

# Updated Initial Environmental Examination

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## NEP: Third Small Towns Water Supply and Sanitation Sector Project —Birtamod (Jhapa District)

Prepared by ITECO Nepal (P) Ltd., SILT Consultants (P) Ltd., and Unique Engineering Consultancy (P) Ltd. for the Government of Nepal and the Asian Development Bank.

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**Project Management Office (PMO)**  
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**Enhance Functionality in Small Towns Water Supply and  
Sanitation Sector Project (STWSSSP)**

**UPDATED INITIAL ENVIRONMENTAL EXAMINATION REPORT  
(IEE)**

for

**Birtamod Small Towns Water Supply and Sanitation Sector  
Project  
Jhapa District**



*Kathmandu, July 2015*

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## Abbreviations

°C	: Degree Centigrade
ADB	: Asian Development Bank
CBD	: Convention of Biological Diversity
CITES	: Convention on International Trade in Endangered Species of wild Fauna and Flora
cum	: Cubic Meter
DWSO	: District Water Supply Office
DWSS	: Department of water Supply and Sewerage
EA	: Environmental Assessment
EIA	: Environmental Impact Assessment
EMP	: Environmental Management Plan
EPA	: Environmental Protection Act
EPR	: Environment Protection Regulations
GoV	: Government of Nepal
HHE	: Health and Hygiene Education Programs
HRF	: Horizontal Roughing Filter
IEE	: Initial Environmental Examination
JICA	: Japanese International Cooperation Agency
km	: Kilometer
BWSSSP	: Birtamod Water Supply and Sanitation Sub-Project
lpd	: Liter per day
lps	: Liter per second
m	: Meter
MOWR	: Ministry of Water Resources
MPPH	: Ministry of Physical Planning and Housing
MPPW	: Ministry of Physical Planning and Works
NGO	: Non-Government Organization
NPC	: National Planning Commission
NRs.	: Nepalese Rupees
O&M	: Operation and Maintenance
PAC	: Public Awareness Campaign
PCO	: Public Call Office
PF	: Pressure Filter

Pop.	:	Population
PRA	:	Participatory Rural Appraisal
RRA	:	Rapid Rural Appraisal
SPSO	:	Sub-Project Site Office
SSF	:	Slow Sand Filter
STWSSSP	:	Small Town Water Supply and Sanitation Sector Project
TDF	:	Town Development Fund
VDC	:	Village Development Committee
WHO	:	World Health Organization
WSUC	:	Water Supply Users' Committee
WUSC	:	Water Users and Sanitation Committee

## EXECUTIVE SUMMARY

### General

The Enhance Functionality in Small Towns Water Supply and Sanitation Sector Project (STWSSSP) will support the government of Nepal (the Government) in improving water supply and sanitation facilities and services to 24 small towns in Nepal. Out of the 265 small towns in Nepal, Asian Development Bank (ADB) has already supported the Government, through successful implementation of earlier two projects in 50 towns. These include the 24 project for enhancement.

The outcome will be inclusive and sustainable water supply and sanitation service delivery in this Birtamod small town of Nepal. The project will implement improvements/ rehabilitation works within the service area of already completed project. There will be minor civil works necessary for the enhancement of the components without changing the original technical and social concepts.

The Project will be implemented in 6 months period starting around first week of November, 2015.

The project will be funded by a loan using a sector lending approach of ADB. The Executing Agency is the Ministry of Urban Development and the implementing agency is the Department of Water Supply and Sanitation (DWSS).

The sub project IEE report was approved by government of Nepal in 2005. Now the sub project is envisaged to undergo for rehabilitation of project components such as, intake treatment plant, transmission main and distribution line etc. The proposed updated IEE is prepared as an integral part of bid document. However consultant has updated the contents of IEE report already approved from government of Nepal.

This updated IEE Report summarizes anticipated impacts and corresponding mitigation measures, monitoring and also includes cost and time frame for implementation.

In this report, all the policy, legal and administrative framework requirements of ADB including ADB Safeguard Policy and the prevailing GoN Acts/rules & regulations have been considered.

### Categorization

Birtamod town subproject is classified as Environmental Category B as per the SPS as no significant impacts are envisioned. Accordingly, this updated Initial Environmental Examination (IEE) has been prepared and assesses the environmental impacts and provides mitigation and monitoring measures to ensure no significant impacts as a result of the subproject.

### Subproject Scope

The subproject is formulated under the 3STWSSSP to improve water supply and sanitation service delivery in the existing Birtamod water supply and sanitation project constructed during STWSSP 1. Investments under this subproject includes; (i) rehabilitation of a piped water supply system including intake, water treatment plant, transmission main, and distribution main.

### Implementation Arrangements

The Ministry of Urban Development is the executing agency. The Department of Water Supply and Sewerage (DWSS) is the implementing agency. Implementation activities will be overseen by a separate Project Management Office (PMO) which will be established in DWSS head office in Kathmandu and two Regional Project Management Offices (RPMOs) in the eastern and western region. A team of technical, administrative and financial officials, including safeguards specialists, will be provided at the PMO to implement, manage and monitor project implementation activities. The RPMOs will be staffed by qualified and experienced officers and will be responsible for the day-to-day activities of project implementation in the field, and will be under the direct administrative control of the PMO. Consultant teams are responsible for subproject planning and management and



assuring technical quality of design and construction; and designing the infrastructure and supervising construction; and safeguards preparation.

## **Description of the Environment**

Subproject components are located in Birtamod town area and in its immediate surroundings. There is no presence of natural habitat in this project area. The project components will be located in WUSC sites, public road rights-of-way (ROW) and outside the community managed forest and the protected areas. There are no protected areas, wetlands, mangroves, or estuaries in or near the subproject locations.

## **Environmental Management**

An environmental management plan (EMP) is included as part of this IEE, which includes (i) mitigation measures for environmental impacts during implementation; (ii) an environmental monitoring program, and the responsible entities for mitigating, monitoring, and reporting; (iii) public consultation and information disclosure; and (iv) a grievance redress mechanism. A number of impacts and their significance have already been reduced by amending the designs. The EMP will be included in civil work bidding and contract documents.

Locations and siting of the infrastructures were considered in the existing sub-project to further reduce impacts. The concepts considered in design of the subproject are: (i) demand for new piped water supply; (ii) maximum population coverage with pipe layout mostly in residential areas and areas of high growth rate; (iii) avoidance of water-use conflicts; (iv) locating pipelines within ROWs to reduce acquisition of land; (v) locating pipelines at least 10 meters from latrines, septic tanks and any main drains to avoid contamination; (vi) locating Intake point 30 m upstream from sanitation facilities; (vii) locating household and public latrines and septic tanks at least 30 meters downstream from the nearest drinking water source; (viii) piloting controlled disposal of septage in accordance to WHO and US EPA standards to reduce the likelihood of uncontrolled disposal as currently practiced; and (ix) ensuring all planning and design interventions and decisions were made in consultation with local communities and reflecting inputs from public consultation and disclosure for site selection.

During the construction phase, impacts mainly arise from the need to dispose of moderate quantities of waste soil; and from the disturbance of residents, businesses, and traffic. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation. Measures such as conducting work in lean season and minimizing inconvenience by best construction methods will be employed. Traffic management will be necessary during pipe-laying on busy roads. In the operational phase, all facilities and infrastructure will operate with routine maintenance, which should not affect the environment. Facilities will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only.

## **Mitigation Measures**

Mitigation measures have been developed to reduce all negative impacts to acceptable levels. Mitigation will be assured by a program of environmental monitoring to be conducted during construction. The environmental monitoring program will ensure that all measures are implemented, and will determine whether the environment is protected as intended. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries. Any requirements for corrective action will be reported to the ADB.

The stakeholders were involved in developing the IEE through discussions on-site and public consultation, after which views expressed were incorporated into the IEE and in the planning and development of the subproject. The IEE will be made available at public locations in the town and will be disclosed to a wider audience via the ADB and DWSS websites. The consultation process will be continued and expanded during project implementation to ensure that stakeholders are fully

engaged in the project and have the opportunity to participate in its development and implementation.

The citizens of Birtamod core town area will be the major beneficiaries of the project. The most noticeable net environmental benefits to the population of the town will be positive and large as the proposed subproject will improve access to reliable and adequate supply of safe drinking water. The sanitation condition will also be improved.

The sub-project under construction is a rehabilitation project and the mitigation measures recommended in the approved IEE in 2006 have already been successfully implemented. During the updated IEE preparation process, all of the process mentioned above have been checked and followed. The design report has incorporated the recommended mitigation measures.

During construction phase, there are no major environmental impacts in the enhancement project. However there are minor impacts like decrease in water table, water logging, air and noise pollution during construction, traffic disturbances and some disturbances in household water supply distribution. In order to minimize the impacts, specific arrangements have been made in the design and incorporated in the specification of work. The contractor is responsible to follow all the instruction given by the DSC and agreed specifications.

During operational phase also, there will be no significant impacts. However there may be minor impact on water right conflict (tap distribution) and occupational health and safety of workers. These issues will be addressed by and will be the responsibility of WUSC.

### **Consultation, Disclosure and Grievance Redress**

Public consultations were done in the preparation of the project and IEE and throughout the project implementation period of the completed project.

During the preparation of this enhancement project and updated IEE, Public consultations were done at different phases. The first consultation was done during survey and design period. Further consultation was made with the stakeholders at project site after the project design report was approved.

The consultation was focused on environmental impacts, resettlement, social issues, relocation and compensation issues.

### **Monitoring and Reporting**

The PMO, RPMO and DSMC will be responsible for environmental monitoring. The RPMO with support from the DSMC will submit monthly monitoring reports to the PMO. The PMO will consolidate the monthly reports and will send semi-annual monitoring reports to ADB. ADB will post the environmental monitoring reports on its website.

### **Conclusions and Recommendations**

The proposed subproject is unlikely to cause significant adverse impacts. The potential impacts that are associated with design, construction and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures. Based on the findings of the IEE, there are no significant impacts and the classification of the subproject as Category "B" is confirmed. No further special study or detailed environmental impact assessment (EIA) needs to be undertaken to comply with ADB SPS (2009).

## **1. INTRODUCTION**

### **1.1 Background**

1. The Enhance Functionality in Small Towns Water Supply and Sanitation Sector Project (STWSSSP) will support the government of Nepal (the Government) in improving water supply and sanitation facilities and services to 24 small towns in Nepal. Out of the 265 small towns in Nepal, Asian Development Bank (ADB) has already supported the Government, through successful implementation of earlier two projects in 50 towns. These include the 24 project for enhancement.

2. The Enhance Functionality in Small Towns Water Supply and Sanitation Sector Project (STWSSSP) will be implemented in 6 months period starting around first week of November, 2015 and will be funded by a loan using a sector lending approach of ADB. The Executing Agency is the Ministry of Urban Development and the implementing agency is the Department of Water Supply and Sanitation (DWSS).

3. The outcome will be inclusive and sustainable water supply and sanitation service delivery in selected small towns in Nepal. The project will implement improvements/rehabilitation works within the service area of already completed 24 projects. There will be minor civil works necessary for the enhancement of the components without changing the original technical and social concepts.

### **1.2 Objectives of IEE**

4. The updated IEE summarizes anticipated impacts and corresponding mitigation measures, monitoring and also includes cost and time frame for implementation.

### **1.3 Rational of IEE Requirement**

5. The sub project IEE report was approved by government of Nepal in 2005. Now the sub project is envisaged to undergo for rehabilitation of project components such as, treatment plant (specific area) of transmission and distribution line (15 km) etc. The proposed IEE is prepared as an integral part of bid document. However consultant has updated the contents of IEE report already approved from government of Nepal.

### **1.4 Methodology Used in Preparing IEE**

- In the process of preparation of EMP, an extensive review of approved IEE and feasibility reports reviewed with some field based information
- Public consultations were held in the entire process of IEE study and during the disclosure of the draft IEE report to the local people. These processes have taken place and the results were documented. The involvement of the local people in EMP implementation activities have been recommended in EMP, 2000. Accordingly, in the process of EMP implementation, the following mechanism has been adopted to involve the local people in EMP activity:
  - Public Consultation and Involvement have been given highest priority in the implementation of Mitigation measures carried out by EMP; initially prior to the implementation, public consultation usually takes place and on the basis of decision of the consultation meeting, implementation of mitigation measures are being prioritized and carried out with the involvement of local people.
  - Monitoring is another component of EMP. Monitoring of Physical, Biological and Socio-economic components of Environment of the project is being carried out. In the process of compliance monitoring of the project construction, local people and construction workers are being involved and consulted

## 2. POLICY, LEGAL & ADMINISTRATIVE FRAMEWORK

### 2.1 ADB Policy

6. All projects funded by the ADB must comply with the Safeguard Policy Statement (SPS) 2009 to ensure that projects undertaken as part of programs funded under ADB loans are environmentally sound, are designed to operate in compliance with applicable regulatory requirements, and are not likely to cause significant environmental, health, or safety hazards. With respect to the environment, the SPS 2009 is underpinned by the ADB Operations Manual, Bank Policy (OM Section F1/OP, 2010). The policy promotes international good practice as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines.<sup>1</sup>

### 2.2 ADB Safeguards policy

7. ADB's environmental safeguards policy principles are defined in SPS, 2009, Safeguard Requirements<sup>1</sup> and the IEE is intended to meet these requirements, Table 2-1.

**Table 2-1: ADB SPS, 2009 Safeguard Requirements 1: Environment**

SPS 2009 - Safeguard Requirements	Remarks
Use a screening process for each proposed project, as early as possible, to determine the appropriate extent and type of environmental assessment (EA) so that appropriate studies are undertaken commensurate with the significance of potential impacts and risks.	REA has been undertaken (Annex A), indicating that subproject is NOT: (i) environmentally critical; and (ii) adjacent to or within environmentally sensitive/critical area. The extent of adverse impacts is expected to be local, site-specific, confined within main and
SPS 2009 - Safeguard Requirements	Secondary influence areas. Significant adverse impacts during construction will be temporary and short-term, can be mitigated without difficulty. There is no adverse impact during operation. Hence, IEE is sufficient. The IEE including specific description of the environment and corridor of impact will be updated as necessary based on the final design and alignments.
Conduct EA to identify potential direct, indirect, cumulative, & induced impacts and risks to physical, biological, socioeconomic (including impacts on livelihood through environmental media, health and safety, vulnerable groups, and gender issues), and physical cultural resources in the context of the project's area of influence. Assess potential transboundary global impacts, including climate change.	IEE has been undertaken to meet this requirement. (Section VI). No transboundary & global impacts, including climate change.
Examine alternatives to the project's location, design, technology, and components and their potential environmental and social impacts and document the rationale for selecting the particular alternative proposed. Also consider the no project alternative.	Analysis of "with-subproject" or "without subproject" is presented in Section III.
Avoid, and where avoidance is not possible, minimize, mitigate, &/or offset adverse impacts and enhance positive impacts by means of environmental planning & management. Prepare an EMP that includes the proposed mitigation measures, environmental monitoring and	An EMP has been prepared to address this requirement. Section IX

<sup>1</sup> New Version of the "World Bank Group Environmental, Health, and Safety Guidelines", April 30 2007, Washington, USA. <http://www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines>

SPS 2009 - Safeguard Requirements	Remarks
reporting requirements, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators.	
Carry out meaningful consultation with affected people & facilitate their informed participation. Ensure women's participation. Involve stakeholders, including affected people & concerned NGOs, early in the project preparation process & ensure that their views & concerns are made known to & understood by decision makers and taken into account. Continue consultations with stakeholders throughout project implementation as necessary to address issues related to EA. Establish a GRM to receive & facilitate resolution of affected people's concerns & grievances on project's environmental performance.	Key informant and random interviews have been conducted (Annex C). A grievance redress mechanism for the resolution of valid project-related social and environmental issues/concerns is presented in Section VIII.
Disclose a draft IEE (including the EMP) in a timely manner, before project appraisal, in an accessible place & in a form & language(s) understandable to affected people & other stakeholders. Disclose the final EA, & its updates if any, to affected people & other stakeholders.	The draft IEE will be disclosed on ADB's website prior to project appraisal. Copies of both SPS-compliant IEE and Government of Nepal-approved IEE will be made available at the offices of the PMO, Project Implementation Support Unit (PISU) and Water Users' and Sanitation Committee (WUSC) for public consultation. For the benefit of the community, the summary of the IEE will be translated in the local language and made available at (i) offices of executing and implementing agencies, (ii) area offices, (iii) consultant teams' offices; and (iv) contractor's campsites. It will be ensured that the hard copies of IEE are kept at places which are conveniently accessible to people, as a means to disclose the document and at the same time creating wider public awareness. An electronic version of the IEE will be placed in the official website of executing and implementing agencies and the ADB website after approval of the IEE by ADB
Implement the EMP and monitor its effectiveness. Document monitoring results, including the development and implementation of corrective actions, and disclose monitoring reports.	EMP implementation, reporting and disclosure of monitoring reports are in this IEE.
Do not implement project activities in areas of critical habitats, unless (i) there are no measurable adverse impacts on the critical habitat that could impair its ability to function, (ii) there is no reduction in the population of any recognized endangered or critically endangered species, and (iii) any lesser impacts are mitigated. If a project is located within a legally protected area, implement additional programs to promote and enhance the conservation aims of the protected area. In an area of natural	The subproject does not encroach into areas of critical habitats.

SPS 2009 - Safeguard Requirements	Remarks
habitats, there must be no significant conversion or degradation, unless (i) alternatives are not available, (ii) the overall benefits from the project substantially outweigh the environmental costs, and (iii) any conversion or degradation is appropriately mitigated. Use a precautionary approach to the use, development, and management of renewable natural resources.	
Apply pollution prevention and control technologies and practices consistent with international good practices as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines. Adopt cleaner production processes and good energy efficiency practices. Avoid pollution, or, when avoidance is not possible, minimize or control the intensity or load of pollutant emissions and discharges, including direct and indirect greenhouse gases emissions, waste generation, and release of hazardous materials from their production, transportation, handling, and storage. Avoid the use of hazardous materials subject to international bans or phase-outs. Purchase, use, and manage pesticides based on integrated pest management approaches and reduce reliance on synthetic chemical pesticides.	This requirement is only minimally applicable to the subproject in the aspect of waste generation, e.g., effluent from septic tanks and generated sludge and sludge disposal from water supply and sanitation structures. The subproject will not involve hazardous materials subject to international bans/phase outs.
Provide workers with safe and healthy working conditions and prevent accidents, injuries, and disease. Establish preventive and emergency preparedness and response measures to avoid, and where avoidance is not possible, to minimize, adverse impacts and risks to the health and safety of local communities	EMP provides measures to mitigate health and safety hazards during construction and operation.
Conserve physical cultural resources and avoid destroying or damaging them by using field-based surveys that employ qualified and experienced experts during environmental assessment. Provide for the use of "chance find" procedures that include a pre-approved management and conservation approach for materials that may be discovered during project implementation	The subproject will not affect any physical cultural resource. The EMP recommends the measure/s to mitigate adverse impact on physical cultural resources (PCRs) in case of chance find.

### 2.3 Nepal's Environmental Policy and Legal Framework

8. The Interim Constitution of Nepal, 2007 defines the right to live in clean environment as one of the fundamental rights of its citizens (Article 16). It prescribes for the State to give priority to the protection of the environment and prevention of its further damage due to physical development activities (Clause 5 of Article 35). Proceeding from, and conformable to, the Constitution, the Government of Nepal has passed a series of environmental laws, policies and implementing regulations and standards. Among these, the basic legislation that provides the framework within which environmental assessment is carried out in Nepal is the:

- Environmental Protection Act (EPA), 1997, requires a proponent to undertake IEE or EIA of the proposed project and have the IEE or EIA report approved by the concerned sector

agency or Ministry of Science, Technology and Environment (MoSTE), respectively, prior to implementation. The EPA: (i) sets out the review and approval process of IEE and EIA reports, that involve informing and consulting stakeholders; (ii) stipulates that no one is to create pollution that would cause significant adverse impacts on the environment or harm to public life and health, or to generate pollution beyond the prescribed standards; (iii) specifies for the Ministry in charge of environment (currently the MoSTE) to conduct inspection of approved projects to ensure that pollution prevention, control or mitigation is carried out according to the approved IEE or EIA report; (iv) provides for the protection of objects and places of national heritage and places with rare plants, wildlife and biological diversity; and (v) states that any person/party affected by pollution or adverse environmental impact caused by anybody may apply to the prescribed authority for compensation to be recovered from the polluter/pollution generator.

- Environmental Protection Rules (EPR), 1997, and its amendments in 1999 and 2007. Defines the implementing rule and regulations of the IEE/EIA process, elaborating the provisions in the EPA. The preparation, review and approval of IEE and EIA reports are dealt with in Rules 3 to 7 and 10 to 14. Schedules 1 and 2 list down the projects of activities that are required IEE and EIA, respectively, as amended in 2007.
- Other environmental and core labor policies, laws and rules that are relevant to the subproject are presented in Table 2-2.

**Table 2-2: Other Relevant Environmental and Core Labor Policies, Laws and Guidelines of Nepal Applicable to the Subproject,**

Policy/Law/Guideline	Year	Relevant Provisions	Remarks
Resources Act	1992	Comprehensive law on the development, use and conservation of water resources in Nepal, it aims to minimize damage to water bodies by requiring the conduct of IEE & preparation of IEE Report before granting license to use water resources for any purpose.	Government of Nepal environmental assessment report will be prepared based on this IEE.
		Proponents shall make sure that the beneficial use of water resources does not cause damage to other water uses/users (Article 4).	The source is groundwater to be drawn from the deep aquifer. Prevailing water source is the shallow aquifer and water drawn has Mn, Fe, Al and coliform levels exceeding National Drinking Water Quality Standard (NDWQS). Hence, people are eager to be connected to piped water supply system.
		Article 17 requires proponents to apply for any necessary land acquisition accordingly;	Site for the intake well, treatment unit, overhead tank is government land (Dept. of Forest).
		Article 18 requires the compliance to quality standards in making use of water resources. Article 19 prohibits the pollution of water resources. Under the Act are two regulations for drinking water purposes: (i) Water Resources Regulation, 1993, setting out the implementation procedures for the Act; and (ii) the Drinking Water Regulation, 1998, which specifies compliance with the drinking water quality standards and control of water pollution (or sanitation) as it affects drinking water.	Environmental Management Plan prescribes the compliance with NDWQS and its Directives during operation.
Labor Act	1992	Chapter 5 stipulates health and safety provisions at work places, keeping work premises clean and safe, e.g., (i) with provisions for solid waste, sewage and hazardous substance management; (ii) instituting measures to prevent dust, fumes and other impure materials that would adversely affect health; (iii) with supply of potable water and water for emergency situations; (iv) with arrangements for the use of protective devices and wears; (v) with fire safety arrangements; and (vi) measures for protection from hazardous machines/equipment and from physical injury or harm from lifting of heavy weights.	EMP provides measures to mitigate workers' health and safety hazards.
Forest Act	1993	The Act prohibits the extraction of boulders, rocks, pebbles, sand or coilfrom national forests, defined as all forests, excluding private forests, whether marked or unmarked with forest boundary, to include waste or uncultivated lands, or unregistered lands surrounded by the forest or situated near adjacent forests as well as paths, streams rivers, lakes,	Subproject will not impact on any forest. EMP stipulates no illegal quarrying of natural aggregate materials.



Policy/Law/Guideline	Year	Relevant Provisions	Remarks
		riverine lands within the forest.	
National Environmental Policy and Action Plan (NEPAP)	1993	Of its five objectives, most relevant to the Project are to: (i) mitigate adverse environmental impacts; and (ii) safeguard national & cultural heritage & preserve biodiversity, within & outside protected areas.	Subproject will not impact on physical cultural heritage & biodiversity. EMP provides measures to mitigate impacts.
National Water Supply and Sanitation Policy	1998	The Policy requires the: (i) monitoring of water quality supplied by completed WSS projects; and (ii) evaluation of their benefits in improving health (e.g., reducing water-borne diseases) and in relieving the sufferings of women and other disadvantaged groups in carrying out their responsibilities over water collection and maintenance of sanitation and hygiene.	Monitoring of the quality of supplied water is prescribed in the EMP following the NDWQS Directives.
Drinking Water Rules	1998	The Rules: (i) gives the procedure for the settlement of dispute on use of water sources; (ii) requires water supplier to maintain the quality of water as prescribed in the Water Resources Act; (iii) prohibits water supplier to construct structures and conduct activities that would pollute the water source and cause significant adverse effect on the environment.	Monitoring of the quality of supplied water is prescribed in the EMP following the NDWQS Directives.
Local Self-Governance Act	1999	The Act gives Local Government the functions, duties & powers to: (i) conserve & protect their local environment & natural resources; (ii) plan, implement &/or operate & maintain local WS projects; (iii) implement or arrange for implementation local sanitation/sewerage & drainage projects; (iv) protect cultural heritage & religious sites; &/or (v) monitor project activities within their respective jurisdictions.	Provides basis for Local Government to monitor the environmental performance of the subprojects. EMP provides the responsibilities of Local Governments (LGs) in EMP implementation.
National Urban Policy	2007	Policy gives importance to environment conservation while carrying out urban development works and natural resource use; thus, supporting the required environmental conservation and protection in donor-assisted development projects.	Government of Nepal Government of Nepal environmental assessment report, based on this IEE, will be prepared to ensure environmental conservation and protection.
National Urban Water Supply and Sanitation Sector Policy	2008	The Policy requires the IEE or EIA of proposed WSS projects in accordance with the EPA/EPR to: (i) incorporate consultations with key stakeholders, including end-point users; & (ii) specify measures to mitigate environmental impacts prior to, during construction & operation, as well as corrective measures.	Government of Nepal environmental assessment report will be prepared based on this IEE. This ADB IEE will be submitted to ADB for review and approval.
Implementation Directives for the National Drinking Water Quality Standards	2005	It sets out the water sampling, testing, analysis, monitoring and surveillance procedures to certify that the quality of supplied drinking water conforms to the National drinking Water Quality Standards.	Monitoring of the quality of supplied water is prescribed in the EMP following the NDWQS Directives.
Updated 15-Yr Development	2009	The Plan defines the population threshold of "small towns" to	EMP prescribes environmental effects and performance

Policy/Law/Guideline	Year	Relevant Provisions	Remarks
Plan for Small Towns Water Supply and Sanitation Sector		be in the range of 5,000 to 40,000. Reference to Schedules 1 and 2 of the EPR, as amended in 2007, places water supply projects in small towns under Schedule 1 or within the threshold of water supply projects requiring only an IEE. The Plan emphasizes monitoring and evaluation as an important component of a project to determine the overall impact of a project.	monitoring.
Solid Waste Management Act	2011	Article 4 provides that the management of hazardous, medical, chemical or industrial waste rests upon the generators of such wastes. Management should be as prescribed in the Act. Article 5 provides that individuals and entities have the duty to reduce the amount of solid waste generated while carrying out work or business.	EMP prescribes eco- friendly management of solid and hazardous wastes.

9. The key Government of Nepal environmental quality standards are: (i) National Ambient Air Quality Standards for Nepal, 2003; (ii) National Noise Standard Guidelines, 2012; and (iii) National Drinking Water Quality Standards, 2006, which would also be applied to surface and ground water quality monitoring since these resources are used for drinking.

10. Nepal is party to the following international environmental agreements that have broad relevance to works and environmental assessment of works under the project: (i) World Heritage Convention, in 1978; (ii) Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention), in 1987; (iii) Convention on Biodiversity, in 1992, (iv) Vienna Convention for the Protection of the Ozone Layer and its Montreal Protocol and subsequent London Amendment, in 1994, and (v) Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, in 1996.

11. The relevance of the aforementioned environmental agreements to the subproject are on their emphasis for human activities (such as development projects) to: (i) take on/institute measures to protect the local, as well as global, natural resources and/or environment; (ii) prevent and/or reduce the causes of climate change; and (iii) anticipate and mitigate the adverse impacts of climate change. The country is also committed to the Millennium Development Goals (MDG), the seventh goal of which is to “ensure environmental sustainability” targeting the reverse of loss of forest and environmental resources, reduction of biodiversity loss, and increase in the proportion of population with sustainable access to safe drinking water and basic sanitation.

### 3. ANALYSIS OF ALTERNATIVES

#### 3.1 Alternatives considered in the approved IEE report 2006

12. A number of alternatives are identified and analyzed for the proposed water supply and sanitation project. Alternatives regarding the sources, design, route of pipeline, service levels, period of construction etc. are taken into consideration. Analysis for no action scenario has also been dealt to signal out the importance of the proposed project. The alternative listed below provides a basis for taking decision on whether: The proposal should move forward for implementation to the project stakeholders.

##### 3.1.1 No Project Alternative

13. It is assumed that the proposed water supply and sanitation project will not be considered for implementation and the ever-increasing demand on water will be managed by the existing system. This alternative will result in continuation of the present scenario of use of unhealthy water for drinking and risk to the population from epidemics related to water borne diseases.

##### 3.1.2 With project Alternative

14. The project was approved on the on the ground that none of the following negative criteria can result from implementation of the project:

- Unwarranted losses in precious resources
- Unwarranted accelerated use of resources from short term
- Unwarranted hazards to endangered species
- Undesirable displacement of population

##### 3.1.3 Alternative Sources of Water

15. The deep groundwater is the only one source of water and there is no other alternative

##### 3.1.4 Design Alternative

16. Source of gravity water system does not exist in the vicinity of the project area.

##### 3.1.5 Route Alternative

17. Another viable alternative is to divide the service area into two zones: one on the east of Sanischare road to be supplied by the existing system and another on the west of the road to be supplied by the new system to be constructed near Jagatbasti. The details are given below:

Zone A	Water will be supplied from the existing boreholes and 450 cum RCC OHT located in ward number 3, Anarmani VDC. The service area is the total area on the east of Sanischare road.
Zone B	It is the total area west of Sanischare Road. A new 800 cum RCC OHT and boreholes are to be located north of the Highway near the Jagatbasti tole. The boreholes are to have a discharge of about 40 lps, which shall be pumped using submersible pumps.

#### 3.2 Alternatives for the Updated IEE

18. The water supply system for the town of Birtamod was constructed several years before under STWSSP 1, funded by ADB. The project is in operation at present. The WUSC is the operating agency. The project had anticipated a 24 hour service and water quality standards within the NDWQS. After a few years of operation, it was observed that this anticipation was not fulfilled due to some problems. The problems were observed both in technical as well as social and institutional field. Therefore some enhancement measures were necessary. This project is designed to cater for such enhancement works.

19. IEE had been carried out in accordance with the prevailing rules and regulations of ADB and the GoN incorporating the alternatives like “without –sub project or do nothing” and “with sub-

project” was carried out in 2006. As such, alternatives for the water supply project have not been studied in the design report.

#### 4. DESCRIPTION OF SUBPROJECT

##### 4.1 The Study Area

20. Birtamod Water Supply and Sanitation Sub-Project is situated at Jhapa District in Eastern Development Region of Nepal and is at 12 Km North of Chandragadhi, the district headquarter of the district. The project area lies on the East-West highway. The project area lies in the altitude of 300m from sea level. Birtamod is one of the growing markets of Jhapa district. Geographically the district lies 26°39'4" N latitude and 88°0'16" E Longitude.

21. Climate of Birtamod is very hot and humid during summer, and mild and dry during winter. During the summer, temperatures can reach 40 degree Celsius, and the low in winter is about 2 degree Celsius. Rainfall is abundant during the monsoon season (June–September). There is little or no rainfall during winter.

22. The project was launched to serve entire area (Ward nos. 1 to 9) of Anarmani VDC, Ward nos. 1 to 4 of Charpane VDC, Ward nos 7 & 8 of Arjundhara VDC and Ward no 7 & 8 Shanischare VDC. According to the financial appraisal report of TDF, the project had been designed to serve total population 27833 in the base year 2008 and 43612 in the design year 2022 with the additional rental population of 13276.

23. Birtamod is very fast growing town where in-migration trend is very high due opportunity of employment and business, accessibility, availability of services and facilities as well as security. The economy of the service area is predominately business and commercial based economy.

24. The project service area includes both urban and semi-urban areas. The core area of the project is market area situated along both sides of the East-West Highway and densely populated where 65% of population lives in and the main economic activities carried out. Whereas semi-urban settlements are in adjoining area of the Bazaar which are newly developing (growing up), and are basically the residential area of the project. The settlement pattern in the core urban area is dense, where as in semi-urban area the settlements are either moderately dense or scattered. The settlement in this area might be turned into dense settlement within the project duration as in-migration rate is high and there is land available for new settlement in these sections.

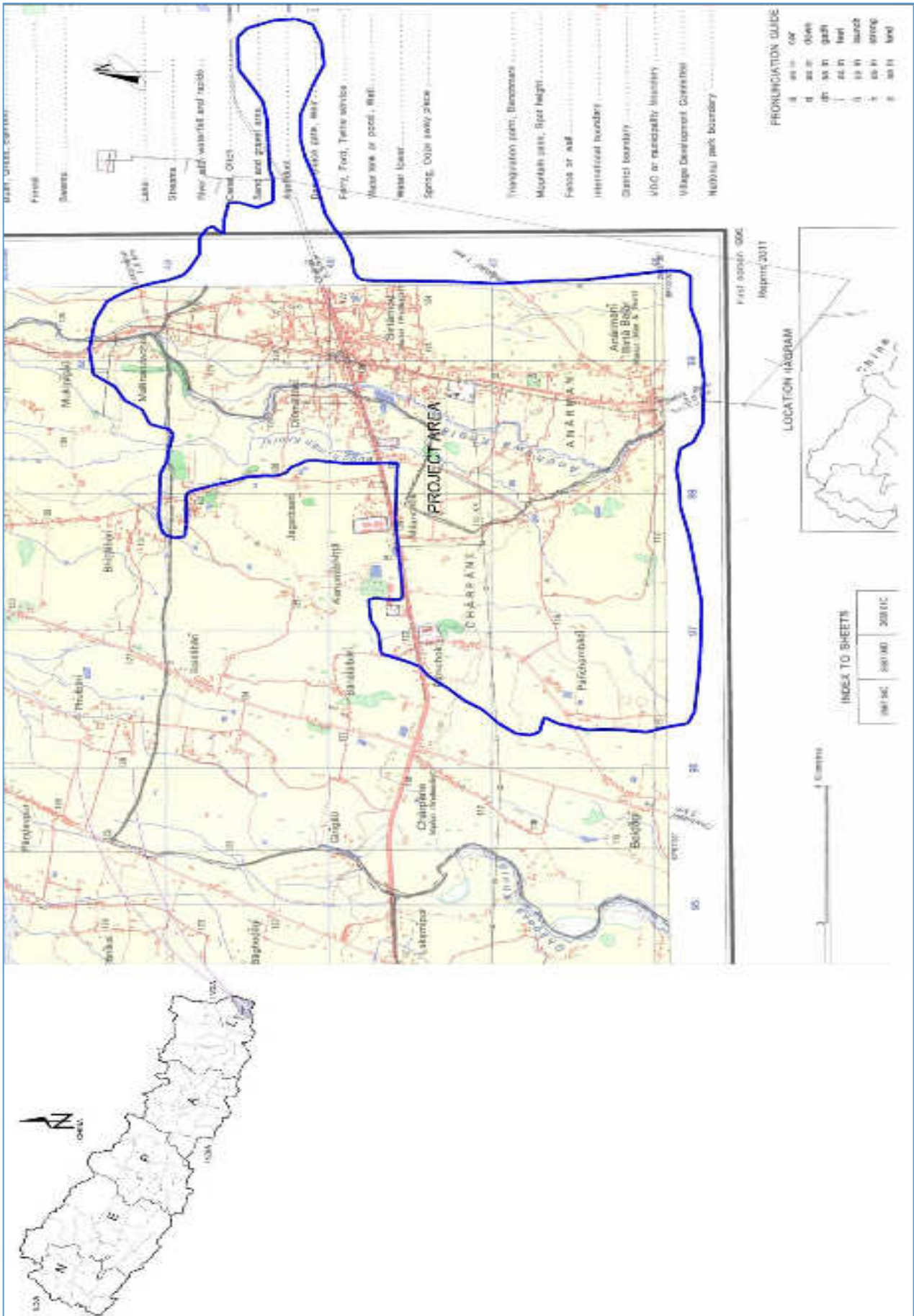


Figure 4-1: Location of the Sub project Area

## 4.2 Existing Condition and Need for the Subproject

25. The sub-project includes the following works;

- Maintenance of 450 m<sup>3</sup> ground reservoir
- One water treatment plant with PF facility
- 15 km of pipe line laying
- Construction of Chlorination unit
- One surface water intake consisting of infiltration gallery at source river

The technical details are shown in Table 4-1.

### 4.2.1 General Information

1. **Name of the Project** : Enhance Functionality in Small Town Water Supply and Sanitation Sector Project
2. **Name of Sub-Project** : Birtamod Small Town Water Supply & Sanitation Project, Jhapa
3. **Service area of the project** : Ward nos. 4, 5, 8 and 9 of former Birtamod VDC (Now Birtamod Municipality).
4. **Total Project Cost** NRs. 19,017,087

### 4.2.2 Technical Information

26. Details of technical information are mentioned in Table.

**Table 4-1: Technical details**

S. No.	Name of structure	Existing	Additional	Total
1	No. and capacity of Reservoirs:	1(450 cum)		1(450 cum)
2	Treatment Facilities	1(PF 1) Chlorination Unit	Chlorination Unit (Rehabilitation)	1(PF 1) Chlorination Unit
3	Pipeline Length:			
3.1	Transmission	0.2 km		0.2 Km
3.2	Distribution	35 km	15 km	50 Km
3.3	Total	35.2Km	15 km	50.2 Km
4	Guard House	1	None	1
5	Generator / Operator House	1	None	1
6	Chlorination Unit with lab	None	One	One
7	Office Building:	One	One	One
8	Surface Intake/ Borehole Drilling	Bore hole 2	None	Bore hole 2
9	Fire hydrant	One	None	One

S. No.	Description	Existing (2014)	Design year (2022)	Design year (2030)
10	Household connection	2,674	3,470	4,503
10.1	Fully plumbed	1,551	2,568	4,053
10.2	Yard connection	1,123	902	450
10.3	Community		3	4
10.4	Institutional	79	99	120
10.5	Total	2,753	3,572	4,627
11	Total Water Demand			
11.1	MLD	1.60	2.19	2.99
11.2	LPS	18.5	25.3	34.6



### 4.2.3 Socio- economic Information

Total Household Number and Population (Pop.)

- Present year (2014): 2,674/14,493
- Design year (2022) : 3,470/18,806
- Design year(2030) : 4,503/24,403

### 4.2.4 Financial Information

1. The financial planning for the enhancement project is as follows;

- Total investment 100%
- Government: Grant 70%
- WUSC Contribution: 5 – 10% of total investment as cash (% to be decided later)
- TDF Loan: 20 – 25% of total investment to be provided to the WUSC (% to be decided later)

2. Weighted Average Tariff NRs 13.5 per cum

3. Cost Per Capita and per household

Description	Base year 2014	Design Year 2022	Design Year 2030
Cost per Capita	1,312.16	1,011.22	779.29
Cost per House hold connection	7,111.85	5,480.43	4,223.20

### 4.3 Sub Project Construction schedule

27. It is expected that the contract will be awarded by the last week of November 2015 and the construction work will be completed by the last week of May 2016. The detail of work is shown in Figure 4-2.

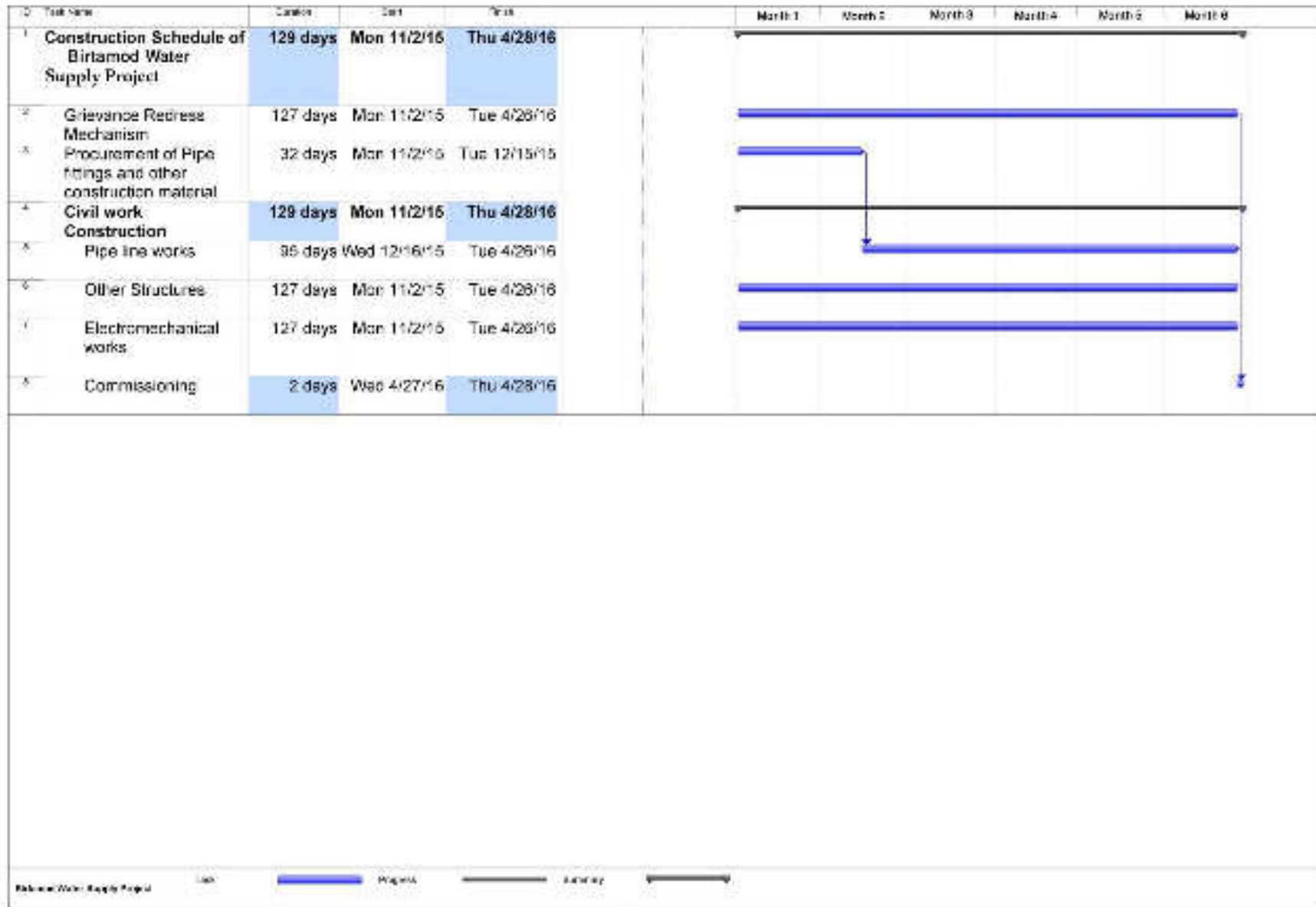


Figure 4-2: Construction Schedule

## **5. DESCRIPTION OF THE ENVIRONMENT**

### **5.1 Physical Profile**

#### **5.1.1 Topography**

28. Topographically, the Birtamod Bazar and the surrounding area lie on a generally flat land in the Terai with the Siwaliks on the north at elevations ranging from 135 to 115 m. above the mean sea level. The town itself is at 126 meters altitude and located 12 km north of the Bhadrapur municipality (District Head Quarter) on the East-West Highway. Though the small town is known as Birtamod, the name of the VDC, where it is situated is Anarmani. The Adjoining VDC on the west, which has also been incorporated into the project area, is Charpane. A part of another adjoining VDC, Arjundhara, is also a part of the service area. A part of the Sanischare VDC on the North and East, has also been included.

#### **5.1.2 Geology and Soils**

29. The service area is situated on upper terai region of the indogangetic plains with the Siwalik Hills to the north. The area is composed mainly of gravel and boulder along with sand, close to the Aduwa khola that runs along the middle of the project area, whereas the rest of the area is composed of silty loamy soil, which is highly fertile.

#### **5.1.3 Climate**

30. The climate of the town is tropical with average yearly minimum and maximum temperatures being 2.5°C and 41.200, respectively. The mean monthly minimum and maximum temperatures are 8.50C and 37.4°C. It receives an average annual rainfall of 1667mm. The highest recorded is 3060 mm.

#### **5.1.4 Surface and Groundwater**

31. The major stream that flows through the centre of project area is Aduwa khola that runs from north to south along Ward # 3, 4, 7 to 9. This stream proceeds to Garmani and Haldibari VDCs on the south and finally reaches India as BhuteniKhola. Other streams of some significance are Deukhaniya that flows through Anarmani ward # 1 to Garamani Ward # 2, Masale Canal flowing Anarmani ward # 1 to Garmani Ward # 2, and Belganchikhola and Rekha khola. These have been providing irrigation to the VDC.

32. In the enhancement project, a new water intake is proposed at the downstream side of the existing intake point towards the right bank of the Ratu River. The water will be taken to a new treatment plant at the downstream side just south side of East West Highway. The water will flow in gravity.

#### **5.1.5 Water Quality Analysis**

33. In the enhancement project additional units of SSF and Chlorination are proposed. The detail analysis of the water quality report is presented in Annex 2 of this report.

34. Water quality analysis were done for all critical sub project components such as intake, water before and after treatment plant. Samplings were also done in the distribution networks as well as randomly selected HHs taps to assure the quality. Mainly Physical component testing was done as pH, Turbidity, Electrical conductivity temperature. Similarly the various chemical components were also tested mostly like Calcium, Iron, Magnesium, Arsenic, Ammonia, Chromium, Nitrate, Sulphate, Chloride, Fluoride and Total Hardness as well.

35. In biological mainly parameter like Total Coliform and Fecal Coliform were tested for. If any contamination is encountered simultaneously the chlorination unit, pressure filter unit, slow sand filter treatment units should be provided. In case of this Water supply sub project due to the presence of Coliform, SSF and Chlorination units are constructed and now functioning.

## 5.2 Ecological Profile

### 5.2.1 Flora

36. It can be expected that three types of forests would be the natural habitat of the area, namely Shorearobusta (sal); Acacia catechu (khayar)-Dalbergiasissoo (sisau), other riverine forests and grasslands.

37. The Shorearobusta forest is dominated by the Shorearobusta species with common associates of Terminaliatomentosa (Asna), Adina cordifolia (karma), Anogeissuslatifolia (bud dhayera), Lagerstroemia parvifolia (botdhaiyero), Dilleniapentagyna (Tantari), Syzygiumcumini (jamun) and Semecarpusanacardium (bhalayo), etc.

38. The acacia catechu-dalbergiasissoo forest is found on newly deposited alluvium, often gravelly along streams and rivers. The other riverine forest consists of tropical evergreen forest dominated by syzygiumcumini (black plum) tropical deciduous forest usually dominated by Bombaxceiba (simal), Holopteliaintegrifolia (cheptepagro) and Trewianudiflora (pindar) species.

39. Medicinal plants of significance that would be expected here are Sikakai (Acacia concinna), Assuro (Adhetodavasica), Tulasi (Ocimum sanctum), Kureelo (Asparagus racemosus), Harro (Terminaliacheberia), Barro (Terminaliafelerica) and Amala (Emblicaofficinalis), etc.

### 5.2.2 Fauna

40. No natural forest to be habitat for wild animals exists in the service area. However, the Charali forest was known to have deer and many other wild animals. It does not have any of the wild animals at present.

41. It is possible that snakes like King Cobra (Ophiophagushannah), Green Pit Viper (Trimeresurusalbolabris), Common Krait (Bungaruscaeruleus) and the Indian Python (Python molurus) would be present in the fields.

### 5.2.3 Protected Areas

42. Protected areas are almost nonexistent. A small patch of forest (1700 hectare) about 5 km to the east from Birtamode known as Char Ali NichaJhoda and a tiny patch of sal frees ( 1 hectare), which is known as Salghati in Charpane 3 and a pond Birat which as per the mythology was built by King Birat during the Mahabharat period. It has an area of 3.5 hectare.

## 5.3 Socio Economic Condition

### 5.3.1 Population, Communities and Occupation

43. Birtamode is the fastest growing town in eastern Nepal, where in-migration trend is very high due to the prevailing security situation in neighboring hill districts of Ilam, Taplejung, Panchthar and Terthum. Also there are high opportunities of employment and business opportunities in Birtamode. Market area of Anarmani (Birtamod and Birta Bazar) is compact. The neighboring VDCs of Arjunthara, Charpane etc. are also developing at a rapid pace.

44. This is evident from the statistical figure of Anarmani VDC. The 1999 population of Birtamode Bazaar (Anarmani VDC) is 27320 with 17816 households (own house) and 9504 (rented house). Of the total hose owning population of 17816 the number of those bom in the VDC itself comprises of 4577. Those from inside the district number 7045 and those from other parts of the country are 4907, There is significant number of immigrants from India: 1184.

45. Construction of houses is gaining momentum albeit haphazardly. Consequently there is rapid population growth in the proposed areas.

46. The major sources of income in the service area are business, agriculture and remittance. The dependency on nonagricultural activity in the VDC is around 75 %. There are several industries in the area. The major industry is agro-based. Tea is a significant one. Tea estates and small tea packaging are operating in the area. Rice mills, oil mills are important industries. This is the main transport centre of the area. Garages and repair shops for motor vehicles abound the main road

area. Other industries under operation are construction, service industry including computer and IT. There is a significant part of the population depending upon transport service.

47. The major ethnic castes in the proposed project area are Brahman, Chhetri, GiriTamang, Limbu, Kami, Damai, Sarki, Newar, Gurung, Rai etc. Similarly, there are also minority ethnic groups such as Rajbansi, Choudhary, Satar, Meche and Muslim etc. residing in the proposed service area.

### **5.3.2 Health and Sanitation**

#### **5.3.2.1 HEALTH AND SANITATION**

48. There is a number of private hospital in the municipality, a private clinic, a vaccination clinic, and number of women Health volunteers and trained midwife. Besides a Mary Stopes Centre and Nepal Family Planning Association Clinic are providing service. There is a good water supply system in the main bazaar area. Of the 3260 households 1181 have connection from the town supply. 1939 HH have only tubewell for drinking water. 140 have dug wells. Even those HH, which have connection to the town supply, have tube well.

49. The prevalent infectious disease is diarrhea. The numbers of children affected in the year 2057/58, 058/059, and 059/060 are 705, 693 and 1392, indicating poor sanitary status. The population without toilets is 771 of the total 3260 HHs. The spread of the infectious disease stem from the defecation at unsafe locations by those without toilets.

50. There is a system of daily cleaning of Birtamode and Birta Bazaar. There is a regular weekly collection of the solid waste from the area. The waste is dumped at an identified dumping site. Recently AdershaSamudayakSamaj Centre of Anarmani Ward No. 3 is also collaborating in this area. But this area still needs a high degree of development.

51. There is no public latrine in the VDC. Those without toilets go the riverside for defecation, which increases the chance of the river being polluted.

### **5.3.3 Economic Characteristics**

#### **5.3.3.1 INDUSTRIES**

52. Although not adequate to give full employment to the total population, the project area is economically the most active location in the region. There are a number of industries in the area. Most of them are agro based. Tea appears to be thriving industry. There are six major tea gardens registered in Anarmani VDC. Two produce fully processed tea, whereas the remaining four produce green leaves, which are, processed elsewhere. There are many tea packaging cottage scale industries. The number of service industries us quite substantial.

#### **5.3.3.2 AGRICULTURAL DEVELOPMENT**

53. The land is fertile for agriculture and the rate of production is good. The main crops are paddy and maize. Two crops of paddy or one each of paddy and maize are planted in a year. Besides wheat, oilseeds, pulses are grown here. Cultivation of vegetables including off seasonal is conducted commercially. Tea gardens have been established in the eastern part of the area and is substantial. The total area under tea plantation is about 165 hectares in Anarmani VDC.

#### **5.3.3.3 MINERAL DEVELOPMENT**

54. Mineral exploitation activities are nonexistent.

### **5.3.4 Infrastructure Facilities**

55. All major infrastructural facilities like water supply, roads, electricity and telephones/communication are available to the consumers in the service area. Such facilities are of course better within the Birtamode Bazaar area within Anarmani VDC, which lies on the East-West Highway.

#### **5.3.4.1 INSTITUTIONS**

56. There are 7 banks, 4 cooperative banks a primary health post, a police office, a post-office, a forestry office, a veterinary centre, irrigation office, VDC office and an agriculture services centre. The educational institutes consist of 5 primary schools (2 government, 3 private), 4 high schools (1 government, 3 private, and a private higher secondary school of commerce. The bazaar area is lies in ward nos. 4, 6 and 7 of Anarmani VDC.

#### **5.3.4.2 TRANSPORTATION**

57. Birtamode is situated on the East-West Highway (Mahendra Rajmarga) and is 12 km north of the Bhadrapur and is easily accessible. Bhadrapur airport is the nearest airport. It is accessible form different parts of the district by a number of gravel and black-topped roads. Means of transport are buses, trucks, cars, motorcycles, tractors and bicycles.

58. Existing black-topped roads are the East West High Way, Birtamod Bhadrapur Road, Sansichare Birtamod Road, Birtamode, Birtabazar road and some subroads within Birtamod. The rest of the network comprises of gravel and dirt roads.

#### **5.3.5 Land Use Planning**

59. There is no scientific land use planning at the moment and that is why ribbon development is occurring at a fast pace. The most extensive land use in the market area is residential/commercial along the East West Highway. Most of the heavily built area is around the old Birta Bazar and along the high way. The houses along the other roads are more scattered. The tea gardens are on the eastern part. Tinpane and Arundhara VDCs are newer development areas towards urbanization.

#### **5.3.6 Quality of Life Values**

60. The Project is not expected to adversely affect any cultural or recreational resources but will increase the existing quality of life values due to the improvement in personal, household and community hygiene practices and community health.

#### **5.4 Resettlement, Relocation and Compensation Issue**

61. The various project components do not require resettlement of households or relocation. The system network has followed public property line and hence the issue of resettlement or relocation is not evident. The minutes of stakeholder consultation meeting also suggests that there is no need of resettlement or relocation.

62. The land required for construction of treatment plant and reservoir has been purchased by the WUSC and there is no need to provide compensation from the project side.

## **6. DESCRIPTION OF IMPACT ASSESSMENT**

63. No significant impacts of project construction and operation were anticipated (IEE, 2005), but the following impacts were likely to occur. The project is now in operational phase and that all the physical and biological and socio-economic cultural impacts have been mitigated. In the enhancement project as well the same type of impacts are likely to occur.

### **6.1 Physical Environment**

64. Physical Impact covers impacts on physical resources such as air, water, soil, rocks etc. The positions of a water table keep on fluctuating up and down in relation to wet and dry weather. Porous sand and gravel aquifers yield more water than silt or clay deposits. Hence physical testing of soil structure will help understanding the water availability.

#### **6.1.1 Impact on land use pattern**

65. Intake structure, reservoir and treatment plant would require some land area in addition to permanent site to facilitate construction activities, which is envisaged to alter the land use during construction period. The implications of such land use may affect on soil, productivity and land use pattern.

#### **6.1.2 Flooding and Stagnant Water Problem**

66. During monsoon season the project area will be affected from flooding and may create the condition of stagnant water. Absence of drainage system in the project area will create flooding problems. This might create public health problem due to increase in number of vector species like mosquito, snails and others.

#### **6.1.3 Impact on water/land quality**

67. Excavation and construction spoils are the major outcomes of construction activity. Besides, the workforce camps and their sanitary behavior might produce unwanted waste materials. The spoils and waste materials may have adverse implications on adjoining water sources.

#### **6.1.4 Impacts of sediments and Disinfecting Chemicals**

68. Issues like release of sediments from treatment plants, and the use of disinfecting chemicals might affect the water quality. Such effects are minor in nature and can be easily mitigated during the operational phase.

#### **6.1.5 Impacts on Air Quality**

69. Dust will be generated from inadequately managed or haphazard: (i) earthworks such as clearing, grubbing, excavations and drilling; (ii) demolition works; (iii) stockpiling of natural aggregates, excavated materials and spoils; (iii) transport, loading and unloading of natural aggregates; (iv) movement of construction-associated vehicles; and (v) on-site rock crushing, cement mixing/concrete batching, borrowing. The significance of dust impact will be high in the bazaar area where more population reside and work and where urban socio-economic activities concentrate. Increase in concentration of vehicle- and process related pollutants will arise from the movement and operation of construction vehicles, equipment and hot-mix plants.

#### **6.1.6 Impacts on Acoustic Environment**

70. Noise and vibration emitting construction activities include earthworks, rock crushing, concrete mixing, movement and operation of construction vehicles and equipment, and loading and unloading of coarse aggregates. The significance of noise and vibration impacts will be high in areas where noise-sensitive institutions such as health care and educational facilities are situated. These impacts will be temporary and short term.

### **6.1.7 Impacts on Traffic and Temporary disturbance**

71. During construction phase, implementation of distribution network pipeline will create disturbance to local transport system. The significant impact will be seen in market and busy area only. These impacts will be temporary and short term.

### **6.1.8 Water Volume/Quality**

72. Over extraction water may decrease the volume of water and improper treatment of water also decrease the quality of water which may arise issues affecting the ground water sources of water.

## **6.2 Biological Environment**

### **6.2.1 Impact on natural vegetation and ecology**

73. The natural vegetation and ecology of the project area may be disturbed due to construction activities of the different project components. Besides, the activities of workforce on the adjoining forest may affect the habitat of wildlife.

### **6.2.2 Impact on aquatic life**

74. The source being ground water no impact on aquatic life is envisaged due to implementation of the project

### **6.2.3 Loss of habitat**

75. Clearance of vegetation along the bulk distribution pipeline, and trunk transmission pipeline, may result loss of some forested habitat of wild life and consequently affect the endangered species.

## **6.3 Socio-Economic and Cultural Environment**

76. Many of the adverse impacts on socio-economic and cultural aspects will be limited to construction stage. The following socio-economic issues have been considered in IEE.

### **6.3.1 Land acquisition**

77. The land required for the construction of permanent facilities has been managed by WUSC and no disputes are observed. Similarly there is no necessity of relocation or resettlement.

### **6.3.2 Outside workforce conflict/health/pollution/culture**

78. Involvement of outside workforce in the local area may initiate conflict between the locals and outsiders due to cultural reasons. Disease transmission, pollution and competition for the available resources with outsiders might arise.

### **6.3.3 Workers' Health and Safety Hazards**

79. Like communities, workers will also be exposed to the cross-cutting threats of the aforementioned impacts during construction. Inadequate supply of safe/potable water and inadequate sanitation facilities; poor sanitation practices on site; poor housing conditions; the handling and operation of construction equipment; handling of hazardous substances; exposure to extreme weather and nonobservance of health and safety measures, pose additional threats to the health and safety of construction workers. Construction workers may also be potentially exposed to communicable and transmittable diseases in the community and in the workforce.

### **6.3.4 Water right Conflict**

80. Involvement of outside workforce in the local area may initiate conflict between the locals and outsiders due to cultural reasons. Disease transmission, pollution and competition for the available resources with outsiders might arise.



#### **6.4 Beneficial impacts**

81. However there are some benefits of the project implementation; particularly on the following:
- Increase in agricultural and livestock products
  - Employment generation
  - Maintaining the health and sanitation activities
  - Increase in quality of life values
  - Change in cropping pattern

## **7. DESCRIPTION OF MITIGATION MEASURES**

### **7.1 Physical Environment**

#### **7.1.1 Impact on land use pattern**

82. The STWSSSP is located in Birtamod municipality in the private land of about 2 ropanis and with boundary wall constructed. It also owns land for other structures like OHT and TWs. It was ensured in design, that the tube wells and other water retaining structures like, OHT, WTP and others are well protected with good drainage to be located on stable ground. Therefore, the project implementation would have less or no effect on soil, productivity and on the land use pattern.

#### **7.1.2 Flooding and Stagnant Water Problem**

83. Proper management of drainage system needs to be improved. Contractor should be instructed not to store construction materials along the water ways.

#### **7.1.3 Water/land quality**

84. The project uses sub surface water that will be taken from below the water bed of the river by using infiltration gully technique. Therefore the quality of water is expected to be clean. However the pollution in the surface water may have negative effect. The intake point is upstream from the settlement area and hence external pollution is also not foreseen. Therefore there is ground water pumping, there is less or minimum effect on water quality. Proper drainage system should be made to avoid water logging and the quality of water sources should be protected. Urination, defecation and dumping of solid and liquid waste in open areas, and water ways may be the potential cause of the pollution of surface and sub-surface water and such activities should be strictly prohibited.

#### **7.1.4 Impacts of sediments and Disinfecting Chemicals**

85. The water quality should be maintained within WHO standards. Filtration and chlorination should be provided to bring the water quality to acceptable levels. Similarly, a manual on water testing and chlorine dosing should be prepared and provided to WUSC.

#### **7.1.5 Water volume**

86. The water should be equally distributed to all the users in a controlled way. The amount of water that required should only be extracted.

#### **7.1.6 Impacts on Air Quality**

87. Some mitigation measures include: (i) confining earthworks according to a staking plan and excavation segmentation plan that should be part of the working documents and/or C-EMP; (ii) watering of dry exposed surfaces and stockpiles of aggregates at least twice daily, as necessary; (iii) if re-surfacing of disturbed roads cannot be done immediately, spreading of crushed gravel over backfilled surfaces; (iv) during demolition, watering of exterior surfaces, unpaved ground in the immediate vicinity and demolition debris; (v) hoarding active work sites in populated areas; (vi) requiring trucks delivering aggregates and cement to have tarpaulin cover and maintain a minimum of 2' freeboard; (vii) limiting speed of construction vehicles in access roads and work sites to maximum of 30 kph; and (viii) providing pollution controls in batching and hot-mix plants.

#### **7.1.7 Impacts on Acoustic Environment**

88. Some mitigation measures include: (i) using equipment that emit least noise, well maintained and with efficient mufflers/exhaust silencers; (ii) restricting noisy activities to daytime and overtime work to avoid using noisy equipment; (iii) limit engine idling to a maximum of 5 minutes; (iv) spread out schedule of material, spoil and waste transport (v) minimizing drop heights when loading and unloading coarse aggregates; and (vi) identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity. Complete work in these areas quickly.

### **7.1.8 Traffic and Temporary disturbance**

89. Some mitigation measures include: (i) distribution pipeline work will be done during night time, (ii) diversion need to be made if work is of long duration.

## **7.2 Biological Environment**

### **7.2.1 Impact on natural vegetation and habitat**

90. The loss of vegetation from construction activities of contractors and construction workforce is recommended to be minimized through the enforcement of the following provisions.

- Prohibition on illegal felling of trees and encroachment of the community forest should be made mandatory.
- Progressive rehabilitation and afforestation of the areas not acquired by the project structures after the completion of the construction activities should be carried out. Such afforestation program is recommended to plant saplings of trees, shrubs and herbs by establishing a nursery or pre-arrangements of such saplings from the local or district level nurseries.
- To enhance the conservation of endangered, protected and threatened species, it is recommended to plant the saplings 2 times the number of felled trees.

## **7.3 Socio-economic and cultural environment**

### **7.3.1 Land acquisition**

91. The land required for the construction of permanent facilities has been managed by WUSC and no disputes are observed. Similarly there is no necessity of relocation or resettlement. Vegetation and agricultural products should be compensated through the afforestation and agricultural enhancement programs in the SWSSSP area.

### **7.3.2 Outside workforce conflict/health/pollution/culture**

92. Outside workers should be provided with the facilities of camps and should be instructed to not to; i) indulge with local people ii) involve themselves for hunting of wildlife iii) involve themselves in social disharmony activities.

### **7.3.3 Workers' Health and Safety Hazards**

93. Some of the mitigation measures for community health and safety hazards: (i) strictly enforce on workers the use of protective wears; (ii) provide safe access to and from work sites; (iii) provide adequate housing at the workers' camp with adequate basic services and provide adequate water supply and sanitation facilities at work sites; (iv) arrange with nearest health center and hospital for health care and emergency care of workers. Overall, the contractor should comply with IFS EHS Guidelines on Occupational Health and Safety.

### **7.3.4 Water right Conflict**

94. The temporary settlement for the workers should be provided with temporary water taps. Open defecation should be controlled. Temporary toilets need to be constructed.

## **7.4 Enhancement of Beneficial Impacts**

95. Some of the beneficial impacts from the implementation of the project should be enhanced by;

- Community mobilization and people's participation in health and sanitation programs should be promoted,
- Training an awareness programs in health and uses of water and its importance (water cost, saving, reuse, recycle, water pollution etc.) should be given,
- Technical training to the local people on plumbing, chlorination, water testing, pump maintenance and repair should be conducted.

## **7.5 Activities for Rehabilitation Work and its Mitigation Measures**

96. As this rehabilitation project is for previously implemented and operated in a satisfactory order with minimal rectification works. Physical, Biological and Social environment are described respectively in Section 7.1, 7.2 and 7.3. Slight changes are in social that is increased population, number of stakeholders for which additional distribution lines with ancillary works are to be done. Major focused were given for the technical rectification which need to be done during enhancement work are summarized in Table 7-1 in details. Most of the recommended mitigation measures will be incorporated in the contractual obligations and constructions works to be completed by the contractors. Facilities like water treatment plant, water testing laboratory etc are also either existing or to be installed is also included in the contract. Mitigation measures and monitoring plan of each rehabilitation activities is mentioned in Table 10-2 in Chapter 10.

**Table 7-1: Activities for Rehabilitation Work**

S.No	Name of Structure	Type	Existing Capacity(Q=Ips, RVT=cum, WTP Ips)	Design Capacity(Ips)	Major problems	Required Intervention
<b>1</b>	<b>Civil Structures</b>					
1.a	TW 1(In old OHT-A premises)		15	35	<ul style="list-style-type: none"> <li>• Damaged Bulk meters in both TW in Zone-A&amp; C.</li> <li>• Tube well 3 draws a higher content of sand.</li> </ul>	<ul style="list-style-type: none"> <li>• 2 new TW is proposed.( one at each Zone A &amp; B 20Ips)</li> </ul>
1.b	TW 2 (In old OHT-A premises)		15	35		
1.c	TW 3 (In old OHT-A premises)		NF	35		
1.d	TW 4(OHT-B premises. Near main entrance N-E corner)		15	35		
1.e	TW 5(OHT-B premises. Near main entrance S-W corner)		15	35		
1.f	TW 6(OHT-C premises. Near main entrance S-E corner)		17	35		
1.g	TW 7(OHT-C premises. Near main entrance N-W corner)		17	35		
	<b>Total</b>		<b>94</b>	<b>245</b>		
<b>2</b>	<b>Reservoir</b>					
2.a	Reservoir 1, (ward no 6)	OHT	450	450	<ul style="list-style-type: none"> <li>• Bulk Meters are damaged in each OHT.</li> </ul>	
2.b	Reservoir 2, (ward no 6)	OHT	450	450		
2.c	Reservoir 3, (ward no 6)	OHT	450	450		
	<b>Total</b>		<b>1350</b>	<b>1350</b>		

S.No	Name of Structure	Type	Existing Capacity(Q=Ips, RVT=cum, WTP Ips)	Design Capacity(Ips)	Major problems	Required Intervention
<b>3</b>	<b>Treatment Plant</b>					
3.a	Aeration Tank					
3.b	Pressure Filter				<ul style="list-style-type: none"> <li>• PF has low efficiency</li> </ul>	<ul style="list-style-type: none"> <li>• 2 new PF is proposed</li> </ul>
3.c	Chlorination				<ul style="list-style-type: none"> <li>• Chlorination unit not effective.</li> </ul>	<ul style="list-style-type: none"> <li>• 2 new chlorination unit proposed</li> </ul>
4	Accessories, Valve Chambers etc	Valve chambers, air valve, washout valves, NRV, bulk meters etc			<ul style="list-style-type: none"> <li>• Damaged brick masonry valve chamber.</li> </ul>	
5	Pipes & pipe fittings	HDPE, GI, DI			<ul style="list-style-type: none"> <li>• The distribution network is not efficiently running.</li> <li>• Lack of Fire hydrants.</li> <li>• There are inadequate number of washout and air valves.</li> </ul>	<ul style="list-style-type: none"> <li>• New 10.022 km of pipeline is proposed.</li> </ul>

## 8. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

### 8.1 Consultation

97. Stakeholder consultation and participation was an essential process in project preparation and this updated IEE. The process in engaging stakeholders and affected people during the conduct of the IEE involved key informant interviews, joint sites reconnaissance and on-site discussions with WUSC, and field random interview of stakeholders.

### 8.2 Initial consultation: the existing project

98. During the Feasibility Study, consultations were undertaken by the Design and Supervision Consultants. Stakeholder consultations have been continued through subprojects implementation and operation. All stakeholders were invited and encouraged to participate in community consultations. To facilitate the engagement of stakeholders, the PMO and RPMOs maintained good communication and collaboration with the WUSC and VDC. The PMO, RPMOS, Contractors and/or WUSC were opened to contact by the public on matters concerning the progress of the subprojects, adverse impacts, mitigation measures and environmental monitoring and grievances.

- Prior to construction, the PMO and TPO have conducted information, education and communication (IEC) campaign to ensure sufficient level of awareness/information among the affected communities regarding the upcoming construction, its anticipated impacts, the grievance redress mechanism, contact details and location of the PMO and TPO, and status of compliance with Government's environmental safeguard requirements, among others, are attained/provided. Billboards about the subproject, implementation schedule and contact details of the executing agency, PMO, TPO and Contractors have been set up at strategic locations within the subprojects' main areas of influence. The grievance redress procedure and details will have been posted at the offices of the PMO, TPO, WUSC and VDC.
- During construction, regular random interviews were conducted by the TPO every month to monitor environmental concerns of subproject communities.
- During operation, periodic random interviews were conducted by the PMO and
- TPO and WUSC to monitor the environmental concerns of subproject communities.

### 8.3 The consultation during IEE update

99. The consultation was done in two phases

#### 8.3.1 Phase I

100. During the engineering survey and design phase, the consultations met with the top level management of DWSS, WUSC officials, WS division officials in Kathmandu and concerned municipality offices, WS customers and general public in field. The main persons consulted during this phase are listed below;

**Table 8-1: Lists of People and Institutions Consulted**

S No.	Name	Designation
1	Mr. Ram Deep Sah	Director General
2	Mr. Tires Prasad Khatrai	Acting Project Director
3	Mr. Dr. Mahesh Bhatrai	PMC, Project Co-ordinator
4	Mr. Keshav Raj Bista	Deputy Project Director
5	Mr. Jal Kumar Gurung	Secretary
6	Mr. Khadagraj Giri	Accountant
7	Mr. Ganga Sharma	Member

### **8.3.2 Phase II**

101. After approval of Detail Design report, second level of public consultation was made to discussion issues regarding the environmental impact, resettlement, relocation and compensation with immediate stakeholders. Meeting was held on 2072/06/07 at site. In this phase overall project outcomes were discussed with all concerned stakeholders. Details of participants are presented in Annex 4.

### **8.4 Costs**

102. All costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) at local (field/ward/town) level will be borne by the concerned focal organizations at each level: WUSC at town level; PIU at regional level and PMO at central level.



## **9. GRIEVANCE REDRESS MECHANISM**

### **9.1 Purpose of the Grievance Redress Mechanism**

103. A project-specific grievance redress mechanism (GRM) will be established to receive, evaluate, and facilitate the resolution of APs' concerns, complaints, and grievances related to social and environmental issues of the project. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project.

104. A common GRM will be in place for social, environmental, or any other grievances related to the project. The GRM will provide an accessible forum for receiving and facilitating resolution of affected persons' grievances related to the project. Every grievance shall be registered and careful documentation of process with regard to each grievance undertaken, as explained below. The environmental and social safeguards officer (ESO/SSO) at project management office (PMO) will have the overall responsibility for timely grievance redress on environmental and social safeguards issues. The Social Development Officer at the Regional Project Management Office (RPMO) will be the focal person for facilitating the grievance redress at VDC/Municipality level.

105. A town-level public awareness campaign will be conducted to ensure that awareness on the project and its grievance redress procedures is generated. The social safeguards expert of the project management consultant (PMC) and DSMC's safeguards specialists will support the WUSC and DSMC community mobilisers with information/collateral/awareness material etc. to conduct the town-wide awareness campaign. The campaign will ensure that the poor, vulnerable and others are made aware of grievance redress procedures and project's entitlements.

106. A Grievance Redress Committee (GRC) will be formed at VDC/Municipality level, comprising District Chief WSS as Chairperson and Member of Secretary of concerned WUSC as the GRC secretary. The GRC members will be comprise of (1) RPMO social development officer, (2) representatives of affected persons, (3) DSMC's safeguards specialist (social/environment as relevant), (4) a representative of reputable CBO/SHG/organization working in the project area, and (5) contractor's representative. The secretary of the GRC, who will be responsible for convening timely meetings and maintaining minutes of meetings. The concerned social safeguards expert of DSMC will support the RPMO SDO and Regional Director DWSS to ensure that grievances, including those of the poor and vulnerable are addressed. All GRCs shall have at least two women committee members. Representatives of APs, civil society and eminent citizens are to be invited as observers in GRC meetings.

107. The functions of the local GRC are as follows: (i) provide support to affected persons on problems arising from environmental or social disruption; asset acquisition (if necessary); and eligibility for entitlements, compensation and assistance; (ii) record grievances of affected persons, categorize and prioritize them and provide solutions within 15 days of receipt of complaint by WUSC; and (iii) ensure feedback to the aggrieved parties about developments regarding their grievances and decisions of the GRC. The grievance redress mechanism and procedure is depicted in Figure 9-1.

108. The GRM for the project is outlined below, with each step having time-bound schedules and responsible persons to address grievances and indicating appropriate persons whose advice is to be sought at each stage, as required:

#### **9.1.1 First Level of GRM (WUSC-level)**

109. The first level and most accessible and immediate venue for quick resolution of grievances will be the contractors, DSMC field engineers and PIU supervision personnel, who will immediately inform the WUSC. Any person with a grievance related to the project works can contact the Project to file a complaint. The WUSC will document the complaint within 24 hours of receipt of complaint in the field, and WUSC will immediately address and resolve the issue at field-level with the contractor, supervision personnel of PIU and DSMC field engineers within 5 days of receipt of a complaint/grievance. The assigned DSMC social mobilizer will be responsible to fully document: (i) name of the person, (ii) date of complaint received, (iii) nature of complaint, (iv) location and (v) how the complaint was resolved. If the complaint remains unresolved at the local level within 5 days, the WUSC will forward the complaint issue to the VDC/Municipality level GRM.

### **9.1.2 Second Level of GRM (VDC/Municipality level)**

110. The complainant will be notified by the WUSC that the grievance is forwarded to the VDC/Municipality –level GRM. The Grievance Redress Committee (GRC) will be called for a meeting. The GRC meeting will be called and chaired by the District chief of WSS. The GRC will recommend corrective measures at the field level and assign clear responsibilities for implementing its decision within 10 days of receipt of complaint by WUSC. If the grievance remains unresolved within 10 days of receipt of complaint by WUSC, the matter will be referred to the third level. The RPMO SDO will be responsible for processing and placing all papers before the GRC, recording decisions, issuing minutes of the meetings and taking follow up action to see that formal orders are issued and the decisions carried out. If the complaints are related with IP/dalits/other vulnerable groups, specific NGO/CBO that actively involved in development of these communities should be involved.

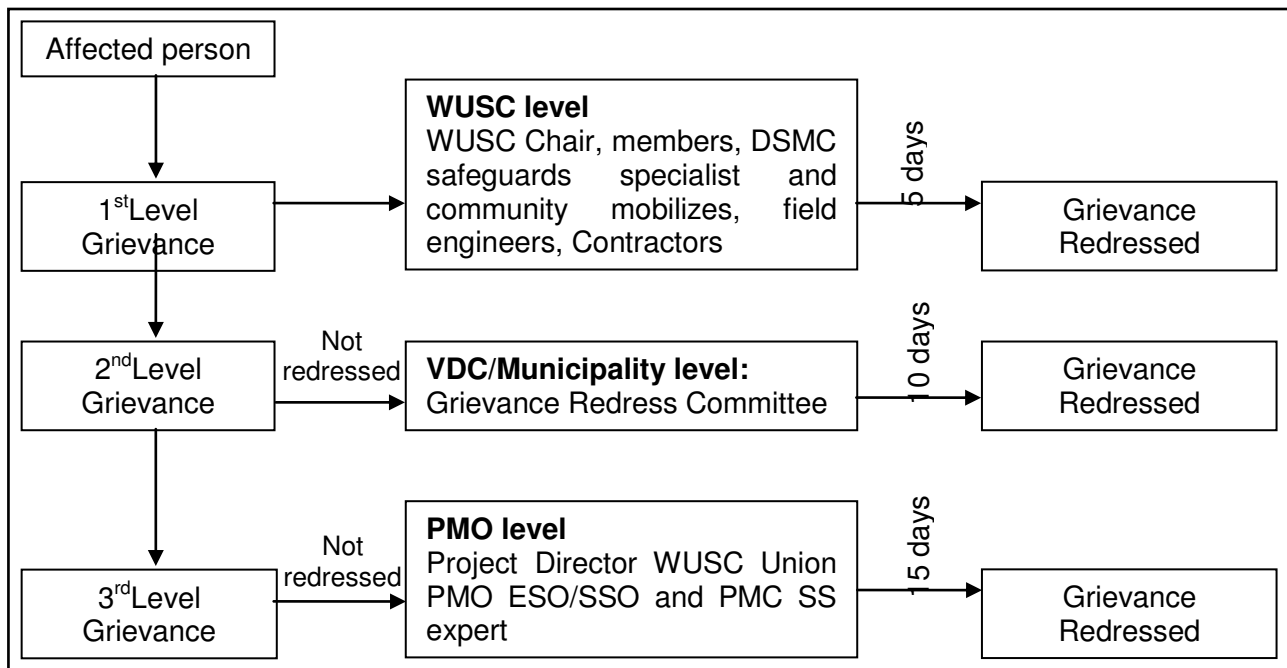
### **9.1.3 Third Level of GRM (PMO Level)**

111. Any unresolved or major issues at Municipality/VDC level will be referred to the PMO for final solution. The PMO’s Project Director and WUSC Union representative will have special meeting to find solution. Decision has to be made within 15 days of receipt of complaint by WUSC. The Project Director will sign off on all grievances received by the PMO. The environmental and social safeguards officers (ESO & SSO) will be involved with support from the PMC Social/Environment Safeguards Experts. The Project Director will sign off on all grievances received by the PMO. The PMO Safeguard Officer will be responsible to convey the final decision to the complainant.

112. All paperwork (details of grievances) needs to be completed by the WUSC member secretary and circulated to the WUSC Chairperson and members. At VDC/Municipality level, the VDC/Municipality SDO will be responsible for circulation of grievances to the Regional Director, DWSS and other GRC members, prior to the scheduled meetings. The PIU SDSO will be responsible for follow-through of all escalated grievances. All decisions taken by the GRC and PSC will be communicated to the APs by the PIU social development and safeguards officer.

113. Despite the project GRM, an aggrieved person shall have access to the country's legal system at any stage, and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM.

114. In the event that the established GRM is not in a position to resolve the issue, the affected person also can use the ADB Accountability Mechanism (AM) through directly contacting (in writing) the Complaint Receiving Officer (CRO) at ADB headquarters or the ADB Nepal Resident Mission. The complaint can be submitted in any of the official languages of ADB’s DMCs. The ADB Accountability Mechanism information will be included in the PID to be distributed to the affected communities, as part of the project GRM.



**Figure 9-1: Grievance Redress Process**

DSMC: Design, supervision and management consultant; ESO: Environmental and social safeguards officer; GRC: Grievance redress committee; PD: Project director; PMC: Project management consultant; PMO: Project management office; WUSC: Water user and sanitation committee.

### Record keeping and disclosure

115. Records at the town-level will be kept by the concerned WUSC Member Secretary, of all grievances received, including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions and the date of the incident and final outcome. The number of grievances recorded and resolved and the outcomes will be displayed/disclosed in the RPMO office, WUSC/municipal/VDC office, and on the web, as well as reported in the safeguards monitoring reports submitted to ADB on a semi-annual basis. For any grievance escalated to RPMO/VDC/Municipality level, the RPMO SDO will be responsible for record-keeping, calling of GRC meetings and timely sharing of information with WUSC. For grievances escalated to PMO and above, the PMO safeguard officers will be responsible for maintenance of records, sending copies to RPMO and WUSC for timely sharing of information with the person filing complaint.

116. Periodic review and documentation of lessons learned. The PMO social safeguard officer will periodically review the functioning of the GRM at town/WUSC level and PIU level and record information on the effectiveness of the mechanism, especially on the project’s ability to prevent and address grievances. Indicators pertaining to grievance redress (no. of grievances received, no. redressed/resolved to be reported by Member Secretary, WUSC to PIU SDSO, and by PIU SDSO to PMO ESO in monthly progress reports.

### Periodic review and documentation of lessons learned

117. The PMO social safeguard officer will periodically review the functioning of the GRM at town/WUSC level and PIU level and record information on the effectiveness of the mechanism, especially on the project’s ability to prevent and address grievances. Indicators pertaining to grievance redress (no. of grievances received, no. redressed/resolved to be reported by Member Secretary, WUSC to PIU SDSO, and by PIU SDSO to PMO ESO in monthly progress reports.

### Costs

118. All costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) at local (field/ward/town) level will be borne by the concerned focal organizations at each level: WUSC at town level; PIU at regional level and PMO at central level. Cost estimates for grievance redress are included in EMP cost estimates.

## 10. ENVIRONMENT MANAGEMENT PLAN

119. The purpose of the environmental management plan (EMP) is to ensure that the activities are undertaken in a responsible, non-detrimental manner with the objectives of: (i) providing a proactive, feasible, and practical working tool to enable the measurement and monitoring of environmental performance on-site; (ii) guiding and controlling the implementation of findings and recommendations of the environmental assessment conducted for the project; (iii) detailing specific actions deemed necessary to assist in mitigating the environmental impact of the project; and (iv) ensuring that safety recommendations are complied with.

120. A copy of the EMP must be kept on work sites at all times. This EMP will be included in the bid documents and will be further reviewed and updated during implementation. The EMP will be made binding on all contractors operating on the site and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

### 10.1 Institutional Arrangement

#### 10.1.1 Executing and implementing agencies.

121. The Ministry of Urban Development (MUD) will be the executing agency with responsibility of subproject execution delegated to the Department of Water Supply and Sewerage (DWSS). The Water Supply and Sanitation Division/Sub-division Office (WSSDOs) are the subproject implementing agencies. Water Users' and Sanitation Committees of participating towns are the implementing agencies.

122. The key responsibilities of the executing and implementing agencies are as follows:

#### ***Prior to construction***

- The MUD will deputize a qualified staff to act as the Environmental Safeguard Officer of the Project management office (PMO).
- The MUD will establish the grievance redress mechanism, including setting up the Grievance Redress Committee.
- The Water Supply and Environment Division of the MUD will be responsible for reviewing the IEE Report prior to submission to the Ministry of Science, Technology and Environment (MoSTE) for review and approval.
- The DWSS will review the IEE Report prepared by the Design and Supervision Consultants' Team's Environmental Safeguard Expert (DSMC-ESE) prior to forwarding this to MUD.
- The DWSS will prepare the ToRs for the Environmental Safeguard Specialist that will be engaged to support the PMO and for the Environmental Safeguard Specialists of the two Design and Supervision Consultants that will be appointed to prepare the subprojects.

#### ***During construction and operation***

- The DWSS, through the PMO, will oversee the EARF and EMP implementation of all subprojects.
- The WSSDO, through the RPMOS, will oversee the EARF and EMP implementation at subproject/town level.

#### 10.1.2 Safeguard Implementation Arrangement

##### **Project Management Office (PMO)**

123. The safeguard officers (environmental safeguard officer and social safeguard officer) of the PMO will receive support from the safeguards experts (environmental and social) of the Project Management Consultants (PMC) as specified below:

- confirm existing IEEs/EMPs are updated based on detailed designs and that new IEEs/EMPs are prepared in accordance with the EARF and government rules;
- confirm whether EMPs are included in bidding documents and civil works contracts;
- provide oversight on environmental management aspects of subprojects and ensure EMPs are implemented by regional project management offices (Eastern RPMO and Western RPMO) and contractors;

- establish a system to monitor environmental safeguards of the project including monitoring the indicators set out in the monitoring plan of the EMP;
- facilitate and confirm overall compliance with all Government rules and regulations regarding site and environmental clearances as well as any other environmental requirements as relevant;
- supervise and provide guidance to the RPMOs to properly carry out the environmental monitoring and assessments as per the EARF;
- review, monitor and evaluate the effectiveness with which the EMPs are implemented, and recommend necessary corrective actions to be taken as necessary;
- consolidate monthly environmental monitoring reports from RPMOs and submit semi-annual monitoring reports to ADB;
- ensure timely disclosure of final IEEs/EMPs in project locations and in a form accessible to the public; and
- address any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs.

### **Regional Project Management Offices (Eastern and Western RPMOs)**

124. The regional DWSS engineers and social development officers of the RPMOs will receive support from; (i) the PMO safeguards officers (environmental and social); and (ii) the safeguards specialists (environmental and social), the social mobilizes and environmental management plan (EMP) monitors of the design, supervision and management consultant (DSMC) teams as specified below:

- prepare new IEEs/EMPs in accordance with the EARF and government rules;
- include EMPs in bidding documents and civil works contracts;
- comply with all government rules and regulations;
- take necessary action for obtaining rights of way;
- oversee implementation of EMPs including environmental monitoring by contractors;
- take corrective actions when necessary to ensure no environmental impacts;
- submit monthly environmental monitoring reports to PMO, and;
- address any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs.

### **Civil Works Contracts and Contractors**

125. EMP is to be included in bidding and contract documents and verified by the PMO and RPMOSs. The contractor will be required to designate an environment supervisor to ensure implementation of EMP during civil works. Contractors are to carry out all environmental mitigation and monitoring measures outlined in their contract. The government will ensure that bidding and contract documents include specific provisions requiring contractors to comply with all: (i) applicable labor laws and core labor standards on (a) prohibition of child labor as defined in national legislation for construction and maintenance activities, on (b) equal pay for equal work of equal value regardless of gender, ethnicity or caste, and on (c) elimination of forced labor; and (ii) the requirement to disseminate information on sexually transmitted diseases including HIV/AIDS to employees and local communities surrounding the project sites. Contractors will only starts the civil works activities in the section/subproject sites that has IR/IPP impacts upon the completion of RP/IPP implementation and after receiving clearance from the WUSC and endorsed by RPMO's SDO.

### **Capacity Building**

126. The PMC safeguards experts (environmental and social) will be responsible for training the; (i) PMO's safeguards officers (environmental and social); (ii) RPMOs' engineers and social development officers. Training modules will need to cover safeguards awareness and management in accordance with both ADB and government requirements as specified below:

- sensitization;
- introduction to environment and environmental considerations in water supply and wastewater projects;

- review of IEEs and integration into the project detailed design;
- improved coordination within nodal departments; and
- Monitoring and reporting system. The contractors will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites.

### **Water Users and Sanitation Committees (WUSCs)**

127. WUSCs are the eventual operators of the completed subprojects. The key tasks and responsibilities of the WUSCs are, but not limited to:

#### **Prior to construction**

- Facilitate public consultation and participation, information dissemination and social preparation.
- Provide available data to the DSMC-ESS during the conduct of the IEE.
- Assist in securing the tree-cutting permit and/or registration of water source.
- Participate in the capacity development program.

#### **During construction**

- Assist in the observance of the grievance redress mechanism.
- Actively participate in the monitoring of Contractor's compliance with the IEE and its EMP and the conditions set out with Government's approval of the IEE Reports.
- Facilitate public consultations, as necessary.

#### **During operation**

- Implement the EMP and the Water Safety Plan.
- Regularly monitor the water quality
- Prepare the environmental monitoring report as per IEE.
- Ensure observance of the grievance redress mechanism

### **Licensed and accredited laboratory**

128. It is recommended that a licensed and accredited laboratory be engaged to conduct water quality monitoring in the first few years of operation and to train the WUSC on the same. The laboratory will ensure that while carrying out the water quality monitoring as prescribed in the National Drinking Water Quality Standard and its Directives, 'hands-on' training is provided to the WUSC.

### **10.1.3 Institutional Capacity Development Program**

129. Considering the limited capability of the Project's key players in environmental management, technical assistance from environmental specialists and capacity development during loan implementation will be needed. Capacity development will consist of hands-on training in implementing the responsibilities in EMP (as well as in EARF) implementation, complemented with a short-term series of lectures/seminars on relevant topics.

130. WUSC does not have the capacity to monitor the quality of supplied water as prescribed in the NDWQS and its Directives. Albeit monitoring kits and laboratory rooms will be provided, this would not guarantee WUSC can handle monitoring appropriately. DWSS has five regional laboratories; however some are not functioning fully due to lack of manpower. Considering that public health is a critical concern associated with water supply, it is recommended that a licensed and accredited laboratory be engaged to conduct water quality monitoring for at least the first 2-3 years of operation with the WUSC actively participating to develop WUSC capacity. The conduct of water quality monitoring should be carried out in such a way that WUSC will be "learning by doing". After the engagement period, there should be continuing periodic training of new persons to ensure capacity of the WUSC is sustained. The cost for monitoring during operation is based on the assumption that a licensed laboratory will be engaged for both the monitoring requirements and to train the WUSC. A Water Safety Plan is included in subproject design and will oblige the operator to carry out water quality monitoring accordingly. The amount of NPR 500,000 will be provided annually to implement the Plan. There will be sufficient fund to include training by the licensed and accredited lab, while monitoring water quality.

131. The PMO will be responsible for trainings on environmental awareness and management in accordance with both ADB and government requirements. Specific modules customized for the available skill set will be devised after assessing the capabilities of the target participants and the requirements of the project. Typical modules would be as follows: (i) sensitization; (ii) introduction to environment and environmental considerations in water supply and wastewater projects; (iii) review of IEEs and integration into the project detailed design; (iv) improved coordination within nodal departments; and (v) monitoring and reporting system. The contractors will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites.

#### **10.1.4 Staffing Requirement and Budget**

132. Costs required for implementing the EMP will cover the following activities:

- Updating IEE, preparing and submitting reports and public consultation and disclosure;
- Application for environmental clearances; and
- Implementation of EMP, environmental monitoring program and long-term surveys.

133. The infrastructure involved in each scheme is generally straightforward to build. Environmental monitoring during construction will also be straightforward and will involve periodic site observations and interviews with workers and others, plus checks of reports and other documents. This will be conducted by PMO assisted by the PMO environmental safeguard officer. Therefore, no separate budget is required for the PMO.

134. The cost of mitigation measures and surveys during construction stage will be incorporated into the contractor's costs, which will be binding on him for implementation. The surveys will be conducted by the contractors.

135. The operation phase mitigation measures are again of good operating practices, which will be the responsibility of the WUSC. All monitoring during the operation and maintenance phase will be conducted by WUSC. The Water Safety Plan, included in each subproject design, will allocate NPR 500,000 annually for operation and maintenance particularly water quality monitoring. If a licensed laboratory will be engaged for the first 2-3 years of operation for training purposes, the cost can be accommodated under the Water Safety Plan.

### **10.2 MONITORING AND REPORTING**

136. RPMOs will monitor and measure the progress of EMP implementation with assistance from DMSC. The monitoring activities will correspond with the project's risks and impacts, and will be identified in the IEE for the projects. In addition to recording

#### **10.3 Environmental Monitoring Mechanism**

137. Under the chairmanship of Birtamod municipality, a Monitoring Committee should be formed. The committee should be represented by the chairman of concerned service wards of the VDC, representative from environment related NGOs, local community, Water Users' Committee and local entrepreneur. Secretary of the Birtamod municipality should act as member secretary of the Monitoring Committee. This committee should be assigned following duties and responsibilities:

- The committee should meet at least twice a month;
- The committee should collect all complaints from the local people concerning distribution, pipeline etc and should discuss in the meeting for the final decisions;
- The monitoring committee should identify the mistakes and deficiency regarding the project and should discuss in the meeting for the purpose of correction;
- Any negligence regarding the water quality should be considered and take necessary action;
- The committee should also supervise and provide instructions for activities such as:
  - Distribution of qualitative water,
  - Storage of water in the reservoir tanks,
  - Treatment plant,
  - Handling of toxic/chemical matters,
  - Training for the locals, and
- Examine monitoring reports periodically and take necessary actions if required etc.

#### **10.4 Monitoring Reporting Mechanism**

138. As proposed by approved EMP, the reporting system should include site supervision and reporting as well and primarily connected with Monitoring plan. The construction contractors are responsible for implementing approved EMP. The supervising consultants are responsible for monitoring to oversee whether or not the contractors have complied with the approved conditions as stated in EMP and also receive the monthly progress report from construction contractors. Based on this information the consulting engineers prepare the front line monitoring report and submit to DWSS for review

#### **10.5 Monitoring cost, parameters, location and schedule**

139. During rehabilitation, the cost for monitoring will be minimum and it should be allocated as and when required from the project contingency.

#### **10.6 Contractors Compliance on EMP**

140. The recommended mitigation measures are shown in the Table 10-1. The contractor should comply with the recommended mitigation activities.

#### **10.7 Institutional Capacity Development Program**

141. Considering the limited capability of the Project's key players in environmental management, technical assistance from environmental specialists and capacity development during loan implementation will be needed. Capacity development will consist of hands-on training in implementing the responsibilities in EMP (as well as in EARF) implementation, complemented with a short-term series of lectures/seminars on relevant topics.

142. In the Table 10-1 given below, the types of impact as predicted, corresponding mitigation measures, monitoring parameters, monitoring indicators, location and sources, responsibility and frequencies of monitoring have been included. The monitoring protocols given below are based on the Environmental Management Plan (IEE Birtamod, 2005) approved by Government of Nepal 2005.

#### **10.8 Environmental mitigation cost**

143. Most of the recommended mitigation measures are incorporated in the contractual obligations and constructions works to be completed by the contractors. Facilities like water treatment plant, water testing laboratory etc are also either existing or to be installed is also included in the contract. Therefore mitigation cost of the enhancement project will be negligible. However in order to strengthen the existing facilities 2% of total project cost is proposed should be allocated.



**Table 10-1: Mitigation measures and corresponding Monitoring plan**

Impact and Mitigation Prescription		Monitoring plan for implementation						Status	
Environmental Impact	Mitigation action	Parameter to be Monitored	Indicators	Location	Sources	Responsibility	Frequency	Previous	Present <sup>2</sup>
Physical Environment									
Construction Phase									
Land use pattern	Acquire only required land	Change in cropping pattern	Quality and quantity of yield	Project area	Local people	WUSC	Half yearly	Completed	Not applicable
Flooding and water stagnant	Drainage management	Observation of the project area	Increase in mosquito Increase in vector born diseases	Project area	Field inspection	DSC/Contractor	During and after monsoon	Completed	Recommended
	The excavated material must be safely disposed.	Ensure proper management of excessive spoil materials in place	Evidence of landscape erosion and river turbidity undisturbed	Project area	Field inspection	DSC/Contractor	After monsoon	Completed	Recommended
Impacts of sediments and Disinfecting Chemicals	Safe disposal	Water quality	Chemicals and pathogen exceeding national standards	Project area	Water quality test	DSC/Contractor	Quarterly	Completed	Recommended
Water Volume/ Quality	Limited extraction/ regular testing	Measurement of River flow and underground water table level	Change in quantity	Project area	River and ground water	DSC/Contractor	Quarterly	Completed	Recommended

<sup>2</sup> Recommended for EMP compliance

Impact and Mitigation Prescription		Monitoring plan for implementation						Status	
Environmental Impact	Mitigation action	Parameter to be Monitored	Indicators	Location	Sources	Responsibility	Frequency	Previous	Present <sup>2</sup>
Air Quality	Confine earthworks according to a staking plan and excavation segmentation plan and a part of the document	Visibility due to presence of dust	Location of stock pile	Project area	Local people and surrounding environment	DSC/Contractor	Twice in a week	Completed	Recommended
		Amount of dust present in surrounding environment	Number of complaint from sensitive receptors	Project area	Local people and surrounding environment	DSC/Contractor	Twice in a week	Completed	Recommended
Acoustic environment	Restrict noisy activities to daytime. Overtime work should avoid using noisy/high noise generating equipment.	Sound intensity during day and night time	Number of complaints from sensitive receptors;	Project area	Local people and surrounding environment	DSC/Contractor	Twice in a week	Completed	Recommended
		Sound intensity at and nearby of source	Use of silencers in noise-producing equipment and sound barriers;	Project area	Local people and surrounding environment	DSC/Contractor	Twice in a week	Completed	Recommended
Traffic movement	Pipe line work need to be done during night and during less traffic time	Number of vehicles diverted	Number of vehicles movement	Project area	Local people and surrounding environment	DSC/Contractor	During pipeline work	Completed	Recommended
Biological Environment									
Construction Phase									
Impact on	Construction	Vegetation	Change in	Project	Project area	DSC/Contractor	Quarterly	Completed	Recommended

Impact and Mitigation Prescription		Monitoring plan for implementation						Status	
Environmental Impact	Mitigation action	Parameter to be Monitored	Indicators	Location	Sources	Responsibility	Frequency	Previous	Present <sup>2</sup>
natural vegetation and habitat	area should be well demarked and proper instruction to be given for the workers.	density, number and types of wild animals	vegetation density and number of wild life	area					
Socio-economic and cultural environment									
Construction Phase									
Impairment to Infrastructure	Not applicable								
Land acquisition	Project has to make sure that adequate compensation for the land acquired from private citizens (if required) is made	Compensation measures	All affected	Project area	Records and Interview	WUSC	Yearly	Completed	Completed
Outside workforce conflict/ health/ pollution/ culture	Disease transmission, pollution and competition for the available resources to outsiders should be thoroughly checked.	Situation of social disharmony Awareness program	Decreased social disharmony Effective awareness program	Project area	Records and Interview	Contractor	Yearly	Completed	Recommended
Operation Phase									
Water right Conflict	Public taps should be established in appropriate places.	Number of public taps installed	Adequate water supply to the public	Project area	Field inspection and Interview	WUSC	Quarterly	Completed	Recommended
Workers health	Comply with	Health of	Site-specific	Project	Workers	WUSC	Quarterly	Completed	Recommended

Impact and Mitigation Prescription		Monitoring plan for implementation						Status	
Environmental Impact	Mitigation action	Parameter to be Monitored	Indicators	Location	Sources	Responsibility	Frequency	Previous	Present <sup>2</sup>
and safety	requirements of Labor Act of GoN and standards on workers' health and safety (H&S).	workers Dress and first-aid facilities stations	H&S Plan	area	health status and Interview				
	Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances	Health of workers Dress and first-aid facilities stations	Condition of sanitation facilities for workers	Project area	Workers health status and Interview	WUSC	Quarterly	Completed	Recommended

Source: IEE Birtamod 2005

2. Recommended for EMP compliance

**Table 10-2: Mitigation Measures and Monitoring Plan for Rehabilitation Activities**

Overview of Impacts		Required mitigation measures			Monitoring plan for implementation				
Project activities	Possible impacts (on all baseline parameters)	Mitigation associated with project location	Mitigation in project design features	Residual mitigation measures (not addressed by location and design)	Parameter to be Monitored	Indicators	Location	Responsibility	Frequency
<b>Water source</b>									
Maintenance of existing tube well	No significant impact								
Construction of new tube well	Ground water reduction	Construction of ground water recharge pond			Water table level	Reduction in ground water level	site specific	Contractor and WUSC	During operation
<b>Transmission line</b>									
Enhancement not required	No any significant impact								
<b>Treatment plant</b>									
Chlorination unit	No any significant impact								
Maintenance of pressure filter	No significant impact								
Installation of new pressure filter	No significant impact								
<b>Reservoir</b>									
No	No any								

Overview of Impacts		Required mitigation measures			Monitoring plan for implementation				
Project activities	Possible impacts (on all baseline parameters)	Mitigation associated with project location	Mitigation in project design features	Residual mitigation measures (not addressed by location and design)	Parameter to be Monitored	Indicators	Location	Responsibility	Frequency
enhancement work	significant impact								
<b>Distribution line</b>									
Network rehabilitation activities/ Additional distribution network	Traffic disturbance	Arrangement for traffic diversion with traffic	Traffic diversion		Arrangement of vehicular movement during construction	Smooth running of vehicles through diversion	Site specific	Contractor	During construction
	Air pollution	Dust reduction should be controlled	Not applicable		Air quality	Particulate matter in air	Site specific	Contractor, WUSC and Locals	During construction
	HHs water distribution	Intermittent supply	Supply water through other sources		Water supply continued	Adequate amount of water supply in each households	Site specific	Contractor and WUSC	During construction
Electrical and mechanical repairment	Noise pollution and oil spillage	Sound muffler installed and proper management of waste oil	Not applicable		Sound level and amount of oil	Noise level emission standard	Site specific	Contractor	During construction

Note: Table 10-2 is prepared according to Table 7-1 of Chapter 7.

## 11. CONCLUSIONS AND RECOMMENDATIONS

144. The proposed subproject is not an environmentally critical undertaking. The IEE indicates that:

- The proposed subproject, its components, are not within or adjacent to environmentally sensitive areas.
- The extent of adverse impacts is expected to be local, confined within the subprojects' main areas of influence, quarry or borrowing sites, waste disposal sites, and the routes to and from these sites. Fine aggregates, sediments and/or wastes would not be transported beyond the aforementioned sites. With mitigation measures in place and ensuring that the bulk of earthworks are completed prior to the onset of the rainy season, the potential adverse impacts during construction would be highly/more site-specific.
- The few adverse impacts of high magnitude during construction will be temporary and short-term (i.e., most likely to occur only during peak construction period). These will not be sufficient to threaten or weaken the surrounding resources. The preparation and implementation of a Contractor's EMP that would address as minimum the requirements of the SPS-compliant subproject EMP will mitigate the impacts and lower their residual significance to acceptable levels. Simple/uncomplicated mitigation measures, basically integral to socially and environmentally responsible construction practices, are commonly used at construction sites and are known to Contractors. Hence, mitigation measures would not be difficult to design and institute.
- During operation, the potential delivery of unsafe water can be mitigated with good operation and maintenance, prompt action on leaks, and complying with the required quality monitoring of supplied water as prescribed in the National Drinking Water Quality Standards Directives.
- The proposed subproject will bring about: (i) the benefits of access to reliable supply of safe and potable water; (ii) promotion of good hygiene and sanitation practices and reduced health and safety risks as positive impacts; and (iii) enhanced public health, improved quality of life and safe communities as outcomes.

145. Based on the above findings, the classification of the 3rdSTWSSSP as Category B is confirmed, and no further special study or detailed EIA needs to be undertaken to comply with the Safeguard Policy Statement of the ADB. The Government of Nepal will incorporate the findings and recommendations of this IEE and prescribed environmental management in the EMP.

**12. COMMENTS INCORPORATION MATRIX**





## **Annexes**

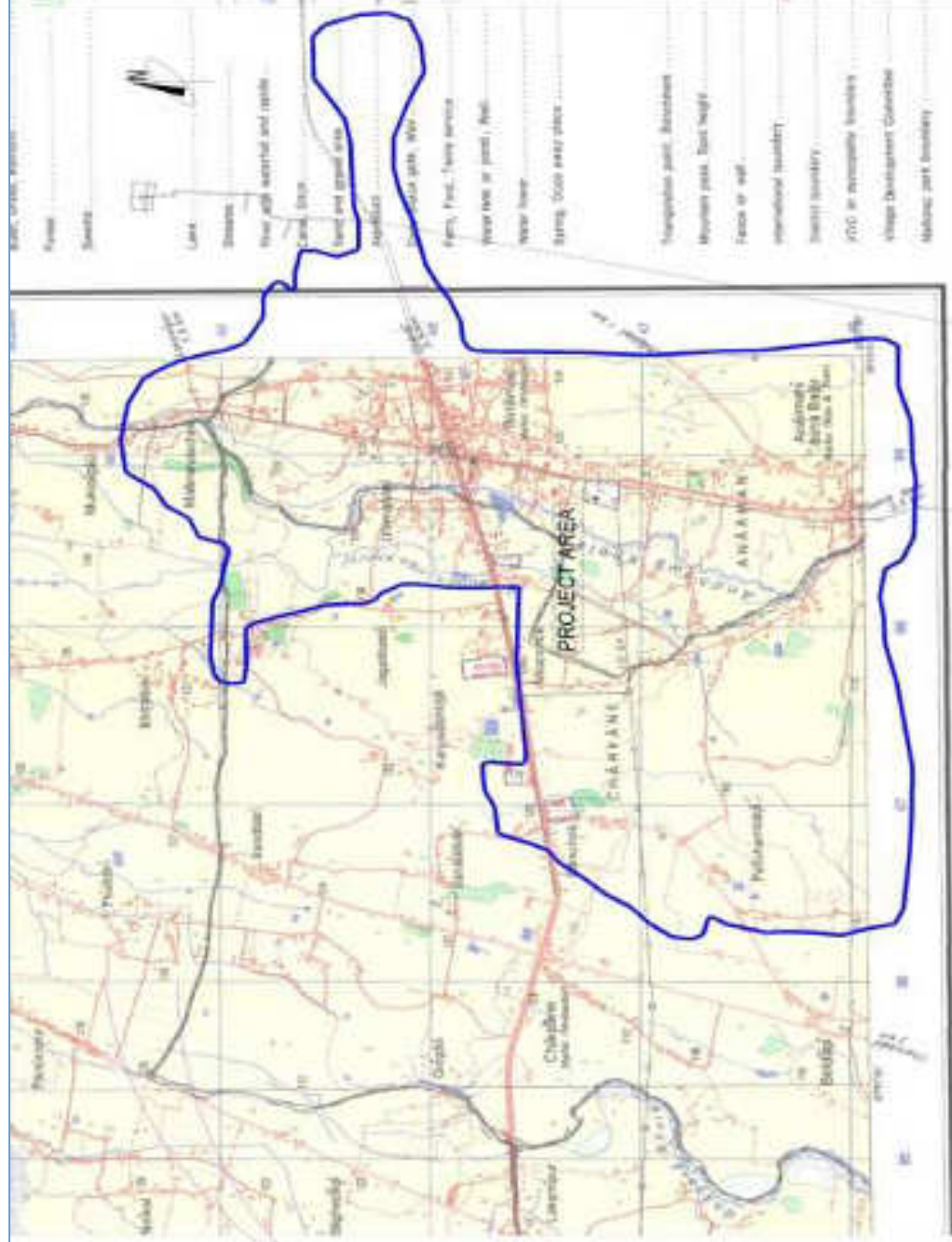
**Annex 1: Project Location Map and Water Supply Plan**

**Annex 2: Water Tested Laboratory Analysis Report**

**Annex 3: Rapid Environmental Assessment (REA) Checklist**

**Annex 4: Minute of Meeting**





Scale: 1:50,000

- Scale: 1:50,000
- River
- Stream
- Lake
- Stream
- Road with asphalt and cobble
- Road
- Road and gravel area
- Highway
- Electricity pylon, wire
- Ferry, Ferry service
- Road (one or more) feet
- Road lane
- Strong, foot over place



- Telephone post, Station
- Mountain pass, Road height
- Fence or wall
- International boundary
- National boundary
- POB or municipality boundary
- Khmer Development Committee
- Station post boundary

**PROBATION GUIDE**

0	0.0	0.0
5	0.0	0.0
10	0.0	0.0
15	0.0	0.0
20	0.0	0.0
25	0.0	0.0
30	0.0	0.0
35	0.0	0.0
40	0.0	0.0
45	0.0	0.0
50	0.0	0.0
55	0.0	0.0
60	0.0	0.0
65	0.0	0.0
70	0.0	0.0
75	0.0	0.0
80	0.0	0.0
85	0.0	0.0
90	0.0	0.0
95	0.0	0.0
100	0.0	0.0

Scale: 1:50,000  
 August 2011

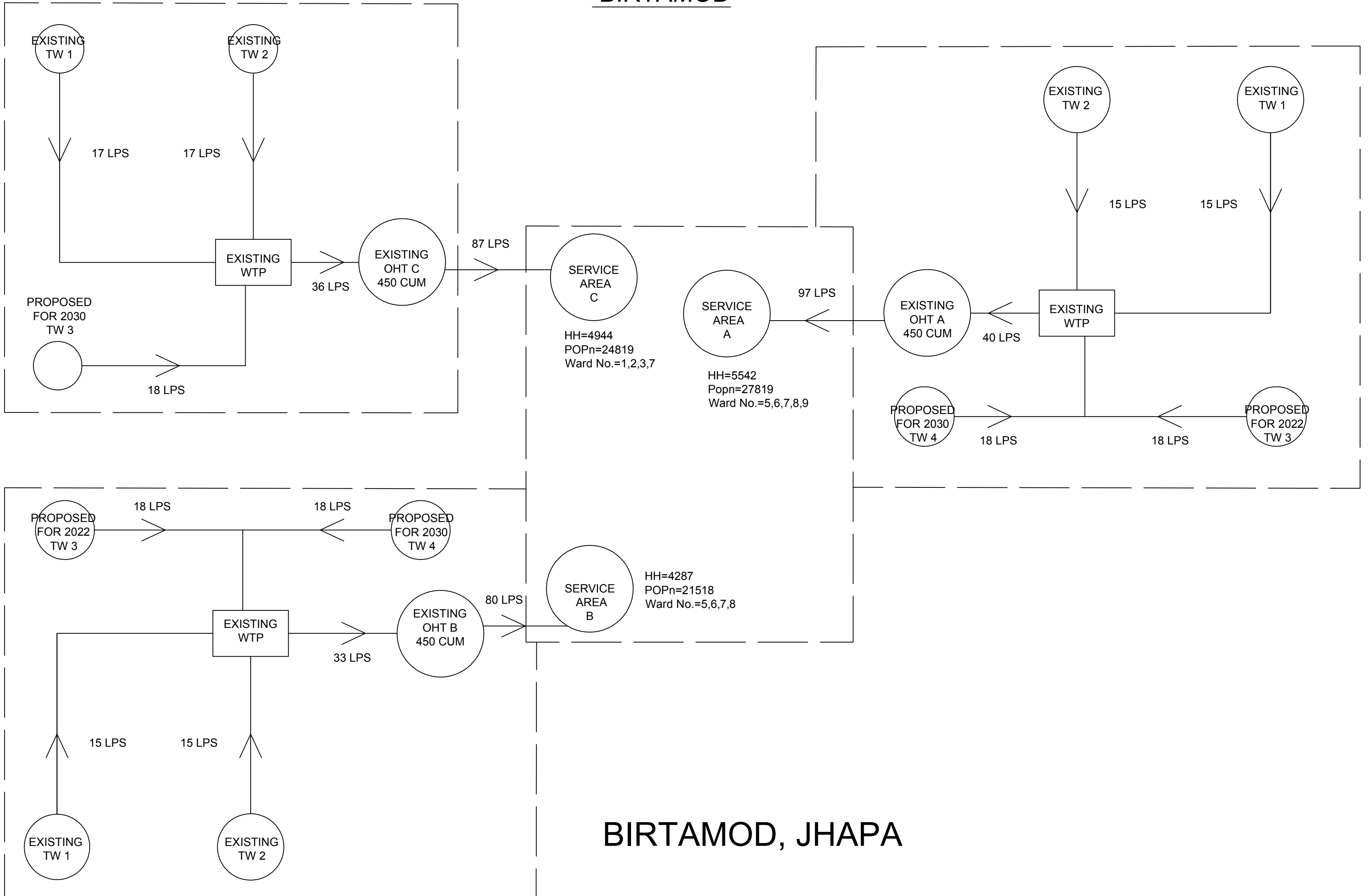
LOCATION DIAGRAM



Scale: 1:50,000

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# BIRTAMOD, JHAPA

## **Annex - 2: Water Tested Laboratory Analysis Report**



# Water

Engineering & Training Centre (P.) Ltd.

Laboratory, R & D on Total Water Management, Treatment & Consultancy

## LABORATORY ANALYSIS REPORT

Name of Sender: **SUREKHA SIKDORNBABY** Name of the Project: **Birtamod SFTWSSSP** Date of Collection: **17/9/2014**  
 Sample No: **668071072** Type of Sample: **Boring (New)** No of Sample: **1**  
 Date of Receipt: **18/9/2014** Name of the Source: **Trunk 1** Field Temperature: **27.1 °C**  
 Analyzed Date: **18-20/9/2014** Sampling Point: **Boring (North West)** Field pH: **7.1**  
 Sampled by: **WELL** Location: **Ilam** Field DO: **169.0 µS/cm**

Parameters	Units	WHO/GB	NDWS	Result	Methods Used
<b>PHYSICAL</b>					
pH	-	6.5-8.5	6.5-8.5	6.9	4500-B, APHA, 21ST EDITION
Turbidity	NTU	5	5.00	17.0	2120-B, APHA, 21ST EDITION
Electrical Conductivity	µS/cm	-	1500	165	2510-B, APHA, 21ST EDITION
Lab Temperature	°C	-	-	30.0	2550-B, APHA, 21ST EDITION
<b>CHEMICAL</b>					
Calcium	mg/L as Ca <sup>2+</sup>	-	500	16	3500-C, APHA, 21ST EDITION
Magnesium	mg/L as Mg <sup>2+</sup>	-	-	4.8	3900-Ng H, APHA, 21ST EDITION
Iron	mg/L as Fe <sup>2+</sup>	0.3	0.300	4.2	3111-D, APHA, 21ST EDITION
Manganese	mg/L as Mn <sup>2+</sup>	0.1	0.2	0.34	3111-B, APHA, 21ST EDITION
Asenic	mg/L as As <sup>3+</sup>	0.01	0.05	<0.006	3111-A, APHA, 21ST EDITION
Arsenic	mg/L as As <sup>5+</sup>	1.5	1.5	0.02	3500-NI SC, APHA, 21ST EDITION
Sulfate	mg/L as SO <sub>4</sub> <sup>2-</sup>	-	-	9.4	3111-H, APHA, 21ST EDITION
Acetate	mg/L as C <sup>-2</sup>	-	-	0.7	3111-D, APHA, 21ST EDITION
Total Calcium	mg/L as Ca <sup>2+</sup>	0.05	0.05	<0.01	3111-H, APHA, 21ST EDITION
Bicarbonate	mg/L as CaCO <sub>3</sub>	-	-	84	2320-B, APHA, 21ST EDITION
Carbonate	mg/L as CO <sub>3</sub> <sup>2-</sup>	-	-	Nil	2320-D, APHA, 21ST EDITION
Hydroxide Alkalinity	mg/L as OH <sup>-</sup>	-	-	Nil	2320-D, APHA, 21ST EDITION
Total Alkalinity	mg/L as CaCO <sub>3</sub>	500	-	84	2120-B, APHA, 21ST EDITION
Calcium Alkalinity	mg/L as CaCO <sub>3</sub>	-	-	Nil	2320-D, APHA, 21ST EDITION
Non carbonate Alkalinity	mg/L as CaCO <sub>3</sub>	-	-	84	2120-B, APHA, 21ST EDITION
Phosphate	mg/L as P	-	-	0.34	4500-F, APHA, 21ST EDITION
Nitrate	mg/L as NO <sub>3</sub> <sup>-</sup>	50	50	<0.02	4500-NO <sub>3</sub> -D, APHA, 21ST EDITION
Nitrite	mg/L as NO <sub>2</sub> <sup>-</sup>	3	-	0.02	4500-NO <sub>2</sub> -B, APHA, 21ST EDITION
Sulfite	mg/L as SO <sub>3</sub> <sup>2-</sup>	250	250	<5.0	4500-SO <sub>3</sub> -A, APHA, 21ST EDITION
Chloride	mg/L as Cl <sup>-</sup>	250	250	3.9	4500-Cl-D, APHA, 21ST EDITION
Silica	mg/L as Si	-	-	26.7	4500-Si-D, APHA, 21ST EDITION
Fluoride	mg/L as F <sup>-</sup>	1.5	0.7-1.5	<0.05	4500-F-2-D, APHA, 21ST EDITION
Total Hardness	mg/L as CaCO <sub>3</sub>	500	500	80	2315-C, APHA, 21ST EDITION
Barium Carbonate Hardness	mg/L as CaCO <sub>3</sub>	-	-	84	Calculation
Total Dissolved Solids	mg/L	1000	-	83	2540-C, APHA, 21ST EDITION
Total Suspended Solids	-	-	-	4.57	2550-D, APHA, 21ST EDITION
<b>BIOLOGICAL</b>					
Total Coliform	CFU/100 ml	Nil	Nil	200	9222-D, APHA, 21ST EDITION
Fecal Coliform	CFU/100 ml	Nil	Nil	20	9222-D, APHA, 21ST EDITION

APHA: American Public Health Association, Standard Methods for the Examination of Water and Wastewater, WHO/GB: World Health Organization Guidelines, Vol. 2, 2000, Update. NDWS: National Drinking Water Quality Standard, 2012 (Nepal). \* These values show lower and upper limits. Values in the parentheses show the acceptable level only when the actual value is not available. \*\* Not a standard test Method.

Comments: All the tested parameters are within the NDWS guideline range except biological tests.

Analytically

Checked by

Author's Signature

Note: 1. The test results for the parameters that are not reported in our laboratory should be used as a guide only. 2. The test results are subject to change without notice. 3. The test results are subject to change without notice. 4. The test results are subject to change without notice. 5. The test results are subject to change without notice.



# Water

Engineering & Training Centre (P.) Ltd.

Laboratory, R & D on Total Water Management, Treatment & Consultancy

## LABORATORY ANALYSIS REPORT

Name of Sample: **SHELFERKO UNICORN JV** Name of the Project: **Biramond S/WSSSP** Date of Collection: **17/9/2014**  
 Sample No: **669/071/072** Use of Source: **Boring** No of Sample: **1**  
 Date of Receipt: **18/9/2014** Name of the Source: **Trunk** Field Temperature: **26.8 °C**  
 Analyzed Date: **18-28/9/2014** Sampling Date: **Boring (Well)** Field pH: **6.9**  
 Sampled by: **WETC** Location: **Jhapa** Field Loc: **L101** Elevn:

Parameters	Units	WHO GV	ISIRI QS	Result	Methods Used
<b>PHYSICAL</b>					
pH	-	6.5-8.5	6.5-8.5*	6.7	4500 H-D, APHA, 21ST EDITION
Turbidity	NTU	5	5 (10)	15.3	2100 B, APHA, 21ST EDITION
Electrical Conductivity	us/cm	-	1500	125	2510 B, APHA, 21ST EDITION
Water Temp. (°C)	°C	-	-	30.4	2550 D, APHA, 21ST EDITION
<b>CHEMICAL</b>					
Calcium	mg/l as Ca <sup>2+</sup>	-	200	9.6	3500-C, APHA, 21ST EDITION
Magnesium	mg/l as Mg <sup>2+</sup>	-	-	5.3	3500-A, APHA, 21ST EDITION
Iron	mg/l as Fe <sup>2+</sup>	0.3	0.3(3)	6.6	3110 B, APHA, 21ST EDITION
Manganese	mg/l as Mn <sup>2+</sup>	0.4	0.2	0.19	3110 B, APHA, 21ST EDITION
Aspartic	mg/l as As <sup>3+</sup>	0.01	0.05	<0.005	3110 C, APHA, 21ST EDITION
Ammonia	mg/l as NH <sub>4</sub> <sup>+</sup>	1.5	1.5	0.61	4500-NH <sub>4</sub> , APHA, 21ST EDITION
Sodium	mg/l as Na <sup>+</sup>	-	-	17.5	3110 B, APHA, 21ST EDITION
Potassium	mg/l as K <sup>+</sup>	-	-	1.5	3110 B, APHA, 21ST EDITION
Total Hardness	mg/l as CaCO <sub>3</sub>	0.05	0.05	<0.01	3110 A, APHA, 21ST EDITION
Dissolved Hardness	mg/l as CaCO <sub>3</sub>	-	-	64	2320 D, APHA, 21ST EDITION
Carbonate	mg/l as CaCO <sub>3</sub>	-	-	Nil	2320 A, APHA, 21ST EDITION
Hydroxide Alkalinity	mg/l as CaCO <sub>3</sub>	-	-	Nil	2320 A, APHA, 21ST EDITION
Total Alkalinity	mg/l as CaCO <sub>3</sub>	500	-	64	2320 B, APHA, 21ST EDITION
Carbonate Alkalinity	mg/l as CaCO <sub>3</sub>	-	-	Nil	2320 B, APHA, 21ST EDITION
Non-carbonate Alkalinity	mg/l as CaCO <sub>3</sub>	-	-	64	3500 B, APHA, 21ST EDITION
Phosphate	mg/l as P	-	-	1.46	4500-P, APHA, 21ST EDITION
Nitrate	mg/l as NO <sub>3</sub> <sup>-</sup>	50	50	<0.02	4500-NO <sub>3</sub> -N, APHA, 21ST EDITION
Nitrite	mg/l as NO <sub>2</sub> <sup>-</sup>	3	-	0.02	4500-NO <sub>2</sub> -N, APHA, 21ST EDITION
Sulfate	mg/l as SO <sub>4</sub> <sup>2-</sup>	250	250	<5.0	4500-SO <sub>4</sub> , APHA, 21ST EDITION
Chloride	mg/l as Cl <sup>-</sup>	250	250	3.0	4500-Cl-B, APHA, 21ST EDITION
Silica	mg/l as SiO <sub>2</sub>	-	-	30.1	4500-Si, APHA, 21ST EDITION
Fluoride	mg/l as F <sup>-</sup>	1.5	0.5-1.5*	<0.02	4500-SiO <sub>2</sub> , APHA, 21ST EDITION
Total Hardness	mg/l as CaCO <sub>3</sub>	500	500	46	2310 C, APHA, 21ST EDITION
Non-Carbonate Hardness	mg/l as CaCO <sub>3</sub>	-	-	64	Calculation
Total Dissolved Solid	mg/l	1000	-	63	2540 C, APHA, 21ST EDITION
Langelier Saturation Index	-	-	-	-2.19	2330 B, APHA, 21ST EDITION
<b>BIOLOGICAL</b>					
Total Coliform	CFU/100 ml	Nil	Nil	10	9222 B, APHA, 21ST EDITION
Fecal Coliform	CFU/100 ml	Nil	Nil	Nil	9222 D, APHA, 21ST EDITION

APHA: American Public Health Association, Standard Methods for the Examination of Water and Wastewater, WHO: World Health Organization, Guidelines for Drinking Water Quality, NSDWQ: National Drinking Water Quality Standard, Nil: None. \* These values show acceptable upper limits. † Values are the scientific value the acceptable values only when alternative is not available. \*\* Not accredited Test Method

Comments: *Turbidity, iron and total coliform exceeded the guideline value.*

Analyzed By:

Checked by:

Authorized Signature:

Note: 1. The report is only a guideline and the user is responsible for the use of the report. 2. The report is only a guideline and the user is responsible for the use of the report. 3. The report is only a guideline and the user is responsible for the use of the report.

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# Water

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## LABORATORY ANALYSIS REPORT

Name of Sender: **SUIT TITIKO UNILORUN JV** Name of the Project: **Birtamad S/WSSSP** Date of Collection: **17/9/2014**  
 Sample No: **170171012** Type of Sample: **Boring** No. of Sample: **1**  
 Date of Receipt: **18/9/2014** Name of the Source: **Trunk Y** Field Temperature: **26.7 °C**  
 Analyzed On: **15/10/2014** Sample Volume: **WTP400liter** Field No: **72**  
 Sampled by: **WETC** Location: **Jhapa** Field EC: **124.6 us/cm**

Parameters	Units	WHO Gy	NDWQS	Result	Methods Used
<b>PHYSICAL</b>					
pH	-	6.5-8.5*	6.5-8.5*	7.0	4500-CL D, APHA, 21ST EDITION
Turbidity	NTU	5	5 (0)	1.0	2190 B, APHA, 21ST EDITION
Electrical Conductivity	µS/cm	-	1mm	120	2550 B, APHA, 21ST EDITION
Lab Temperature	°C	-	-	26.7	1550 B, APHA, 21ST EDITION
<b>CHEMICAL</b>					
Calcium	mg/L as Ca <sup>2+</sup>	-	200	10.4	1500-Ca D, APHA, 21ST EDITION
Magnesium	mg/L as Mg <sup>2+</sup>	-	-	4.4	1500-Mg H, APHA, 21ST EDITION
Iron	mg/L as Fe <sup>2+</sup>	0.3	0.3 (3)	0.27	3111 B, APHA, 21ST EDITION
Manganese	mg/L as Mn <sup>2+</sup>	0.1	0.2	0.03	3111 B, APHA, 21ST EDITION
Arsenic	mg/L as As <sup>3+</sup>	0.01	0.05	<0.005	3114 C, APHA, 21ST EDITION
Ammonia	mg/L as NH <sub>4</sub> <sup>+</sup>	1.5	1.5	0.88	4500-NHCL, APHA, 17TH EDITION
Sodium	mg/L as Na <sup>+</sup>	-	-	7.8	3111 B, APHA, 21ST EDITION
Potassium	mg/L as K <sup>+</sup>	-	-	1.5	3111 B, APHA, 21ST EDITION
Total Chloride	mg/L as Cl <sup>-</sup>	0.05	0.05	<0.01	3111 B, APHA, 21ST EDITION
Bicarbonate	mg/L as CaCO <sub>3</sub>	-	-	62	2320 B, APHA, 21ST EDITION
Carbonate	mg/L as CO <sub>3</sub> <sup>2-</sup>	-	-	Nil	2320 B, APHA, 21ST EDITION
Hydroxide Alkalinity	mg/L as OH <sup>-</sup>	-	-	Nil	2320 B, APHA, 21ST EDITION
Total Alkalinity	mg/L as CaCO <sub>3</sub>	500	-	62	2320 B, APHA, 21ST EDITION
Carbonate Alkalinity	mg/L as CaCO <sub>3</sub>	-	-	Nil	2320 B, APHA, 21ST EDITION
Non-carbonate Alkalinity	mg/L as CaCO <sub>3</sub>	-	-	62	2320 B, APHA, 21ST EDITION
Phosphate	mg/L as P	-	-	0.19	4500-P, APHA, 21ST EDITION
Nitrate	mg/L as NO <sub>3</sub> <sup>-</sup>	50	50	0.89	4500-NO <sub>3</sub> -D, APHA, 21ST EDITION
Nitrite	mg/L as NO <sub>2</sub> <sup>-</sup>	3	-	<0.02	4500-NO <sub>2</sub> -D, APHA, 21ST EDITION
Sulfate	mg/L as SO <sub>4</sub> <sup>2-</sup>	250	250	<5.0	4500-SO <sub>4</sub> , APHA, 21ST EDITION
Chloride	mg/L as Cl <sup>-</sup>	250	250	2.0	4500-CL-H, APHA, 21ST EDITION
Silica	mg/L as F <sup>-</sup>	-	-	23.4	4500-F-D, APHA, 21ST EDITION
Fluoride	mg/L as SiO <sub>2</sub> <sup>2-</sup>	1.5	0.5-1.5*	0.27	4500-SiO <sub>2</sub> -D, APHA, 21ST EDITION
Total Hardness	mg/L as CaCO <sub>3</sub>	500	500	44	2190 C, APHA, 21ST EDITION
Non-Carbonate Hardness	mg/L as CaCO <sub>3</sub>	-	-	62	Calculation
Total Dissolved Solid	mg/L	1000	-	60	1540 C, APHA, 21ST EDITION
Laq. Saturation Index	-	-	-	-1.89	2190 G, APHA, 21ST EDITION
<b>BIOLGICAL</b>					
Total Coliform	CFU/100 ml	Nil	Nil	11	9222 B, APHA, 21ST EDITION
Fecal Coliform	CFU/100 ml	Nil	Nil	Nil	9222 A, APHA, 21ST EDITION

APHA: American Public Health Association Standard Methods for the Examination of Water & Wastewater, 1995 Edition. WHO-GY: World Health Organization Guidelines Value, 2005 Update. NDWQS: National Drinking Water Quality Standard, 2002 (Nepal). \*These values show lower and upper limits. ( ) values in the parenthesis refers the acceptable value only when alternative is not available. \*\*See accredited Test Method.

Comment: *Sampled water is coliform contaminated*

Analyzed by:

Checked by:

Authorized Signatory:

Note: 1. The test results are the responsibility of the client. 2. The test results are only valid for the purpose of the project and are not intended for any other use. 3. The test results are only valid for the purpose of the project and are not intended for any other use. 4. The test results are only valid for the purpose of the project and are not intended for any other use.



# Water

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## LABORATORY ANALYSIS REPORT

Name of Sample: SILJITTEKOTI NICORN JV Name of the Project: District of S/WSSSP Date of Collection: 17/9/2014  
 Sample No.: 671/071/072 Type of Source: Boring No. of Sample: 1  
 Date of Receipt: 18/9/2014 Name of the source: Tank 2 Field Temperature: 28 °C  
 Analyzed Date: 18-28/9/2014 Sampling Point: Boring (South West) Field pH: 7.1  
 Sampled by: WELC Location: Jhara Field DO: 124.0 ppm

Parameters	Units	WHO GV	NDWQS	Result	Methods Used
<b>PHYSICAL</b>					
pH	-	6.5-8.5	6.5-8.5*	6.9	4500-D D, APHA, 21ST EDITION
Turbidity	NTU	5	5.0	6.0	2100 B, APHA, 21ST EDITION
Electrical Conductivity	µS/cm	-	1500	133	2550 B, APHA, 21ST EDITION
Lab Temperature	°C	-	-	29.7	2550 B, APHA, 21ST EDITION
<b>CHEMICAL</b>					
Calcium	mg/L as Ca <sup>2+</sup>	-	200	12.8	3500 Ca H, APHA, 21ST EDITION
Magnesium	mg/L as Mg <sup>2+</sup>	-	-	4.4	3500 Mg D, APHA, 21ST EDITION
Iron	mg/L as Fe <sup>2+</sup>	0.3	0.3(0)	6.4	3111 B, APHA, 21ST EDITION
Manganese	mg/L as Mn <sup>2+</sup>	0.4	0.2	0.18	3111 D, APHA, 21ST EDITION
Arsenic	mg/L as As <sup>3+</sup>	0.01	0.05	<0.005	3143 C, APHA, 21ST EDITION
Ammonia	mg/L as NH <sub>4</sub> <sup>+</sup>	1.5	1.5	0.11	4500 NH <sub>4</sub> C, APHA, 21ST EDITION
Sulfate	mg/L as SO <sub>4</sub> <sup>2-</sup>	-	-	7.0	3111 D, APHA, 21ST EDITION
Potassium	mg/L as K <sup>+</sup>	-	-	1.6	3111 B, APHA, 21ST EDITION
Total Chloride	mg/L as Cl <sup>-</sup>	0.05	0.05	<0.01	3111 B, APHA, 21ST EDITION
Bicarbonate	mg/L as CaCO <sub>3</sub>	-	-	58	2320 D, APHA, 21ST EDITION
Carbonate	mg/L as CaCO <sub>3</sub>	-	-	Nil	2320 H, APHA, 21ST EDITION
Hydroxide Alkalinity	mg/L as OH <sup>-</sup>	-	-	Nil	2320 H, APHA, 21ST EDITION
Total Alkalinity	mg/L as CaCO <sub>3</sub>	500	-	58	2320 D, APHA, 21ST EDITION
Carbonate alkalinity	mg/L as CaCO <sub>3</sub>	-	-	Nil	2320 H, APHA, 21ST EDITION
Non-carbonate Alkalinity	mg/L as CaCO <sub>3</sub>	-	-	58	2320 D, APHA, 21ST EDITION
Phosphate	mg/L as P	-	-	0.55	4500-P E, APHA, 21ST EDITION
Nitrate	mg/L as NO <sub>3</sub> <sup>-</sup>	50	50	<0.02	4500-NO <sub>3</sub> -B, APHA, 21ST EDITION
Nitrite	mg/L as NO <sub>2</sub> <sup>-</sup>	3	-	<0.02	4500-NO <sub>2</sub> -B, APHA, 21ST EDITION
Sulfide	mg/L as S <sup>2-</sup>	250	250	12.0	1500-SG4, APHA, 21ST EDITION
Chloride	mg/L as Cl <sup>-</sup>	250	250	3.9	4500-Cl-B, APHA, 21ST EDITION
Silica	mg/L as SiO <sub>2</sub>	-	-	23.4	4500-Si D, APHA, 21ST EDITION
Fluoride	mg/L as F <sup>-</sup>	1.5	0.5-1.5*	<0.02	4500-SiO <sub>2</sub> D, APHA, 21ST EDITION
Total Hardness	mg/L as CaCO <sub>3</sub>	500	500	50	2440 C, APHA, 21ST EDITION
Non Carbonate Hardness	mg/L as CaCO <sub>3</sub>	-	-	58	Calculation
Total Dissolved Solid	mg/L	1000	-	66	2510 C, APHA, 21ST EDITION
Duval's Saturation Index	-	-	-	-1.99	2440 A, APHA, 21ST EDITION
<b>BIOLOGICAL</b>					
Total Bacteria	CFU/100ml	Nd	Nd	3	9222 D, APHA, 21ST EDITION
Fecal Coliform	CFU/100ml	Nd	Nd	Nd	9222 D, APHA, 21ST EDITION

APHA - American Public Health Association, Standard Methods for the Examination of Water and Wastewater, 19th Edition, World Health Organization, Guidelines for Drinking Water Quality, 3rd Edition, WHO (Geneva), 2004. \*These values vary from the standard values in the parentheses refer to the available values only when alternative is not available. \*\*N/A, accredited Test Method

Comment: *Does not exceed the guideline value and water is biological contaminated.*

Analyzed by

Checked by

Authorized Signatory

Note: This report is valid only for the purpose stated and it is not to be used for any other purpose. The information on this report is not to be used for any other purpose. The information on this report is not to be used for any other purpose. The information on this report is not to be used for any other purpose.



# Water

Engineering & Training Centre (P.) Ltd.

Laboratory, R & D on Total Water Management, Treatment & Consultancy

## LABORATORY ANALYSIS REPORT

Name of Client: **SIL PITERKO UNICORN JV** Name of the Project: **Bhramade STWSSRP** Date of Collection: **15-9-2014**  
 Sample No: **672071072** Type of Source: **Boring** No. of Sample: **1**  
 Date of Report: **15-9-2014** Name of the Source: **Tank 2** Field Temperature: **28.2 °C**  
 Analytical Date: **18-09-2014** Sampling Point: **WTP(PH) Outlet** pH: **7.3**  
 Sampled by: **W.F.K.C.** Location: **Bhramade** Field No.: **1270**

Parameters	Units	WHO GV	NDWQS	Result	Methods Used
<b>PHYSICAL</b>					
pH	-	6.5-8.5	6.5-8.5*	6.7	4500-D B, APHA, 21ST EDITION
Turbidity	NTU	5	5(10)	2.0	2100 B, APHA, 21ST EDITION
Electrical Conductivity	µS/cm	-	1500	134	2430 B, APHA, 21ST EDITION
Lab Temperature	°C	-	-	29.5	2550 B, APHA, 21ST EDITION
<b>CHEMICAL</b>					
Calcium	mg/l as Ca <sup>2+</sup>	-	200	11.4	3500-CAL-B, APHA, 21ST EDITION
Magnesium	mg/l as Mg <sup>2+</sup>	-	-	5.3	3500-MAG-B, APHA, 21ST EDITION
Zinc	mg/l as Zn <sup>2+</sup>	0.3	0.3(3)	0.08	3111 B, APHA, 21ST EDITION
Manganese	mg/l as Mn <sup>2+</sup>	0.4	0.2	0.15	3111 D, APHA, 21ST EDITION
Arsenic	mg/l as As <sup>3+</sup>	0.01	0.05	<0.005	3112-C, APHA, 21ST EDITION
Ammonia	mg/l as NH <sub>4</sub> <sup>+</sup>	1.5	1.5	0.07	4500-NH <sub>4</sub> -B, APHA, 21ST EDITION
Sodium	mg/l as Na <sup>+</sup>	-	-	6.8	3111 B, APHA, 21ST EDITION
Potassium	mg/l as K <sup>+</sup>	-	-	1.6	3111 B, APHA, 21ST EDITION
Total Chromium	mg/l as Cr <sup>6+</sup>	0.05	0.05	<0.01	3111 B, APHA, 21ST EDITION
Bicarbonate	mg/l as CaCO <sub>3</sub>	-	-	54	2320 B, APHA, 21ST EDITION
Chloride	mg/l as Cl <sup>-</sup>	-	-	Nil	7300 B, APHA, 21ST EDITION
Hydroxide Alkalinity	mg/l as OH <sup>-</sup>	-	-	Nil	2320 B, APHA, 21ST EDITION
Total Alkalinity	mg/l as CaCO <sub>3</sub>	300	-	54	2320 B, APHA, 21ST EDITION
Carbonate Alkalinity	mg/l as CaCO <sub>3</sub>	-	-	Nil	7300 B, APHA, 21ST EDITION
Non-carbonate Alkalinity	mg/l as CaCO <sub>3</sub>	-	-	54	2320 B, APHA, 21ST EDITION
Phosphate	mg/l as P	-	-	0.14	4500-PO <sub>4</sub> -B, APHA, 21ST EDITION
Nitrite	mg/l as NO <sub>2</sub> <sup>-</sup>	50	50	<0.02	4500-NO <sub>2</sub> -B, APHA, 21ST EDITION
Nitrate	mg/l as NO <sub>3</sub> <sup>-</sup>	3	-	0.04	4500-NO <sub>3</sub> -B, APHA, 21ST EDITION
Sulfate	mg/l as SO <sub>4</sub> <sup>2-</sup>	250	250	20.0	4500-SO <sub>4</sub> -B, APHA, 21ST EDITION
Chloride	mg/l as Cl <sup>-</sup>	250	250	3.9	4500-CL-B, APHA, 21ST EDITION
Silica	mg/l as Si <sup>2+</sup>	-	-	27.8	4500-SI-B, APHA, 21ST EDITION
Fluoride	mg/l as F <sup>-</sup>	1.5	0.5-1.5*	0.22	4500-FLO <sub>2</sub> -D, APHA, 21ST EDITION
Total Hardness	mg/l as CaCO <sub>3</sub>	500	500	48	2140 C, APHA, 21ST EDITION
Non Carbonate Hardness	mg/l as CaCO <sub>3</sub>	-	-	54	Calculation
Total Dissolved Solid	mg/l	1000	-	67	2140 C, APHA, 21ST EDITION
Total Suspended Solids	-	-	-	2.27	2100 B, APHA, 21ST EDITION
<b>BIOLOGICAL</b>					
Total Coliform	CFU/100ml	Nil	Nil	Nil	9223 B, APHA, 21ST EDITION
Fecal Coliform	CFU/100ml	Nil	Nil	Nil	9222 C, APHA, 21ST EDITION

APHA - American Public Health Association, Standard Methods for the Examination of Water & Wastewater, 19th Edition, 2005. Health Protection Agency, Guidelines Value, 2006. (applied) NDWQS - National Drinking Water Quality Standard, 2002 (Nepal). \* These values are given in mg/l or µg/l units. CFU/100 ml is the preferred units, therefore, acceptable values only when alternative is not available. \*\* Not a recognized Test Method

Comment: *Tested parameters are within the guideline value.*

Analyzed by:

Checked by:

Authorized Signature:

Note: 1. This report is valid only for the parameters listed in the sample analysis. It does not cover any other parameters not listed in the analysis report. 2. This report is valid only for the parameters listed in the sample analysis. It does not cover any other parameters not listed in the analysis report.

3. This report is valid only for the parameters listed in the sample analysis. It does not cover any other parameters not listed in the analysis report.



# Water

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Laboratory, R & D on Total Water Management, Treatment & Consultancy

## LABORATORY ANALYSIS REPORT

Name of Sensor: SULTIPIPOO UNICORN JV      Name of the Project: Humana STWSSSP      Date of Collection: 17/9/2014  
 Sample No: 673-071-002      Type of Source: Boring      No. of Sample: 1  
 Date of Receipt: 18/9/2014      Name of the Source:      Lab. Temperature: 21 °C  
 Analyzed Date: 18-09/2014      Sampling Point: Tap Water (Blue Park)      TDS (µS): 7.3  
 Sampled by: WETC      Location: Dhapa      pH: 135.0 (50°C)

Parameters	Units	WHO GV	NDWQS	Result	Methods Used
<b>PHYSICAL</b>					
pH	-	6.5-8.5	6.5-8.5*	7.0	4500-H+ B, APHA, 21ST EDITION
Turbidity	N.T.U.	5	5,10,	<1.0	2120 B, APHA, 21ST EDITION
Electrical Conductivity	µS/cm	-	750	120	2530 D, APHA, 21ST EDITION
Lab. Temperature	°C	-	-	24.4	2530 B, APHA, 21ST EDITION
<b>CHEMICAL</b>					
Calcium	mg/L as Ca <sup>2+</sup>	-	200	9.6	3500-Ca D, APHA, 21ST EDITION
Magnesium	mg/L as Mg <sup>2+</sup>	-	-	4.4	4500-Mg B, APHA, 21ST EDITION
Iron	mg/L as Fe <sup>2+</sup>	0.3	0.3(3)	0.07	3111 D, APHA, 21ST EDITION
Manganese	mg/L as Mn <sup>2+</sup>	0.4	0.2	0.02	3111 B, APHA, 21ST EDITION
Arsenic	mg/L as As <sup>3+</sup>	0.01	0.05	<0.005	3111 C, APHA, 21ST EDITION
Ammonia	mg/L as NH <sub>4</sub> <sup>+</sup>	1.5	1.5	0.04	4500-NH <sub>4</sub> <sup>+</sup> , APHA, 21ST EDITION
Sodium	mg/L as Na <sup>+</sup>	-	-	7.7	3111 B, APHA, 21ST EDITION
Potassium	mg/L as K <sup>+</sup>	-	-	1.5	3111 B, APHA, 21ST EDITION
Total Chromium	mg/L as Cr <sup>6+</sup>	0.05	0.05	<0.01	3111 D, APHA, 21ST EDITION
Bicarbonate	mg/L as CaCO <sub>3</sub>	-	-	62	2520 H, APHA, 21ST EDITION
Carbonyl	mg/L as CO <sub>3</sub> <sup>2-</sup>	-	-	Nil	2420 H, APHA, 21ST EDITION
Hydroxide Alkalinity	mg/L as OH <sup>-</sup>	-	-	Nil	2320 D, APHA, 21ST EDITION
Total Alkalinity	mg/L as CaCO <sub>3</sub>	500	-	62	2520 H, APHA, 21ST EDITION
Carboxylate Alkalinity	mg/L as CaCO <sub>3</sub>	-	-	Nil	2420 H, APHA, 21ST EDITION
Non-carboxylate Alkalinity	mg/L as CaCO <sub>3</sub>	-	-	62	2320 H, APHA, 21ST EDITION
Phosphate	mg/L as P	-	-	0.24	4500-PO <sub>4</sub> -P, APHA, 21ST EDITION
Nitrate	mg/L as NO <sub>3</sub> <sup>-</sup>	50	50	0.71	1500-NO <sub>3</sub> <sup>-</sup> D, APHA, 21ST EDITION
Nitrite	mg/L as NO <sub>2</sub> <sup>-</sup>	3	-	<0.02	4500-NO <sub>2</sub> <sup>-</sup> B, APHA, 21ST EDITION
Sulfate	mg/L as SO <sub>4</sub> <sup>2-</sup>	250	250	<5.0	4500-SO <sub>4</sub> , APHA, 21ST EDITION
Chloride	mg/L as Cl <sup>-</sup>	250	250	2.0	4500-CL B, APHA, 21ST EDITION
Silica	mg/L as Si <sup>4+</sup>	-	-	21.3	1500F-D, APHA, 21ST EDITION
Fluoride	mg/L as SiO <sub>2</sub> <sup>2-</sup>	1.5	0.5-1.5*	0.19	4500-SiO <sub>2</sub> D, APHA, 21ST EDITION
Total Hardness	mg/L as CaCO <sub>3</sub>	500	500	42	2340 C, APHA, 21ST EDITION
Non Carbonate Hardness	mg/L as CaCO <sub>3</sub>	-	-	62	Calculation
Total Dissolved Solid	mg/L	1000	-	60	2540 C, APHA, 21ST EDITION
Langlier Saturation Index	-	-	-	-1.47	2350 B, APHA, 21ST EDITION
<b>BIOLOGICAL</b>					
Total Coliform	CFU/100 ml	Nil	Nil	140	9222 B, APHA, 21ST EDITION
Fecal Coliform	CFU/100 ml	Nil	Nil	Nil	9222 D, APHA, 21ST EDITION

APHA: American Public Health Assoc. on Standard Methods for the Examination of Water & Wastewater, WHO GV: World Health Organization Guideline Value, 2006 Edition, NDWQS: National Drinking Water Quality Standard, 2062 (Nepal). \* These values show lower and upper limits. 0: Values of the parenthesis refers the acceptable value only when alternative is not available. \*\*Not accredited Test Method

Comment: Biological contaminated.

Analyzed by

Checked by

Authorized signature

Note: 1. To ensure the reliability of the test, the samples provided for analysis should be collected by using aseptically collected, uncontaminated, representative sample and preserved in a cool and dark place. 2. The test results are for information only and are not intended for legal or regulatory purposes. 3. For any laboratory services for business, please contact us at: wetc@ncc.com.np

**Annex - 3: Rapid Environment Assessment  
(REA) Checklist**

## ADB'S REA Checklist

## Rapid Environmental Assessment (REA) Checklist

## WATER SUPPLY

## Instructions:

- This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Regional and Sustainable Development Department.
- This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department.
- This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) Involuntary resettlement, (ii) Indigenous peoples planning, (iii) Poverty reduction, (iv) Participation and (v) Gender and development.
- Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

**Country/Project Title:** Birtamod Small Town Water Supply Rehabilitation Sub-Project, Jhapa

**Sector Division:** Water Supply

SCREENING QUESTIONS	Yes	No	REMARKS
<b>A. Project Siting</b> Is the project area...			
• Densely populated?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
• Heavy with development activities?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Agro based industries (Tea Estate, Rice and oil mills)
• Adjacent to or within any environmentally sensitive areas?			
• Wetland	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Birat Pond (3.5 ha, 100 years old)
• Cultural heritage site	<input type="checkbox"/>	<input checked="" type="checkbox"/>	The subproject components are not within locations in or near sensitive and vulnerable ecosystems and protected areas.
• Protected area	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
• Mangrove	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
• Estuarine	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
• Buffer zone of protected area	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
• Special area for protecting biodiversity	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
• Bay	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>B. Potential Environmental Impacts</b> Will the Project cause ...			
• Pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not anticipated
• Impairment of historical/cultural monuments/areas and loss/damage to these sites?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Absence of historical monuments
• Hazard of land subsidence caused by excessive ground water pumping?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Deep Boring (Jagat Basti)
• Social conflicts arising from displacement of communities?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not anticipated
• Conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not anticipated. Water quantity is sufficient.

SCREENING QUESTIONS	Yes	No	REMARKS
• Unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Arsenic problem occurs in the area, a health hazard
• Delivery of unsafe water to distribution system?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be mitigated
• Inadequate protection of intake works or wells, leading to pollution of water supply?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be mitigated
• Over pumping of ground water, leading to salinization and ground subsidence?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	High cost involved in pumping will constrain over pumping. EMP recommends monitoring pumping & maintaining record to control pumping to design limit.
• Excessive algal growth in storage reservoir?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Treatment will come in existence
• Increase in production of sewage beyond capabilities of community facilities?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be mitigated
• Inadequate disposal of sludge from water treatment plants?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be mitigated
• Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	High cost involved in pumping will constrain over pumping. EMP recommends monitoring pumping & maintaining record to control pumping to design limit.
• Impairments associated with transmission lines and access roads?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Minor and temporary impact
• Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	To be consider in design stage
• Health and safety hazards to workers from the management of chlorine used for disinfection and other contaminants?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Training for operator to be provided
• Dislocation or involuntary resettlement of people	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
• Social conflicts between construction workers from other areas and community workers?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Minor and temporary impact
• Noise and dust from construction activities?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Minor and temporary impact
• Increased road traffic due to interference of construction activities?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Minor and temporary impact
• Continuing soil erosion/silt runoff from construction operations?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Minor and temporary impact
• Delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Training for operator to be provided
• Delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Concern for corrosion of G.I. pipes caused by the chlorine content in treated water is low. EMP provides mitigation measures.
• Accidental leakage of chlorine gas?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Bleaching power is used in Nepal
• Excessive abstraction of water affecting downstream water users?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not applicable
• Competing uses of water?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not applicable
• Increased sewage flow due to increased water supply	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Frequency of septage pumping to be increased; regular testing of ground water for microbiological pollution
• Increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Can be mitigated and improved

SCREENING QUESTIONS	Yes	No	REMARKS
treatment plant			
<ul style="list-style-type: none"> <li>Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Its small project, so limited number of worker will increase, and can be managed
<ul style="list-style-type: none"> <li>Social conflicts if workers from other regions or countries are hired?</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Priority in employment will be given to local residents.
<ul style="list-style-type: none"> <li>Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during operation and construction?</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Minor and temporary impact
<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>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Minor and temporary impact
<b>Sanitation</b>			
<b>C. Potential environmental impacts</b> Will the project cause...			
<ul style="list-style-type: none"> <li>Impairment of historical/cultural monuments/areas and loss/damage to these sites?</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No such areas near the subproject sites.
<ul style="list-style-type: none"> <li>Interference with other utilities and blocking of access to buildings; nuisance to neighboring areas due to noise, smell, and influx of insects, rodents, etc.?</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Minor and temporary impact
<ul style="list-style-type: none"> <li>Dislocation or involuntary resettlement of people?</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not applicable
<ul style="list-style-type: none"> <li>Disproportionate impacts on the poor, women and children, indigenous peoples or other vulnerable groups?</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not applicable
<ul style="list-style-type: none"> <li>Impairment of downstream water quality due to inadequate Sewage treatment or release of untreated sewage?</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Toilets will be connected to septic tanks that will be designed to achieve maximum retention.
<ul style="list-style-type: none"> <li>Overflows and flooding of neighboring properties with raw sewage?</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not applicable
<ul style="list-style-type: none"> <li>Environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers?</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Minor and temporary impact
<ul style="list-style-type: none"> <li>Noise and vibration due to blasting and other civil works?</li> </ul>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Minor and temporary impact
<ul style="list-style-type: none"> <li>Risks and vulnerabilities related to occupational health and safety due to physical, chemical, and biological hazards during project construction and operation?</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Minor and temporary impact
<ul style="list-style-type: none"> <li>Discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers?</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Minor and temporary impact
<ul style="list-style-type: none"> <li>Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances, and protect facilities?</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Minor and temporary impact
<ul style="list-style-type: none"> <li>Road blocking and temporary flooding due to land excavation during the rainy season?</li> </ul>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Not applicable as construction work will be done during off rainy seasons
<ul style="list-style-type: none"> <li>Noise and dust from construction activities?</li> </ul>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Minor and temporary impact
<ul style="list-style-type: none"> <li>Traffic disturbances due to construction material transport and wastes?</li> </ul>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Minor and temporary impact
<ul style="list-style-type: none"> <li>Temporary silt runoff due to construction?</li> </ul>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Not applicable



SCREENING QUESTIONS	Yes	No	REMARKS
<ul style="list-style-type: none"> <li>Hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Minor and temporary impact
<ul style="list-style-type: none"> <li>Deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not applicable
<ul style="list-style-type: none"> <li>Contamination of surface and ground waters due to sludge disposal on land?</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not applicable
<ul style="list-style-type: none"> <li>Health and safety hazards to workers from toxic gases and hazardous materials which may be contained in confined areas, sewage flow and exposure to pathogens in untreated sewage and unsterilized sludge?</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not applicable
<ul style="list-style-type: none"> <li>Large population increase during project construction and operation that causes increased burden on social infrastructure (such as sanitation system)?</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not applicable
<ul style="list-style-type: none"> <li>Social conflicts between construction workers from other areas and community workers?</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Priority in employment will be given to local residents.
<ul style="list-style-type: none"> <li>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?</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not applicable.
<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>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Minor and temporary impact



## **English Translation of Minute of Meeting - Phase II**

Birtamod Small Town Water Supply Sanitation and User's Committee organized a public hearing workshop on 2072/6/7. Participation were made from all concerned stakeholders. After discussion in the public hearing it was observed that there will be no negative impacts on the environment, no necessity of land acquisition and no need of resettlement while implementing the proposed "Enhance Functionality" in Small Town Water Supply and Sanitation Sector Project. As such it was decided to inform this conclusion to the concerned authorities.

# Phase 1

(आज मिति २०७१/०३/२० गतेका दिन यस विद्याका निवेदन  
श्री अलकुरा गुरुकुल मा. र. सता लहरी २०७०५३ आयोजना (काठमाडौं)  
बाट Concordant का प्रतिनिधीहरूको लक्ष्य उपाधेतिमा  
उपशील अभ्यासका पुस्तावत इत्तमाल गरी उपशील लक्ष्य  
निर्वाह गर्ने गरी इत्तमाल प्रो. (ग. अ. वि.)

उपाधेति

१. सचिव : श्री अलकुरा गुरुकुल

२. ITECO-Sill Ince J.V. विम लिङ्ग श्री हरिप्रकाश

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पुस्तावत आयोजना पुस्त निर्माण (विमलिङ्ग),  
पुस्तावत २. (विमलिङ्ग)

निर्वाह नं. १ पुस्तावत. १ उपर इत्तमाल गरी साक्षात्कारी









२०७०५३ आयोजनाका लागि आउनु भएका ITECO-Sill  
J.V. का परामर्श गता हस्तगत यस विद्याका निवेदन  
गर्नु पर्ने शैक्षिक खर्चका पुस्त निर्माण तथा अडानका  
आगे अत्यावश्यक वस्तु स्थिति हस्तगत जानकारी दिई  
आजका बेरक अन्त्य गरियो /

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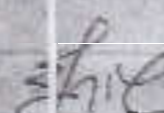
# Phase 2

आज्ञा मिति २०६२/०६/०६ गते विहवारका दिन विहीनमाइ  
 खानेपानी तथा सरसलाइ उपरोक्त सभ्याको मासिक नियमित  
 बैठक सभ्याको उपाध्यक्ष श्री पावेगा निरौला (खरेल) ज्ये-  
 को अध्यक्षतामा बैठक बसि तपशील बमोजिमका प्रस्ताव  
 माथि छलफल गरि तपशील बमोजिमको निर्णय लिई गरी  
 बैठक पुराको गरियो।

उपाध्यक्ष

१. अध्यक्ष : श्री रोमप पुसाइ
२. उपाध्यक्ष : श्री पावेगा निरौला (खरेल) 
३. सचिव : श्री जल कुु कुु कुु 
४. कोषाध्यक्ष : श्री गोपी थंडू निरौला 
५. सदस्य : श्री मेघराज वालुजा 
६. " : श्री आनुराग पुसाइ 
७. " : श्री पुष्प प्रताप 
८. " : श्री विमलु निरौला 
९. " : श्री शशा कुु कुु 

आगामीत उपाध्यक्ष

१०. I T E T C O नेपाल  
 वातावरण इन्जीनियर श्री आनु रिजाल 

प्रस्ताव नं. १ नेपालको संविधान २०६२ को स्वयंसेवक  
 सम्वन्धमा।

प्रस्ताव नं. २ श्रमता आभिवृद्धी कार्यक्रमको वातावरणीय  
 प्रभाव बारे।

प्रस्ताव नं. ३ आ. वि. २०६१/०६२ को लैंगिक सम्वन्धमा  
 प्रतिवेदन अनुसन्धान सम्वन्धमा।

प्रस्ताव नं. ४ आ. वि. २०६२/०६३ को अनुसन्धान

पुस्तावले-२ - विनिर्दिष्ट, (समापक २०६२/०३)

श्रमिका लागि थप स्वतन्त्रता हुन निर्माण सम्बन्ध

निर्णय नं-१ पुस्तावले १ उपर हलमल गर्दा

मिति २०६२/०६/०३ गतेका दिन संविधान समले नेपालको संविधान २०६२ घोषणा गरेको मासो प्रति खुसी व्यक्त गर्दै यस संविधानको लेखन २ नेपालीको स्वाभिमत २ स्वाधिनता माथि उच्च शरणा सवै नेपालीको भावनालाई आत्म सन्तुष्टि राख्ने एकसुत्रमा गाभेर देशमा शान्ति सुख २ विगत विकासमा टेवा पुऱ्याउने सकारण भन्ने शुभ कामना व्यक्त गर्ने निर्णय गरियो।

निर्णय नं-२ पुस्तावले २ उपर हलमल गर्दा

थाल्नु हुन लागेको स्वतन्त्रता श्रमता (अपेक्षा) कायम कायमपन गर्दा वातावरणमा कुनै प्रतिकूल झार नपर्ने जग्गा अधिकरण गर्न नपर्ने, सुनवासाको व्यवस्था समेत गर्न नपर्ने सम्पूर्ण शरणा-वालाहरूद्वारा निर्णय गरियो

निर्णय नं-३ पुस्तावले ३ उपर हलमल गर्दा यस

संस्थाले मिति २०६१/०६२ मा भए गएको अडार तथा स्वयंसेवकको लेखा परिक्षण गराए तथा लेखा परिक्षण प्रतिवेदन अनुसार हुने आधारमा पेश गर्ने निर्णय गरियो

निर्णय नं-४ पुस्तावले ४ उपर हलमल गर्दा यस

संस्थाको मिति ०६२/०६३को आम्बानी तथा स्वयंसेवकको लेखा परिक्षणको प्रतिवेदनमा आधारित निर्णय गरियो।



## तपशील

- १ संयोजक ! - श्री गोपी चन्द्र शर्मा
- २ - सदस्य " मेघराज वाकनाथ
- ३ " " " सिद्धु तिलेवा
- ४ " " " शंका शर्मा
- ५ " " " शांतानंद प्रसाद

## निर्णयनं-२

पुस्तकाने २ उपर हस्तगत गरी यसलेच्या वाटू वितरण गरिस्को पात्रप जाडन वार पानि आभुति गन वस पाके क्षेत्र २ बुहावारी-क्षेत्रता पहिले गरिस्को डिजाइन सके आगुसा लुप्त क्षेत्र आंगी- तिक लवले आगुसा अनसल्याको हिला व लवले लवले वरि मरि मरि इतक स्थानको सतह कुनीको पानी पिउन आरत पुत मस्को लव स्थानपानीको माग अत्याधिक मस्को दुप आल फुडन (थालु) पुत जागेको स्वानपानी पुत निर्माणका योजना हरु शिनिअर्जन इ लिये वस पाके मरु शक्ति मरि अनेकि व क्षेत्रता पयोक्त स्वानपानीको सदन रुपमा लिक विलका शरउने निर्माण गरिया /

# **Project Photographs**

**Photos on Public Gathering Meeting on Environmental and Social Issues**

**BIRTAMOD**



*Photo No. 1*



*Photo No. 2*



*Photo No. 3*



*Photo No. 4*