Environmental Monitoring Report

Semestral Report
June 2016

For the period July - December 2015

IND: Jammu and Kashmir Urban Sector Development Investment Program, Project 3

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

Semi-Annual Environmental Monitoring Report

Loan Number: 3132 IND
Period: July 2015 to December 2015

IND: Jammu and Kashmir Urban Sector Development Investment Program

Submitted By:
Economic Reconstruction Agency, Government of Jammu and Kashmir

Contents

1. INTRODUCTION

1.1. Overall Project Description:

1. The State of Jammu and Kashmir lies in the northernmost part of the country and shares international border with Pakistan and China. This physiographic situation attaches strategic importance to the region as well as the infrastructural development in the state. The state has three main geographical regions namely Jammu, Kashmir valley and highlands of Ladakh. As per details from Census 2011, Jammu and Kashmir has population of 1.25 Crores, an increase from figure of 1.01 Crore in 2001 census. The population forms 1.04% of India in 2011, compared to 0.99% in 2001. As per census 2011, the Sex Ratio of female is 889 per 1000 male, which is below national average of 940. While in 2001 the sex ratio of female was 900 per 1000 males. The literacy rate has seen an upward trend at 67.16% as per 2011 census as compared to the national literacy rate of 64.80%, while in 2001 literacy rate stood at 55.52%.

2. Jammu and Srinagar are the two major cities where majority of urban population is concentrated while other smaller towns share the rest. Urban infrastructure in these places for long has been neglected and hence, is subject to severe urban infrastructure problems. Although, at least, majority of population in Jammu and Srinagar cities have been provided with piped water supplies, the other urban amenities remain neglected. This is mainly due to meager investments made in the urban infrastructure either by private or by public sector.

3. The Government of Jammu and Kashmir (GoJK), apart from the ADB financed Multi-Sector Project for Infrastructure Rehabilitation (MPIR) in Jammu and Kashmir, again approached ADB for assistance in urban sector development for more development works and studies so as to implement comprehensively the urban sector reforms. The GoJK through Jammu and Kashmir Economic Reconstruction Agency has conceived the Jammu and Kashmir Urban Sector Development Investment Program (JKUSDIP) in its effort to boost economic growth in Jammu and Kashmir State. The primary objective of JKUSDIP is to promote economic development in Jammu and Kashmir State 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 reforms, capacity building and training.

1.2. Project Objectives:

4. The proposed JKUSDIP will foster the economic growth in Jammu and Kashmir State. The long term Project objectives are to contribute to the economic development of Jammu and Kashmir through enhanced and sustainable growth in the main urban areas with emphasis on promoting commerce and on improvement of livelihood for the poor.

5. The urban sector sub-projects are aimed at expansion of basic services such as water supply, sanitation, waste management, urban transport and other municipal functions in

Jammu and Srinagar cities and other urban centers in order to cater to the demands and requirements of the increasing population. The overall program envisages the following broad benefits:

i. Improved water supply system
ii. Improved drainage waste management systems
iii. Improved road and traffic (urban transport) conditions
iv. Other municipal facilities.
v. Adequate Mechanized Parking.

1.3. Environmental Category:

6. The Project 3 (Tranche-3) under JKUSDIP was categorized as Environmental Category "B", according to ADB's Safeguard Policy Statement (2009). All the subprojects under execution in Srinagar and Jammu have been categorized as Category "B".

1.4. Environmental Performance Indicators, if any:

7. For effective monitoring, selected environmental parameters have been identified as indicators which may be qualitatively and quantitatively measured and compared over a period of time in order to assess/ensure the compliance to environmental management plans (EMPs). The environmental performance indicators selected are physical, biological and social characteristics identified as most important in affecting the environment at critical locations all along the sub-project corridors. The parameters identified as performance indicators are:

i. Compliance with environmental management and monitoring plan.
ii. Compliance to State/National environmental regulations.
iii. Monitoring of ambient air quality, water quality and noise levels and comparison with baseline environmental quality and State/National standards.

1.5. Overall project progress, agreed milestones and implementation schedules:

8. In Srinagar, following subprojects are under execution:

i. Construction of Surface water Drainage System for Rawalpora-Channapora area (**Overall progress of the contract is about 35.97%)**

ii. Providing and laying of Raw Water main from higher reaches of Doodhganga Nallah to Kralpora Treatment plant at Srinagar.(**Overall progress of the contract is about 27.58%)**

iii. Construction of New Mehjoor Bridge at Jawahar Nagar and Two Grade Separators in Srinagar city". (**Overall progress of the contract is about 15.63%)**

9. In Jammu, following sub-project is under execution

i. Rehabilitation of Water Supply Network in Identified Areas within Zone 2, 3, 4 and 5 in Jammu City. Contract Package No: JKUSDIP/Jammu/WS 05. (**Overall progress of the contract is about 10.87%)**

ii. Providing, Laying, Jointing, Testing and commissioning of Sewerage Network in Bakshi Nagar,Shakti Nagar, Shiv nagar and Janipur Areas in Division A Phase II at Jammu. Contract Package No: JKUSDIP/WW/07. (Overall progress of the contract is about 2.16%)

1.6. Any other information useful for assessing environmental performance of the project:

Public consultation and grievance redressal:

10. Public consultation has evolved as a useful tool in addressing the issues and rectification of the same wherever possible. The public consultation is the ongoing and continuous process, which is conducted on regular basis in Srinagar and Jammu subprojects under execution, with local residents to ensure that they are fully engaged in the project and have the opportunity to participate in its implementation. Formal consultations as well as adhoc regular discussions with the local residents both form part of the public consultation process.

11. Communication with the local residents is always open and views of the residents are taken into consideration during planning of the work programs under JKUSDIP so that the people suffer least disturbance and inconvenience as the work is executed.

12. Various issues were discussed during formal consultation which includes:-

a) Removal of surplus and waste material
b) Restoration of damaged water supply connection
c) Restoration of roads and lanes
d) Inconvenience with regard to access disruption
e) Dust and noise problems faced during execution of work
f) Use of proper barricading to ensure the safety of public and workers.

13. Mitigation measures discussed during formal consultation includes:

i. Clearing passageways and roads of surplus waste material on priority
ii. Speedy restoration of all the utilities
iii. Simultaneous road restorations after execution of work
iv. Provision of alternate access routes till restoration is achieved
v. Using appropriate dust suppression measures and proper noise/air monitoring. Frequent water sprinkling and removal of left over soil arising due to the excavation activities.
vi. Barricading of the site under construction to ensure safety of pedestrians etc

2. COMPLIANCE STATUS WITH NATIONAL /STATE /LOCAL STATUTORY ENVIRONMENTAL REQUIREMENTS

14. **Table-1:** Status of statutory environmental requirements is shown in the following table:

S. N.	Name of Sub-project	Statutory Environmental Requirements	Status of Compliance	Actions Required
1.	Construction of Surface water drainage system for Rawalpora-Channapora area (Package: JKUSDIP Srinagar/SWD/02).	Environmental clearance under EIA Notification, 2006.	Not applicable	Contractor to submit consents pertaining to batching Plant and DG Set however, contractor has applied to SPCB vide letter no. HRCC/consent order/223/14-15 dated. 03/09/2014) and is under process. For non-compliance of EMP measures certain amount from IPCs of the contractor was deducted (withheld) and the details for the same is mentioned in table-4a.
		Approval for tree cutting	Not required	
		Consent to establish/operate for stone crusher.	Obtained and submitted by Contractor. • Consent No: 595 of 2015 Valid upto March 2016 (Renewed Consent submitted	
		Consent to establish & operate Hot Mix Plant	Contractor has submitted consent of HMM Plant. Consent No: 594 of 2015 Valid upto July 2016	
		Consent to establish & operate Batching Plant	Consent certificate of batching plant not submitted by the contractor. Contractor ensured timely submission of consents	
		Consent to establish and operate DG Sets	Consent to establish/ operate for D.G set required and contractor has applied to SPCB and is under process	
		PUC certificates for contractor's vehicles.	Submitted by contractor	
2.	Providing and Laying of Raw water main from higher reaches of Doodhganga nallah to Kralpora Water Treatment Plant. (Package: JKUSDIP	Environmental clearance under EIA Notification (MoEF), 2006.	Not applicable	
		Approval for tree cutting	Not required	

	Srinagar/WS/02).	Consent to establish/ operate Stone Crusher Plant from SPCB	• Consent no of 304 of 2015 valid upto March 2016.	
		Consent to establish/ operate DG Set from SPCB (If required).	Not required for the present works	
		PUC certificates for contractor's vehicles.	Submitted	
3.	Construction of New Mehjoor Bridge at Jawahar Nagar and Two Grade Separators in Srinagar city	Environmental clearance under EIA Notification, 2006.	Not Applicable	D.G set consent required from contractor. Contractor has applied to SPCB for consent to establish/ operate D.G sets and the case is under process. For non-compliance of EMP measures certain amount from IPCs of the contractor was deducted (withheld) and the details for the same is mentioned in table-4a.
		Approval for tree cutting	NOC (DS/Plan/2014-15/537-38) dated: 28.5.2015 obtained from Dept. of Sericulture for cutting 11 trees. All trees (11 no.) of Mulberry trees were and stand cleared. 9 trees require to be cut down at Grade separator at Radio Kashmir TRC crossing for which permission is being procured and action initiated by the parent department from the district commissioner to whom the property belongs	
		Consent to establish/operate for stone crusher.	Consent no.136 RDK of 2015 Dated: 28.07.2015 and valid for the period of 2 years i.e. July 2017	
		Consent to establish & operate Hot Mix Plant	Not required for the present period.	
		Consent to establish and operate DG Sets	Consent to establish/ operate for D.G sets required and contractor has applied to SPCB and is under process.	
		PUC certificates for contractor's vehicles.	Submitted by the contractor.	

Jammu.				
4	Rehabilitation of Water Supply Network in Identified Areas within Zone 2, 3, 4 and 5 in Jammu City. Package No.: JKUSDIP/Jammu/WS 05	Approval for tree cutting	Cutting of Forest tree or any other schedule tree not required	
		Consent to establish and operate stone crusher.	Not required yet	
		PUC certificates for contractor's vehicles.	Obtained and submitted by the Contractor	
6.	Providing, Laying, Jointing, Testing and Commissioning of Sewerage network in Bakshi Nagar, Ranbir Collector, Janipur, Shiv Nagar and Shakti Nagar of division 'A' Phase-II at Jammu." (Balance works of WW-01 & WW-02). **Package No. JKUSDIP/Jammu/WW-07.**	Approval for tree cutting	Cutting of Forest tree or any other schedule tree not required	
		Consent to establish and operate stone crusher.	Stone aggregate material is being procured from approved Stone Crusher Plant having the consent to operate (renewed) from SPCB vide - Consent No: 110 of 2015, Dated: 18/04/2015 Validity: Mar. 2016.	
		PUC certificates for contractor's vehicles.	Obtained and submitted by the Contractor	

3. Compliance Status With The Environmental Covenants As Stipulated In The Loan Agreement

15. **Table-2:** Status of compliance with environmental loan covenants of Tranche-3 is presented below:

Loan Covenants	Compliance status
The Borrower shall ensure, or cause the EA to ensure that;	
the preparation, design, construction, implementation, operation and decommissioning of the project, and all subproject facilities comply with; (i) all applicable laws and regulations of the Borrower and the State relating to environment, health, safety; (ii) the Environmental Safeguards; (iii) EARF; and (iv) all measures and requirements set forth in the respective IEE and EMP, and any corrective or preventative actions set forth in a Safeguards Monitoring Report.	Being complied with.
All bidding documents and contracts for Works contain provisions that require contractors to:- – Comply with the measures and requirements relevant to the contractor set forth in the IEE and EMP; and any corrective or preventive actions set out in a Safeguards Monitoring Report.	The bidding documents and contract agreements for work are incorporated with provisions set forth in the IEE and EMP and are being complied with.
– Make available a budget for all such environmental measures.	Environmental monitoring and mitigation costs allocated/ incorporated in contract agreements.
– Provide the EA with a written notice of any unanticipated environmental impacts that arise during construction, implementation or operation of the project that were not considered in the IEE and in the EMP.	Being complied with
– Adequately record the condition of roads, agricultural land and other infrastructure prior to starting to transport materials and construction.	The existing condition of roads and other infrastructure has been recorded in the form of photographs.
– Fully reinstate pathways, other local infrastructure, and agricultural land to at least their pre-project condition upon the completion of construction.	All the areas that if disturbed by construction activities will be cleared and restored to pre-project condition.
– Submit semi-annual Safeguards Monitoring to ADB and disclose relevant information from such reports to affected persons promptly upon submission;	Semi-annual report prepared and submitted to ADB as per the guidelines.
– If any unanticipated environmental risks and impacts arise during construction, implementation or operation of the Project that were not considered in the IEE and EMP as applicable, promptly inform ADB of the occurrence of such risks or impacts, with detailed description of the event and proposed corrective action plan; and	In case of any unanticipated environmental risks and impacts arise during construction, implementation or operation of the Project that were not considered in the IEE and EMP as applicable that shall be immediately informed to ADB with detailed description of the event and proposed corrective action plan.
– Report any breach of compliance with the measures and requirements set forth in the EMP, promptly after becoming aware of the breach.	Breach will be reported to ADB immediately after becoming aware of it.

4. COMPLIANCE STATUS WITH ENVIRONMENTAL MANAGEMENT AND MONITORING PLANS AS STIPULATED IN THE ENVIRONMENTAL DOCUMENTATION AS AGREED WITH ADB.

16. **Table-3:** The compliance status with environmental management and monitoring plan is shown in the following table:

S. No	Sub-project Name	EMP Part of Contract Documents (Yes/No)	EMP Being Implemented (Yes/No)	Status of EMP Implementation (Excellent/ Satisfactory/ Partially Satisfactory/ Below Satisfaction)	Actions Proposed/ Additional Corrective Measures Required
1.	Construction of Storm water drainage system for Rawalpora-Channapora area (Package: JKUSDIP Srinagar/ SWD/02).	Yes	Yes	Satisfactory	
2.	Providing and Laying of Raw water main from higher reaches of Doodhganga Nallah to Kralpora Water Treatment Plant. (Package: JKUSDIP Srinagar/ WS/02).	Yes	Yes	Satisfactory	For non-compliance of EMP measures certain amount from IPCs of the contractor was deducted (withheld) and the details for the same is mentioned in table-4a.
3.	Construction of New Mehjoor Bridge at Jawahar Nagar and Two Grade Separators in Srinagar city	Yes	Yes	Satisfactory	
Jammu.					

4.	Rehabilitation of Water Supply Network in Identified Areas within Zone 2, 3, 4 and 5 in Jammu City. Package No.: JKUSDIP/Jammu/WS 05	**Yes**	**Yes**	**Satisfactory**	
5.	Mechanized Semi-Automatic Parking facility at Super Bazaar City Chowk Jammu. Package No.: JKUSDIP/Jammu/UT 02	**Yes**	**Technical Bid Evaluation Report(TBER) submitted to ADB for approval (Date of submission of TBER- 26/06/2015)**		
6.	Providing, Laying, Jointing, Testing and Commissioning of Sewerage network in Bakshi Nagar, Ranbir Collector, Janipur, Shiv Nagar and Shakti Nagar of division 'A' Phase-II at Jammu." (Balance works of WW-01 & WW-02). **Package No. JKUSDIP/Jammu/WW-07.**	**No**	**Yes**	**Partially Satisfactory**	Contractor instructed to strengthen PPEs for workers, traffic safety measures, and further improve dust suppression measures etc.

17. Details of amount deducted from the IPC's for Non-compliance of various components of EMP, in accordance with ERA Circular No.: ERA/CEO/1038/ADM/9629-42, DATED 10/01/2013, during the period July 2015 – December 2015.

18. **Table-4:** Status of amount deducted from the IPC's for Non-compliance of EMP, Srinagar

S. No.	Contract Package	Bill No.	Total Recommended Deductions
1	Construction of Storm water drainage system for Rawalpora-Channapora area (Package: JKUSDIP Srinagar/ SWD/02).	IPC 13th	Rs 70000 (Withheld)
2	Providing and Laying of Raw water main from higher reaches of Doodhganga nallah to Kralpora Water Treatment Plant. (Package: JKUSDIP Srinagar/ WS/02)	IPC 3rd	Rs 76000 (Withheld)
3	Construction of New Mehjoor Bridge at Jawahar Nagar and Two Grade Separators in Srinagar city	IPC 1st	Rs 70000 (Withheld)

5. APPROACH AND METHODOLOGY ENGAGED FOR ENVIRONMENTAL MONITORING OF THE PROJECT

19. Construction works of 3 subprojects are under execution in Srinagar and 2 subprojects in Jammu. Monitoring schedules and reporting formats were issued to each contractor for compliance and implementation of EMP of each site. The contracting firms of all subprojects have nominated/ mobilized Environmental Safety Officers and are submitting site environmental reports at the end of each month.

20. Site visit/ inspections are being carried out on regular basis to assess the EMP implementation of Tranche-3 subprojects under execution.

21. Public consultation was conducted for the subprojects in both Srinagar and Jammu. During consultation with different stakeholders, issue of “fugitive dust generation” was addressed. They have also suggested measures apart from normal water sprinkling by way of water tankers like “frequent mopping and scrapping of the left-over soil produced from excavation activities” must be implemented. Since, ongoing works have a limited construction period and hence have only temporary and short-term impact within the impact corridor. Contracting firms are being instructed for strict follow-up of mitigation measures as devised in EMP. Refer Appendix 1-3 for Public Consultation (participant details).

22. Public consultation shall be a regular process throughout the construction and operation phases of the subprojects to solve any issues arising out of the ongoing works.

23. The safeguards staff conducts frequent site visits to monitor the implementation of safeguard measures on sites and report to concerned official about issues/problems related to environmental non-compliance. Necessary directions in the form of corrective action measures, in case of non-compliances, are being issued to the contractors on the site and through letters about the procedures to resolve problems/issues or requirements.

6. MONITORING OF ENVIRONMENTAL RECEPTORS/ ATTRIBUTES

1.7. Monitoring basis

24. Air quality, water quality and noise levels are required to be monitored to check if any adverse impact is being caused by the construction activities. The monitoring of these variables is to be carried out in construction areas at sensitive locations within 100 m impact zone of the subproject. The monitoring of environmental variables is to be carried out as per the agreed Environmental Monitoring Plan.

1.8. Type of environmental receptor/attribute to be monitored (for each type)

20. The environmental attributes monitored include the air, noise and water quality parameters at the construction sites in sub-project corridors. The air quality parameters monitored include RSPM (PM_{10}), $PM_{2.5}$, SO_2 and NO_2. The water quality parameters include temperature, pH, electrical conductivity (EC), dissolved oxygen (DO), biochemical oxygen demand (BOD_5), chemical oxygen demand (COD), total suspended solids (TSS), total dissolved solids (TDS), turbidity (NTU), total alkalinity, total hardness, calcium hardness and magnesium hardness. In case of noise quality, the day time dB L_{eq} values are monitored.

1.9. Methodology, Regulatory Standards of monitoring and equipment's adopted for Environmental Monitoring Laboratory (EML):

25. The following standard methods and equipment's are being used for monitoring.

26. **Table-5:** List of Assessment Methodology, Acceptable Standards and equipment's adopted.

S.No	Parameters	Assessment Methodology	[1]Acceptable Standards	Cause for rejection	Equipment's in Use
A.	**Ambient Air Quality ([2]NAAQ Standards, 2009)- Time weighted average**				
1.	*RSPM– particulate matter PM_{10}*	Gravimetric High Volume Sampler method (attached with cyclone).	100 *µg/m³* 60 *µg/m³*		Respirable Dust Sampler, Envirotech - APM 460 BL Digital Balance, Schimadzu – BL-220H

[1] CPHEEO Manual, MoUD, GOI, May 1999; and MoEF, Act and Rules, 1986 & Amendments 2000
[2] National Ambient Air Quality Standards (NAAQS)

2	[3]*Fine particulate matter* $PM_{2.5}$,	Gravimetric method.	60 $\mu g/m^3$ 40 $\mu g/m^3$		Ambient Fine Dust Sampler, Instrumex.
3.	SO_2	Modified West and Gaeke Method.	80 $\mu g/m^3$		High Volume Air Sampler, Envirotech – APM 460BL. Thermo-electrically cooled gaseous sampling attachment, Envirotech – APM 411TE Digital Spectrophotometer, EI-305.
4.	NO_2	Modified Jacob & Hochheiser Method.	80 $\mu g/m^3$		High Volume Air Sampler, Envirotech – APM 460BL. Thermo-electrically cooled gaseous sampling attachment, Envirotech – APM 411TEDigital Spectrophotometer, EI-305.
B.	[4]**Ambient Noise Level**				
1.	*Residential Area*	Direct Reading in Decibel Sound Level Meter.	*55dB(A)* L_{eq} *(Day time)*		Digital Sound Level Meter, AZ-8928
2.	*Commercial Area*	Direct Reading in Decibel Sound Level Meter.	*65 dB(A)* L_{eq} *(Day time))*		Digital Sound Level Meter, AZ-8928
C.	[5]**Ambient Water Quality *(For Drinking / Ground Water)***				
1.	*Temp (in ºC)*	Digital/Mercury Thermometer Method.	>20 *ºC*		Digital/Mercury Thermometer
2.	*Color (Hazen units)*	Hazen Method	5 Platinum cobalt scale	25	-
3.	*Taste and Odour*		Unobjectionable	Objectionable	-
4.	*pH value*	Electrometric Method.	6.5-8.5	>8.5	Digital pH Meter, HANNA – HI98127,
5.	*Electrical Conductivity*	Electrometric Method.	≤ 500 µs/cm	1000 µs/cm	Digital TDS/EC Meter, HANNA – HI-

[3] $RSPM_{2.5}$ sampler procured by the JK ERA for EML and next reporting period (July-Dec 2015) will form part of env. Monitoring.
[4] Standards specified in the schedule of Noise Pollution (Regulation And Control) Rules, 2000 of Government of India The Principal Rules were published in the Gazette of India, vide S.O. 123(E), dated 14.2.2000 and subsequently amended vide S.O. 1046(E), dated 22.11.2000, S.O. 1088(E), dated 11.10.2002, S.O. 1569 (E), dated 19.09.2006 and S.O. 50 (E) dated 11.01.2010 under the Environment (Protection) Act, 1986.
[5] Drinking water Specifications, IS-10500

	(EC) µs/cm				96311
6.	*Dissolved Oxygen (DO) mg/l*	Winkler's Method Using Azide Modification	> 6 mg/l		Winkler's Method
7.	*Total Suspended Solids (TSS) mg/l*	Gravimetric (Filtration and Drying at 105°C)	<120 mg/L		Hot Air Oven, Digital Balance, Schimadzu-BL-220H
8.	*Total Dissolved Solids (TDS) mg/l*	Digital Meter Method.	≤ 500 mg/l	2000 mg/l	BOD Incubator
9.	*Turbidity (NTU)*	Nephelo Turbidity Method.	1mg/l	10 mg/l	Nephelo Turbidity Meter, Systronics – 132
10.	*Total Hardness (as $CaCO_3$) mg/l*	EDTA Titrimetric	300 mg/l	600 mg/l	-
11.	*Total Alkalinity (as $CaCO_3$) mg/l*	Titrimetric (Methyl Orange)	200 mg/l	600 mg/l	-
12.	*Calcium Hardness (Ca) mg/l*	EDTA Titrimetric	75 mg/l	200 mg/l	-
13.	Magnesium Hardness *(Mg) mg/l*	Calculation from total Hardness and Calcium	30 mg/l	150 mg/l	-
D.	**[6]Waste Water Quality (Storm/ drain water, dry weather flow)**				
1.	*Temp (in ºC)*	Digital/Mercury Thermometer Method.	Shall not exceed 5°C above the receiving water temperature		Digital/ Mercury Thermometer
2.	*Color (Hazen units)* Platinum cobalt scale	-	5	25	-
3.	*Odour*	Objectionable/ Non-objectionable	Non-objectionable		-
4.	*pH value*	Electrometric Method.	5.5-9.2		Digital pH Meter, HANNA – HI98127,
5.	*Electrical Conductivity (EC)* µs/cm	Electrometric Method.	< 2000		Digital TDS/EC Meter, HANNA – HI-96311
6.	*Dissolved Oxygen (DO) mg/l*	Winkler's Method Using Azide Modification	> 6 mg/L		Winkler's Method

[6] Standards for Discharge of Environmental Pollutants, IS-10500

7.	*Biochemical Oxygen Demand (BOD_5) mg/l*	Five Days BOD as per APHA 2005	30 mg/l		BOD Incubator
8.	*Chemical Oxygen Demand (COD) m/l*	Dichromate Method (APHA 2005)	250 mg/l		
9.	*Total Dissolved Solids (TDS) mg/l*	Digital Meter Method.	≤500 mg/L	2100 mg/L	Digital TDS/EC Meter, HANNA – HI-96311
10.	*Total Suspended Solids (TSS) mg/l*	Gravimetric (Filtration and Drying at 105°C)	<120 mg/L		Hot Air Oven, Digital Balance, Schimadzu-BL-220H
11.	*Turbidity (NTU)*	Nephelo Turbidity Method.	5 mg/L	10 mg/L	Nephelo Turbidity Meter, Systronics – 132
12.	*Total Alkalinity (as $CaCO_3$) mg/l*	Titrimetric (Methyl Orange)	200	600	

Annotation: *BOD= biochemical oxygen demand; DO= dissolved oxygen; EC= electrical conductivity; NO_2= nitrogen dioxide; PM_{10}= particulate matter with particle size less than 10µ; RSPM= respirable suspended particulate matter; SO_2=Sulphur dioxide; TDS= total dissolved solids; TSS= total suspended solids.*

1.10. Monitoring results and comparison with statutory requirements at National levels.

27. The environmental monitoring for air quality, water quality and noise levels for subprojects under Tranche-3 in both Srinagar and Jammu. Monitoring was conducted during the reporting period of July-December 2015 by Environmental Monitoring Laboratory of J&K ERA (Under supervision of PMC-JKUSDIP). Results of the environmental monitoring report is tabulated below;

A. Air Quality

28. The results of air quality monitoring conducted on various sampling locations of different subprojects in Srinagar and Jammu are represented below;

29. **Table-6:** Construction of Storm Water Drainage in Rawalpora area Chanapora Bridge, Srinagar

Srinagar Subprojects							
Ambient Air Quality- Construction of Storm Water Drainage in Rawalpora Area							
Site Code	**Quarter**	**Month of Sampling with date**	**Sampling Site/ Location**	**Site Type**	**RSPM$_{10}$ (µg/m^3)**	**SO_2 (µg/m^3)**	**NO_2 (µg/m^3)**
					Permissible Limits/ Standards		
					100	**80**	**80**
S-A1	Baseline monitoring	January 30-01-2013	Rawalpora Area	Residential Area	179.16	7.12	8.59
	Q3 (July-Sept)	August 20-08-2015	Rawalpora near	Residential area	223.51	8.76	9.66

			construction area				

30. Air quality monitoring was conducted at sampling location S-A1 near Rawalpora area which shows higher values of $RSPM_{10}$ than the permissible level of NAAQ standards and baseline monitoring. Excavation, laying of drainage pipes and restoration where the major activities. However, the baseline monitoring conducted in January 2013 also shows higher values than the present monitoring hence such short term impact was envisaged which was mitigated properly through proper dust suppression measures. The present particulate matter (PM_{10}) is mainly caused due to the high vehicular traffic movement and ongoing construction activities of Zone-1 & 2 areas.

31. Since the ongoing construction activity is time and site specific and temporary in nature hence no long term impact is envisaged. Result shows dust emanating from construction zone due to the plying of the heavy traffic in NH-1A which directly correlated to insufficient dust control measures. Necessary instruction with proper protocol given to the contracting firm. The gaseous pollutants of SO_2 & NO_2 were well within the limits. Comparative analysis of site S-A1 with NAAQ standards and baseline monitoring is illustrated below in Figure 1;

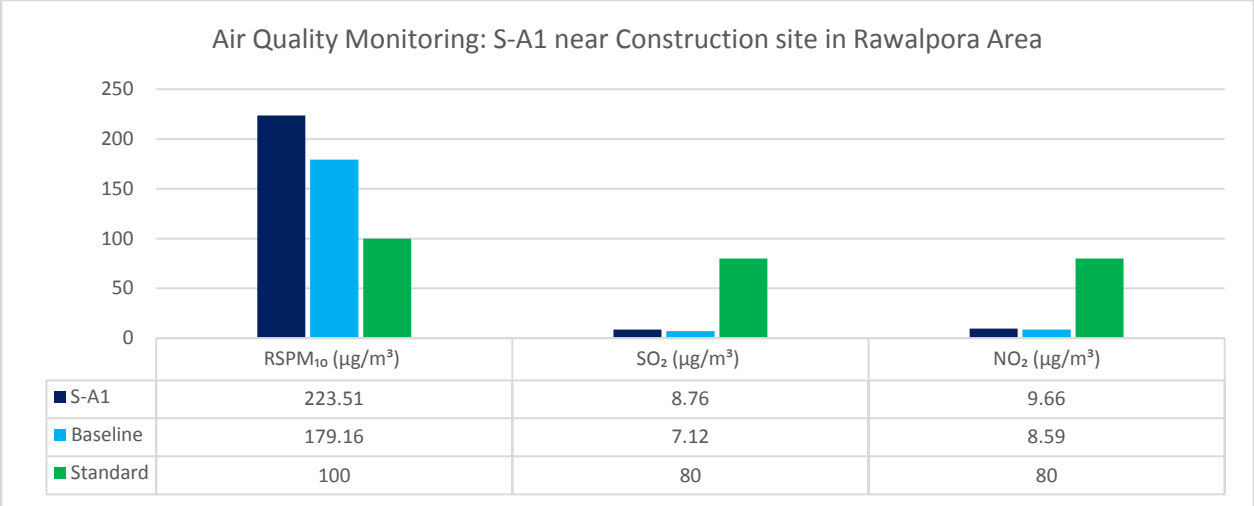


Figure 1: Comparative analysis of Air Quality parameters of Rawalpora site S-A1 with NAAQ standards and Baseline monitoring Srinagar.

32. **Table-7:** Construction/ Laying of WS Pipeline from higher reaches of Doodhganga Stream to Kralpora WTP, Srinagar

Srinagar Subprojects							
Ambient Air Quality: Laying of WS Pipeline from Doodhganga to Kralpora WTP							
Site Code	**Quarter**	**Month of Sampling with date**	**Sampling Site/ Location**	**Site Type**	**$RSPM_{10}$ (µg/m³)**	**SO_2 (µg/m³)**	**NO_2 (µg/m³)**
					Permissible Limits/ Standards		
					100	**80**	**80**
	Baseline Monitoring (Pre-Construction)	December 23/12/2014	Near Nowhara bridge at Source	Residential area	64.43	5.36	7.12

S-A2	Q3 (July-Sept)	August 24-08-2015	Near Nowhara bridge at	Residential area	87.33	5.69	6.65

33. Air quality monitoring was conducted for Doodhganga stream near Nawhara tapping point sampling location site S-A2. The result shows particulate matter of $RSPM_{10}$ well within the permissible level of NAAQ standards and slightly above or nearly in line with baseline monitoring which was taken in December 2014. This baseline data was established to correlate and compare with the monitoring during construction phase at this point.

34. Since the site location is having least movement of vehicular traffic, hence generation of dust is not anticipated on higher side. Whereas, the gaseous pollutants of SO_2 & NO_2 were well within the limits. The comparative analysis of site S-A2 with NAAQ standards and baseline monitoring is illustrated below in Figure 2;

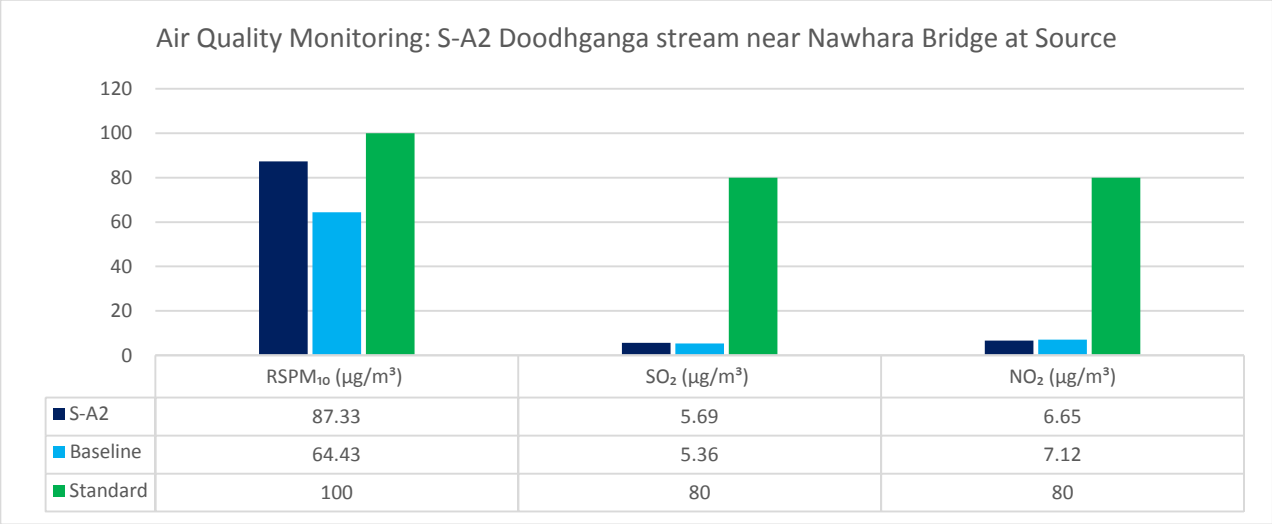


Figure 2: Comparative analysis of Air Quality parameters of Rawalpora site S-A2 with NAAQ standards and Baseline monitoring Srinagar.

35. **Table-8:** Construction of New Mehjoor Bridge and 2 Grade Separators in Srinagar City.

Srinagar Subprojects								
Ambient Air Quality: Construction of New Mehjoor Bridge and Grade Separators.								
Site Code	**Quarter**	**Month of Sampling with date**	**Sampling Site/ Location**	**Site Type**	**$RSPM_{10}$ ($\mu g/m^3$)**	**$RSPM_{2.5}$ ($\mu g/m^3$)**	**SO_2 ($\mu g/m^3$)**	**NO_2 ($\mu g/m^3$)**
					Permissible Limits/ Standards			
					100	**60**	**80**	**80**
S-A3	Baseline Monitoring	July 06/07/2013	Near Bridge Site	Residential area	87.23	-	4.22	5.79
	Q3 (July-Sep)	September 12-09-2015	Near Bridge site	Residential area	87.85	-	6.23	8.41
	Q4 (Oct-Dec)	November 03-11-2015	Near Bridge site	Residential area	117.56	42.73	7.82	19.67

36. Air quality monitoring was conducted during Q3 & Q4 monitoring at sampling location S-A3 near

new Mehjoor bridge site. The results Q3 monitoring shows $RSPM_{10}$ values within the permissible levels as per NAAQ standards and likewise in line of baseline monitoring. However, the $RSPM_{10}$ values were marginally higher during Q4 monitoring. The fine particulate matter $RSPM_{2.5}$ monitoring conducted in November 2015 was well within the permissible levels. Higher values are attributed to dry weather condition coupled with ongoing construction activity and frequent traffic movement (since this the main diversion route of Flyover Jehangir Chowk to Rambagh under Tranche-2) hence dust generation is anticipated which is controlled by dust suppression measures. .

37. The gaseous pollutants of SO_2 & NO_2 were well within the limits during the sampling period. Comparative analysis of site S-A3 with NAAQ standards and baseline monitoring is illustrated below in Figure 3;

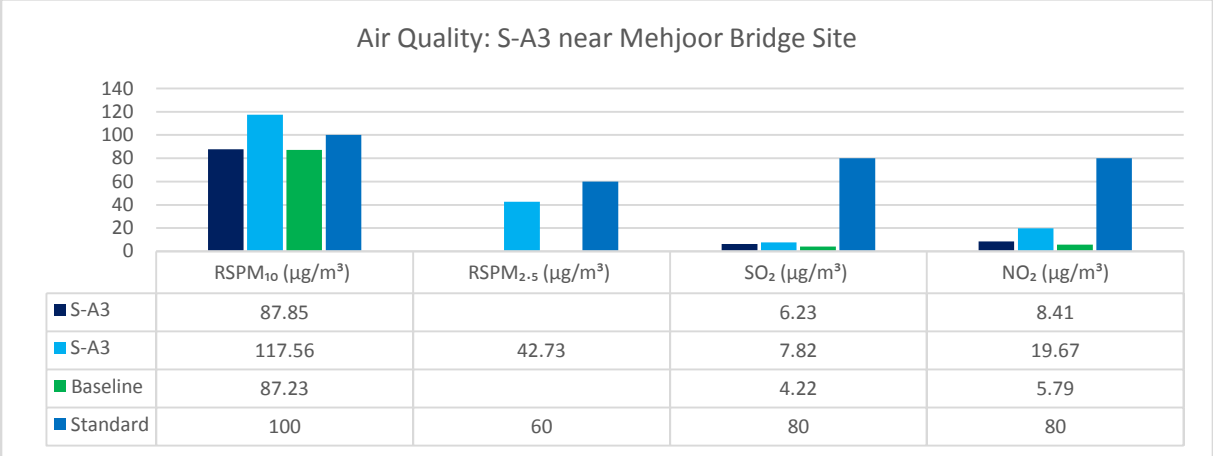


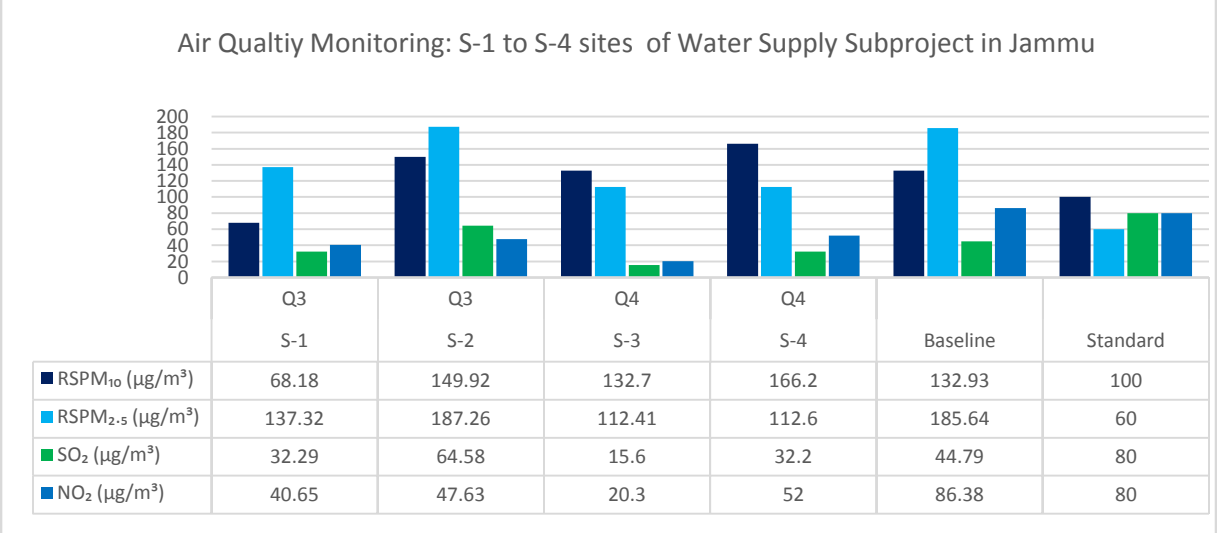
Figure 3: Comparative analysis of Air Quality parameters of S-A3 near bridge site with NAAQ standards and baseline monitoring Srinagar.

38. **Table-9.** Air quality monitoring of subprojects in Jammu

Air Quality- Jammu Subprojects								
Site Code	Quarter	Month of Sampling with date	Sampling Site/ Location	Site Type	$RSPM_{10}$ (µg/m^3)	$RSPM_{2.5}$ (µg/m^3)	SO_2 (µg/m^3)	NO_2 (µg/m^3)
					Permissible Limits			
					100	**60**	**80**	**80**
Rehabilitation of water supply pipe network in identified area with zone 2, 3, 4 and 5 in Jammu city								
	Baseline Monitoring (Pre-Construction)	**17-06-2015**	**Site corridor**	***Residential area***	**132.93**	**185.64**	**44.79**	**86.38**
S1	**Q3**	**24-09-15**	**Indira Theatre, Near Puran Nagar**	***Residential area***	**68.18**	**137.32**	**32.29**	**40.65**
S2	**Q3**	**28-09-15**	**Bhagwati Nagar, near Tawi 4th Bridge**	***Residential area***	**149.92**	**187.26**	**64.58**	**47.63**

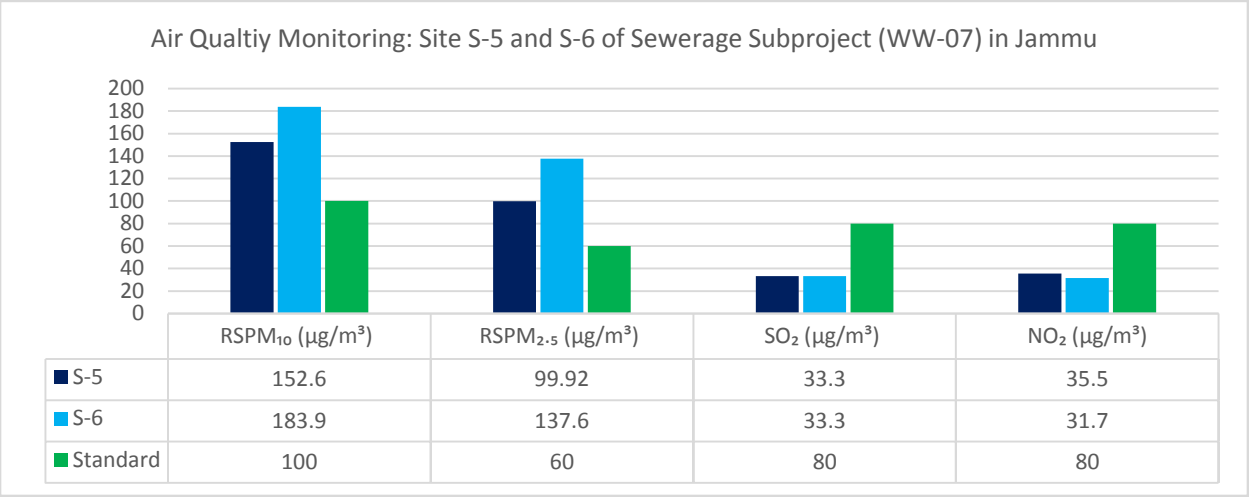
S3	**Q4**	**28-11-15**	**Bhagwati Nagar near Amarnath Yatri Niwas**	***Residential area***	**132.7**	**112.41**	**15.6**	**20.3**
S4	**Q4**	**16-12-15**	**A.G Office Shakti Nagar**	***Residential area***	**166.2**	**112.6**	**32.2**	**52.0**
Sewerage network Package WW-07								
S5	**Q4**	**30-11-15**	**Vikas Nagar Sarwal**	***Residential area***	**152.6**	**99.92**	**33.3**	**35.5**
S6	**Q4**	**15-12-15**	**Cremation Ground Shakti Nagar**	***Residential area***	**183.9**	**137.6**	**33.3**	**31.7**

39. Air quality monitoring conducted at site S-1 (Puran Nagar) during Q3 period shows the $RSPM_{10}$ values well within the permissible level as specified in NAAQ standards and far below than the baseline monitoring. However $RSPM_{2.5}$ values observed at the same site shows higher values but far below than the baseline data. The Q3 and Q4 monitoring of site S-2 to S-6, $RSPM_{10}$ values was observed higher than the permissible level which was also recorded higher during the baseline monitoring. In reference to the $RSPM_{2.5}$ monitoring, the values were below or in line with baseline monitoring but exceeding the NAAQ standards. Corrective measures were instructed to so that the present recorded values are not exceeding. The higher values of particulates matter 10 & 2.5 is mainly attributed to frequent traffic movement and coinciding with ongoing construction works. These impacts are short term in nature as the works are temporary in nature and time/ site specific These impacts are controlled by applying dust control measures frequent sprinkling with water, clearing/ removal of excavated/ left over soil from the construction zones.
40. Throughout the Q3 and Q4 monitoring, the gaseous pollutants of SO_2 and NO_2 were within the permissible limit and baseline monitoring. Comparative analysis is illustrated in Figure 4 and 5 below;



	Q3 S-1	Q3 S-2	Q4 S-3	Q4 S-4	Baseline	Standard
$RSPM_{10}$ (µg/m³)	68.18	149.92	132.7	166.2	132.93	100
$RSPM_{2.5}$ (µg/m³)	137.32	187.26	112.41	112.6	185.64	60
SO_2 (µg/m³)	32.29	64.58	15.6	32.2	44.79	80
NO_2 (µg/m³)	40.65	47.63	20.3	52	86.38	80

Figure 4: Comparative analysis of Air Quality parameters observed at site S-1 to S-4 of Water Supply subproject-Jammu and in comparison with NAAQ standards and baseline monitoring.



	RSPM$_{10}$ (µg/m^3)	RSPM$_{2.5}$ (µg/m^3)	SO$_2$ (µg/m^3)	NO$_2$ (µg/m^3)
S-5	152.6	99.92	33.3	35.5
S-6	183.9	137.6	33.3	31.7
Standard	100	60	80	80

Figure 5: : Comparative analysis of Air Quality parameters observed at site S-5 to S-6 of Sewerage subproject (Balance work)-Jammu and in comparison with NAAQ standards and baseline monitoring.

B. Noise Quality

41. The measured noise quality data at various locations is given below:

Table-10: Construction of Storm Water Drainage System in Rawalpora Area to Chanapora Bridge Srinagar City

Srinagar Subprojects						
Site Code	**Quarter**	**Month of Sampling with date**	**Sampling Site/ Location**	**Site Type**	***Day Time Noise Levels dB (A) Leq***	***Day Time Noise Quality Standards dB (A) L_{eq}***
Construction of Storm Water Drainage System in Rawalpora Area to Chanapora Bridge Srinagar City						
S-N1	Baseline	January 08-01-2015	Near Rawalpora Area	Residential	*57.7*	*65*
	Q3 (July-Sept)	August 20-08-2015	Near Rawalpora Area	Residential	*60.4*	*65*

43. The observed values of noise quality monitoring shows marginal increase at site SN1, which is mainly attributed to frequent and heavy traffic movement and partly due to the ongoing construction activity in main road. However, contractor was instructed to proper maintenance of vehicles and application of mitigation measures so to avoid noise pollution. Comparative analysis of S-N1 is illustrated in Figure 6 below;

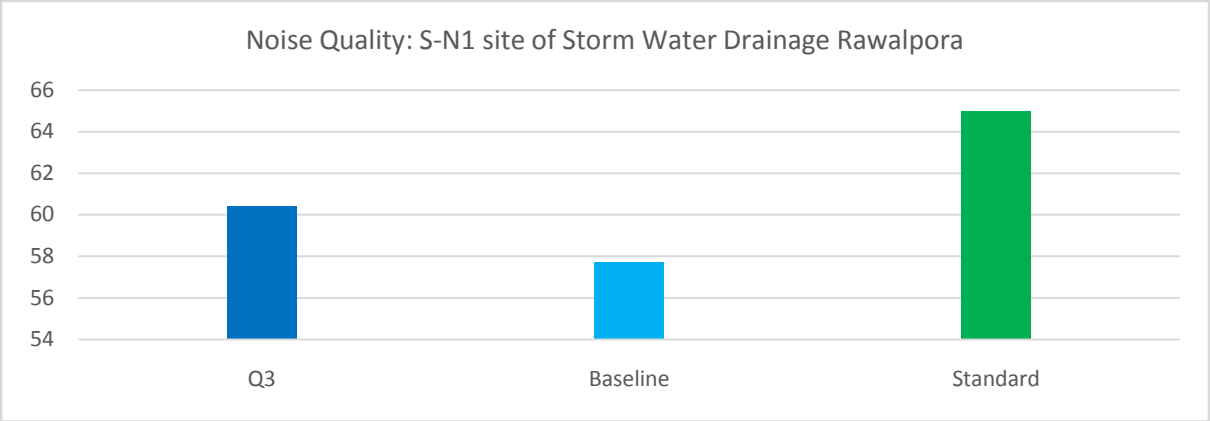


Figure 6: Comparison of day time noise levels observed near Rawalpora area monitoring site with National noise standards and baseline monitoring, Srinagar.

44. **Table-11:** Construction/ Laying of WS Pipeline from higher reaches of Doodhganga Stream to Kralpora WTP, Srinagar

Srinagar Subprojects						
Site Code	**Quarter**	**Month of Sampling with date**	**Sampling Site/ Location**	**Site Type**	***Day Time Noise Levels dB (A) Leq***	***Day Time Noise Quality Standards dB (A) L_{eq}***
Laying of WS Pipeline from higher reaches of Doodhganga Stream to Kralpora WTP						
S-N2	Baseline Monitoring (Pre-Construction)	December 23/12/2014	Near Nowhara bridge at Source	Residential area	*47.2*	*55*
	Q3 (July-Sept)	August 24-08-2015	Near Nowhara bridge at Source	Residential	*52.3*	*55*

45. The recorded values of noise quality at Site S-N2 at Nawhara point was well within the permissible level but slightly higher than the baseline monitoring conducted in December 2014. Comparative analysis of S-N2 is illustrated below in Figure 7;

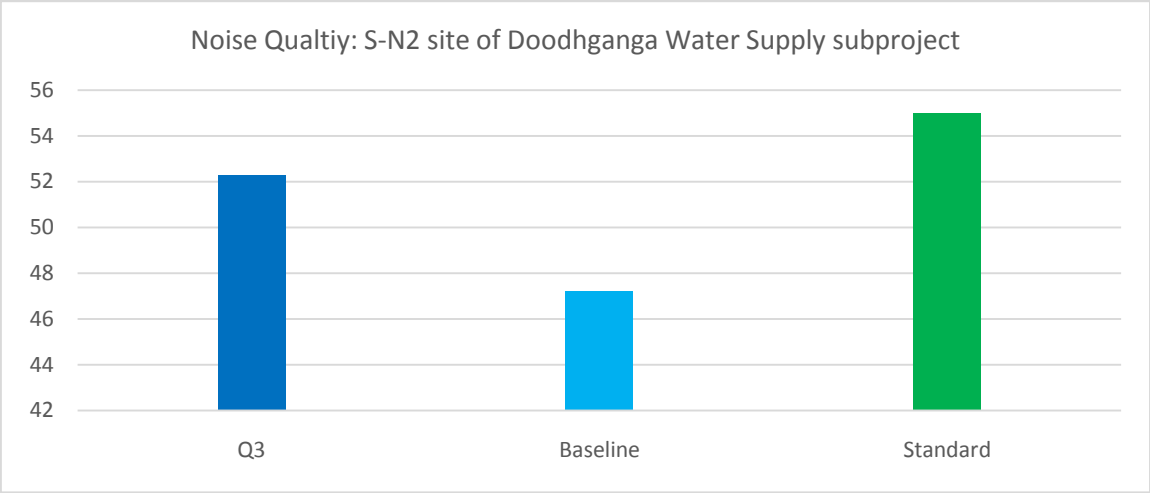


Figure 7: Comparison of day time noise levels observed near Nawhara bridge (tapping point) monitoring site with National noise standards and Baseline monitoring Srinagar.

46. **Table-12:** Construction of New Mehjoor Bridge and 2 Grade Separators in Srinagar City.

Srinagar Subprojects						
Site Code	**Quarter**	**Month of Sampling with date**	**Sampling Site/ Location**	**Site Type**	***Day Time Noise Levels dB (A) Leq***	***Day Time Noise Quality Standards dB (A) L_{eq}***
Construction of New Mehjoor Bridge and 2 Grade Separators in Srinagar City						
S-N3	Baseline Monitoring	July 06/07/2013	Near New Mehjoor Bridge	Residential area	*56.6*	*55*
	Q3 (July-Sept)	September 12-09-2015	Near New Mehjoor Bridge	Residential	*53.3*	*55*
	Q4 (Oct-Dec)	November 03-11-2015	Near New Mehjoor Bridge	Residential	*63.0*	*55*

47. At S-N3 of new Mehjoor bridge, the noise quality level during quarter 3 shows well within the permissible level as NAAQS and baseline monitoring. However during quarter 4 monitoring, noise level was recorded at 63 dB which is mainly attributed to frequent and heavy traffic movement during the monitoring period and partly due to the ongoing construction activity on main road. Since the bund road is a main diversion route used for the Flyover- Jehangir Chowk to Rambagh under Tranche-2. Contractor was instructed for proper maintenance of vehicles and application of mitigation measures so to avoid noise pollution exceeds above levels. Comparative analysis of S-N3 is illustrated below in Figure 8;

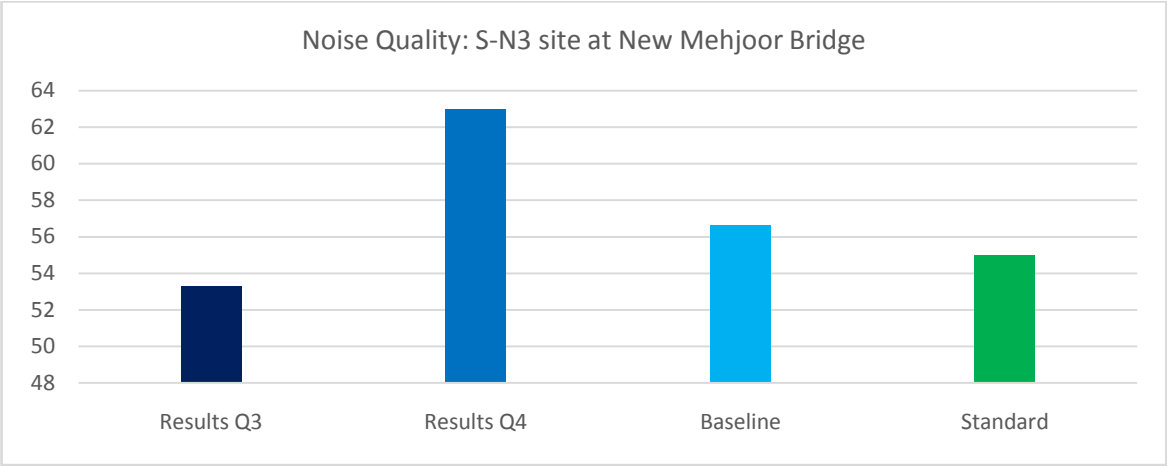


Figure 8: Comparison of day time noise levels observed near new Mehjoor Bridge monitoring site with National noise standards and Baseline monitoring Srinagar.

48. **Table-13:** Noise Quality data of subprojects in Jammu

Noise Quality- Jammu Subprojects (Tranche – 3)						
Site Code	**Quarter**	**Month of Sampling with date**	**Sampling Site/ Location**	**Site Type**	**Noise Levels (dB L_{eq})**	**Standards**
Rehabilitation of water supply pipe network in identified area with zone 2, 3, 4 and 5 in Jammu city						
	Baseline Monitoring	June 17-06-2015	At University Road	*Residential*	75.5	55
S1	Q3	24-09-15	Indira Theatre, Near Puran Nagar	*Residential*	54.99	
S2	Q3	28-09-15	Bhagwati Nagar, near Tawi 4th Bridge	*Residential*	72.10	
S3	Q4	28-11-15	Bhagwati Nagar near Amarnath Yatri Niwas	*Residential*	62.4	
S4	Q4	16-12-15	A.G Office Shakti Nagar	*Residential*	65.3	
Sewerage network Package WW-07						
S5	Q4	30-11-15	Vikas Nagar Sarwal	*Residential*	65.3	55
S6	Q4	15-12-15	Cremation Ground Shakti Nagar	*Residential*	64.0	

49. Monitoring of noise quality/ levels was conducted in both quarters. The observed values at S-2 to S-4 were on higher side, whereas at S-1 site the recorded noise level was within the permissible limits. However, the baseline monitoring results at University road was recorded at 75.5 is higher than the present monitoring. Further, the under package WW-7, the recorded values were also observed on higher side. The higher values are coinciding with the frequent traffic movement on the subproject corridor and partly by machinery engaged by the contractor. This is site and time specific impact and temporary in nature. Corrective measures were

instructed to ensure use of measures so that the present values are not exceeding the baseline monitoring. Comparative analysis of noise quality at S-1 to S-6 are illustrated in below in Figure 9 and 10;

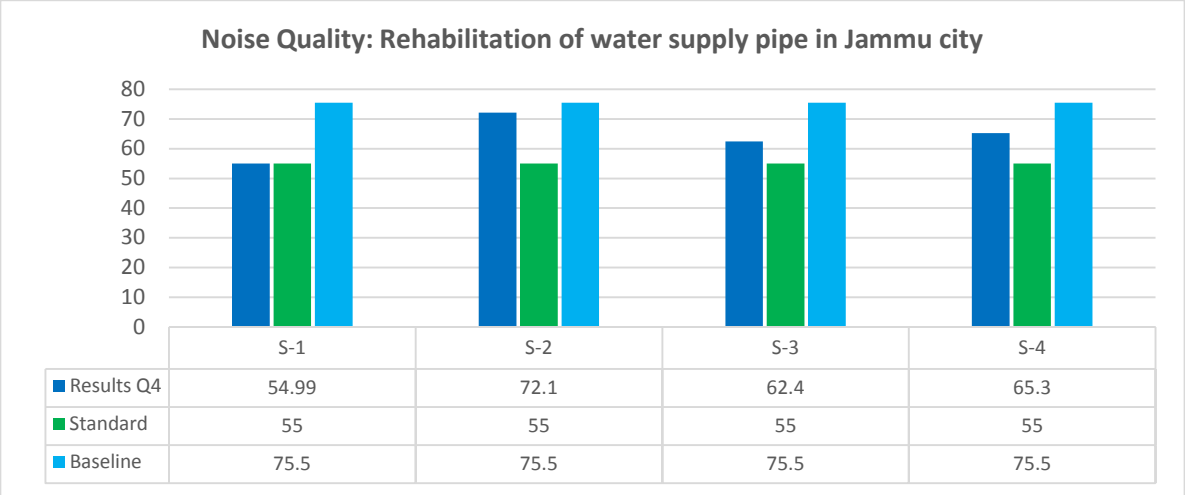


Figure 9: Comparison of day time noise levels observed at S-1 to S-4 with NAAQ standards and Baseline monitoring

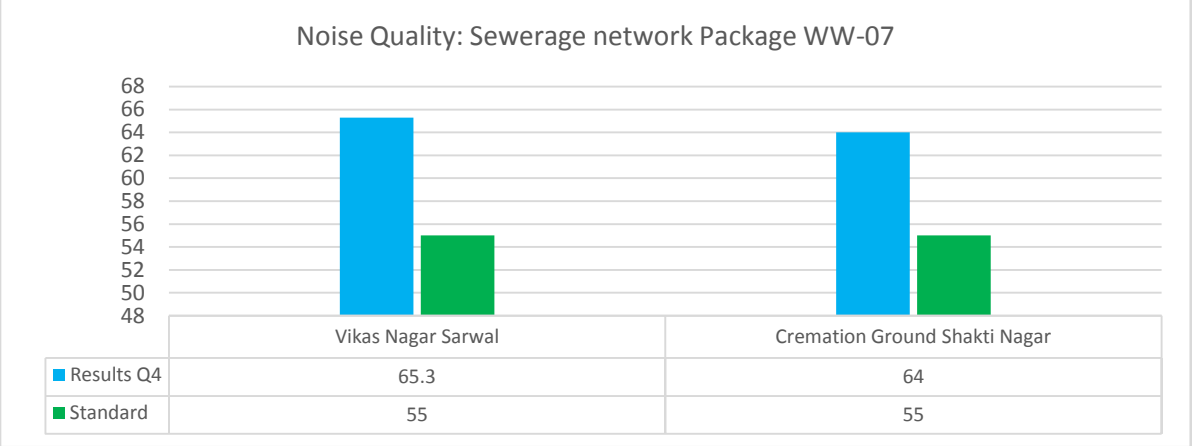


Figure 10: Comparison of day time noise levels observed at S-5 to S-6 with NAAQ standards and Baseline monitoring

C. Water Quality

50. The results of water quality analysis conducted at sites in Srinagar are presented below:

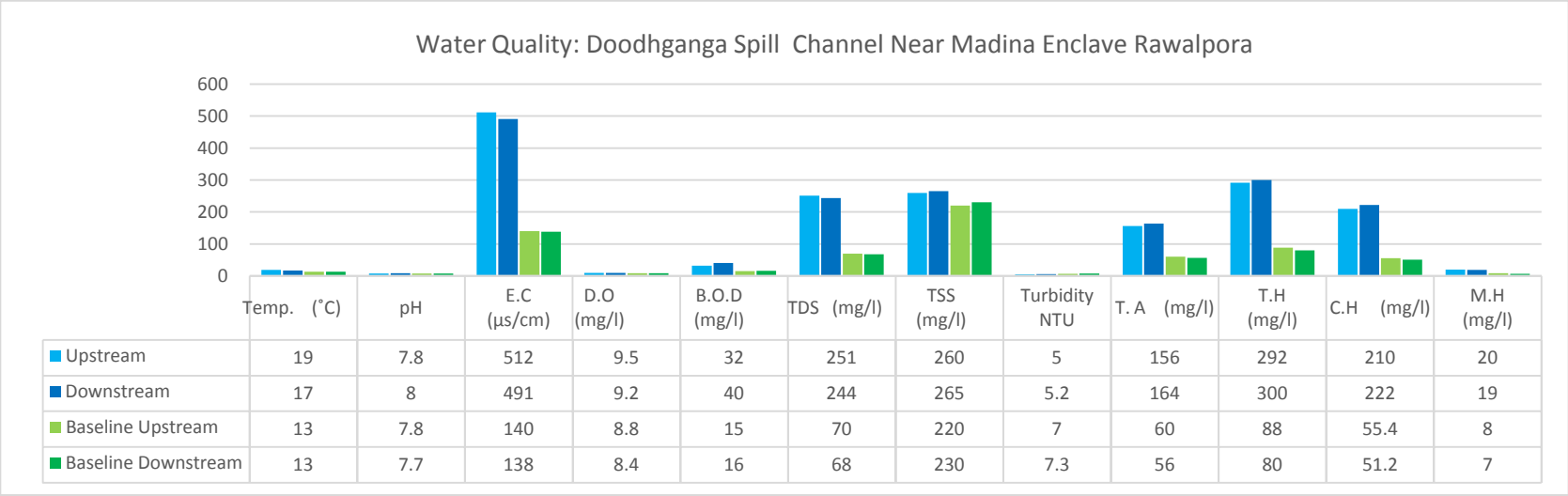
51. **Table-14: Construction of Construction of Storm Water Drainage system for Rawalpora-Channapora area, Srinagar**

Site Code	Quarter	Month of Sampling with date	Sampling Site	Location	Temp ºC	pH	E.C µs/cm	D.O mg/l	B.O.D mg/l	TDS mg/l	TSS mg/l	Turbidity NTU	T.A	T.H	C. H	M.H
					Permissible Limits											
					-	*6.5-8.5*	*≤500*	*>6*	*5*	*≤500*	*≤120*	*5-10*	*200 - 600*	*300 - 600*	*75-200*	*30-75*
	Baseline (Doodhganga Nallah)	Jan-Apr 2013	Doodhganga Nallah near Channpora Bridge	Upstream	10.8	7	212	8.0	5.2	108	100	17.2	The above 4 parameters were not part of the baseline monitoring. These additional parameters included into monitoring in November, 2013			
				Downstream	10.9	7	223	7.6	4.8	100	104	21.4				
	Baseline (Pre-Construction)	June 22.06.2015	Doodhganga Spill Channel near Rawalpora Area	Upstream	13	7.8	140	8.8	15	70	220	7	60	88	55.4	8
				Downstream	13	7.7	138	8.4	16	68	230	7.3	56	80	51.2	7
S-W1	Q3 (July-Sept)	August 20-08-2015	Doodhganga Flood spill channel near Madina Enclave	Upstream	19	7.8	512	9.5	32	251	260	5	156	292	210	20
				Downstream	17	8	491	9.2	40	244	265	5.2	164	300	222	19
S-W2	Q3 (July-Sept)	August 20-08-2015	Doodhganga Flood spill channel near Fair Bank Colony	Upstream	21	7.7	441	10.4	20	224	250	4	184	260	126	32.56
				Downstream	23	7.8	528	10.0	22	263	260	4	200	240	138.6	26.5
S-W3	Q4 (Oct-Dec)	December 23-12-2015	Doodhganga Flood Spill Channel near Rawalpora Area	Upstream	3	7.9	616	9.0	5.0	328	200	2.6	200	440	260	43
				Downstream	3	8.0	632	8.5	6.0	331	220	3.6	200	420	273	37

Annotations: TA- Total Alkalinity; TH- Total Hardness; CH- Calcium Hardness; MH-Magnesium Hardness

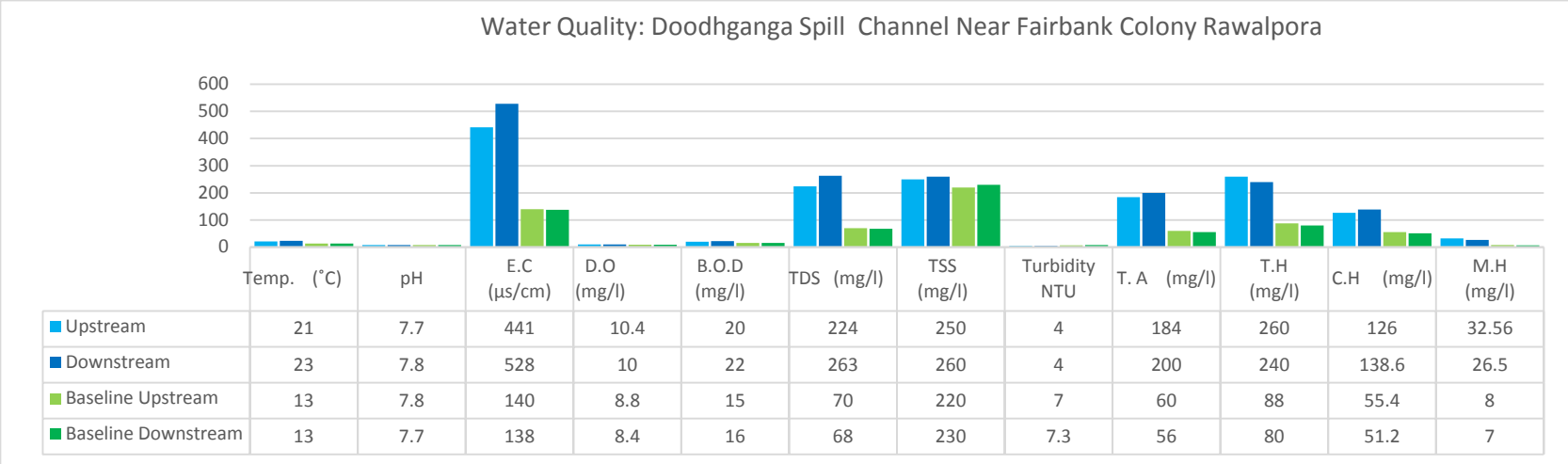
52. Water quality sampling was conducted during Q3 and Q4 period for Doodhganga flood spill channel which is flowing through the Rawalpora area and is in proximity of ongoing works of Storm Water Drainage. The Flood spill channel was was almost stagnant and greenish in colour. It was found to be full of algal (Chlorophyta and Bacillariophyta type) growth. Also in this channel suspended substances and litter was present in good quantity. DO of the spill channel was found in optimum amount due to the presence of algae and availability of direct sunlight.

53. BOD of the Flood Spill channel is high and may be due to the presence of high organic load. Conductivity and TDS values were found to be in normal range. TSS and Turbidity were observed to be higher and it may be due to the presence of lot of litter. Low concentrations of Alkalinity and Hardness were found in the water body. Physio-chemical characteristics of the most parameters are within the permissible levels and in line with baseline characteristics. The higher BOD and TSS values is mainly attributed to number of storm and waste water disposal (both point and non-point source) into spill channel. Water level was minimum during sampling in December.. Comparative analysis of the Doodhganga Floodspill Channel is illustrated in Figure 11 to 13 below;



	Temp. (˚C)	pH	E.C (µs/cm)	D.O (mg/l)	B.O.D (mg/l)	TDS (mg/l)	TSS (mg/l)	Turbidity NTU	T. A (mg/l)	T.H (mg/l)	C.H (mg/l)	M.H (mg/l)
Upstream	19	7.8	512	9.5	32	251	260	5	156	292	210	20
Downstream	17	8	491	9.2	40	244	265	5.2	164	300	222	19
Baseline Upstream	13	7.8	140	8.8	15	70	220	7	60	88	55.4	8
Baseline Downstream	13	7.7	138	8.4	16	68	230	7.3	56	80	51.2	7

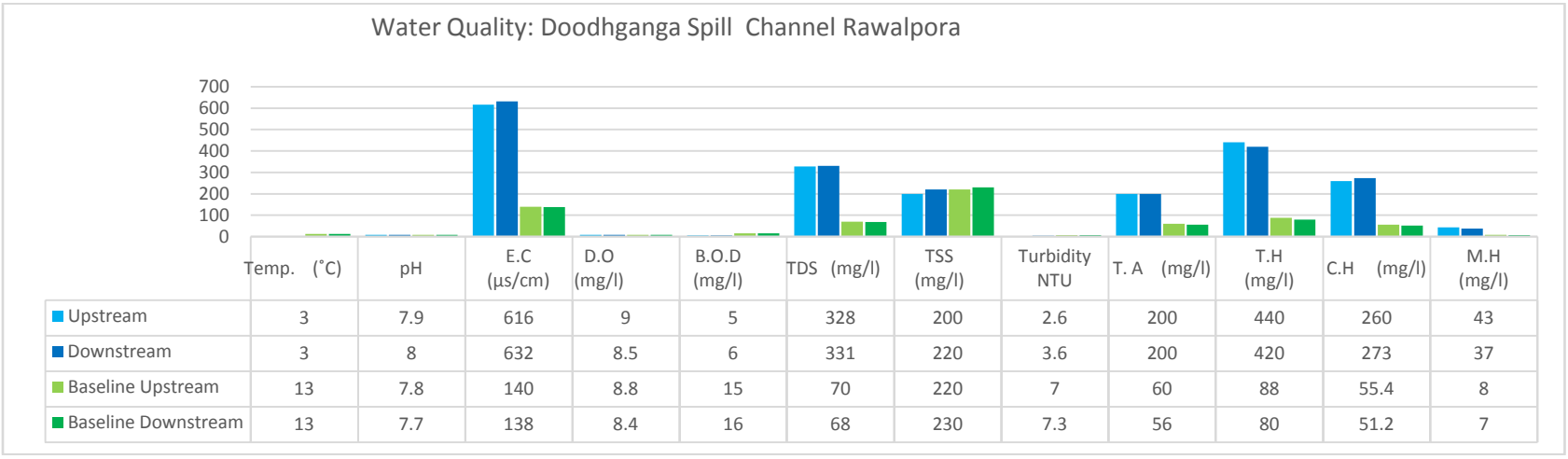
Figure 11: Water quality characteristics of Doodhganga Flood Spill Channel near Madina Enclave S-W1, Srinagar.



	Temp. (˚C)	pH	E.C (µs/cm)	D.O (mg/l)	B.O.D (mg/l)	TDS (mg/l)	TSS (mg/l)	Turbidity NTU	T. A (mg/l)	T.H (mg/l)	C.H (mg/l)	M.H (mg/l)
Upstream	21	7.7	441	10.4	20	224	250	4	184	260	126	32.56
Downstream	23	7.8	528	10	22	263	260	4	200	240	138.6	26.5
Baseline Upstream	13	7.8	140	8.8	15	70	220	7	60	88	55.4	8
Baseline Downstream	13	7.7	138	8.4	16	68	230	7.3	56	80	51.2	7

Figure 12: Water quality characteristics of Doodhganga Flood Spill Channel near Fairbank Colony S-W2, Srinagar.

.



	Temp. (˚C)	pH	E.C (µs/cm)	D.O (mg/l)	B.O.D (mg/l)	TDS (mg/l)	TSS (mg/l)	Turbidity NTU	T. A (mg/l)	T.H (mg/l)	C.H (mg/l)	M.H (mg/l)
Upstream	3	7.9	616	9	5	328	200	2.6	200	440	260	43
Downstream	3	8	632	8.5	6	331	220	3.6	200	420	273	37
Baseline Upstream	13	7.8	140	8.8	15	70	220	7	60	88	55.4	8
Baseline Downstream	13	7.7	138	8.4	16	68	230	7.3	56	80	51.2	7

Figure 13: Water quality characteristics of Doodhganga Flood Spill Channel near Rawalpora Main Area S-W3, Srinagar.

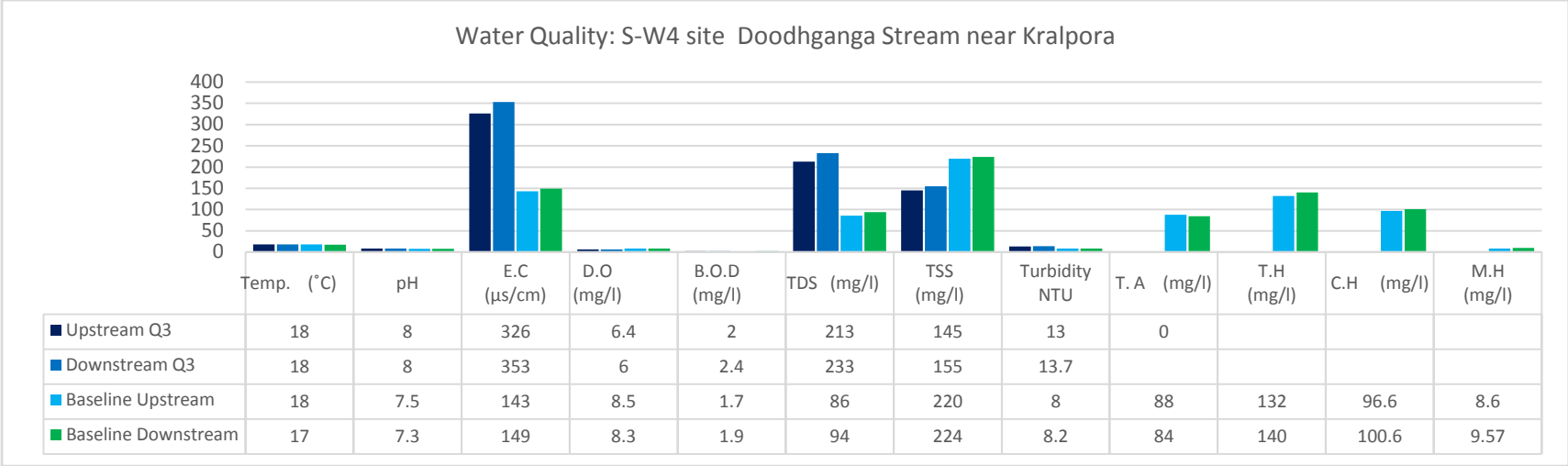
.

.

54. **Table-15:** Laying of Raw WS Pipeline from higher reaches of Doodhganga to WTP Kralpora Srinagar

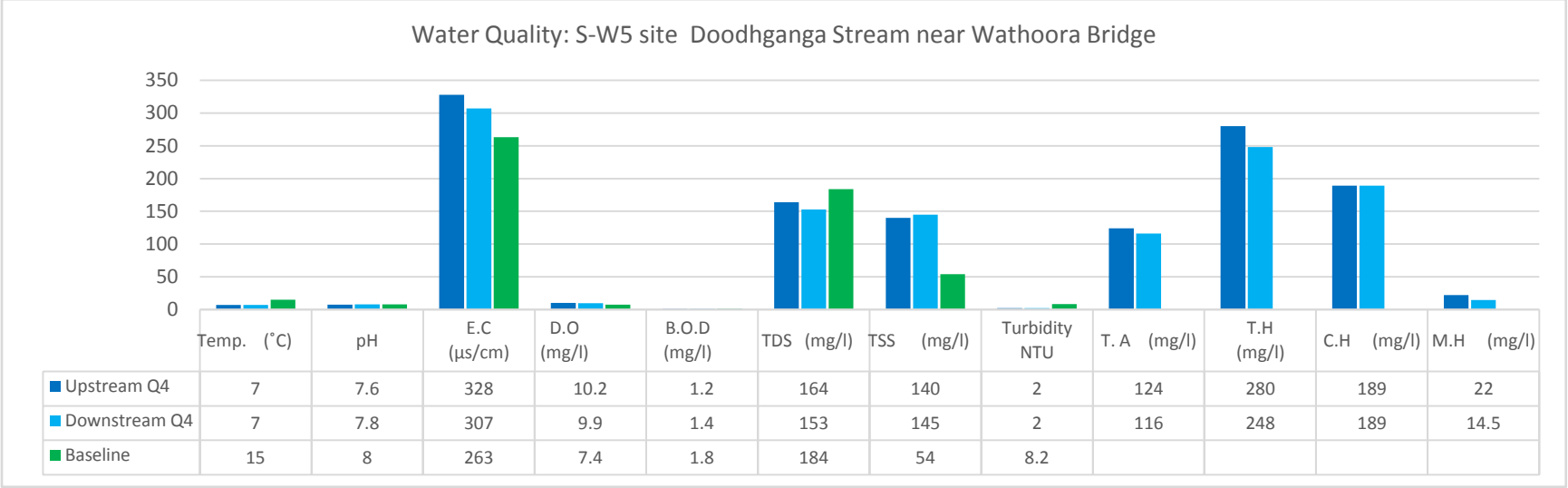
Site Code	Quarter	Month of Sampling with date	Sampling Site	Location	Temp ºC	pH	E.C µs/cm	D.O mg/l	B.O.D mg/l	TDS mg/l	TSS mg/l	Turbidity NTU	T.A	T.H	C. H	M.H
					Permissible Limits											
					-	*6.5-8.5*	*≤500*	*>6*	*5*	*≤500*	*≤120*	*5-10*	*200 - 600*	*300 - 600*	*75-200*	*30-75*
S-W4	Baselin Monitoring	June 21-06-2013	Doodhganga Stream near Kralpora	Upstream	18	8	326	6.4	2	213	145	13	These above parameters were not part of the baseline monitoring, however added in November 2013 onwards.			
				Downstream	18	8	353	6	2.4	233	155	13.7				
	Q3 (July-Sept)	August 03-08-2015	Doodhganga Stream near Kralpora	Upstream	18	7.5	143	8.5	1.7	86	220	8.0	88	132	96.6	8.60
				Downstream	17	7.3	149	8.3	1.9	94	224	8.2	84	140	100.6	9.57
S-W5	Baseline	June 21-06-2013	Doodhganga Stream near Wathoora Bridge	Doodhganga Stream	15	8	263	7.4	1.8	184	54	8.2				
	Q4 (Oct-Dec)	November 23-11-2015	Doodhganga Stream near Wathoora Bridge	Upstream	7	7.6	328	10.2	1.2	164	140	2	124	280	189	22
				Downstream	7	7.8	307	9.9	1.4	153	145	2	116	248	189	14.5

55. During Q3 monitoring, the water samples were collected from the Doodhganga stream near Kralpora. The water in the concerned stream was flowing moderately. The water was observed to be clear and odourless. The present study revealed that Dissolved Oxygen of the concerned stream was found to be healthy due to the moderate flow of the water. BOD was found to be in permissible limits due to the low organic load and healthy (DO). Conductivity, TDS, and pH were found well within permissible limits. Higher values of TSS may be attributed to the turbulent flow of water which brings sediments from the upper reaches. Moderate concentrations of Alkalinity and Hardness were found in the concerned water body.



	Temp. (˚C)	pH	E.C (µs/cm)	D.O (mg/l)	B.O.D (mg/l)	TDS (mg/l)	TSS (mg/l)	Turbidity NTU	T. A (mg/l)	T.H (mg/l)	C.H (mg/l)	M.H (mg/l)
Upstream Q3	18	8	326	6.4	2	213	145	13	0			
Downstream Q3	18	8	353	6	2.4	233	155	13.7				
Baseline Upstream	18	7.5	143	8.5	1.7	86	220	8	88	132	96.6	8.6
Baseline Downstream	17	7.3	149	8.3	1.9	94	224	8.2	84	140	100.6	9.57

Figure 14: Water quality characteristics of Doodhganga Stream near Kralpora Site S-W4 Srinagar.



	Temp. (˚C)	pH	E.C (µs/cm)	D.O (mg/l)	B.O.D (mg/l)	TDS (mg/l)	TSS (mg/l)	Turbidity NTU	T. A (mg/l)	T.H (mg/l)	C.H (mg/l)	M.H (mg/l)
Upstream Q4	7	7.6	328	10.2	1.2	164	140	2	124	280	189	22
Downstream Q4	7	7.8	307	9.9	1.4	153	145	2	116	248	189	14.5
Baseline	15	8	263	7.4	1.8	184	54	8.2				

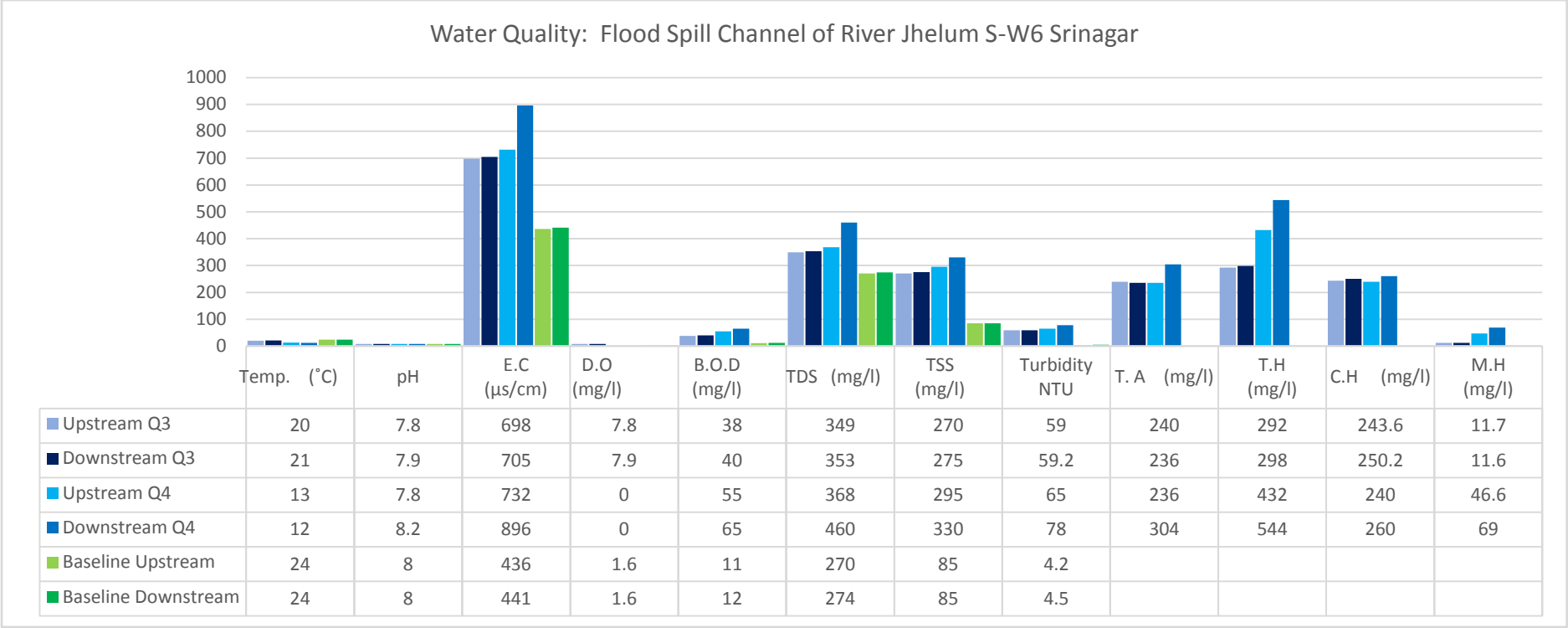
Figure 15: Water quality characteristics of Doodhganga Stream near Wathora Bridge Site S-W5 Srinagar.

56. **Table-16:** Construction of New Mehjoor Bridge and Grade Separator in Srinagar City.

Site Code	Quarter	Month of Sampling with date	Sampling Site	Location	Temp ºC	pH	E.C µs/cm	D.O mg/l	B.O.D mg/l	TDS mg/l	TSS mg/l	Turbidity NTU	T.A	T.H	C. H	M.H
					Permissible Limits											
					-	*6.5-8.5*	*≤500*	*>6*	*5*	*≤500*	*≤120*	*5-10*	*200 - 600*	*300 - 600*	*75-200*	*30-75*
S-W6	Baseline Monitoring	July 06.07.2013	Near Mehjoor Bridge Site	Upstream	24	8	436	1.6	11	270	85	4.2				
				Downstream	24	8	441	1.6	12	274	85	4.5				
	Q3 (July-Sept)	September 09-09-2015	Near Mehjoor Bridge Site	Upstream	20	7.8	698	7.8	38	349	270	59.0	240	292	243.6	11.7
				Downstream	21	7.9	705	7.9	40	353	275	59.2	236	298	250.2	11.6
	Q4 (Oct-Dec)	November 18-11-2015	Near Mehjoor Bridge Site	Upstream	13	7.8	732	BDL	55	368	295	65	236	432	240	46.6
				Downstream	12	8.2	896	BDL	65	460	330	78	304	544	260	69

57. The Water Samples were taken from the upstream and downstream of Jhelum Flood Spill Channel near Mehjoor Bridge during Q3 and Q4 monitoring. This flood spill Channel was almost static and lot of detritus as witnessed during the sampling period. This flood spill channel receives sewage from various sewage pumping stations. Water was found to be turbid greenish in color with fishy odour.

58. The analysis of the Water samples revealed that the DO of the Flood channel was found to be Below Detection Level due to static nature of the Spill Channel and high organic load. BOD values of the flood spill are high and may be due to the presence of high organic load. Conductivity was found to be high due to the discharge of sewage from the pumping stations. pH and TDS were found in permissible limits. High values of TSS and Turbidity may be due to the presence of detritus and litter.



	Temp. (˚C)	pH	E.C (µs/cm)	D.O (mg/l)	B.O.D (mg/l)	TDS (mg/l)	TSS (mg/l)	Turbidity NTU	T. A (mg/l)	T.H (mg/l)	C.H (mg/l)	M.H (mg/l)
Upstream Q3	20	7.8	698	7.8	38	349	270	59	240	292	243.6	11.7
Downstream Q3	21	7.9	705	7.9	40	353	275	59.2	236	298	250.2	11.6
Upstream Q4	13	7.8	732	0	55	368	295	65	236	432	240	46.6
Downstream Q4	12	8.2	896	0	65	460	330	78	304	544	260	69
Baseline Upstream	24	8	436	1.6	11	270	85	4.2				
Baseline Downstream	24	8	441	1.6	12	274	85	4.5				

Figure 16: Water quality characteristics of Floodspill Channel of River Jhelum Site S-W5 Srinagar.

7. ANY OTHER ENVIRONMENTAL ASPECTS, IMPACTS OBSERVED DURING IMPLEMENTATION WHICH WERE NOT COVERED EARLIER

59. During this reporting period no such impact was envisaged.

8. DETAILS OF COMPLAINTS RECEIVED FROM PUBLIC AND ACTIONS TAKEN THEREOF TO RESOLVE

60. No complaint was received during this period in sub-projects being implemented in Jammu.

Table-11: Details of complaints (maintained in Public Grievance Register at site) were received from public relating to ongoing works of Storm Water Drainage works of Rawalpora in Srinagar. All the issues (minor in nature) were resolved on priority basis. Details is given below;

S. No	Subproject Name	Date of compliant registered	Type of Compliant Received (Public Grievance Register at Site)	Action Taken/ Corrective Action Measures	Remarks
01	Construction of Strom Water Drainage System in Rawalpora Area to Channapora Bridge, Srinagar	10-August - 2015	Shopkeepers complained of dust pollution in the vicinity	Dust suppression was done by sprinkling water on the roads with increase in frequency	Issue resolved.
02		27-Oct-2015	Wall damaged because of construction activity	Wall restored	Issue resolved
03		08-Dec -2015	PHE Restoration at Hakeem Bagh	Connection restored on priority basis	Issue resolved

9. FOLLOW-UP ACTIONS AND CONCLUSIONS

61. Site supervision of above sub-project under execution is being carried out regularly to ensure that environmental impacts are adequately mitigated and to ensure continuation of compliance with statutory regulations as required by laws and agreed upon EMP. The contractor is being regularly guided and instructed to adhere to the provisions of EMP under contractual conditions.

62. In Zone-II of Rawalpora Storm Water Drainage Pacakge, additional approved works of drainage (sub main and main) have been included; Qayoom Colony, Fair Bank Colony, Old Rawalpora, Madina Enclave, Mehboobabad, School Enclave and the change in the location of pumping station in Zone-II. The IEE of the package has been revised/ updated on the similar grounds. Since the additional works are part of the same domain area of the subproject and continue to be classified as Category-B.

63. As part of Capacity Building Programme for JKUSDIP subprojects training programs for the engineers, the contractors and project staff will be conducted and regular informal onsite orientation for the contractor's supervisory staff and site engineers on EMP implementation will be continued.

Signed by:
Authorized signatory from implementing agency/ executing agency

(P N Balli)
Director Safeguards
J&K ERA

Appendix-1 Public Consultation (Participants) Details of Rawalpora Storm Water Drainage For Additional Works.

PUBLIC CONSULTATION ATTENDENCE SHEET

JAMMU AND KASHIR URBAN DEVELOPMENT INVESTMENT PROGRAMME (JKUSDIP), J&K ERA

Project Name: Construction of Storm Water Drainage in Rawalpora Area to Chanapora Bridge at NH-1A By-Pass, Srinagar (for proposed additional works in Zone-2)

Location/ Site: Qayoom and Fairbank Colony, School Enclave, Madina Enclave, Mehboobabad, Old Rawalpora area in Zone-2

Date: 8-13 Oct 2015 **Time:** 10.00 am **PC Conducted by:** PMC, J&K ERA JKUSDIP

S. No	Name	Address	Occupation	Signature/ Thumb Impression
1.	Abdul Rehman	Mehboobabad Rawalpora	Govt. Employee	
2.	Manzoor Ah.	Mehboobabad Rawalpora	Private Employee	
3.	Haji Mohd	Mehboobabad Rawalpora	Retd Govt Employee	
4.	Ghulam Mohd Dar	Mehboobabad Rawalpora	Shopkeeper	
5.	Nisar Ah. Khan	Mehboobabad Rawalpora	Tailor Master	
6.	Amir Qayoom	Old Rawalpora	Student	
7.	Gowhar Ah. Baray	Rawalpora	Business	
8.	Tahir Ahmad	Rawalpora	Business	
9.	Riyaz Ah.	Rawalpora	Govt Servant	
10.	Javed Ahmad	Rawalpora	Business	
11.	Mirza Latief	Old Rawalpora	Dr.	
12.	Rafiq Ahmad	Qayoom Colony	Driver	
13.	Abdul Rashid Baray	Qayoom Colony	Farmer	
14.	Bilal Ah. Wani	Qayoom Colony	Business	
15.	Shakeel Khan	Rawalpora / Q.C	Business	

Conducted by: PMC-JKUSDIP

EE, PMC

Appendix-1 Continued…

PUBLIC CONSULTATION ATTENDENCE SHEET
JAMMU AND KASHIR URBAN DEVELOPMENT INVESTMENT PROGRAMME (JKUSDIP), J&K ERA

16.	Ishfaq Ah. Bhat	Dayoo Colony	Business	
17.	Ab. Rehman	Dayoo Colony Athanpora	Business	
18.	Mohd. Yousf	Dayoo Colony	Shopkeeper	
19.	Abdul. Dayoo Wafi	Madeen Lane Kawarpora	Business	
20.	Syed Andrabi	Madeen Lane	Business	
21.	Aaliya Rashid	Madeen Lane Kawarpora	Student	
22.	Sana Khan	Kawarpora Madeen Lane	Student	
23.	Ghulam Nabi Dar	Baribrari bagh colony,	Business	
24.	Abdul Lateef Sofi	Madeen Lane	Business	
25.	Abdul. Majid.	Madeen Lane	Sanitary Shopkeeper	
26.	Mohammad Ali Sofi	Fairbank Colony	Dr —	
27.	Lateef Ah Sofi	"	Business	
28.	Bashir Ah	Fairbank Colony	Ex- Govt Employee	
29.	Mohd. Idrees	Daribagh Bangh.	Business.	13/10/15
30.	Shahid Bashir	School Lane Bandipora	Student	
31.	Arshid Gul Baba	School Lane	Student	

32. Asad Ullah Kuchroo · Retd. AEE School Lane. Hno 12 → Rehm AEE

Environmental safeguards PMC, JKUSDIP

Appendix-2 Public Consultation (Participants) Details of Rawalpora Subproject.

JAMMU AND KASHMIR URBAN DEVELOPMENT INVESTMENT PROGRAMME (JKUSDIP), J&K ERA

LIST OF PARTICIPANTS IN PUBLIC CONSULTATION WITH SIGNATURES

SUB-PROJECT NAME: Const. of Storm water Drainage - Rawalpora

LOCATION OF MEETING/ CONSULTATION: Dayoon colony.

DATE AND TIME: 28/12/2015 - 11:00 am

S.NO	Name	Age/ Sex	Occupation	Address	Signature
1.	Abid Yasin.	M/30	Shopkeeper	Mehboob colony, Rawalpora.	[illegible]
2.	Bashir Ahmad	M/45	Shopkeeper	Mehboob Colony, Rawalpora	[illegible]
3.	Ghulam Moh. Tantray.	M/60	Retd. Govt. Emp.	Rawalpora.	[illegible]
4.	Ghulam Mohd Tantray	M/68	Retd. Govt. Emp.	Rawalpora	[illegible]
5.	Haji Ali Mohd. Dar	M/65	Shopkeeper	Dayoon Colony.	[illegible]
6.	Haji Abdul Dayoon Dar	M/6[illegible]	Shopkeeper.	Dayoon colony.	[illegible]
7.	Shahid Saleem.	M/20	Student	Dayoon Colony	[illegible]
8.	Nighat Jabeen	F/42	House wife.	Madina Enclave.	[illegible]
9.	Ab-Hameed	M/45	Contractor	Madina Enclave	[illegible]
10.	Haleema Bhat	F/50	House wife	Rawalpora,	[illegible]
	[illegible]	[illegible]/22	Student	Rawalpora,	[illegible]

Conducted by: PMC - JKUSDIP.

[illegible] Env Expert - PMC

Appendix-3 Public Consultation (Participants) Details of New Mehjoor Bridge Subproject.

JAMMU AND KASHMIR URBAN DEVELOPMENT INVESTMENT PROGRAMME (JKUSDIP), J&K ERA

LIST OF PARTICIPANTS IN PUBLIC CONSULTATION WITH SIGNATURES

SUB-PROJECT NAME: CONST. OF NEW MEHJOOR BRIDGE/GS.

LOCATION OF MEETING/ CONSULTATION: Jawahar Nagar side

DATE AND TIME: 11:30 a.m – 28/12/2015.

S.NO	Name	Age/ Sex	Occupation	Address	Signature
1.	Yasir Basit	M/37	Contractor	Tengpora -	[signature]
2.	Imran Hayat	M/26	Student	Iqbal Park	Imran
3.	Rizwana Nabi	F/39	House wife.	Kursoo Padshahi Bagh.	R. [signature]
4.	Abdul Ahad Kathim	M/70	-	Padshahi Bagh	
5.	Abdul Ahad.	M/66	Ltd. Govt. Employee.	Padshahi Bagh	[signature]
6.	Sara Mir	F/60	House. wife.	Mehjoor Nagar. Mehboob Colony.	
7.	Ghulam Nabi Dar.	M/39	Shopkeeper. Cement Shop.	Padshahi Bagh.	[signature]
8.	Amir Ali	M/25	Shopkeeper	Mehjoor Nagar	[signature]
9.	Gh. Mohammad.	M/58	Business	Lalbagh.	[signature]
10.	Ali. Mohammad Khan.	M/67	Ex. Employee	Jawahar Nagar	[signature]

Attach additional sheets if required.......

Conducted by: PMC – JKUSDIP.

[signature] Env. Expert, PMC.

Appendix-4 Public Consultation (Participants) Details of Sewerage/ WS Subproject Jammu.

JAMMU AND KASHMIR URBAN DEVELOPMENT INVESTMENT PROGRAMME (JKUSDIP), J&K ERA

LIST OF PARTICIPANTS IN PUBLIC CONSULTATION WITH SIGNATURES

SUB-PROJECT NAME: Const. of Sewerage system / Water Supply.

LOCATION OF MEETING/ CONSULTATION: Shiv Nagar, Rajpura, Jammu.

DATE AND TIME: 30th, Dec 2015 Shanti Nagar

S.NO	Name	Age/ Sex	Occupation	Address	Signature
1.	Darshan Kumar	37/M	Asst. Optom.	Shiv Nagar	
2.	Pawan Kumar Verma.	37/M	Optom	Rajpura	
3.	Otar Sharma	38/M	Shop.	Rajpura Lane-37	
4.	Abhishek Bali	29/M	Student	Mark, Jammu.	
5.	Satish Kumar	57/M.	Shop. Mngr	Rajpura.	
6.	Mamta Sharma.	35/F	House wife.	Shiv Nagar.	
7.	Pawan Sharma	25/M	Job - Brother	~~Shiv~~ Shanti Nagar	
8.	Ruchi Gupta	21/F	Medical Shop.	Shanti Nagar	Ruchi
9.	Vijay Kumar	54/M	Sales Mn.	Shanti Nagar	
10.	Kali dass Sharma	49/M	Vegetable vendor	Vikram Nagar. Sainik.	

Attach additional sheets if required.....

Conducted by: PMC-JKUSDIP

EE, PMC

Appendix -5 Public Consultation Photos at different locations of Rawalpora (Storm Water Drainage System)

Qayoom Colony and Old Rawalpora Area.

Mehboobabad Area

Fairbank Colony and Madina Enclave Area

School Enclave Area

Appendix-6: Photos of Public Consultation of Mehjoor bridge Site





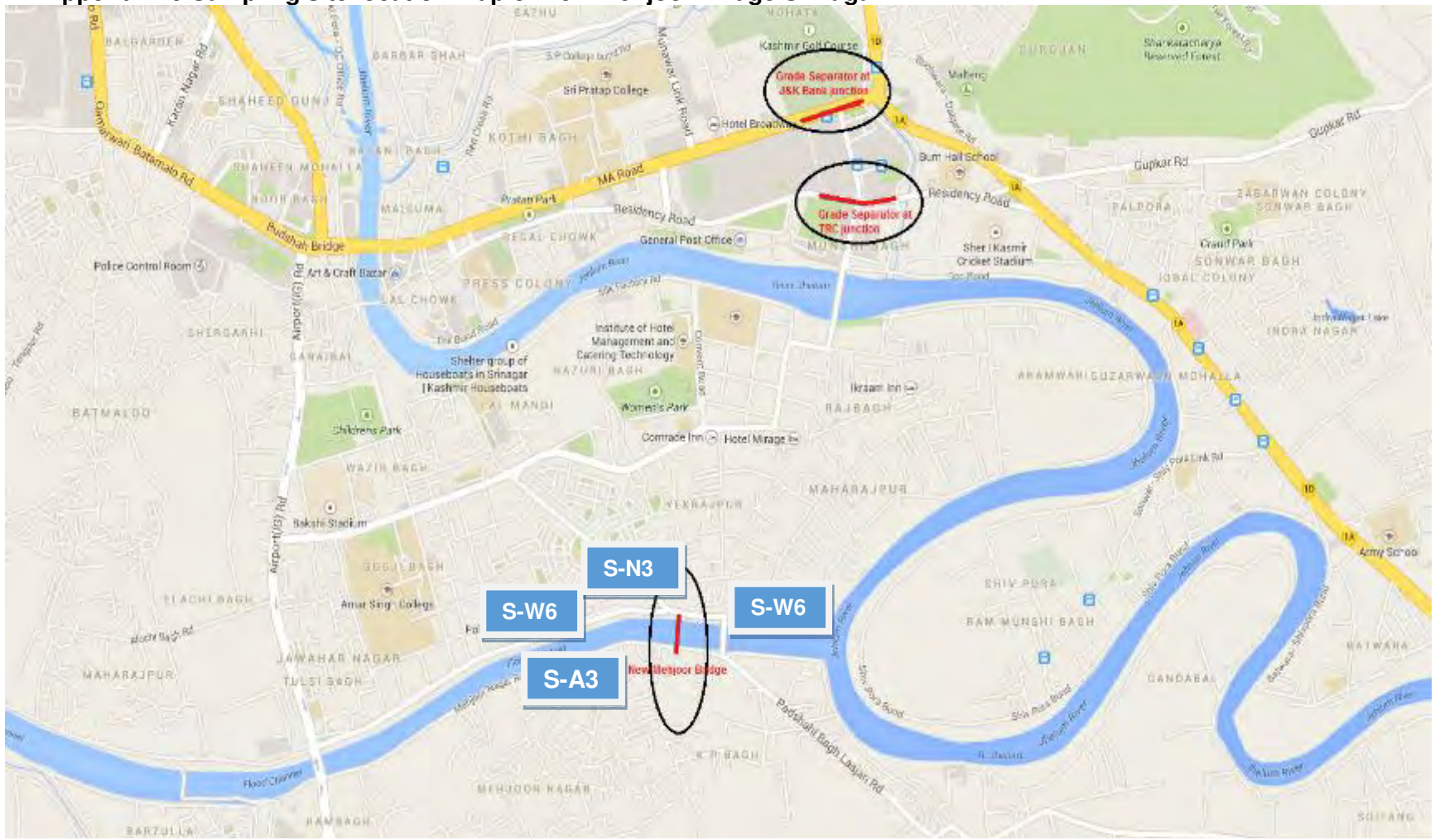

Appendix-7 Photos of Public Consultation of Jammu Subprojects.



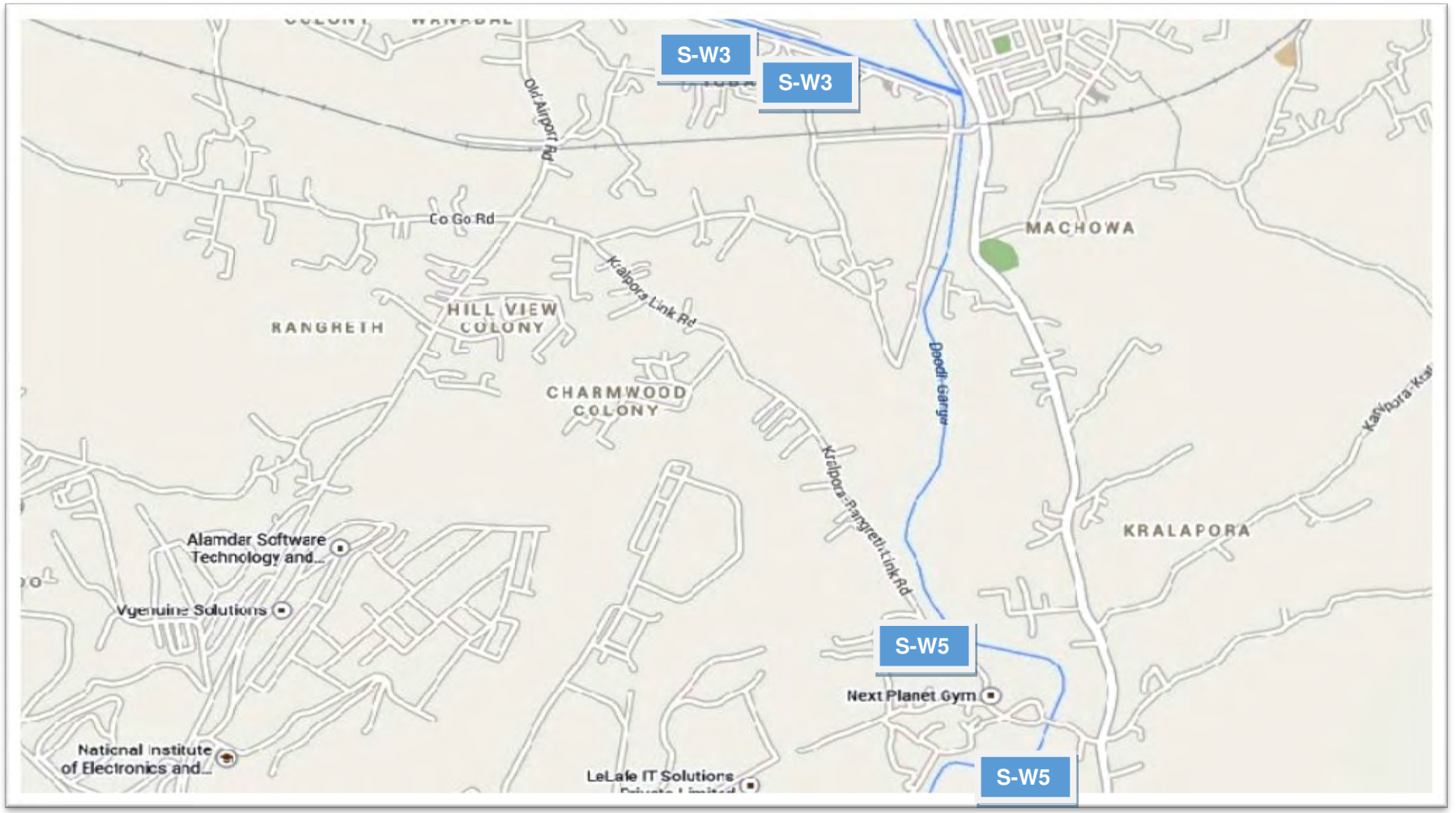



Appendix-8 : Sampling site location map of Surface Water Drainage at Rawalpora Srinagar

Appendix- 9 Sampling site location map of New Mehjoor Bridge Srinagar



Appendix-10 Sampling site location map of Doodhganga Water Supply Subproject Srinagar



Appendix-11: Sampling site location map of Multilevel parking and Rehabilitation of Water Supply Network.