

# Initial Environmental Examination

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## NEP: Kathmandu Valley Wastewater Management Project – Dhobighat (PART B)

Package No: KUKL/WW/TP-03

Prepared by the Project Implementation Directorate, Kathmandu Upatyaka Khanepani Limited, Ministry of Water Supply, Government of Nepal for the Asian Development Bank.

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Impacts Project Activities	Management Plan					
Impacts due to	Mitigating Measures	Parameters to be monitored	Measurements	Location	Frequency	Responsibility
Waste management	Store all materials, toxic, non-toxic and hazardous materials in safe place (warehouse). Collect, segregate and dispose waste at designated areas	Waste management plan Log of collection and disposal of waste from the site	Check amount of solid waste generated and if solid waste management is carried out efficiently. Audit of waste management plans; inspection of disposal areas/site plan drawings, photographs etc.	Project site	During the construction period	Contractor
Vegetation Clearance	Provide LPG/kerosene to workforce. Stockpile the felled trees and take permission from concerned authority for its use Plant and rear tree saplings at the rate of 25 saplings for each felled tree.	Cutting of only the specified and marked trees; use of timber and wood; availability of LPG/kerosene; plantation @ 25 tree saplings per cut tree Permits for tree felling and its use	Check records of trees cut and planted; whether LPG/kerosene is available in camp sites. Photographs, expiry date of permits and number of permits etc.	Project Site	Regularly	Contractor
Damaged infrastructures and services	Reinstate/relocate community assets that are disturbed such as irrigation canals, electricity poles, telephone lines, drinking water pipes, sewerage lines, roads, etc. to the a standard as before and/ or better.	Reinstatement of structurally damaged infrastructures like temples, bridges, irrigation channels, electricity poles, telephone lines, drinking water pipes, sewers, access roads, cracks in buildings etc.	Field observation to visually assess if disturbed community assets are reinstated. Design drawings and technical specifications showing areas for potential reinstatement, photographs before and after construction in sensitive areas etc.; emergency response plans	Project Site	Once construction in the area is over.	Contractor
Crime and community	Prohibit gambling and alcohol consumption in camp sites.	Restoration of social harmony	Crime records and causes; camp issues;	Project Location	Once a month	Contractor

Impacts Project Activities	Management Plan					
Impacts due to	Mitigating Measures	Parameters to be monitored	Measurements	Location	Frequency	Responsibility
stress	Instruct the outside workforce to respect the local cultures, traditions, rights etc. Provide security in camps	Awareness program.  Workers/ Staff conduct policy	enforcement of remedies; security situation in camps.  Audit of staff/ workers conduct policy		Once a month	
Health and hygiene	Provide regular health check-ups, sanitation and hygiene, training in community health and safety, OHS measures, health care, and control of epidemic diseases to the workforce. Launch awareness programs concerning human trafficking and the possibility of spread of STDs and HIV/AIDS using brochures, posters, and signboards. Make available first aid kits, ambulance and fire extinguishers in camp sites.	The use of safety equipment by workforce The provision of health measures and training Awareness program Signs and posters Compensation for health	Health records; records of outbreak of diseases; maintenance of health clinic; health complaints; number of awareness programs launched; number of persons trained.	Project Site	Every week	Contractor
Archaeological and cultural heritage sites	Protect archaeological and cultural heritage sites: In case of relocation, consult the local community Inform the Chief District Officer ( in case of chance finds) who has to report the findings in writing to the Department of Archaeology within 35 days, according to the Ancient Monuments Protection Act, 1956 and Rules, 1989. Use manual labour for digging trenches and avoid heavy equipment and pneumatic drills.	Surveys and discussion with local residents and community Notification to CDO and Department of Archaeology before works are to begin Availability of workers and equipment to undertake the works	Field observation of archaeological and cultural sites and number of chance finds to authorities. No. of notifications sent and meeting minutes/ letters of correspondence Design and technical specification documents specifying requirements. No of workers available etc.	Project site	Every month	Contractor
Traffic Management	Develop a traffic plan to minimize traffic flow interference from construction activities. Advance local public notification of	Working schedules and traffic plans. Information about	Visual observation of traffic; complaints from travellers and locals;	Project site	Every week	Contractor

Impacts Project Activities	Management Plan					
Impacts due to	Mitigating Measures	Parameters to be monitored	Measurements	Location	Frequency	Responsibility
	<p>construction activities, schedule, routing, and affected areas including road closures.</p> <p>Erect signage in Nepali and English languages.</p> <p>Use of steel plates or other temporary across trench facilities in key areas such as foot trails or livestock routes; arrange for pedestrian access and sidewalks and parking areas.</p> <p>Arrange for night-time construction for activities in congested/ heavy day-time traffic areas.</p> <p>Undertake trench closure and facilitate rehabilitation as quickly as feasible.</p>	<p>construction schedule to the local people</p>	<p>existence of signage and effectiveness of speed control and diversion measures.</p>			
<b>Operation Phase</b>						
Discharge of industrial wastes to WW treatment System	<p>Train workers in OHS hazards and provide PPE; monitor illegal discharge of industrial wastes to the system and enforce strict regulations in coordination with the Ministry of Environment, Science and Technology</p>	<p>Observation; implementation of training plans, OHS policy, implementation of trade waste policy. Monitoring at the inlet of WWTPs for electrical conductivity and DO using online instrumentation.</p>	<p>Visual observation, audit of training plan, OHS policy and trade waste policy.</p> <p>EC (for electrical conductivity), mg/L (for DO)</p>	Nearby Industries	Once a month	Contractor
Wastewater release	<p>Treat wastewater to meet the effluent standards before releasing it to natural surface resources; regular monitoring the quality of the</p>	<p>Quality of treated wastewater that will be released to river</p>	<p>Influent BOD/COD, pH, TSS, T, heavy metals; effluent BOD/COD, pH,</p>	At the WWTP outlet and downstream of	Regularly during operation	Contractor

Impacts Project Activities	Management Plan					
Impacts due to	Mitigating Measures	Parameters to be monitored	Measurements	Location	Frequency	Responsibility
	treated wastewater and that of the receiving water.	(TSS, BOD <sub>5</sub> , and heavy metals in mg/l; pH, T (°C) as mentioned in Annex 3)	TSS and heavy metals; stream water quality (TSS, T, BOD/COD, pH)	wastewater release	(fortnightly)	
Overflow flooding	Careful operation of wastewater system according to the Operation Manual and HACCP; provide stand-by generators for pumping stations. To ensure O&M, training of operators to be provided for regular inspection, cleaning and maintenance of plant and sewers.	Standby generators in operating conditions with sufficient fuel (the diesel generator is the second backup power. The first is the power generated from the digestion plant. The constant source of electricity supply, if available will also be used). Emergency response procedures have to be developed and implemented. Operation and maintenance schedules Trainings conducted	Visual observation Audit of O&M manual, schedules, HACCP plans. No of incident reports	Treatment plants	Once a month	Contractor
Health and safety	Provide trainings to workers on OHS	Number of trainings given	Quizzes and interviews, audit of OHS policy, number of workers participated etc.	Plant sites	Once a month	Contractor

## **C. Implementation Arrangements**

### **1. Environmental Procedures and Institutions**

217. The Ministry of Forest and Environment (MoFE) is in charge of environmental control and management for all sector agencies. The Ministry of Water Supply (MoWS) has the overall responsibility for environmental monitoring of all water supply. In case of an EIA, it has to be finally approved by MoFE. In case of an Initial Environmental Examination (IEE), the final approval lies with MoWS.

218. The MoWS will be the executing agency responsible for overall strategic planning, guidance, and management of the project, and for ensuring compliance with loan covenants. As part of institutional reforms under the ongoing loans, three water and wastewater organizations were created - Kathmandu Valley Water Supply Management Board (KVWSMB), the asset owner; KUKL, the asset operator and service provider; and Water Supply Tariff Fixation Commission (WSTFC), the regulator. KVWSMB will continue to discharge its responsibilities as asset owner of water supply and wastewater systems and monitoring of performance of KUKL as provided in the lease and license agreement between KVWSMB and KUKL. KUKL will be the implementing agency, and the existing PID in KUKL will be responsible for (i) project planning, implementation, monitoring, and supervision; (ii) reporting to KUKL Board of Directors, MoWS, and ADB; and (iii) coordination of all activities. The experience of PID, KUKL in implementing Kathmandu Valley Water Supply Improvement Project (ADB 2776-NEP) will be useful in taking advance actions for the Project.

Some clearances are required to be taken before the Project commences:

219. • In the forest regulations, if the project "will result in clear cutting of national forest" or "falls within protected area". The Forest Act, 1993 Article 68 mentions that in order to implement any project with "priority status" and "with no other alternatives than to use the forest", "only in such situation and conditioned that there will not be any adverse environmental effect by implementing such schemes", the Government of Nepal may give permission to use some part of forest (organized forest/conserved forest/community forest/lease hold forest) to implement such projects. The Ministry of Forests and Soil Conservation (2009) also requires that all the costs related to the clearing off the forest, its transportation to the approved location and works related to environmental mitigation shall be borne by the project itself. It is mandatory to plant 25 saplings for every tree cut and maintain/nurture them for 5 years. If the proponent cannot nurture the saplings, the proponent will provide the total cost involved to the National Parks and Wildlife who shall rear/nurture the saplings for 5 years. If during the detailed design, it is found that tree cutting is unavoidable, then the above procedures will be followed. However, the proposed sewer alignments do not fall under any national and government forest area, conservation area, protected area and national parks. Similarly, the proposed treatment plants area also does not fall under any such protected and conservation area. All the lands of treatment plants belong to the project and no any private land parcels are existed within the boundary of those treatment plants. Some of the trees existed within the boundary shall be considered as private trees and the project will provide appointed contractor to cut the required trees in piecemeal basis. The contractor will be responsible to plant tree saplings in the ratio of 1:25 and will also be responsible to protect it at least for 5 years.

Table 0-II: Institutional/organizational responsibilities in environmental monitoring

Organization	Roles and Responsibilities		
	Pre- construction phase	Construction phase	Operation phase
Ministry of Water Supply and Sanitation (MoWS)	<ul style="list-style-type: none"> <li>• Review IEE document and submit to donors; approve IEE report,</li> <li>• review design and tender documents in order to examine whether or not mitigation prescriptions are included and instruct KUKL.</li> </ul>	<ul style="list-style-type: none"> <li>• review EMP Report               <ul style="list-style-type: none"> <li>(i) to ensure EMP implementation</li> <li>(ii) effectiveness of the implementation measures and</li> <li>(iii) compliance</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• review bi-annual monitoring reports, and</li> <li>• annual site inspection.</li> </ul>
Kathmandu Valley Water Supply Management Board (KVWSMB)/ Kathmandu Upatyaka Khanepani Limited (KUKL) and Projection Implementation Directorate (PID)	<ul style="list-style-type: none"> <li>• review final design and tender documents and forward them to MoWS,</li> <li>• instruct PID to update RAP and get it approved,</li> <li>• establish 'Safeguard Unit/Utility Management Coordination Subcommittee /appoint Design and Supervision Consultant (DSC)</li> <li>• obtain all necessary permissions and permits, notify, carry out land acquisition (if required), and crop compensation evaluation</li> <li>• select contractor, award and</li> </ul>	<ul style="list-style-type: none"> <li>• conduct frontline monitoring on mitigation implementation               <ul style="list-style-type: none"> <li>(i) effectiveness</li> <li>(ii) enhancement programs</li> <li>(iii) appoint monitoring team</li> <li>(iv) ensure public participation</li> <li>(v) RAP implementation</li> <li>(vi) environmental compliance and</li> <li>(vii) prepare quality monitoring report to submit to MoWS .</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• ensure smooth operation of water supply and sewerage systems</li> </ul>
Design and Supervision Consultant (DSC)	<ul style="list-style-type: none"> <li>• incorporate all provisions of EMP in the final design,</li> <li>• incorporate all mitigation measures in the tender documents,</li> <li>• assist in site inspection during land intake, and</li> <li>• Baseline monitoring of air and receiving water quality, noise level and vibrations and overall environmental status of the project area.</li> </ul>	<ul style="list-style-type: none"> <li>• approval of construction works</li> <li>• monitoring of the contractor's performance on EMP implementation/ mitigation effectiveness / impact monitoring</li> <li>• labour employment as per regulations</li> <li>• instruct contractor for corrective actions</li> <li>• impose fine/or null payment in case of noncompliance and</li> <li>• prepare monthly monitoring report/ participate in inspection</li> <li>• periodic monitoring of air quality, receiving water quality and noise and vibration levels at the project area</li> <li>• monitoring of impacts on physical, biological and</li> </ul>	

<p>Construction Contractor</p>	<ul style="list-style-type: none"> <li>• prepare EMEP for contracts,</li> <li>• select temporary land use sites, and</li> <li>• assist the supervising engineer in joint site inspection of KVWSMB/ KUKL for approval.</li> </ul>	<ul style="list-style-type: none"> <li>• get permission to start work from DSC</li> <li>• ensure that all prescriptions of EMP are included in the work activities               <ul style="list-style-type: none"> <li>• ensure employment opportunities for the locals and maintain records of employment, and submit to the</li> </ul> </li> <li>Supervising Engineer               <ul style="list-style-type: none"> <li>• carry out corrective measures as recommended by DSC</li> </ul> </li> <li>• participate in monitoring and inspection</li> <li>• prepare an operational manual to submit to DSC               <ul style="list-style-type: none"> <li>• provide training to the monitoring personnel, and</li> </ul> </li> <li>• submit monthly reports on EMP compliance to DSC.</li> </ul>	
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## **2. Monitoring and Reporting Procedures**

220. The Construction Contractor should develop a construction environmental management plan (CEMP) based on the EMP. The CEMP should be approved by PID/KUKL and DSC. Contractors are to submit monthly CEMP implementation status reports to DSC. DSC should submit quarterly reports to PID which should be reviewed by the Safeguard Unit of PID. PID should submit semi-annual monitoring reports to ADB in a similar format provided in Annex 13. The reporting system should be based on site supervision to see whether mitigation measures are carried out according to the Monitoring Plan. DSC is responsible for checking the monthly progress reports submitted by the Contractor and field verified whether or not the Contractor has complied with the approved conditions as stated in the CEMP.
221. DSC should then prepare a quarterly environmental monitoring report based on the monthly report submitted by the Contractor and submit to PID/KUKL for review. The report is developed based on field inspection, investigation, consultation and information given in the monitoring report. 10 copies of the reports should be submitted to PID/KUKL every month, which should be distributed to the responsible agencies for review. The Environmental Specialist of DSC should then review the comments and suggestions from the various authorities and act accordingly.
222. Monthly progress reports, including bi-annual and annual reports on the implementation of EMP should be produced on a regular basis. The monthly progress report should contain information on the works carried out and the results of all monitoring and investigation works performed during that particular month. The report should also include cases of compliance and non-compliance and the corresponding further mitigation measures to be adopted to correct the non-compliances and also include the outcome of the monitoring, important issues identified and the measures to be undertaken to ameliorate them.

### **D. Environmental Management and Monitoring Cost**

223. The EMP will be incorporated into the bidding and contract documents and the contractors will make available a budget for all such environmental mitigation measures.
224. A domestic Community Awareness and Safeguard Support Consultant (CASSC) firm will facilitate community awareness and participation programs over the 5-year period. The cost for the public awareness specialist, support team, and IEC (Information, Education and Communication) materials has been estimated as \$600,000.
225. The Contractors and their supervisory staff should be made aware on the importance of meeting environmental safeguard standards in the contracts, and the importance of preparing, submitting and getting the Environmental Mitigation Execution Plan (EMEP) (to be prepared for each subproject, according to the EMP) approved before construction starts. A one-day orientation program has been estimated at \$ 4,000. The orientation program will consist of (i) environmental issues in WWTP construction, (ii) implementation of mitigation measures, (iii) monitoring of implementation and (iv) preparation of the Environmental Mitigation Execution Plan.
226. Costs for the operation and maintenance phase trainings of KUKL staff, including monthly monitoring of influent and effluent wastewater quality of the WWTP, noise and air quality will be included in the WWTP construction contract for 5 years.
227. All the costs related to cutting of trees (if there are any and which will be known once the final alignment of the pipelines have been fixed by DSC), their transportation to an approved location and works related to environmental mitigation shall be borne by the project itself. The new sewers will be laid so as to avoid the cutting of trees. If during the detailed design, it is found that tree cutting is unavoidable, it is mandatory to plant 25 saplings for every tree cut and maintain them for 5 years.

The annual and total environmental cost for 5 years is given in Table 0-III.

Table 0-III: Total estimated cost included in BOQ to enhance safety and environment

	<b>Plants to be supplied by contractor for safety</b>				
sn.	Description	unit	quantity	figure in NRP	figure in USD
1	Safety Equipment (Fire Extinguisher etc)	lot	1	447,630.32	32,167.68
2	Fire Alarm System	lot	1	200,830.82	14432.11
			<b>A</b>	<b>648,461.14</b>	<b>46,599.79</b>
	<b>Operation and Maintenance for 5 years</b>				
sn.	Description	unit	quantity	figure in NRP	figure in USD
1	1st year safety and health	lot	1	129,150.00	2,947.50
2	2nd year safety and health	lot	1	138,190.50	3,153.80
3	3rd year safety and health	lot	1	147,863.80	3,374.60
4	4th year safety and health	lot	1	158,214.30	3,610.80
5	5th year safety and health	lot	1	1,692,889.30	3,863.60
				2,266,307.90	16,950.30
			<b>B</b>	<b>2,266,307.90</b>	<b>16,950.30</b>
1	Provisional Sum (Training and capacity Development)	LS		21,000,000.00	400,000.00
	Total		<b>C</b>	<b>21,000,000.00</b>	<b>400,000.00</b>
	<b>All total</b>		<b>A+B+C</b>	<b>23,914,769.04</b>	<b>463,550.09</b>

## **IX CONCLUSIONS AND RECOMMENDATIONS**

228. Overall the impacts of the Project will be very positive, benefitting the environment and the people. Some impacts are anticipated during implementation but in specific areas and for short duration (dust, noise, traffic problems, erosion, sedimentation etc.). It is expected that the adverse environmental impacts of the planned project for will in general not be significant and can be reduced and/ or prevented through mitigation measures and regular monitoring during the design, construction and operation phases.

229. This IEE is updated for Dhobighat waste water treatment plant facility where new waste water treatment plants will be established. The project will contribute significantly to the improvement of the health and quality of life of the people due to the wastewater improvements in Kathmandu Valley.

230. The project is unlikely to cause significant adverse impacts. The potential adverse impacts 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 as detailed in the EMP.

231. Based on the findings of the IEE, the classification of the project as category - B is confirmed, and no further special study or detailed EIA needs to be undertaken to comply with ADB SPS (2009).

### Appendix 1: Rapid Environmental Assessment (REA) Checklist

#### Kathmandu Valley Wastewater Management Project

1. The Kathmandu Valley Wastewater Management Project (KVWMP) will support the ongoing efforts of the Government of Nepal toward improving the wastewater services in Kathmandu Valley.

2. The proposed infrastructure components of this project includes (i) rehabilitation and expansion of sewerage network including property connections; (ii) rehabilitation and construction of interceptors along the streams; (iii) rehabilitation and construction of 5 wastewater treatment plants of 90.5 MLD capacity; and (iv) energy generation of approximately 910 KW through sludge digestion and gasification, etc.

3. **Categorization (Environment)** - Category B. No significant impacts. Potential impacts are site specific, few if any of them are irreversible, and in most cases mitigation measures can be designed readily. An IEE with EMP was prepared.

Screening Questions	Yes	No	Remarks
<b>B. Project Siting</b> Is the project area...			
a) Densely populated?	x		Rehabilitation of sewerage network will be in urban areas. Extension of interceptors will be in non-populated areas. WWTPs will be rehabilitated/ constructed in existing sites owned by the Government.
b) Heavy with development activities?		x	In established residential areas
c) Adjacent to or within any environmentally sensitive areas?			
Cultural heritage site	x		Sewer will be laid on the streets of the Heritage sites. Prior to construction approval will be sought from Department of Archaeology in accordance to The Ancient Monuments Preservation Rules 2046 (1989) Section 4.1.1
• Protected Area		x	
• Wetland		x	
• Mangrove		x	
• Estuarine		x	
• Buffer zone of protected area		x	
• Special area for protecting biodiversity		x	
• Bay		x	
<b>Potential Environmental Impacts</b> Will the Project cause.			
■ impairment of historical/cultural monuments/areas and loss/damage to these sites?		x	If there are any chance finds, work will be stopped immediately, the Chief District Officer contacted immediately, and the findings reported in writing to the Department of Archaeology within 35 days, according to the Ancient Monuments Protection Act, 1956 and Rules, 1989.

Screening Questions	Yes	No	Remarks
■ interference with other utilities and blocking of access to buildings?	x		Detailed surveys will be conducted of all services and as constructed drawings obtained where possible to locate existing services and to prevent disruption during construction. Budget for restoration/replacement of damaged utilities will be made available and a contingency plan in case of disruption prepared and implemented.
■ nuisance to neighboring areas due to noise, smell, and influx of insects, rodents, etc.?		x	Not anticipated.
■ dislocation or involuntary resettlement of people?		x	No displacement of communities required in this project.
■ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		x	Not applicable.
■ impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage?		x	Project involves construction of WWTPs designed to allow for expansion as wastewater flows increase in the future. WWTPs to be operated using WWTP safety plans that use a risk based approach to operation.
■ overflows and flooding of neighboring properties with raw sewage?		x	Sewers will be designed to meet peak flow to ensure no overflows of raw sewage. provide stand-by generators for pumping stations. Train operators for regular inspection, cleaning, and maintenance of plant and sewers.
■ environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers?		x	Sludge will be treated and managed to produce energy at 4 WWTPs via gasification, anaerobic digestion etc.
■ noise and vibration due to blasting and other civil works?	x		No blasting activities. Restrictions on operational hours of crushing plants and construction vehicles etc will be applied.
■ risks and vulnerabilities related to occupational health and safety due to physical, chemical, and biological hazards during project construction and operation?		x	Use of PPE at all sites will be applied strictly. The EMP ensures occupational health and safety measures are included. No hazardous chemicals will be used during construction and operation.
■ discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers?		x	Not anticipated. Sewerage to be collected from residential areas. Some commercial connections are anticipated. Waste from these industries discharged to the sewer network will be restricted through the implementation of appropriate discharge standards and monitoring through regular audits conducted by health inspectors.
■ inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances, and protect facilities?		x	Establishment and maintenance of environmental buffer zones in WWTP along with secure fencing. Design of pumping stations will include appropriate housing for pumps for noise proofing and protection of the facility.
■ road blocking and temporary flooding due to land excavation during the rainy season?		x	Not anticipated. Construction activities to be conducted during non-rainy season.

Screening Questions	Yes	No	Remarks
■ noise and dust from construction activities?	x		Anticipated during construction activities. However impacts are temporary and short in duration. The EMP ensures measures are included to mitigate the impacts.
■ traffic disturbances due to construction material transport and wastes?	x		Anticipated during construction activities. However impacts are temporary and short in duration. A traffic management plan will be developed and implemented by the contractor. Contractors will also coordinate with the local traffic police.
■ temporary silt runoff due to construction?	x		Run-off during construction is anticipated. However impacts are temporary and short in duration. The EMP ensures measures are included to mitigate the impacts. Spoil disposal will be immediate and any stockpiling will be away from drain channels etc.
■ hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?		x	Not anticipated. Sewer system to be designed to accept future flows and peak flows. Design to also include stand-by generators for pumping stations.
■ deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?		x	Not anticipated. The EMP ensures measures are included to manage the sludge. Design of plants include management of sludge for energy generation. Design to include plant to accept future flows. Water safety plans for the plants will be developed and implemented to ensure effluent complies with government standards and minimize operational failure.
■ contamination of surface and ground waters due to sludge disposal on land?		x	Not anticipated. Sludge to be managed and used for energy generation.
■ health and safety hazards to workers from toxic gases and hazardous materials which maybe contained in confined areas, sewage flow and exposure to pathogens in untreated sewage and unstabilized sludge?		x	Not anticipated. The EMP ensures measures are included to mitigate the impacts. Occupational, health and safety training provided to all personnel. PPE to be worn at all times. Emergency response plans to be developed and implemented. Personnel will also be provided with relevant inoculations.
■ large population increase during project construction and operation that causes increased burden on social infrastructure (such as sanitation system)?		x	Priority in employment will be given to local residents. Contractors will provide workers camps with sanitary amenities that meet the IFC 2009 guidelines.
■ social conflicts between construction workers from other areas and community workers?		x	Priority in employment will be given to local residents.
■ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		x	Not anticipated. Construction will not use explosives and chemicals. The EMP ensures measures are included to manage storage, use and disposal of fuel for construction equipment. Storage will be in designated areas away from water bodies. Fuel use areas to have drip basins/ catch tank (for fuelling) to prevent leakage and catch spills. Fuel to be recycled where possible or disposed in designated areas.

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> <li>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?</li> </ul>		x	Operation area will be clearly demarcated and restrict public access.
<b>Climate Change and Disaster Risk Questions</b> The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.	Yes	No	Remarks
<ul style="list-style-type: none"> <li>Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)?</li> </ul>	x		Kathmandu Valley is located in a seismic zone.
<ul style="list-style-type: none"> <li>Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost?</li> </ul>		x	Not applicable.
<ul style="list-style-type: none"> <li>Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g. high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?</li> </ul>		x	The project will improve the socioeconomic conditions of both, the poor and non-poor populations of Kathmandu valley.
<ul style="list-style-type: none"> <li>Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)?</li> </ul>		x	Improved wastewater services could potentially attract migrants to the area.

## Appendix 2: Bagmati River pollution

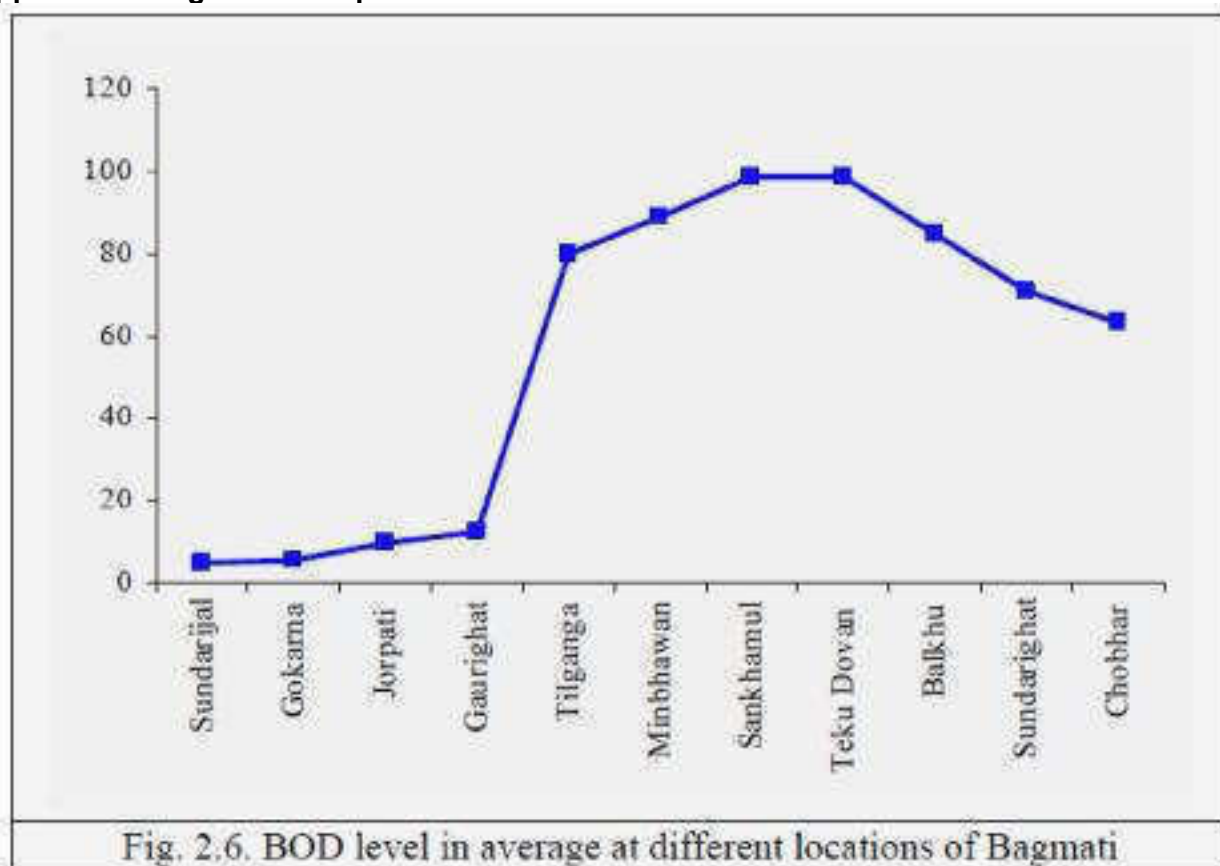


Fig. 2.6. BOD level in average at different locations of Bagmati

Y- Axis: BOD (mg/l); X-Axis: Locations in Kathmandu Valley

**Table 3.1. Water quality parameters**

Parameters	Sundarijal	Khokana
TSS mg/l	5	70
Chloride mg/l	1	24
Ammonia mg/l	0.03	11
BOD mg/l	1.3	65
Coliforai counts per 100 ml	1000	1.000.000
DO mg/l	5.9	1.7

Source: MWSP (2000)

Source: **BAGMATI ACTION PLAN (2009-2014), DRAFT REPORT**, March 31, 2008

Submitted to: National Trust for Nature Conservation

Submitted by Joint Venture of Astra Development Network Pvt. Ltd, GeoSpatial Systems Pvt. Ltd, Innovative Solution Pvt. Ltd.



### Appendix 3: Tolerance limits for wastewater to be discharged into inland surface waters from combined wastewater treatment plant (generic standards)

Characteristics	Tolerance Limit
Total Suspended solids, mg/L, Max	50
Particle size of total suspended particles	Shall pass 850-micron Sieve.
pH	5.5 to 9.0
Temperature	Shall not exceed 40 degree C in any section of the stream within 15 meters down-stream from the effluent outlet.
Biochemical oxygen demand (BOD) for 5 days at 20 degree C, mg/L, Max	50
Oils and grease, mg/L, Max	10
Phenolic compounds, mg/L, Max	1
Cyanides (as CN), mg/L, Max	0.2
Sulphides (as S), mg/L, Max	2
Radioactive materials:	
a. Alpha emitters, c/ml, Max	7-Oct
b. Beta emitters, c/ml, Max	8-Oct
Insecticides	Absent
Total residual chlorine, mg/L	1
Fluorides (as F), mg/L, Max	2
Arsenic (as As), mg/L, Max	0.2
Cadmium (as, Cd), mg/L, Max	2
Hexavalent chromium (as Cr), mg/L, Max	0.1
Copper (as Cu), mg/L, Max	3
Lead (as Pb), mg/L, Max	0.1
Mercury (as Hg), mg/L, Max	0.01
Nickel (as Ni), mg/L, Max	3
Selenium (as Se), mg/L, Max	0.05
Zinc (as Zn), mg/L, Max	5
Ammonia nitrogen, mg/L, Max	50
Chemical Oxygen Demand, mg/L, Max	250
Silver, mg/L, Max	0.1

Source: Urban Environment Management Framework 2068 (2011), GON

**Note:**

This generic standard applies to discharge of wastewater into inland surface waters from combined wastewater treatment plants. The municipal wastewater treatment plants in the proposed project will collect and treat only domestic wastewater from Kathmandu Valley. Therefore, in the absence of generic standards for domestic wastewater to be discharged into inland surface water from municipal wastewater treatment plants, this standard will only be applied as a guide. The project will assist in the development and implementation of domestic sewage discharge standards.

## **Appendix 4: Environment Related Acts and Regulations in Nepal**

### **Acts**

- 1) Ancient Monuments Protection Act, 1991
- 2) Civil Aviation Act, 1958
- 3) Aquatic Animals Protection Act, 1960
- 4) Plant Protection Act, 1964
- 5) National Parks & Wild Life Conservation Act, 1987
- 6) Public Road Act, 1974
- 7) Trust Corporation Act, 1976
- 8) Tourism Act, 1978
- 9) King Mahendra Nature Conservation Trust Act, 1982
- 10) Soil & Watershed Conservation Act, 1982
- 11) Nepal Petroleum Act, 1983
- 12) Nepal Electricity Authority Act, 1984
- 13) Mines & Mineral Act, 1985
- 14) Pashupati Area Development Trust Act, 1987
- 15) Solid Waste (Management & Resource Mobilization) Act, 1987
- 16) Town Development Act, 1988
- 17) Kathmandu Valley Development Authority Act, 1988
- 18) Nepal Water Supply Corporation Act, 1989
- 19) The Constitution of the Kingdom of Nepal, 1990
- 20) Pesticides Act, 1991
- 21) Village Development Committee Act, 1991
- 22) District Development Committee Act, 1991
- 23) Municipality Act, 1991
- 24) Water Resources Act, 1992
- 25) Forest Act, 1992
- 26) Electricity Act, 1992
- 27) Motor Vehicle & Transportation Management Act, 1992
- 28) Labour Act, 1992
- 29) Industrial Enterprises Act, 1992
- 30) Nepal Tourism Board Act, 1996
- 31) Environment Protection Act, 1996
- 32) Children' s Act, 1992

### **Rules**

- 1) National Parks & Wild Life Conservation Rules, 1973
- 2) Plant Protection Rules, 1974
- 3) Wild Life Reserve Rules, 1977
- 4) Himalayan National Park Rules, 1979
- 5) Mountaineering Rules, 1979
- 6) King Mahendra Nature Conservation Trust Rules, 1984
- 7) Petroleum Rules, 1984
- 8) Khaptad National Park Rules, 1987
- 9) Ancient Monuments Protection Rules, 1989
- 10) Solid Waste (Management & Resource Mobilization) Rules, 1989
- 11) Water Resources Rules, 1993

- 12) Pesticides Rules, 1993
- 13) Labour Rules, 1993
- 14) Electricity Rules, 1993
- 15) Forest Rules, 1994
- 16) Buffer Zone Management Rules, 1995
- 17) Royal Bardiya National Park Rules, 1996
- 18) Conservation Area Management Rules, 1996
- 19) Vehicle & Transportation Management Rules, 1997
- 20) Environment Protection Rules, 1997

Parameters	Units	Averaging Time	Concentration in Ambient Air, maximum	Test Methods
TSP (Total Suspended Particulates)	$\mu\text{g}/\text{m}^3$	Annual	-	
		24-hours*	230	High Volume Sampling
PM10	$\mu\text{g}/\text{m}^3$	Annual	-	
		24-hours*	120	Low Volume Sampling
Sulphur Dioxide	$\mu\text{g}/\text{m}^3$	Annual	50	Diffusive sampling based on weekly averages
		24-hours**	70	To be determined before 2005.
Nitrogen Dioxide	$\mu\text{g}/\text{m}^3$	Annual	40	Diffusive sampling based on weekly averages
		24-hours**	80	To be determined before 2005.
Carbon Monoxide	$\mu\text{g}/\text{m}^3$	8 hours**	10,000	To be determined before 2005.
		15 minute	100,000	Indicative samplers ***
Lead	$\mu\text{g}/\text{m}^3$	Annual	0.5	Atomic Absorption Spectrometry, analysis of PM <sub>10</sub> samples****
		24-hours	-	
Benzene	$\mu\text{g}/\text{m}^3$	Annual	20	Diffusive sampling based on weekly averages
		24-hours	-	
PM10	$\mu\text{g}/\text{m}^3$	24-hours	40	
Ozone	$\mu\text{g}/\text{m}^3$	8-hours	157	

#### Appendix 5: National Ambient Air Quality Standard, 2012 for Nepal

**\*Note:** 24 hourly values shall be met 95% of the time in a year. 18 days per calendar year the standard may be exceeded but not on two consecutive days

**\*\*Note:** 24 hourly standards for NO<sub>2</sub> and SO<sub>2</sub> and 8 hours standard for CO are not to be controlled before MOPE has recommended appropriate test methodologies. This will be done before 2005

**\*\*\*Note:** Control by spot sampling at roadside locations: Minimum one sample per week taken over 15 minutes during peak traffic hours, i.e. in the period 8am - 10am or 3pm - 6pm on a workday. This test method will be re-evaluated by 2005

**\*\*\*\*Note:** If representativeness can be proven, yearly averages can be calculated from PM10 samples from selected weekdays from each month of the year.

**Appendix 6: Recommended noise exposure limits for the work environment (adopted from Occupational Safety and Health Administration (OSHA))**

<b>S.No</b>	<b>Noise Exposure (dBA)</b>	<b>Permissible exposure (Hours and Minutes)</b>
1.	85	16 hrs.
2.	87	12 hrs. -18 min.
3.	90	8 hrs.
4.	93	5 hrs - 18 min.
5.	96	3 hrs.-30 min.
6.	99	2 hrs. - 18 min.
7.	102	1 hr. - 30 min.
8.	105	1 hr.
9.	108	40 min.
10.	111	26 min.
11.	114	17 min.
12.	115	15 min.
13.	118	10 min.
14.	121	6.6 min.
15.	124	4 min.
16.	127	3 min.
17.	130	1 min.

**Source: Marsh, 1991**

**Recommended Average Equivalent Sound Levels for Protecting the Public Health and Welfare**

<b>S.No</b>	<b>Land Use</b>	<b>Measure</b>	<b>To Protect Against Activity Interference and Hearing Loss Effects (dBA)</b>
1.	Residential including farm residences	Leq (24)	55
2.	Commercial	Leq (24)	70
3.	Hospitals	Leq (24)	55
4.	Industrial	Leq (24)	70
5.	Educational	Leq (24)	55
6.	Recreational Areas	Leq (24)	70
7.	Farmland and general unpopulated land	Leq (24)	70

**Source: U.S Environmental Protection Agency, 1974**

Note: Leq (24) = Equivalent Sound Level in decibels for 24 hours.

## Appendix 7: Recommended Standards for Vibration from Construction Sites

Type of Restriction	Area Classified	
Standard Value	I & II	85 dBA
Work Prohibited Time	I	7.00 P.M. - 7.00 A.M.
	II	10.00 P.M. - 6.00 A.M.
Maximum Working Duration	I	10.00 hrs. per Day
	II	14 hrs. per Day
Maximum Consecutive Working Days	I & II	6 Days
Working Prohibited Days	I & II	Saturdays & Holidays

**Source: Vibration Regulation Law 64 of 1976, Japan**

Notes: 1. Area I, stands for areas to which one of the following descriptions applies:

- Areas where maintenance of quiet is particularly needed to preserve the residential environment.
- Areas which require maintenance of quiet since they are need for residential purposes.
- Areas need for commercial and industrial as well as residential propose which are in need of measures to prevent vibration pollution since a considerable number of houses are located.
- The neighbourhood of schools, hospitals and the like.
- Area II stands for areas where there is a need to preserve the living environment of in habitants and other than Area I.

2. Vibration level shall be measured at the boundary line of the specified construction work site.

### Recommended Limits for Road Traffic Vibration

Area	Day time	Night time	Applicable areas
I	65 dB	60 dB	Areas where maintenance of quiet is particularly needed to preserve a good living environment and where quiet is called for us as they are used for residential purpose.
II	70 dB	65 dB	Areas need for commercial and industrial as well as residential purposes where there is a need to preserve the living environment of local inhabitants and areas mainly serving industrial proposes which are in need of measures to prevent the living environment of local residents from deteriorating.

**Source: Vibration Regulation Law 64 of 1976, Japan**

Note: Vibration level shall be measured at the boundary line of the road.

**Appendix 8: Schedules 1 and 4 of the Ancient Monuments Preservation Rules 2046**

**(1989)**

**Schedule-1**

**(Relating to Sub- rule 4.1.1)**

Department of Archaeology

I am / We are going to carry out the following construction work in .....  
monuments conserved zone, located in ..... of ..... District, ..... Zone,  
within the Following time period. Therefore, I/ We have field this application for obtaining the  
approval of the Department. I am / We are ready to bear any punishment, as per the prevailing  
laws, if construction work is made other than written in this application.

Description of the construction work, which is going to be carried out within the monuments  
conserved areas and tentative time period to complete the construction: -

Of the applicant, Name

and Surname -

Signature - Date -

Permanent Address-

Temporary Address-

**Schedule-4**  
**(Relating to Sub-rule 4.3.1)**  
**The Description of Archaeological Object Form-2**

**Zone:**  
**District:**

[illegible]

## The Local Officer:

Date:

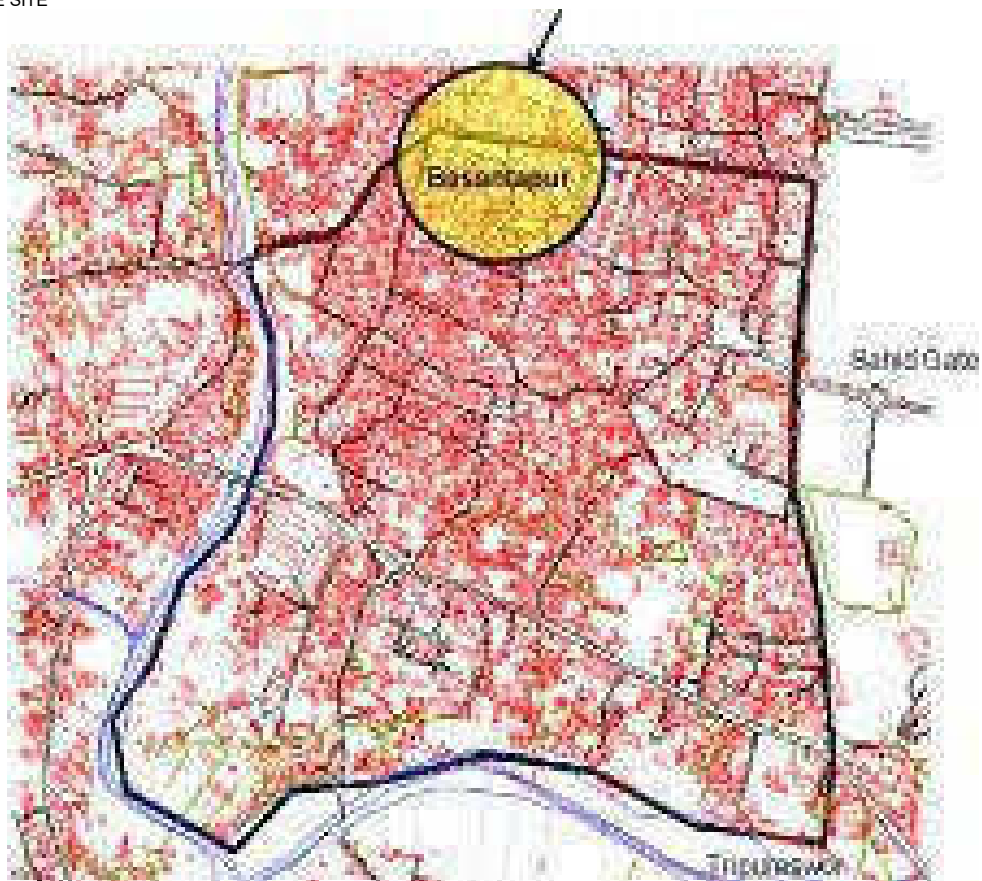
Modified by the Ancient Monument Conservation (First Amendment) Rules, 2049 (1992) Annex 10:



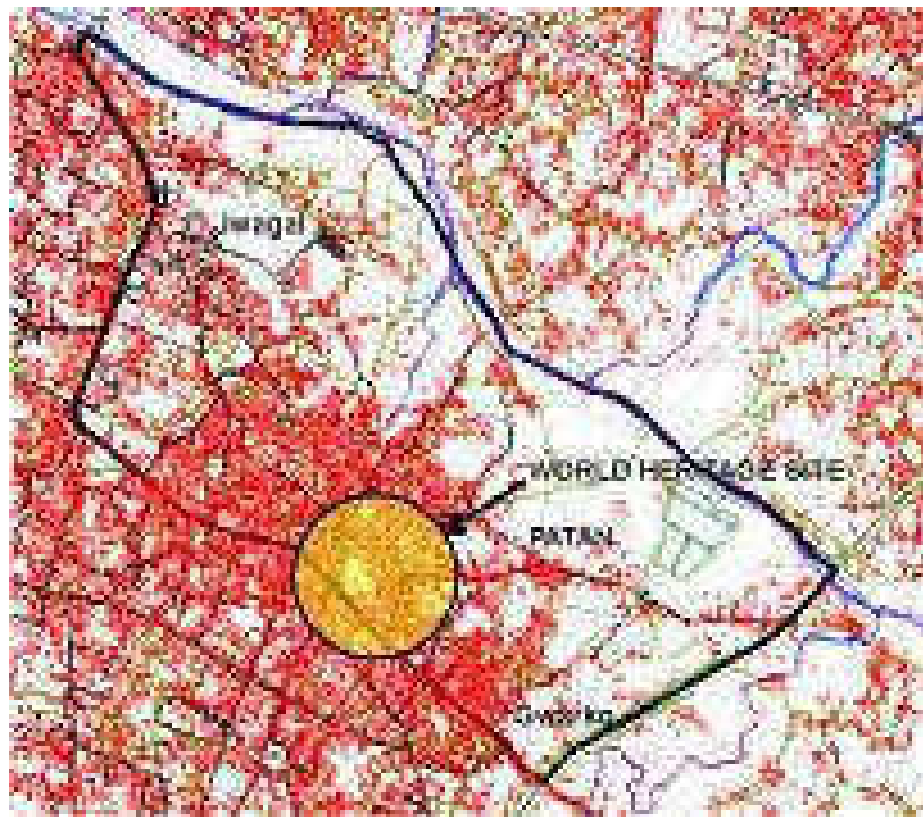
**Heritage Sites: Kathmandu Darbar Square and, Patan Darbar Square respectively**



WORLD HERITAGE SITE



LOCATION PLAN: Kathmandu Darbar Square



LOCATION PLAN: Patan Darbar Square