercial area	148.41	8.76	12.13
5	S-A5	Tengpora	Commercial area	105.54	7.65	9.32
6	S-A6	Abi Guzar	Commercial area	104.16	10.59	13.89
7		Khidmat press				
8		Court road				
9	S-A7	Barbarshah	Commercial area	108.23	11.72	17.74
10		Shora khan				
11	S-A8	Golf Course	Commercial area	123.49	9.27	16.74
12	S-A9	SMHS Hospital	Commercial area	14256	9.12	12.78
13		Syed Hamidpora				
14		Darsh Kadal				
15	S-A10	Ikhrajpora (Jawaharnagar Bund)	Residential area	121.45	7.45	9.12
16		Polytechnic College				
17	S-A11	Rajbagh (Silk Factory)	Residential area	101.56	6.45	8.23
18		Old Gandhanjipora				
19		New Gandhanjipora (Near Watali House)				
20	S-A12	Patlipora (Chattabal)	Commercial area	136.35	9.44	11.56
21		Qamarwani				
22		Noorbagh				
23	S-A13	Shivpora	Residential Area	87.56	7.89	8.76
24	S-A14	Sonwar Bagh (Near Suspension Bridge)	Commercial Area	132.22	9.23	10.30
25		Sonwar Devis (Ansari Motors)				
26	S-A15	Bishambar Nagar	Residential area	84.32	7.21	8.45
27		Mandir Bagh				

PM10= Particulate matter below 10µ particle size ,RSPM: Respirable Suspended Particulate Matter, SO_2: Sulphur dioxide and NO_2: Nitrogen dioxide, NAAQS: National Ambient Air Quality Standards of Govt. of India

47. Air quality monitoring shows higher RSPM (PM_{10}) values are above the NAAQ standard at, different locations of existing drainage pumping stations. The primary reason for higher RSPM (PM_{10}) values are attributed to fugitive dust generation mainly caused by plying of

vehicular traffic and indirectly related to September 2014 floods (which brought huge silt and muck during unprecedented deluge).

48. 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_{10} and $PM_{2.5}$. The air quality monitoring equipment presently available with J&K ERA can measure the total particulate matter below 10µ particle size. However, separate values for PM_{10} and $PM_{2.5}$ cannot be determined. ERA has recently procured latest equipment in April 2015 for the measurement of RSPM ($PM_{2.5}$) for separate measurement of these parameters and baseline data shall be generated for these parameters before start of works on the proposed subproject.

6. Ambient Noise Levels

49. Vehicular traffic contribute significantly to the noise pollution especially in congested areas such as crowded commercial areas and market places. Due to increasing number of vehicles, the noise pollution caused by them will soon reach alarming propositions. The following table (Table 13) depicts the levels of noise observed near the subproject sites in Feb-April, 2015. The measurements were done by Environmental Monitoring Laboratory of ERA**.**

Table 13: Ambient noise quality data at various locations near pumping stations

S. No	Location	Site Code	Site Class	Parameters	
				Leq. dB(A)	Permissible Limits
1	Allochibagh	S-N1	Residential area	56.8	55
2	Batamaloo	S-N2	Commercial area	66.3	65
3	Kawji Adda	S-N3	Commercial area	67.4	65
4	Nursing Garh	S-N4	Commercial area	64.4	65
5	Tengpora	S-N5	Commercial area	63.7	65
6	Abi Guzar	S-N6	Commercial area	68.4	65
7	Khidmat press				
8	Court road				
9	Barbarshah	S-N7	Commercial area	62.5	65
10	Shora khan				
11	Golf Course	S-N8	Commercial area	67.2	65
12	SMHS Hospital	S-N9	Commercial area	66.5	65
13	Syed hamidpora				
14	Darsh Kadal				
15	Ikhrajpora (Jawaharnagar Bund)	S-N10	Residential area	57.5	55
16	Polytechnic College				
17	Rajbagh (Silk Factory)	S-N11	Residential area	58.6	55
18	Old Gandhanjipora				
19	New Gandhanjipora (Near Watali House)				
20	Patlipora (Chattabal)	S-N12	Commercial area	68.7	65
21	Qamarwani				
22	Noorbagh				
23	Shivpora	S-N13	Residential Area	54.5	55
24	Sonwar Bagh (Suspension Bridge)	S-N14	Commercial Area	66.1	65

25	Sonwar Devis (Ansari Motors)				
26	Bishambar Nagar	S-N15	Residential area	57.4	55
27	Mandir Bagh				

Permissible Limit for Commercial area= 65 dB (A) Permissible limit for Residential area= 55 dB (A)

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

50. Day time noise levels recorded at above site locations were higher than the prescribed permissible limits. This is mainly attributed to vehicular traffic influx throughout the monitoring phase.

51. 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, because of same security reasons, 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.

B. Water Resources

I. Surface Water

Srinagar city is bestowed upon by nature with so many water bodies including world famous Dal Lake which is situated in the middle of the city. River Jhelum flows through the city dividing it into two parts. Other important water bodies in and around the city include Nagin lake, Anchar lake, Khushalsar, Gilsar, Hokersar (wetland), Telbalnallah, Dachigam nallah and Doodganga nallah.

52. The water quality of river Jhelum, Spill Channel of Jhelum, Chunt Kul and Sunnar Kul has been analyzed in Feb-April 2015 by the Environmental Monitoring Laboratory of ERA and is presented in **Table-14**.

Table-14: Ambient Water Quality of the surface water bodies near pumping stations.

S.No	Sampling Sites	Site Code	Flow Regime	Temp ºC	pH	E.C µs/cm	D.O mg/l	B.O.D mg/l	TDS mg/l	TSS mg/l	Turbidity NTU
1.	AllochiBagh (Jhelum Flood spill Channel)	S-W1	Upstream	12	8.0	321	4.2	11.2	200	380	33.2
			Downstream	12	8.0	370	4.0	12.1	224	400	36.0
2.	Tengpora (Jhelum Flood spill Channel)	S-W2	Upstream	13	8.0	825	2.5	13.0	475	670	26.1
			Downstream	13	8.0	885	2.0	14.6	503	700	28.2
3.	Abiguzar/ Khidmat Press/ Court Road (River Jhelum)	S-W3	Upstream	12	8.0	252	6.2	2.2	138	162	4.2
			Downstream	12	8.1	254	6.0	2.4	146	171	5.2
4.	Mandir bagh/ Bishambarnagar (Chunt Kul)	S-W4	Upstream	9	8.0	270	6.5	6.0	170	220	6.0
			Downstream	9	7.9	277	6.0	6.5	175	230	6.0
5.	Shorekhan (Gaw Kadal)/	S-W5	Upstream	9	8.0	275	6.0	6.5	176	225	6.0

	Barbarshah (chunt Kul)		Downstream	9	8.0	279	6.0	6.5	179	236	5.8
6.	Rajbagh / Old Gandhanjipora / New Gandhanjipora (River Jhelum)	S-W6	Upstream	11	8.0	260	7	2	158	136	2.1
			Downstream	11	8.0	267	6.6	2	160	140	2.2
7.	Golf Course (Chunt kul)	S-W7	Upstream	9	7.8	260	7.5	5.5	155	200	4.3
			Downstream	8	7.7	266	7.0	5.5	165	210	4.7
8.	Jawahnagar Bandh (Ikhrajpora) Jhelum Flood spill channel	S-W8	Upstream	11	8.0	627	3.2	8.2	311	180	10.0
			Downstream	11	8.1	634	3.0	8.9	315	190	10.5
9.	Syed Hamidpora/ SMHS/ Darish Kadal (SunnarKul)	S-W9	Upstream	12	7	169	7.5	2.5	94	50	4.0
			Downstream	12	7.2	175	7.0	2.2	105	55	4.2
10.	Patlipora/Qamarwari/ Noorbagh (River jhelum)	S-W10	Upstream	10	8.0	167	7.2	2.0	98	92	2.8
			Downstream	10	8.0	172	7.0	2.2	105	100	3.0
11.	Shivpora/Sonwar Bagh/Sonwar Devis (River Jhelum)	S-W11	Upstream	11	8.4	165	8.8	2.0	84	200	15.3
			Downstream	11	8.5	168	8.4	2.5	82	210	15.9

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

53. It is clear that the parameters analyzed above are within permissible limits.

54. 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 and is suitable for drinking without any conventional treatment but after disinfection.

II. Geohydrology and Groundwater

55. The depth of water table in Srinagar is reported to be between 0.3 to 7.0 with average depth of 3.65m. Public water supply is the major source of potable water for the settlements around the subproject area A potential seasonal variation of ± 1.0m to 2.0m may be expected.

C. Ecological Resources

56. **Terrestrial ecology and Biodiversity**. Since the subproject stretch is located within heavily built-up area of Srinagar city, no sensitive ecological areas are located along the stretches of subproject.

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

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

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

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

61. **Fisheries**. [1]The common fish species found in River Jhelum include *Schizothorax curvifrons Schizothorax esocinus Schizothorax plagiostomus 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.. No interference with fishery activities is envisaged by execution of the proposed subproject.

D. Economic Development

62. 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 is used to make high-quality cricket bats, popularly known as Kashmir Willow. 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.

63. 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 and walnuts.

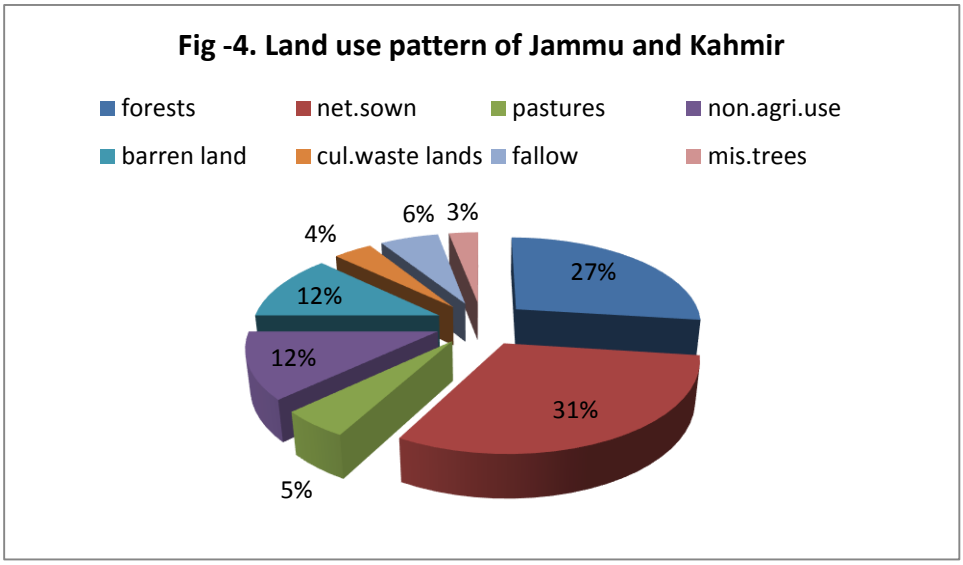
64. **Land use Pattern**. As per Master Plan for Srinagar (2001-2021), 27.70% area of Srinagar city is developed (various types of constructions), 5.4% under defense use, 55.10% under agriculture, horticulture and rocky land, and 11.66% is covered by water bodies and floating gardens. The proposed subproject will be located within the urban city areas. The broad land uses of Srinagar local area are summarized in **Table-15** below.

Table 15: Broad land uses of Srinagar Local Area

S.N.	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
	Total	**100**

[1] ***Source:*** *"Current Status of the Fish Fauna of River Jhelum, Kashmir, J&K" Imran Khan and Mudasir Ali, Department of Environmental Science, University of Kashmir, Open Access Scientific Reports, January 26, 2013

65. 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 India

66. **Commercial Activities:** The land use in the subproject area is mainly commercial. Varied types of commercial activities in the form of wholesale, retail or small scale services are carried out in this area.

67. The construction (upgradation and upliftment) of proposed drainage pumping stations in Srinagar City is already an existing facilities and hence does not require/ involve any land acquisition The subproject will not have any impact upon any structures as no such kind of structures was not in the vicinity area.

68. **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 site.

69. **Agriculture**. There are no agricultural activities 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.

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

71. **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.

72. **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.

73. **Drainage**. As per surface 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 surface water drains. In addition to such drains, there are substantial lengths of tertiary drains/ deep drains. The proposed upgradation and upliftment of existing pumping stations will enhance the efficacy of existing drainage system in the Srinagar City.

74. **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).

75. **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.

76. 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 LCV plying in the area. In slow moving vehicles category, cycles are predominant and other categories are almost negligible.

E. Social and Cultural Resources

77. Total population of Jammu and Kashmir as per 2011 census is 12,541,302 of which male and female are 6,640,662 and 5,900,640 respectively. In 2001, total population was 10,143,700 in which males were 5,360,926 while females were 4,782,774. Srinagar district Constitute 10.12% of the total population of the state.

78. Jammu and Kashmir has a multicultural and multi religious demographic set up. Majority of population practice Islam as their religion. It is the only Muslim majority state in India. 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, Sikhs and minor population of Christians also, living side by side at many places. In totality, the Muslims constitute 67% of the population, the Hindus about 30%, the Buddhists 1%, and the Sikhs 2% of the population.

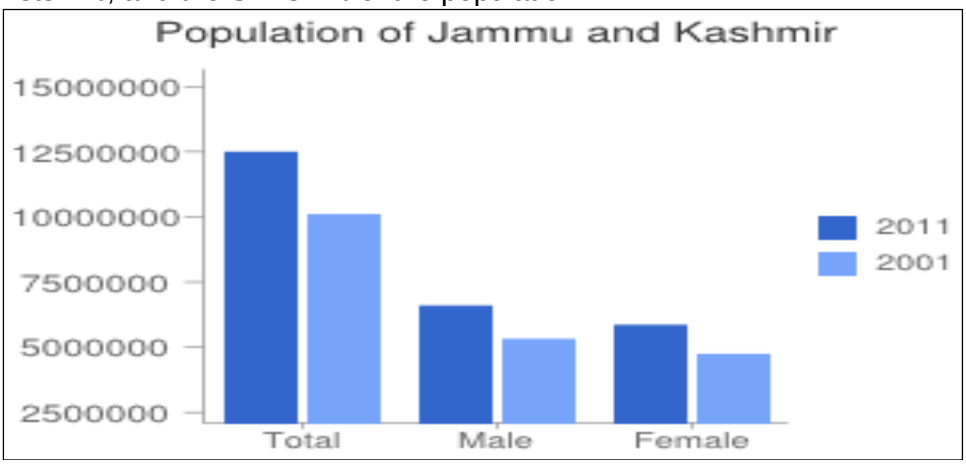


Figure-5: Population of Jammu and Kashmir State

79. 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.

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

81. 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 Badhshah University Jammu, SSM College of Engineering and Technology Kashmir, and various Government Degree Colleges.

82. **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.

83. 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 & rivers across the Valley. Shikaras are a common feature in lakes & rivers across the Kashmir valley.

84. Kawa, 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.

85. 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, an annual holiday 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 Bakkarwalas 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.

86. Some archaeological, historical monuments and religious places like Burzhama 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.

87. 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 Achariya Temple, etc. Dal Lake is 3-9 km, Mughal Gardens 10-14 km, Hazratbal Shrine 12 km, and Shankar Achariya Temple 5--10 km away from the proposed subproject of pumping stations; hence no such impact on these sites is anticipated.

88. **Sensitive Environmental Receptors:** The sensitive environmental receptors prevailing near proposed upgradation of the existing pumping stations include religious places, educational institutions and community property resources. The details of the existing sensitive environmental receptors are given in **Table 16**.

Table 16: Sensitive environmental receptors in subproject area

Sensitive Feature	Location	Distance (m) from the alignment
Mosque	**Nursing Garh**	100m
College	**Polytechnic**	80m
Child care school	**Rajbagh**	60m
Mosque	**Qamarwari**	80m
RN Mandier school	**Syed Hamid Pora**	80m
Salfia Mosque	**Batamaloo**	150m
Mosque	**Patlipora**	150m
City hospital	**Tengpora**	100m
Mosque	Abiguzar	100 m
Temple	Khidmat Press	90 m
Mosque	Noor Bagh	50 M
Mosque	Mandir Bagh	70 m
School	Sonwar Davis	100m

89. It is clear from the above table that some of the sensitive receptors are close to the existing pumping stations. During the construction phase necessary mitigation measures should be taken.

V. ANTICIPATED IMPACTS AND MITIGATION MEASURES

90. The present report assesses the impacts of the proposed activities on various environmental attributes of the subproject sites.

91. **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.

92. 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 17:

Table 17: Summary of Quantifiers and Qualifiers Used for Assessment Purposes

Duration (time-scale)	Short-term	Impact restricted to construction (0-15 months).
	Medium-term	Impact will continue throughout operation (30 years).
	Long-term	Impacts will exist beyond the life of the Pumping Stations infrastructure (>30 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 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%)

93. Categorization of the subproject has been undertaken using REA Checklist for Urban Drainage (Upgradation and Upliftment of existing 27 No's of drainage pumping stations in Srinagar City.)

A. Planning and Design Phase

94. 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 subproject "Upgradation and Upliftment of Existing 27 No's of Pumping Stations in Srinagar City are: (i) no land acquisition; (ii) improvement in draining surface water (iii)

Reducing water logging (iv) most suitable construction methodology; and (v) Site constraints.

95. The Salient design features are presented in **Table 18**.

Table-18 Salient Design Features of the subproject

Design Feature	Description
Design Year	**2015**
Replacement of pumping and electrical equipment for dry weather flow	**All pump sets for dry weather flow will be replaced with new sewage pumps and allied equipment of required capacity with necessary electrical system.**
Replacement of Storm water flow pumping equipment	**All pump sets for storm water flow, which have completed 20 years or more will be replaced by new pumps along with allied accessories.**
Power Supply	**1. AVR'S to be provided 400V+/-10% against input voltage of 280 to 400V.** **2. Generating Set to be provided, where they lie defunct or do not exist,**
Stand by arrangement	**1. 100% stand by pump sets for dry weather flow pumping.** **2. No stand by pumps for storm water pumping.**
Staff Welfare	**One toilet unit at each pumping station**

96. Statement Showing the Details of Catchment area and Capacity of drain is presented in Table 19 below;

Table19: Details of Catchment area and Capacity of drains.

S. No.	Name of Station	Catchment area in (Ha) "A"	Discharge as per CA			Capacity of Drain "Cusecs"
			C	I mm/hr	Q* "Cumecs"	
1	ALLOCHI BAGH	110.00	0.40	10	1.344 (47.50 Cusec)	44.00
2	DARESH KADAL	147.00	0.60	9	2.205 (77.86 Cusec)	66.80
3	NEW GADHANJIPORA	75.00	0.40	10	0.83 (29.50 Cusec)	46.50
4	NURSING GRAH	10.00	0.40	23	0.25 (9.00)	8.00
5	POLYTECHNIC COLLEGE	75.00	0.40	10	0.38 (30.00 Cusec)	42.50
6	QAMARWARI	103.00	0.40	10	1.14 (40.50	75.00
7	SYED HAMID PORA	23.00	0.60	13	0.50 (18.00 Cusec)	25.50
8	S.M.H.S	10.00	0.40	23	0.26 (9.00)	11.60
9	ABI GUZAR	9.00	0.60	23	0.345 (12.50 Cusec)	20.00

10	BARBAR SHAH	29.00	0.60	12	0.58 (18.0 Cusec)	18.00
11	BISHEMBER NAGAR	10.00	0.60	23	0.38 (13.50 Cusec)	15.00
12	IKHRAJ PORA	38.00	0.40	12	0.50 (18.00 Cusec)	65.50
13	KAWJI ADDA	55.00	0.40	11	0.67 (23.60)	32.00
14	KHIDMAT PRESS	8.00	0.60	25	0.33 (12.00 Cusec)	23.00
15	MANDIR BAGH	2.80	0.40	25	0.077 (2.75 Cusec)	13.30
16	OLD GADHANJIPORA	45.00	0.40	11	0.56 (19.50 Cusec)	19.00
17	RAJBAGH SILK FACTORY ROAD	18.00	0.40	15	0.30(11.00 Cusec)	18.60
18	SHORA KHAN	18.00	0.60	15	0.45(16.00 Cusec)	27.80
19	SONWAR BAGH	33.00	0.40	12	0.44 (15.60 Cusec)	23.00
20	SONWAR DEVIS	38.00	0.40	12	0.50 (18.50 Cusec)	23.00
21	BATMALOO	86	0.40	10	0.93(33.0 Cusec)	34.00
22	COURT ROAD	15	0.60	17	0.42(15.0 Cusec)	12.00
23	GOLF COURSE	51.5	0.40	11	0.614(22.0 Cusec)	25.0
24	NOOR BAGH	48.25	0.40	11	0.6(21.0 Cusec)	23.0
25	PATLIPORA	27.00	0.40	13.8	0.4(14.0)	20.00
26	SHIV PORA	66	0.40	6	.73(26.0)	20.0
27	TENGPORA	18	0.40	15	0.3(10.0 cusec)	17.0

97. The following Table-20 outlines potential impacts collected 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.

Table 20: 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	• The existing problem of defunct and outdated drainage pumping stations in city center, resulting in water logging in residential and commercial areas with frequent inundation of roads, footpaths, shops, houses etc. • Water logging provides breeding grounds for different water borne diseases like malaria, cholera etc along with contaminated water that creates unhygienic and unsafe environment for residents, pedestrians and commuters thus loss of aesthetics of area. This acts as a barrier to redevelopment and growth of the area.	• The subproject will improve drainage dewatering facility in a safe and highly efficient manner. The improved and revamped dewatering pumping stations will control water logging, numerous water borne diseases and will facilitate safe passage for residents and commuters.	High (-)	Local/ Regional	Medium-term	Full Mitigation Definite	High (+)
Planning initiatives	Planning initiatives have been identified as: • Upgradation and upliftment of existing drainage pumping stations in Srinagar City will led to highly efficient drainage control system.	• The subproject will improve dewatering capacity of existing drainage facility in a safe and efficient manner. This will allow for the planning initiatives to be realized.	High (-)	Local/ regional	Medium-term	Full mitigation definite	High (+)
Identifying upgradation of existing drainage pumping stations needs and demands	The ERA vision is to provide safe, reliable, effective and efficient drainage/ pumping facilities which will best meet the needs of the people in such a way which supports government strategies for economic and social development, whilst being environmentally and economically sustainable.	• The subproject will significantly reduce/ control the water logging problems and surface water inundation of roads, footpaths, shops, houses etc • Efficient drainage of	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
		water from the area will result in control of numerous water borne diseases, thus saving human life, as well as the economy of the City. • It is envisaged that pedestrian sidewalks and footpaths, roads will be improved and increased in size together with general urban design elements to create an environment that is conducive to pedestrian/ commuter activity. • The future developmental and event needs (tourism) will have better access to and from the City by reducing unnecessary traffic jams due to surface water flooding of roads.					
Alternatives	The following alternatives have been considered: • Option 1 - Do nothing – This will not address the underlying problem of water logging and surface water flooding • Option 2 - Do Minimum	Approval of the IEE and Environmental Management Plan to ensure proposed mitigation measures are complied with.	High (-)	Site	Short to Medium-Term	Partial Mitigation Definite	Medium (-)

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Mitigation	Significance After Mitigation
	– This option involves at grade improvements to improve safety but still does not address the underlying problem of water logging and surface water flooding. • Option 3 - Current preferred option. This offers the best balanced solution by providing the desired outcomes with least impacts on environment and no land acquisition.						

B. Construction Phase

98. Table-21 presents an indication of what activities and facilities are likely to be undertaken during construction of the subproject, including associated inputs/outputs.

Table 21: Summary of Activities and Facilities, Resource Use, and Produced Outputs during Construction Phase

Activities and Facilities	Inputs/Resource Use	Outputs/Waste Production
• Construction camp and its associated facilities (including lay-down areas) • Storage camps and lay-down areas − Materials and equipment stockpiles − Handling and storage of hazardous materials including chemicals additives, gravel, cement, concrete and lubricants • Source of water • Vegetation clearance • Bulk earthworks, grading and contouring. • Boring • Movement of construction staff, equipment and materials • Importation of selected materials/base layer construction. − Construction of a surfaced layout − Sub-base and base layers (Excavations, Grading, Importation of fill materials and selected gravel materials for sub-base and base layers, Application of water, Compaction and Disposal of spoil material (excess excavated soil) − Construction of wearing course (Concrete and Paving block) • Temporary detours • Noise and vibrations • Dust suppression • Waste production and temporary storage/disposal i.e. used fuels, waste concrete and bitumen, spoil materials and general waste • Stabilization of slopes and erosion prevention • Concrete batching plan (and associated storage and mixing areas, chemicals) • Interaction between construction workforce and local communities • Management of the passing pedestrians and points of congestion • Implementation of the Resettlement Plan prior to start of construction • Reminders to affected people of construction with timeframes	• Cement • Paving blocks/bricks • Aggregate (sand and stone) • Gravel (fill material for embankments/selected material for sub-base and base layers) • Water − Drinking, cooking and sanitation at construction camps − Water for dust suppression − Water applied to base and sub-base layers during compaction − Water for application to sub-base and base layers prior to compaction • Petrochemicals • Other chemicals/lubricants/paints • Construction vehicles, machinery and equipment • Temporary energy supply to construction camps • Topsoil used during revegetation and rehabilitation • Plant material for re-vegetation (seeds, sods, plant specimens) • Labour − Recruitment of construction workforce − Skills training • Public movement control − need barriers (not just danger tape) to protect people from trenches during construction	• Waste concrete and other construction rubble • Used fuels, lubricants, solvents and other hazardous waste • General waste • Contaminated soil − Soil contaminated with bitumen − Soil contaminated with petrochemicals (i.e. oils and lubricants) and other chemicals • Sewage and grey water (temporary construction camp sanitation) • Spoil material (excess soil removed during excavations) • Noise and vibrations (construction vehicles and machinery) • Lighting at construction camps, equipment yards and lay-down areas • Plant material removed from servitude during vegetation clearance • Smoke and fumes − Burning of waste − Burning of vegetation cover − Fires used for cooking and space heating (construction camps) − Vehicle exhaust emissions

99. The following Table – 22 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 22: 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	• The nature and intensity of rainfall events in an area, has implications for surface water management. • Smoke from burning activities could be wider spread on windy days especially when dust could be blown off site.	• Seasonal climatic variations will be considered during scheduling of construction activities in the area • Excavations and other clearing activities will only be done during agreed working times and permitted weather conditions. • Surface water control during construction phase as per the method approved by the Engineer. • Seeding of topsoil and subsoil to prevent wind and water erosion of soil surfaces. • No open fires permitted on site	Low (-)	Site	Short-term	Full Mitigation Probable	Low (-)
Air Quality	• Sensitive receptors (e.g. hospitals, schools, religious places) may be affected temporarily and related impacts during the construction phase • Fugitive dust can also impact air quality in subproject area during construction. Exhaust fumes from construction machinery, and potential smoke from cooking fires. • Burning of waste and cleared vegetation	• Ensure compliance with the Air Act. • Ensure compliance with emission standards • Guidelines that deal with the control of air pollution on site have been outlined in the Environmental Management Plan (EMP) • Monitoring of air pollution levels in potential problem areas will be undertaken. • Management (including storage, transport, handling and disposal) of hazardous substances used during construction. • Dust control measures have been included in the EMP. • Dust generating construction activities will be avoided during strong winds. • Soil loads in transit will be kept covered	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
	• Odors from use of toilet 'facilities' other than provided facilities.	• Stockpiles of soil will be kept covered or have suitable dust palliative applied such as water • A suitable dust palliative (water) will be applied if dust levels rise above acceptable levels, Regular servicing vehicles off site in order to limit gaseous emissions. • No open fires permitted on site • Temporary toilet facilities will be provided on site and will be maintained on a daily basis.					
Geology	• Strong water flows into open excavations may occur, causing sidewall collapse. • Layers of mixed fill cover natural ground surface in many places. • Contamination from spillage of petroleum products, spent engine oil and oil leaks from construction vehicle maintenance taking place on site. • Contamination through use of toilet 'facilities' other than provided facilities.	• Rehabilitate all sites during construction including construction camps, stockpile area, temporary access and hauling routes, as soon as possible after the disturbance has ceased. • Contractor to exercise strict care in the disposal of construction waste, with proof of disposal at an approved site provided after offloading each waste load and this is logged/registered. • Contaminated water will be contained and disposed off site at an approved disposal site at Achan Landfill in Srinagar. • The contractor will dispose of waste from the oil interceptors at Achan Landfill in Srinagar • Cement, concrete and chemicals will be mixed on a concrete plinth and provisions will be made to contain spillages or overflows into the soil.	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
		• No vehicle maintenance to be allowed on site. • If oil spills occur the contaminated soil will be disposed of at the Landfill site at Achan in Srinagar. • Temporary toilet facility will be provided by contractor on site and maintained on a daily basis. • Topsoil and subsoil will be protected from contamination. • Subsoil and overburden in all construction and lay down areas to be stockpiled separately and returned for backfilling in the correct soil horizon order.					
Drainage and hydrology	• The proposed upgradation and upliftment of existing drainage pumping stations are situated in Srinagar City..No wetlands occur within the subproject location. Due to the nature and locality of the subproject there is unlikely to any significant impacts on water resources within the immediate area.	• The site surface has been engineered and shaped in such a way that rapid and efficient evacuation of runoff is achieved. • Improve existing drainage pumping stations. • Provide containment areas for potential pollutants at construction camps, refueling, depots and concrete batching plants. • Waste management practices will be implemented. • The transport, storage, handling and disposal of hazardous substances will be controlled and managed.	Low (-)	Site	Short-term	Full Mitigation Probable	Low (+)
Biodiversity Fauna and Flora	• The proposed development is situated within an existing commercial and residential	• Any landscaping to be undertaken will be done with locally indigenous species and low maintenance requirements.	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
	areas in Srinagar City. No areas of ecological diversity occur within the subproject location. Due to the nature and locality of the subproject there is unlikely to any significant impacts on biodiversity within the area • The proposed upgradation of existing pumping stations does not involve any tree cutting.						
Land Uses	• Due to the location and nature of the subproject, there may be interference with access.	• The proposed subproject is upgradation and upliftment of already existing pumping stations facility. The major component of the work involves installation of electro-mechanical equipment's besides some minor civil works. • ERA will made provisions for vehicle and pedestrian access to maintain community linkages. • Consult with local departments, organizations, etc regarding location of construction camps other likely disturbances during construction. • Provide clear and realistic information regarding employment opportunities and other benefits for	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
		local communities in order to prevent unrealistic expectations. • Make use of local labor, materials, goods and services as far as possible • Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. • Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.					
Infrastructure and Services	• Any community utility such as water supply lines, transformer and power supply cables, telephone cables, public convenience etc, if any, will be relocated if unavoidable	• • Keep construction related disturbances to a minimum. • Consult with affected service providers regarding impacts on access to infrastructure and services and alternatives. • Consult with affected communities or businesses prior to foreseeable disruptions, for example notifying residents of a temporary severance of water and electric supply. • Provide access points to infrastructure and services. • Monitor complaints by the public.	Medium (-)	Local	Short-term	Full Mitigation Probable	Low (-)
Traffic	• Road safety concerns due to slow moving construction vehicles.	• The proposed subproject is upgradation and upliftment of already existing pumping stations facility. The major component of the work involves installation of electro-mechanical equipment's besides some minor civil works.	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
		• Clear roads signs will be erected for the full length of the construction period at each site. Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints. • Construction site clearly defined. • Access of all construction and material delivery vehicles will be strictly controlled and allowed during non-peak traffic hours.(After evening) • Enforcement of speed limits.					
Health and Safety	• Danger of construction related injuries. • Open fires in construction camp can result in accidents • Safety of workers and general public must be ensured. • Poor waste management practices and unhygienic conditions at temporary ablution facilities can breed diseases. • Standing water due to inadequate surface water drainage systems,	• Implement good housekeeping practices at the construction camp. • Strict health and safety measures to be implemented and audited on a regular basis. • Secure enclosed construction site. • Use of reputable contractors. • Provide warning signs of hazardous working areas. • Excavations to be clearly demarcated and barriers (not just danger tape) erected to protect pedestrians from open trenches. • Workers will be thoroughly trained in using dangerous equipment. • Workers have the right to refuse work in unsafe conditions. • Undertake waste management practices. • Control speed and movement of construction vehicles • Improved signage, speed control,	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
	inadequate waste management practices, pose a health hazard by providing breeding grounds for disease vectors such as mosquitoes, flies and snails. • The use of hazardous chemicals in the construction can pose potential environmental, health and safety risks. • Road safety may be affected during construction.	walkways and crossings will reduce health and safety risks due to construction. • Exclude public from the site • Ensure all workers are provided with and use Personal Protective Equipment. Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas • Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site; • Provide medical insurance coverage for workers; • Provide clean eating areas where workers are not exposed to hazardous or noxious substances; • Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; • Ensure moving equipment is outfitted with audible back-up alarms; • At each site of pumping stations 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					

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
		shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate.					
Noise and Vibrations	• Sensitive receptors (hospitals, schools, religious places) may be affected temporarily. • Use of heavy vehicles and equipment may generate high levels of noise. • Vibrations resulting from bulk earthworks and compaction of base layers may create significant disturbances to nearby people and businesses. • Disturbance from afterhours work.	• Restrict construction activities to reasonable working hours where near sensitive receptors. • Keep adjacent landowners informed of unusually noisy activities planned. • Ensure that machinery is in a good state of maintenance. • Silencers must be fitted and maintained to all machinery on site. • Monitor noise levels in potential problem areas.	High (-)	Local	Short-term	Partial Mitigation Probable	Medium (-)
Aesthetics, Landscape Character, and Sense of Place	• The presence of heavy duty vehicles and equipments, temporary structures at construction camps, stockpiles may result in impacts on aesthetics and landscape character	• Storage areas will be properly fenced off. • All domestic solid waste will be collected from a central point of disposal and fed into the city waste collection system. • Contractor to exercise strict care in disposing construction waste, with proof of disposal at the approved site provided after offloading each	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
		waste load and this to be logged/registered. • Identification of suitable waste disposal site with enough capacity to hold additional waste to be produced by the proposed construction activities. • Use of recycled material is encouraged especially in filling of excavated areas • 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	• The use of labor intensive construction measures will be used where appropriate. • Employ local labor if possible • Training of labor to benefit individuals beyond completion of the subproject. • Recruitment of labors will take place offsite.	Medium (+)	Local	Short-term	Partial Mitigation Probable	High (+)

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
	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 contractual documentation will ensure that at least 50% of all labor is from surrounding communities					
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 be contacted if any heritage resources or objects, defined in the Act, be discovered and all activities will be ceased until further notice. • Any heritage object found will not be moved without prior consultation with ASI or the State Department of Archaeology and all activities will be ceased immediately.					

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
		• 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.					

C. Operation and Maintenance Phase

100. Table 23 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 23: Summary of Activities and Facilities, Resource Use, and Produced Outputs during Operation and Maintenance Phase

Activities and Facilities	Inputs/Resource Use	Outputs/Waste Production
• Signage • Safety barriers • Lighting • Surface water drainage system • Cut and fill embankments • Vehicle exhaust emissions • Noise and vibrations • Litter collection • Maintenance activities − Repainting of road markings − Pothole repair, crack sealing − Resealing/resurfacing − Safety barriers repairs − Upkeep and repair of surface water drainage system • Eradication & control of invasive vegetation species • Auxiliary activities and Infrastructure − Roadside markets / shops	• Labor • Vehicles and equipment used for inspections and maintenance • Aggregate used during resurfacing/ repair.	• Vehicle exhaust emissions • Dust • Particulates from tires, brake, and road wear • Petrochemical products leaking from vehicles and entering surface water • Potential for water resource contamination • Illegal dumping, mainly in open spaces near subproject area. • Litter, also entering surface water system and causing blockages • Noise and vibrations • Lighting

101. The following Table- 24 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 24: 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	• The nature and intensity of rainfall events in an area, has implications for surface water management. • The corrosive nature of climatic conditions may impact on infrastructure, including signage and safety barriers.	• The upgradation and upliftment of existing drainage pumping stations will improve drainage system and prevent frequent water logging of the areas to be catered. • Provide warning signs and suggested speed limits during dangerous conditions..	Low (-)	Site	Medium-term	Partial Mitigation Probable	Low (+)
Air Quality	• Air pollutants can be inhaled directly from the air, or ingested from touching surfaces or objects where pollutants have settled. • Air pollution may increase slightly over time due to incremental increases in different air pollutants emitted from diesel generators in the pumping stations during operation and maintenances. • The impacts on air quality to sensitive receptors may improve as a result of the subproject since there will be less traffic jams owing to efficient drainage of surface water.	• Ensure compliance with emission standards applicable to the ambient air quality. • Monitoring of air pollution levels in potential problem areas will be undertaken.	Medium (-)	Local	Medium-term	Partial Mitigation Unsure	Low (-)
Geology	• Soils around the pump house may be affected by airborne pollutants emitted by generators.	• Develop emergency response procedures to deal with the containment and cleanup of hazardous spills. • Design of site drainage system in line with topographical features of the site will control runoff.	Medium (-)	Site	Long-term	Full Mitigation Possible	Low (-)
Drainage and hydrology	• Drainage of the area will become more efficient during the operation and maintenance of the sub project.	• Design of site drainage system in line with topographical features of the site will control runoff.	Low (-)	Local	Long-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
	• Pollutants settling on the land surface may be washed off during rain as runoff. • The overall flow in the adjacent Jhelum river will increase because of the discharging of the surface water. This surplus water can be used for irrigation down the stream.	• Waste management practices will be implemented during operation of the sub project.					
Land Uses	• The construction of the surface water drainage will have positive impacts on the land use of the subproject area. • Efficient drainage will reduced water logging within the catchment area and along the road side resulting in high land gains, more pedestrian space etc. • The proposed development is expected to bring about positive economic benefits in the medium- to long- term. • Local road side businesses, public transport, education and health facilities, etc are likely to benefit from the subproject. • It is envisaged that as a result of this project, road space, pedestrian sidewalks and footpaths will be improved. • The proposed development is likely to impact positively on commercial activities within the subproject area and	• No mitigation required	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
	surroundings.						
Traffic	• Significant reduction in traffic jams owing to efficient drainage of surface water from roads. • The subproject is expected to reduce the number of accidents and potential conflicts that occur within the area, thus saving human life. • Efficient drainage of surface water from roads will reduced road side parking that results in land gains, which can be utilized to enhance the road and pedestrian space. • 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.	• No mitigation required	High (+)	Regional	Long-term	No Mitigation Required	High (+)
Health and Safety	• The reduction in water logging is expected to reduce the number of epidemics like malaria, cholera etc thus improving public safety.	No required	High (+)	Local	Long-term	Partial Mitigation Probable	High (+)
Noise and Vibration	• Expected increase in noise due to operation of diesel generator and pump sets. • Vibrations are much less likely to be a cause of disturbance than noise levels.	• Ensure appropriate noise control measures by installing low noise generators and pump sets. • Monitor noise levels in potential problem areas.	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**
Aesthetics, Landscape Character, and Sense of Place	• The subproject is considered to be compatible with the surrounding landscape and is not likely to impact negatively on the existing visual quality or landscape character of the area; rather it is expected to improve the general environment through better use of the area. • The subproject will reduce water logging and thus will improve the aesthetics,and Landscape Character of the subproject area.	• Provide waste disposal and littering facilities • Provide assistance with cleaning and maintenance of pump house and sump area. • Monitor housekeeping, littering and illegal dumping.	Low (+)	Local	Long-term	Partial Mitigation Probable	Medium (+)

D. Cumulative Environmental Impacts

102. Table 25 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.

E. Assessment of "No - Go Option"

103. Table 26 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 25: 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 surface water and water logging from the subproject area.	• The Upgradation and Upliftment of existing pumping station facilities in Srinagar City will address the water logging problem and efficient control drainage system of the areas as the area has seen rapid urbanization in recent past. • In addition the traffic jams, pedestrian walking and public/ commuters inconvenience due to the water logging will be reduced to a greater extent. • The frequency of road accidents will be reduced as footpaths will be available for people to walk due to timely draining of surface water.	•	High (-)	Site/Local	Long-term	Full Mitigation Definite	High (+)
The rationalization and reorganization of drainage system and sewerage systems.	• In order to promote the national imperative of promoting public sanitation it is essential to provide a safe, efficient, reliable, drainage system including surface water drainage and sewer systems in residential and commercial hubs.	•	High (-)	Site/Local	Long-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**
The rationalization and revitalization of land uses	• The expected land gains by virtue of effective drainage allows for the area to be redeveloped and revitalized in a coordinated and integrated manner, ensuring connectivity between the various land uses, greater road, pedestrian/open spaces, general urban redesign of the appearance of the area to create a better quality environment for people. • Improved drainage facility to the City	•	High (-)	Site/Local	Long-term	Full Mitigation Definite	High (+)

Table 26: 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	• No obvious impacts	•					
Air Quality	• Will remain the same • No impacts on sensitive receptors during construction	•	Medium (-)	Local			Medium (-)
Geology	• No obvious impacts	•					
Drainage and hydrology	• Water logging will remain prevalent in the subproject area that results in wear and tear of roads.	•	High (-)	Local	Long-term		Medium (-)
Land Use	• The subproject area will remain water logged with high volumes of traffic jams and pedestrians inconvenience. • Improper drainage pattern will lead to flooding. • 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.	•	High (-)	Local	Long-term		High (-)
Traffic	• The number of vehicles parked on road sides because of water logging, causes frequent traffic jams. This in turn will result in considerable congestion and delays to vehicles. • The high risk of accidents to traffic users and pedestrians will remain as such. • Access to future developmental and event needs to and from the City will continue to be a problem.	•	High (-)	Local	Long-term		High (-)
Health and Safety	• Due to lack of proper drainage, water logging results in flooding of pedestrian walkways and overflow onto the road. • This together with a lack of adequate enforcement will	•	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**
	continue to create an unsafe environment for residents, pedestrians and commuters. • Frequent water logging during summers may result in cholera, malaria and other epidemics.						
Noise Pollution	• Noise pollution will remain the same. • No impacts on sensitive receptors during construction	•	Medium (-)	Local	Long-term		Medium (-)
Aesthetics, Landscape Character and sense of place	• Likely to deteriorate as more land uses compete for limited space leading to visual degradation in terms of water logging and congestion.	•	Medium (-)	Local	Long-term		Medium (-)

VI. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

A. Public participation during the preparation of the IEE

104. 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.

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

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

106. 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

107. The construction (Upgradation and Upliftment) of drainage pumping stations is confined to already existing facilities at different locations in Srinagar city; as such means of mass information dissemination about the consultations were necessary. The interested 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 shopkeepers/ businessmen, and residents from the subproject areas, associations of shop owners in addition to daily commuters consulted randomly. In addition to a number of informal consultations conducted regularly in the subproject area, selected on a stratified basis to ensure diversified representation, were formally interviewed with the help of an interview schedule from 15.03.2015 to 25.03.2015. Issues discussed and feedback received along with details of date, time, location and list of participants are given in **Appendix-3**.. The records of public consultations are annexed as Appendix 3.

C. Future Consultation and Disclosure

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

Consultation during detailed design

109. 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 kept available at the PMU office of ERA.

110. 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.

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

Consultation during construction:

112. 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; and

113. 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;

Project disclosure

114. 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. 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.

115. For the benefit of the community the IEE will be translated in the local language and made available at: (i) ERA office; (ii) District Magistrate Office; and, (iii) PMU/PIU. Hard copies of the IEE will be kept in the town library, 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 PMU/PIU/State Government and the official website of ADB after approval of the IEE by Government and ADB. The PMU/PIU will issue Notification on the locality-wise start date of implementation of the subproject. The notice will be issued by the PMU/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

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

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

117. 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.

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

VIII. ENVIRONMENTAL MANAGEMENT PLAN

119. The EMP 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.

120. 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.

121. 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[2] mandates those responsible for environmental damage must pay the repair costs both to the environment and human health and the preventative measures to reduce or prevent further pollution and/or environmental damage. (The polluter pays principle).

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

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

A. Institutional Arrangement

123. 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.

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

125. ERA shall be responsible for ensuring compliance to environmental requirements of the ADB as well as central/state governments and reporting the

[2] 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."

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.

126. **ERA (PMU and PIU)**

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

127. **Project Management Consultants (PMC)**

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

128. **The Engineer (DSC)**

- Complies with all applicable legislation and is conversant with the requirements of the EMP;
- Arranges information meetings for and consults with interested and affected parties about the impending construction activities;
- Maintains a register of complaints and queries by members of the public at the site office. This register is forwarded to the Project Manager of PIU on weekly basis
- Enforces and monitors compliance the requirements of the EMP on site;
- Assesses the Contractor's environmental performance in consultation with the Environmental Expert (of DSC)
- Documents in conjunction with the Contractor, the state of the site prior to commencing construction activities.

129. **Environmental Expert of Engineer (DSC)**

- Briefs the Contractor about the requirements of the Environmental Specification and/ or EMP, as applicable;
- Advises the Engineer about the interpretation, implementation and enforcement of the Environmental Specification and other related environmental matters;
- Monitors and report on the performance of the contractor/project in terms of environmental compliance with the EMP to the Engineer and ERA; and

- Provides technical advice relating to environmental issues to the Engineer.

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

Capacity Building

131. Training and orientation programs shall be organized by the Environmental Experts of DSC (Engineer), 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.

132. Table 27 outlines the site establishment and preliminary activities.

Table 27: Site Establishment and Preliminary Activities

S.N	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
1.	Legislation, Permits and Agreements	In all instances, ERA, service providers, contractors and consultants must remain in compliance with relevant local and national legislation.	All	Prior to moving onto site and during construction
		Proof of compliance to Air Act must be forwarded by the contractor to PMU/PIU (in relation to stone crushers, diesel generators etc)	Engineer	Prior to moving onto site and during construction
		A copy of the EMP must be kept on site during the construction period	Environmental Expert of Engineer (EE)	At all times
2.	Access to Site	Access to site will be via existing roads. The Contractor will need to ascertain the existing condition of the roads and repair damage shall occur due to construction.	Engineer	Prior to moving onto site and during construction
		The Local Traffic police Department shall be involved in the planning stages of the road closure and detour and available on site in the monitoring of traffic in the early stages of the operations during road closure	Engineer	Prior to moving onto site
		The Local Traffic Department must be informed at least a week in advance if the traffic in the area will be affected.	Engineer	Prior to moving onto site
		The Contractors must comply with the recommendations from the traffic study. Layout design shall accommodate the impact on existing traffic flow patterns (e.g. access points).	Engineer	Prior to moving onto site
		The location of all affected services and servitudes must be identified and confirmed.	Engineer	Prior to moving onto site
		All roads for construction access must be planned and approved by the Engineer and its Environmental Expert ahead of construction activities. They shall not be created on an ad-hoc basis.	Engineer	Prior to moving onto site and during construction.
		No trees/shrubs/groundcover may be removed or vegetation stripped without the prior permission of the Engineer/ Environmental Expert.	Engineer/EE	Before and during construction.
		Agreed turning areas for haulage vehicles are to be formalized and used by the Contractor. No turning maneuvers other than at the designated places shall be permitted.	Engineer	Prior to moving onto site.
		Contractors shall construct formal drainage on all temporary haulage roads in the form of side drains 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[3]	Choice of site for the Contractor's camp requires the Engineer's permission and must take into account location of local residents, busineses 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 investigation s 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 investigation s 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

[3]Careful planning of the construction camp can ensure that time and costs associated with environmental management and rehabilitation are reduced.

S.N	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
				inspections
		In most cases, on-site accommodation will not be required. The construction camp can thus be comprised of: • site office • ablution facilities • designated first aid area • eating areas • staff lockers & showers (where water and waterborne sewers are available) • storage areas • batching plant (if required) • refueling areas (if required) • maintenance areas (if required) • crushers (if required)	Engineer	During set-up
		Cut and fill must be avoided where possible during the setup 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[4]	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 are	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,	EE	During site set-up

[4]Storage areas can be hazardous, unsightly and can cause environmental pollution if not designed and managed carefully

S.N	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage area(s). These pollution prevention measures for storage shall include a bund wall high enough to contain at least 110% of any stored volume. The Contractor shall submit a method statement to the Engineer for approval		and ongoing
		These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of surface 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[5]	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[6]	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, loaders, etc.) shall be adequately trained and sensitized to any potential hazards associated with their task	EE and Contractor	During staff induction, followed by ongoing monitoring

[5]Materials must be sourced in a legal and sustainable way to prevent offsite environmental degradation.
[6]These points need to be made clear to all staff on site before the subproject begin.

S.N	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		No operator shall be permitted to operate critical items of mechanical equipment without having been trained by the Contractor	EE and Contractor	During staff induction, followed by ongoing monitoring
		All employees must undergo safety training and wear the necessary protective clothing	EE and Contractor	During staff induction, followed by ongoing monitoring
		A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: • No alcohol / drugs to be present on site; • Prevent excessive noise • Construction staff are to make use of the facilities provided • for them, as opposed to ad-hoc alternatives (e.g. fires for • cooking, the use of surrounding bus as a toilet facility are forbidden) • No fires to be permitted on site • Trespassing on private / commercial properties adjoining • the site is forbidden • Other than pre-approved security staff, no workers shall be • permitted to live on the construction site • No worker may be forced to do work that is potentially • dangerous or for what he / she is not trained to do	EE	During staff induction, followed by ongoing monitoring
6.	Social Impacts[7]	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 particularly important (e.g. along commercial/ tourism routes) or privacy concerns for surrounding buildings exist, the site may require screening. This could being the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction.	Engineer and EE	During surveys and preliminary investigations and site set-up.

[7]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.

S.N	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		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 be to 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[8]	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 minimised wherever possible. Care shall be taken to ensure that lead times are not excessive.	Engineer and EE	Throughout the duration of the subproject.
		Wind screening and surface 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.	Surface water[9]	To prevent surface water damage, the increase in surface water run-off resulting from construction activities must be estimated and the drainage system assessed accordingly. A drainage plan must be submitted to the Engineer for approval and must include the location and design criteria of any temporary stream crossings (siting and return period etc).	Engineer	During surveys and preliminary Investigations.
		The subproject is constructed to provide efficient drainage to the area as there is almost nonexistent or dysfunctional drainage system. Wherever existent drainage is functional it will be provided with surface water culverts and covered with metal grids so as to prevent blockages if deemed by the Engineer.	Engineer	During site setup.
		Temporary cut off drains and berms may be required to capture surface water and promote infiltration.	EE	During site setup.
11.	Water Quality[10].	Storage areas that contain hazardous substances must be bunded with an approved impermeable liner	Engineer	During site setup.
		Spills in bunded areas must be cleaned up, removed and disposed of safely from the bunded area as soon after detection as possible to minimise pollution risk and reduced bunding capacity.	Engineer and EE	During site setup.

[8]Establishment of the camp site, and related temporary works can reduce air quality.
[9]Serious financial and environmental impacts can be caused by unmanaged surface water.
[10]Incorrect disposal of substances and materials and polluted run-off can have serious negative effects on groundwater quality

S.N	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		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 runoff to be treated to the Engineer's approval before being discharged into the surface 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 the Natural Environment[11]	No vegetation may be cleared without prior permission from the Engineer.	Engineer and EE	During site setup and ongoing.
		Trees that are not to be cleared shall be marked beforehand with danger tape. The Environmental Expert of Engineer (DSC) must be given a chance to mark vegetation that is to be conserved before the Contractor begins clearing the site	Engineer and EE	During site set-up
		Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas. (Particular attention must be paid to imported material)	EE	Ongoing in camp Site, haulage Areas
13.	Set-up of Waste Management Procedure	The excavation and use of rubbish pits on site is forbidden	EE	Ongoing
		Burning of waste is forbidden.	EE	Ongoing
14.	Cultural Environment	Prior to the commencement of construction, all staff need to know what possible archaeological or historical objects of value may look like, and to notify the Engineer/Contractor shall such an item be uncovered.	EE	During site set-up And ongoing.
15.	Security and Safety	Lighting on site is to be set out to provide maximum security and to enable easier policing of the site, without creating a visual nuisance to local residents or businesses.	Engineer	During site set-up
		Material stockpiles or stacks, such as, pipes must be stable and well secured to avoid collapse and possible injury to site workers / local residents.	Engineer and EE	Ongoing
		Flammable materials shall be stored as far as possible from adjacent residents / businesses.	Engineer and EE	Ongoing
		All interested and affected parties shall be notified in advance of any known potential risks associated with the construction site and the activities on it. Examples are: • stringing of power lines • earthworks / earthmoving machinery on steep • slopes above houses / infrastructure • risk to residences along haulage roads / access routes	Engineer and EE	24 hours prior to activity in question

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

133. Table 28 outlines management of construction activities and work force.

[11]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.

Table 28: Management of Construction and Work force Activities

S.N	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 surface water damage as soon as these develop.	Engineer	Weekly inspection.
		If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have been spilt.	Contractor	When necessary
		Unnecessary compaction of soils by heavy vehicles must be avoided; construction vehicles must be restricted to demarcated access, haulage routes and turning areas.	Contractor	Ongoing monitoring.
		Cognizance of vehicle weight / dimensions must be taken when using access constructed out of certain materials. e.g. paved surfaces / cobbled entranceways.	Engineer	Ongoing monitoring.
2.	Maintenance of Construction Camp	The Contractor must monitor and manage drainage of the camp site to avoid standing water and soil erosion.	Engineer	Ongoing monitoring.
		Run-off from the camp site must not discharge into neighbors' properties.	Engineer	Ongoing monitoring.
		Toilets are to be maintained in a clean state and shall be moved to ensure that they adequately service the work areas	Contractor	Weekly inspection
		The Contractor is to ensure that open areas or the surrounding bush are not being used as a toilet facility.	Contractor	Weekly inspection
		The Contractor shall ensure that all litter is collected from the work and camp areas daily.	Contractor	Ongoing monitoring.
		Bins and/or skips shall be emptied regularly and waste shall be disposed of at the pre-approved site. Waybills for all such disposals are to be kept by the Contractor for review by the Engineer/EE	Contractor	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[12]	Vehicles travelling to and from the construction site must adhere to speed limits so as to avoid producing excessive dust.	Engineer	Ongoing monitoring.

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

S.N	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		A speed limit of 30km/hr must be adhered to on all dirt roads.	Engineer	Ongoing monitoring.
		Access and other cleared surfaces must be dampened whenever possible and especially in dry and windy conditions to avoid excessive dust.	Engineer	Ongoing monitoring.
		Where dust is unavoidable in residential or commercial areas, screening will be required utilizing wooden supports and shade cloth.	Engineer	As directed by the engineer.
		Vehicles and machinery are to be kept in good working order and to meet manufacturers specifications for safety, fuel consumption etc.	Contractor	Ongoing monitoring.
		Should excessive emissions be observed, the Contractor is to have the equipment seen to as soon as possible.	Engineer	As directed by the engineer.
		No fires are allowed on site except for the burning of firebreaks.	Engineer	Ongoing monitoring.
5.	Soil Erosion	Once an area has been cleared of vegetation, the top layer (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.
		Surface 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.	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.	Engineer	Immediately after the creation of the embankment/stripping of vegetation.
6.	Surface water	The Contractor shall not in any way modify nor damage the banks or bed of streams, rivers, wetlands, other open water bodies and drainage lines adjacent to or within the designated area, unless required as part of the construction project specification. Where such disturbance is unavoidable, modification of water bodies shall be kept to a minimum in terms of: • Removal of riparian vegetation • Opening up of the stream channel	Contractor	Ongoing monitoring.
		Earth, stone and rubble is to be properly disposed of so as not to obstruct natural water pathways over the site. i.e.: these materials must not be placed in surface water channels, drainage lines or rivers.	Engineer	Monitoring throughout the duration of the project.
		There shall be a periodic checking of the site's drainage system to ensure that the water flow is	Engineer and Contractor	Monthly inspection.

S.N	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		unobstructed.		
		The use of closed pipes with velocity not more than 2.5m/sec shall be used in place of high velocity surface water pipelines.	Engineer	As directed by the engineer
		A number of smaller surface water outfall points shall be constructed rather than a few large outfall points.	Engineer	As directed by the engineer
		Surface 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 is 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[13]	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 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.	Contractor	Regular monitoring (refer to the environmental monitoring program)
		Site staff shall not be permitted to use any stream, river, other open water body or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing or for any construction or related activities. Municipal water (or another source approved by the Engineer) shall instead be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting etc.	Contractor	Regular monitoring (refer to the environmental monitoring program)
		Emergency contact numbers of the SPCB shall be referred to in order to deal with spillages and contamination of aquatic environments.	Engineer and Contractor	As necessary
8.	Conservation of Natural Environment	As the work front progresses the Contractor is to check that vegetation clearing has the prior permission of the Engineer.	Engineer	Ongoing monitoring.

[13]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.

S.N	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		Only trees that have NOT been marked beforehand are to be removed.	Contractor	Ongoing monitoring.
		Gathering of firewood, fruit, plants, crops or any other natural material on site or in areas adjacent to the site is prohibited.	Contractor	Ongoing monitoring.
		The hunting of birds and animals on site and in surrounding areas is forbidden.	Contractor	Ongoing monitoring.
		Immediate revegetation of stripped areas and removal of aliens by deweeding must take place. This significantly reduces the amount of time and money that must be spent on alien plant management during rehabilitation.	Contractor	Ongoing monitoring.
		Alien vegetation encroachment onto the site as a result of construction activities must be controlled during construction.	Contractor	Twice-monthly monitoring.
		Where possible, cleared indigenous vegetation shall be kept in a nursery for use at a later stage in the site rehabilitation process	Contractor	As the work front progresses.
9.	Materials Management	Stockpiles shall not be situated such that they obstruct natural water pathways.	Engineer and Contractor	Location as directed by the engineer
		Stockpiles shall not exceed 2m in height unless otherwise permitted by the Engineer.	Engineer	Location as directed by the engineer
		If stockpiles are exposed to windy conditions or heavy rain, they shall be covered either by vegetation or cloth, depending on the duration of the project. Stockpiles may further be protected by the construction of berms or low brick walls around their bases	Contractor	As necessary
		Stockpiles shall be kept clear of weeds and alien vegetation growth by regular deweeding	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.
10.	Waste Management	Refuse must be placed in the designated skips / bins which must be regularly emptied. These shall remain within demarcated areas and shall be designed to prevent refuse from being blown out by wind	Contractor	Ongoing monitoring.
		In addition to the waste facilities within the construction camp, provision must be made for waste receptacles to be placed at intervals along the work front.	Contractor	Ongoing monitoring.
		Littering on site is forbidden and the site shall be cleared of litter at the end of each working day.	Contractor	Ongoing monitoring.
		Recycling is to be encouraged by providing separate receptacles for different types of waste and making sure that staffs are aware of their	Contractor	Ongoing monitoring.

S.N	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		uses.		
		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.
11.	Social Impacts[14]	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.

[14] Regular communication between the Contractor and the interested and affected parties is important for the duration of the contract.

S.N	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		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: • noise generated by jackhammers, diesel generator sets, excavators etc • drilling • dewatering pumps	Engineer and Contractor	At least 24 hrs prior to the activity taking place.
		Noisy activities must be restricted to the times given in the Project Specification or General Conditions of Contract.	Engineer	Ongoing monitoring.
		The Engineer and Contractor are responsible for ongoing communication with those people that are interested in / affected by the project.	Engineer and Contractor	
		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 • submitting these for inclusion in complaints register • bringing issues to Engineer's attention immediately • taking remedial action as per Engineer's instruction	Contractor	Ongoing monitoring.
		Selected staff are to be made available for formal consultation with the interested and affected parties in order to: • explain construction process • answer question	Contractor	Ongoing monitoring.
12.	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 SES	As required.
13	Environment Safeguard Officer	Contractor shall appoint one Environment Safeguard Officer who shall be responsible for assisting contractor in implementation of EMP, community liaisoning, consultations with interested/affected parties, reporting and grievance redressal on day-to-day basis.	Engineer and EE	Person to be appointed before start of construction activities and remain available through the project duration.

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

134. Table 29 outlines the post-construction activities.

Table 29: Post Construction Activities

S.N.	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
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
		All vegetation that has been cleared during construction is to be removed from site or used as much as per the re-vegetation specification, (except for seeding alien vegetation).	Engineer	Subproject completion
		The Contractor is to water and maintain all planted vegetation until the end of the defects liability period and is to submit a method statement regarding this to the Engineer.	Engineer	Subproject completion
3.	Land Rehabilitation	All surfaces hardened due to construction activities are to be ripped & imported materials thereon removed.	Contractor	Subproject completion
		All rubbles 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 asphalting 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
		Contractor 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 works 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 construction & maintenance phases
		Temporary roads must be closed and access across these blocked.	Engineer and EE	On completion of

S.N.	Activities	Management/Mitigation	Responsible for Monitoring	Frequency
				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. Re-vegetation 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

EE = Environmental Expert of Engineer (DSC)

B. Environmental Monitoring Program

135. **Table 30** outlines the environmental monitoring program to ensure implementation of the management and mitigation measures specified in the EMP. The table shall be read within the context of the body of the entire EMP.

Table 30: Environmental Monitoring Program

Aspect	Parameter	Standards	location	duration / frequency	Implementation	Supervision
1. Site establishment and preliminary activities						
Legislation, Permits and Agreements	Consent for Establishment and Consent to Operate (in relation to hot mixing, wet mixing, batching plant, stone crushers, and diesel generators)	Air Act Water Act Noise Act	-	prior to moving onto site and during construction	Contractor	Engineer/EE/PMU/PMC
	Copy of EMP	EARF and ADB SPS 2009	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	EE and Contractor	PMU/PMC
	Notifications and road signages	EMP	all affected roads	one week in advance of the activity	Engineer & EE in coordination with the Contractor & Traffic Police	PMU/PMC
Construction camp	Approval of location and 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 and 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 SES	PMU/PMC
Education of site staff	Awareness Level Training - Environment - Health and	EMP and records	-	during staff induction, followed by scheduled	Contractor with the Engineer and SES	PMU/PMC

Aspect	Parameter	Standards	location	duration / frequency	Implementation	Supervision
	Safety			as determined		
Social impacts	Public Consultations, Information Disclosure, Communication Strategy	EARF, ADB SPS and EMP	subproject site	prior to moving onto site and ongoing	Contractor with Engineer, PIU/ PMC	PMU
	GRM Register	EMP	subproject site	prior to moving onto site and ongoing	Contractor with the Engineer, EEPIU	PMU/PMC
Noise	Baseline Data for noise level in dB(A) L_{eq}	National Noise Standards	Near construction sites as specified by engineer	prior to site set-up	Engineer and EE in coordination with the Environmental Monitoring Laboratory of ERA	PMU/PMC
Air quality	Baseline ambient data for particulate matters 10 and 2.5 (PM_{10}, $PM_{2.5}$), sulfur dioxides (SO_2) and nitrogen dioxide (NO_2)	National Ambient Air Quality Standards	near construction sites	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
Surface water	Surface water management measures	EMP	as identified by the engineer	during site set-up and throughout the duration of the subproject	Contractor with the Engineer and EE	PMU/PMC
Water quality	Baseline qualitative characteristics	EMP	subproject sites[15]	prior to site set-up	Contractor with Engineer and EE	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 SES	PMU/PMC
Cultural environment	Chance finds	ASI Act and EMP	as determined	prior to site set-up and ongoing throughout the	Contractor with Engineer and SES	PMU/PMC

[15] 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
				subproject		
2. Construction phase						
Access to Site	Qualitative characteristics	Pre-subproject condition and EMP	all access and haul roads	refer to EMP (table on management of construction and workforce activities)	Contractor	Engineer
Construction camp	Qualitative characteristics	Pre-subproject condition and EMP	all access and haul roads	refer to EMP (table on management of construction and workforce activities	Contractor	Engineer
Staff conduct	Site Records (Accidents, Complaints)	EMP	subproject sites	ongoing	Contractor	Engineer
Air quality	PM_{10}, $PM_{2.5}$, SO_2, NO_2 and HC	National Ambient Air Quality Standards	Near construction sites	once in 3 months (4 times in a year)	Engineer and Environmental Monitoring Laboratory of ERA	PMC/PMU
Soil erosion	Soil erosion management measures	EMP	subproject sites	ongoing	Contractor	Engineer
Surface water	Soil erosion management measures	EMP	subproject sites	ongoing	Contractor	Engineer
Water quality	Qualitative characteristics	EMP and pre-existing conditions	Water source near subproject sites	Once in 3 months (4 times in a year)	Environmental Monitoring Laboratory of ERA	PMC/PMU
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, EEPIU	PMU/PMC
	GRM Register	EMP	subproject sites	ongoing	Contractor with the Engineer, EEPIU	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	Near Construction sites	Once in 3 months (4 times in a year)	Environmental Monitoring Laboratory of ERA	PMC/PMU
C. Post-construction activities						
Construction camp	Pre-existing conditions	EMP	construction camp	subproject completion	Contractor	Engineer
Materials and	Pre-existing conditions	EMP	subproject sites	subproject completion	Contractor	Engineer

Aspect	Parameter	Standards	location	duration / frequency	Implementation	Supervision
infrastructure						
General	Records	EMP	subproject sites	subproject completion	Contractor with Engineer and EE	PMU/PMC
D. Operation and maintenance (defect liability period)						
Air quality	PM_{10}, $PM_{2.5}$, SO_2, NO_2	National Ambient Air Quality Std.	One location as specified by the ERA.	Once in 3 months (defect liability period)	Environmental Monitoring Laboratory of ERA	PMC/PMU
Noise quality	Noise Level in dB(A) L_{eq}	As per National Noise standards	One location as specified by the ERA	once in 3 months (defect liability period)	Environmental Monitoring Laboratory of ERA	PMC/PMU
Water Quality	Qualitative characteristics	As per Water Standards	One location as specified by the ERA	once in 3 months (defect liability period)	Environmental Monitoring Laboratory of ERA	PMC/PMU

C. Environmental Management and Monitoring Cost

136. 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.

137. 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

138. 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.

139. **Table 31** presents the estimated cost to implement the EMP.

Table 31: Indicative Cost for EMP Implementation

Component	Description	Number	Unit Cost (Rs)	Cost (Rs)	Source of Funds
Legislation, Permits and Agreements	Consent to Establish and Consent to Operate for plants and machinery of the contractor				These consents are to be obtained by contractor at his cost.
Public consultations and information disclosure	construction phases	Lump sum	10,000	10,000	
Baseline Monitoring	Site preparation and preliminary activities				
Air	Baseline Data	15 x 1	7000 per sample	1,05000	Included in engineering cost
Noise	Baseline Data	15 x 1	1000 per sample	15,000	Included in engineering cost
Water	Baseline Data	11 x 1	5000 per sample	55,000	Included in engineering cost
Dust Suppression at subproject sites	construction and defect liability phases	lump sum	200000	200000	Contractor's Cost
Construction Monitoring					
Air	Once in 3 months at each location (for 15 months, total 15 samples)	15 x 5	7,000 per sample	5,25,000	
Noise	Once in 3 months at each location (for 15 months, total 15 samples)	15 x 5	1,000 per sample	75,000	
Water	Once in 3 months at each location (for 15 months, total 11 samples)	11 x 5	5000 per sample	2,75,000	

Component	Description	Number	Unit Cost (Rs)	Cost (Rs)	Source of Funds
Defects Liability Period (6 months)					
Air	Once in 3 months at each location	15 x 2	7,000 per sample	2,10,000	
Noise	Once in 3 months at each location	15 x 2	1,000 per sample	30,000	
Water	Once in 3 months at each location	11 x 2	5000 per sample	1,10,000	
				TOTAL (Rs)	**16,10,000**

The above cost have been arrived on the Lump sum basis and subject to change based on the actual.

IX. CONCLUSION AND RECOMMENDATIONS

140. The process described in this document has assessed the environmental impacts of all elements of proposed Surface water drainage subproject in Srinagar. 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.

141. The public participation processes undertaken during project design 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.

142. 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.

143. 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.

144. 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.

145. 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.

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

Rapid Environmental Assessment (REA) Checklist

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

Sector Division: Urban Drainage

Sub-Project: Upgradation and Upliftment of 27 No's of Existing Drainage Pumping Stations of Srinagar City in two Lots (Lot-A 15 NO's & Lot-B 12 NO's).

Screening Questions	Yes	No	Remarks
Project Siting Is the project area			
▪ Densely populated?	✓		The proposed subproject envisages Upgradation & upliftment of drainage pumping stations located across the Srinagar city which is summer capital of the J&K State. The project will have positive impact on the environment by improving drainage system of the city. The sub project area comprises locations of Abi Guzar, Barbarshah, Bishember nagar, Khidmat Press, Mandir Bagh, Shora Khan, Sonvar Bagh, Sonvar Davis, Court Road, Noor Bagh, Golf Club, Shivpora, Allochi Bagh, Darish Kadal, Nursing Garh, Qamarwari, Syed Hamidpora, SMHS, Patlipora, Tengpora, Batamaloo, and Kawaji ada, Old Gadhanjipora, Ikhrajpora, Rajbagh, Polytechnic and New Gadhanjipora and all the above mentioned areas are densely populated.
▪ Heavy with development activities?	✓		Development activities are in progress in the project area.
▪ Adjacent to or within any environmentally sensitive areas?		✓	The sub-project areas are not adjacent to or within any environmentally sensitive areas
▪ Cultural heritage site		✓	No heritage site or archaeologically protected monument is located in the sub-project areas
▪ Protected Area		✓	Not applicable
▪ Wetland		✓	Not applicable
▪ Mangrove		✓	Not applicable
▪ Estuarine		✓	Not applicable
▪ Buffer zone of protected area			Not applicable
▪ Special area for protecting biodiversity		✓	The sub-project is not adjacent to or within any Special area for protecting biodiversity.
▪ Bay		✓	Not applicable
B. Potential Environmental Impacts Will the Project cause			
▪ Impacts on the sustainability of associated sanitation and solid waste disposal systems and their interactions with other urban services.		✓	Not applicable

▪ Deterioration of surrounding environmental conditions due to rapid urban population growth, commercial and industrial activity, and increased waste generation to the point that both manmade and natural systems are overloaded and the capacities to manage these systems are overwhelmed?		✓	The Environmental conditions will improve on account of project implementation, because the water logging will not be there.
▪ Degradation of land and ecosystems (e.g. loss of wetlands and wild lands, coastal zones, watersheds and forests)?		✓	Not applicable
▪ Dislocation or involuntary resettlement of people?		✓	No such impacts are anticipated.
▪ Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable group?		✓	No such impacts are anticipated. Although the sub projects will generate the employment opportunity to such groups.
▪ Degradation of cultural property, and loss of cultural heritage and tourism revenues?		✓	No impact on historical/cultural monuments/ areas is envisaged.
▪ Occupation of low-lying lands, floodplains and steep hillsides by squatters and low-income groups, and their exposure to increased health hazards and risks due to pollutive industries?		✓	Not applicable
▪ Water resource problems (e.g. depletion/degradation of available water supply, deterioration for surface and ground water quality and pollution of receiving waters?		✓	No such impact is anticipated.
▪ Air pollution due to urban emissions?		✓	No such impact is anticipated.
▪ Risks and vulnerabilities related to occupational health and safety due to physical, chemical and biological hazards during project construction and operation?	✓		During execution stage, workers may face occupational health and safety related issues if personal protection measures are not used properly. Proper implementation of EMP will reduce all such risks.
▪ Road blocking and temporary flooding due to land excavation during rainy season?		✓	Due care shall be taken to carry out the works during dry seasons to avoid incidence of temporary flooding in the sub project area
▪ Noise and dust from construction activities?	✓		The subproject is upgradation and upliftment of 27 no's existing drainage pumping stations in Srinagar city Some minor increase in noise level due to the operation of machines is anticipated. This shall be temporary in nature and shall be restricted to the duration of construction activities at a particular site. Dust generation may take place at certain places which will be suppressed with sprinkling water at the particular place.
▪ Traffic disturbances due to construction material transport and wastes?	✓		Temporary disturbances may occur which will be mitigated accordingly during construction works at needed places.
▪ Temporary silt runoff due to construction?	✓		Temporary silt runoff may occur, which will be checked by silt fencing arrangement.
▪ Hazards to public health due to ambient, household and occupational pollution, thermal inversion, and smog formation?		✓	No such impacts are anticipated as the subproject is about drainage.
▪ Water depletion and/or degradation?		✓	No such impacts are anticipated in case of the proposed sub-project
▪ Overpaying of ground water, leading to land subsidence, lowered ground water table, and Stalinizations?		✓	No such impacts are anticipated in case of the proposed sub-project

▪ Contamination of surface and ground waters due to improper waste disposal?		√	Sludge/waste generated will be properly disposed off. No impact on surface and ground water.
▪ Pollution of receiving waters resulting in amenity losses, fisheries and marine resource depletion, and health problems?		✓	No such issues are anticipated.
▪ Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	ot applicable The project will have positive impact on the environment by improving drainage system of the city
▪ Social conflicts if workers from other regions or countries are hired?		✓	No such issues are 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 operation and construction?		✓	No such impacts are anticipated. The waste generation is expected to be insignificant .No use or transport of explosives involved. Discarded fuel and lubricants will either be reused or disposed off as per applicable laws.
▪ Community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		✓	No such impacts are anticipated in case of the proposed sub-project The pumping stations are isolated and constructions of buildings and installations of machinery do not involve any major structure rising. No community health and safety risks are anticipated.

A Checklist for Preliminary Climate Risk Screening

Climate change and disaster risk questions	Yes	No	Remarks
The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.			
• Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, surface surges, tsunami or volcanic eruptions and climate changes		√	The area is not subject to floods, landslides, tropical cyclone winds, surface surges, tsunami or volcanic eruptions and localized climate changes. The sub-project area falls in Seismic Zone-V as per Seismic Zonation Map of India. Srinagar City experienced a major floods in September 2014, no frequent flooding is reported in the subproject area. Drainage pumping station/ areas were severely affected during September 2014 flood.
▪ Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (eg., increased erosion or landslides could increase maintenance costs, permafrost melting or increased soil moisture content could affect sub-grade).		√	No

▪ Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (eg., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?		√	No
▪ Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by encouraging settlement in areas that will be more affected by floods in the future, or encouraging settlement in earthquake zones)?		√	No

Public Consultation

Subproject: "Upgradation and Upliftment of 27 No's Existing Drainage Pumping Stations 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 water logging, unhygienic conditions.
- 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 surface water drainage, rapid transit of goods and generation of direct employment during the execution of the subproject.

1. Date of Consultation: 15-03-2015 to 25-03-2015.
Location: Srinagar City Area of Interest

Public Consultation Details

S.N	Issues Discussed	Reply from Public	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 water logging, 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 water logging in rainy seasons.	People in general were very enthusiastic about the benefits of the subproject in terms of water logging and also an improvement in the environmental quality.	-
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 wanted 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 historical/cultural site in the vicinity	There is no historical/cultural site in the vicinity of the subproject.	-
6	Presence of any protected area/wetland in or adjoining the construction site.	There is no protected area/wetland in the subproject vicinity.	
8	Information on economic development in generation of direct employment during the execution of the subproject	People were well aware about the benefits of the subproject and 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 project work	

List of Peoples participated in Public Consultation

S.N	Name	Address	Occupation
1	Mushtaq Ahmad	Abi Guzar Bund	Business
2	Maroof Hameed	Abiguzar Mraket Resident	Student
3	Gh Mohd	Barbarshah	Govt Employee
4	Showkat Ahmad	Barbarshah	Labour
5	Khursheed Ahmad	Munawarabad	Shopkeeper
6	Masroor Ahmad	Bishambernagar	Shopkeeper
7	Mohd Maqbool	Ikhrajpora	Business
8	Momin ul Islam	Rajbagh	Doctor
9	Altaf Ahmad	Kawji Adda	Engineer
10	Mohd Shabaan	Khidmat press	Shopkeeper (Resident)
11	Mohd Iqbal	Khidmat press near Bund	Bank Employee
12	Mohd Shahid	Mandir Bagh Bund	Student

13	Amir Maqbool	Mandir Bagh	Student
14	Ab Hamid Bhat	New Gadhanjipora	Shopkeeper
15	Sara begum	Old Gadhanjipora	Driver
16	Mohd Azhar	Sonwar Bagh	House wife
17	Insha Nabi	Sonwar Davis	Govt Employee
18	Azra Qadir	Shora Khan	Student
19	Faizan ul Islam	Shora Khan	Teacher
20	Mohd Lateef	Shora Khan	Engineer
21	Taufeeq Nabi	Nursing Garh	Bussiness
22	Javaid Ahmad	Nursing Garh	Student
23	Zahoor Beigh	Kaksarai	Shopkeeper
24	Iqbal Dar	Kaksarai	Teacher
25	Haris Zargar	Qamarwari	Labour
26	Mohd Shaban Bhat	Cement bridge Qamarwari	Student
27	Ms Zohra	Police colony	Govt Employee
28	Zafar Banday	New Gadhehanjipora	Teacher
29	Mohd Hussain	Kursoo Rajbagh	Govt Employee
30	Samad Kirmani	Darish Kadal	Driver
31	Murtaza Ali	Nalbandpora Darish Kadal	Business
32	Mohd Liyaqat Khan	Jawahar Nagar	Student
33	Akbar Lone	Syed Hamidpora Nawabazar	Retired Teacher
34	Sara Begum	Shah Mohalla Nawabazar	Business
35	Nazir Ahmad	Nawabazar	Housewife
36	Irfan Dar	Madina Colony	Driver
37	Burhan Bhat	Friends colony Alluchi Bagh	Student
38	Ikhlaq Qadri	Alluchi bagh	Shopkeeper
39	Sheikh Obair	Beigh colony Alluchi bagh	Bank Employee
40	Mohd Shahid	Main Alluchi bagh	Student

Present Issues:

1. There is heavy water logging during the rainy and winter season in the areas under consideration in this proposed sub-project
2. Due to the water logging the people are unable to come out of homes and the road surface is damaged quite frequently which makes it difficult for people to move especially for the persons who are physically week ,like elderly people and children
3. The water lodged in the colony enters the residential and commercials premises especially during rainy season thus imparting heavy psychological and economical loss.

Future Prospects:

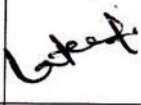
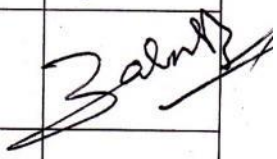
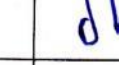
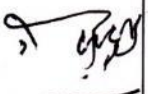
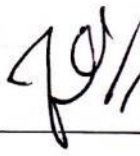
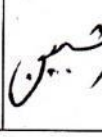
1. Establishment of an efficient drainage pumping stations in area will reduce water logging.
2. Once the pumping stations would be completed it paves way for good quality of life to the residents.
3. Improvement of local environment to reduce health risks to the citizens

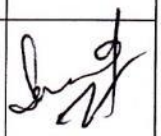
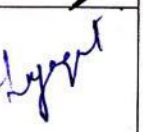
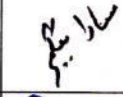
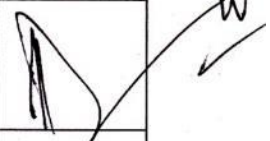
Summary of outcomes:

1. The work on the existing drainage pumping station should be started as early as possible so that the problems faced during rainy season are addressed well in time.
2. The quality of the work and material should not be compromised at any cost.
3. The work should be allotted to the contractor who has the resources to compete the work in time.
4. Public desired for implementation of better measures to reduce noise, dust and air pollution during the construction phase.
5. People also wished that local people be given job opportunities during the project tenure.
6. People expected that their problems shall be addressed and solutions for them shall be implemented during the subproject execution.
7. People are ready to extend all types of support during execution of the subproject.
8. People suggested that adequate safety measures should be provided.
9. 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.

Sub-project Name: Up gradation and Upliftment of 12 No. (LOT-B) existing Drainage Pumping stations in Srinagar city				
Date :	15th March 2015 — 25th March 2015			
Time :	1:30 Pm			
Location:Abi-Guzar, Barbarshah, Bishember Nagar, Ikrajpora, Kawji Adda, Khidmat Press, mandir Bagh, Old Gadhanjipora, Raj Bagh, Shora Khan, sonwar Bagh and Sonwar Davis				
S.No	Name	Occupation	Address	Signature
1	Mushtaq Ahmad.	Business.	Abi Guzar Bund.	
2	Maroof Hamid.	student.	Abi-Guzar Market	
3	Gh. Mohd.	Govt Employee	Barbarshah.	
4	Showkat Ahmad	Labour.	Barbarshah Kralkhud.	
5	Khursheed Ahmad	Shopkeeper	Munawarabad	Khursheed Ahmad
6	Masroor Ahmad.	Shopkeeper	Bishember Nagar.	
7	Mohd Maqbool	Business.	Ikhrajpora Near Police station	
8	Momin-ul-islam	Doctor	Rajbagh.	
9	Altaf Ahmad.	Engineer	Kawji Adda.	
10	Mohd Shabaan.	Shopkeeper	Main Road Khidmat Press	M. Shabaan

S.No	Name	Occupation	Address	Signature
11	Mohd Iqbal.	Bank Employee	Khichmat Dooru Bund.	
12	Ittamul-Islam	Student	Mandir Bagh.	
13	Mohd Shahid.	Student.	Mandir Bagh Bund.	
14	Aamir Maqbool.	Shopkeeper	New Gadhangi-bora	Amir. Maqbool
15	Ab. Hamid Bhat	Driver.	old Gadhangi-bora.	
16	Sadia Begum.	House wife	Sonwar Bagh.	SARA
17	Mohd Azhar.	Govt. Employee	Sonwar Parves	
18	Insha Nabi	Student	Shopian Khan	
19	Aarfa Qadir	Teacher	Shopian Khan	AQadir
20	Faizan-ul-Islam.	Engineer.	Shopian Khan	

S.No	Name	Occupation	Address	Signature
21	Mohd. Lateef	Business	Nursing Garh	
22	Taufeeq Nabi	Student	Nursing Garh	
23	Javaid Ahmad	Shopkeeper	Kaksarai	
24	Zahoor Beigh	Teacher	Kaksarai	
25	Iqbal Dar	Labour	Qamarwari	
26	Haris Zargar	Student	Cement Bridge, Qamarwari	
27	Mohd. Shaban Bhat	Govt. Employee	Police colony, Qamarwari	
28	Ms. Zohra	Teacher	New Gadhanjipora, Rajbagh	
29	Zafar Banday	Govt. Employee	Kursoo Rajbagh	
30	Mohd. Hussain	Driver	Daraish Kadal	

S.No	Name	Occupation	Address	Signature
31	Samad Kirmani	Business	Nalbandpora, Daraish Kadal	
32	Murtaza Ali	Student	Jawahar Nagar	
33	Mohd. Liyakat Khan	Retired Teacher	Syed Hamidpora, Nawabazar	
34	Akbar Lone	Business	Shah Mohalla, Nawabazar	
35	Sara Begum	Housewife	Shah Mohalla, Nawabazar	
36	Nazir Ahmad	Driver	Madina Colony, Alluchi Bagh	
37	Irfan Dar	Student	Friends Colony, Alluchi Bagh	
38	Burhan Bhat	Shopkeeper	Friends Colony, Alluchi Bagh	
39	Iqkhlaq Qadri	Bank Employee	Beigh Colony, Alluchi Bagh	
40	Sheikh Obair	Student	Main Alluchi Bagh	

Requisition from the Commissioner SMC for the Upgradation and Upliftment of Existing Drainage Pumping Stations in Srinagar City

Srinagar Municipal Corporation

Karan Nagar, Srinagar, Jammu and Kashmir, India - 190010

Phone : 0194-2470466 Fax 0194-2476931 Email: commissioner@smcsite.org

No. SMC/PS/COM/ 1160-62
Dated: 16 /04/2015

The Chief Executive Officer
J&K, ERA

Subject: Up-gradation and up-liftment of existing dewatering stations.

Reference: Director Kashmir, J&K ERA's letter No. ERA/DK/16/417-23 Dated: 15/4/2015

Sir

A list of 27 No. pumping stations prioritized earlier stands forwarded to JK ERA for up-gradation and up-liftment by way of ADB financing. However, in the aftermath of September 2014 floods, the actual requirement viz-a-viz problem of drainage observed demands up-gradation of 76 No. pumping station. Therefore, J&K ERA is requested to arrange financing for all the 76 No pumping stations (list enclosed Annexure-A) in view of the highest flood level established in the recent floods.

It is pertinent to mention here that the equipment fitted in most of these dewatering stations viz-a-viz civil structure needs to be revamped.

It is further conveyed that all the pumping station are existing on land belonging to this corporation having no scope for acquisition of land and ***also operation and maintenance cost of the stations (including 27 already prioritized) is being met out of the plan assistance provided by the state government.***

Besides, a list of machines/mechanical equipments recommended by Mechanical Engineering Wing of SMC is enclosed for procurement for smooth functioning of the drainage system (Annexure B). Keeping in view the experience of September 2014 floods there is an acute shortage of mobile dewatering pumps which could be auto priming pumps as most of the housing colonies remain inundated for months together.

As regards improvement in sanitation of Srinagar city is concerned, a list of equipments is enclosed (Annexure C) which is requested to be procured at the earliest.

Yours faithfully

Commissioner 16.4.
Srinagar Municipal Corporation

Copy to the:

1. Commissioner/Secretary to Govt., H&UDD for information
2. Director, Kashmir, J&K ERA for information, this is in reference to the above referred letter.

APPENDIX-4

PHOTOGRAPHS OF THE EXISTING PUMPING STATIONS IN SRINAGAR

Mandirbagh, Srinagar

Qamarwari Chowk, Srinagar

Near Khidmat Press, Lal Chowk

Near Rajbagh Silk Factory

Sonwar Bagh, Srinagar

Shivpora, Srinagar






Photo Slides shows pumping station facilities in highly dilapidated condition which was further damaged with recent major floods in Sept 2014