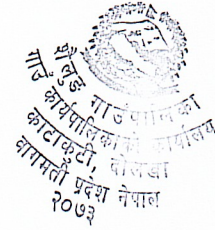




**Shailung Rural Municipality
Office of the Rural Municipal Executive
Katakuti, Dolakha
Bagamati Province, Nepal**

TOR

of



**Consulting Services
for
Preparation of Detail Project Report of Botle Gochet Bhurunga
Drinking Water Supply Project**

शैलुङ्ग रूरीपालिका
काठकुटी, दोलाखा
बागमती प्रदेश, नेपाल

Magh



Detailed Engineering Study and Design of Water Supply and Sanitation Projects

Terms of Reference

1. Introduction

Detailed Engineering Study and Design (DESD) of a project is to be carried out after the project is selected for implementation. The study shall be conducted for all new projects, and for all existing projects to be selected for rehabilitation. The detailed study reports are produced as the outcome of the detail survey and design of the projects so that immediate actions could be undertaken for their implementation.

2. Objectives of the Work

The overall objective of the study is to formulate technically sound and cost effective water supply and sanitation projects. Specific objectives are to ascertain population and coverage area, project cost, community contribution, detailed construction works, and operation & maintenance requirements.

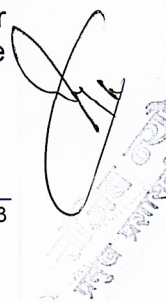
3. Scope of the Work

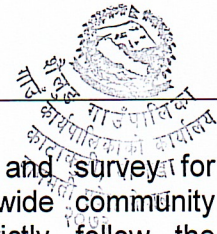
The detailed scope of the work mostly includes, but not necessarily limited to the following:

- to assess existing situation of water supply and sanitation in the project area;
- to assess existing water supply and sanitation structures in terms of their reuse in case of rehabilitation of existing systems;
- to verify the source yield, water quality, intake/deep tube well boring site, reservoir site, pipe alignment and number and location of public taps and other major structures;
- to clarify the community enthusiasm on the execution of the project and willingness to contribute for construction and undertake operation and maintenance responsibility upon commissioning;
- to identify appropriate interventions required to promote sanitation at personal, household and community level, within the project area.

4. Approach and Procedures

Prior to the visit to the project area, Feasibility Study Report (if feasibility study had been conducted in the project area beforehand) is reviewed and the possibilities for modifications/ improvements on the proposals of the feasibility study shall be investigated and incorporated wherever possible/required during detail survey.





The methodology adopted for conducting detailed field study and survey for preparing a detailed engineering report should be based on wide community participatory approach. The detailed study report should strictly follow the departmental design guidelines and GON directives.

Technical Aspects

The technology adopted should be simple, socially, culturally and environmentally acceptable and its operation and maintenance should be affordable and manageable by the community. Standard structures should be used as far as possible and maximum utilization of locally available construction materials should be ensured for the ease of construction and operation and maintenance.

The detailed study report should be fairly described to the extent that it provides complete details on the following technical aspects required for the smooth implementation of the projects and sustainable operation and maintenance after execution.

- Existing water supply and sanitation projects/schemes in the Municipalities related to the project (cross checked through NMIP data);
- Existing situation of water supply in the project area in relation to issues of quantity and quality of water available, hardship, waiting time and mode of collection (type of source);
- Project is a new one or being implemented for interference or supplement such as rehabilitation or up gradation or extension to existing system/s within the project area;
- Sufficient information on the intake site, safe yield, water quality, and water right issues (disputes) for the proposed sources;
- Water demand and level of adequacy;
- Coverage data on households, population and institutions in terms of additional coverage or reinstatement of service;
- Components, technology and methodology adopted in system designing;
- Remedies for water quality improvement, if any, based on the quality analysis of the samples of selected source/s;
- Structures used for water supply and sanitation facilities;
- Alternatives, if any, in terms of technology and/or structures;
- Availability and distances for transportation of local materials, the nearest market and road head and distances involved for importation of materials;
- Check list for IEE;
- Major environmental consequences likely to occur due to construction of the project;
- Detailed hydraulic designs of transmission and distribution pipelines; HDPE pipes shall be used as far as possible;
- Analysis of rates consistent with norms and approved district rates for materials and labour;
- Layout of the project showing relative positions of intake/s, reservoir/s, pipe alignment with appurtenances provided, public stand posts, prominent landmarks and community dwellings, provided bench marks etc.;
- Schematic water flow diagram from intake to the last point of distribution;
- Longitudinal sections of transmission and distribution pipelines following ground profile with static water head and hydraulic gradient lines between water flow points like intake, reservoir, break pressure chamber, distribution chamber, public tap stand posts;
- Complete working drawings of the structures proposed;
- Detail quantity and cost estimates to implement the project;



- Financial analysis and affordability in terms of sustainable operation and maintenance of the system by users committee;
- Suggestion for WTP with its type, if required.

The following methodology should be adopted

Overall project planning

- Generally, project area or schemes included in a project should be confined within one watershed area;
- Overall planning of the project components will be carried out by the Team-leader;
- Possibility of small independent and multiple reservoir systems should be explored; point source schemes should not be selected;
- Pipe traverse through foot tracks should be preferred;
- Standard methods should be adopted in water sample collection and transportation of samples to laboratory for water quality analysis.

Selection of source

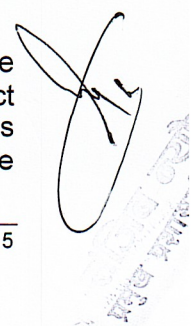
- Perennial spring sources will be preferred over stream sources wherever practical. Special note will be taken of upstream pollution possibilities due to farming; secondary uses of the source like washing clothes and cattle grazing, habitation, etc.;
- Source yield assessment and ascertainments will be made through average of 3 minimum readings;
- Source yield assessments will be preferably carried out in dry season; sufficient allowance for drying should be made based upon thorough consultation with villagers, past experience and observation for source measurements in other seasons;
- Sources with a safe discharge measuring less than 0.10 lps should not be considered;
- In case of deep well boring, water table, yield and quality of underground water should be assessed from near by existing deep tube wells;
- Protection measures required for stability and safe guarding against pollution will be clearly indicated;
- WTP with its type, if required will be clearly suggested.

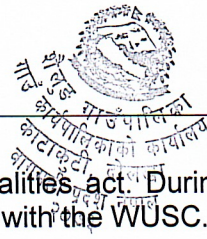
Surveying

- Survey equipment's shall properly be calibrated;
- Topographic survey will be carried out using level instrument/ theodolite for fixing alignment for transmission and distribution pipelines. Bench marks should be established at the source, the reservoir site/s, along transmission and distribution pipelines and other major feature/s by painting enamel paint on permanent features like big rocks, a house, big tree, etc. The established bench marks should be clearly mentioned in the reports. Transmission and distribution routes should be marked by arrows painted preferably by using red enamel paint;
- Distance measurements will be carried out using a fibre glass tape and measurements will follow the ground profile.

Social Aspects

A general mass meeting is held in the Municipalities concerned and through wide participatory discussions the community members are apprised of the project activities and their duties and responsibilities prior to study. Thus users' committee is already formed so as to represent the whole beneficiaries in accordance with the





procedures and conditions as stipulated in the Municipalities act. During the entire period of study the team shall work in close coordination with the WUSC.

Following details should be worked out during the survey and explicitly highlighted in report

- Possibility of interference to selected water source/s use due to existing or probable secondary use;
- Demographic features within the project area like total households and population, distribution of population by gender, distribution of households and population by caste and ethnicity, occupation, average and distribution of family income both in terms of cash and kind, etc.
- Number of households and population below poverty line;
- Present sanitary situation, at personal, household and community level, within the project area;
- Existing numbers of household and public toilets, their type and present use;
- Overall health status within the project area with particular emphasis to occurrence or prevalence of water related diseases;
- Understanding of the project features and implementation procedures by the community;
- Formation of Water Users and Sanitation Committee (WUSC) as per existing policy and strategy and names of WUSC members;
- Names of the proposed VMWs, sanitation motivators and public tap stand post caretakers;
- Commitment by users to actively participate and contribute in the project implementation and undertaking the responsibility of project operation and maintenance upon commissioning;
- Commitment by community to provide required land for project facilities (preferably free of cost) and approximate value of such land; however, the land provided should be convenient for the use of the project;
- Percentage of total cost and the list and approximate value of item works for which the community is willing to contribute (not less than 20%);
- Willingness to pay for the water supply and sanitation services by the community;
- Commitment to contribute towards establishing a maintenance fund as specified by the department;
- General attitude of users on implementation of the project and their willingness towards solving problems that might arise during implementation;
- Confirmation of felt need of the project;
- Any other prominent social features that might have a marked bearing on the project.

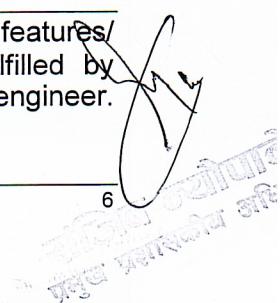
Following methodology is suggested for various item works

Demographic Features

- Data will be collected through household surveys, focus group discussions and interviews with key informants. These data will be cross checked with VDC census data;

Users' commitment

- A mass meeting of beneficiaries will be organized. Project features/ implementation modalities/pre requisites and requirements to be fulfilled by community, O & M issues, etc. will be briefed to the community by the engineer.



Quick Reference Tools (QRT) for component costing developed by the department will be used for arriving at approximate project cost.

- Comments from beneficiaries in listed aspects will be encouraged and noted; women and weaker segments will be prompted to express their views.
- A users committee will be formed on consensus or through democratic selection process by the beneficiaries
- The users committee will provide signed letters of commitment/s on acquiring required water rights for selected source/s, community contribution, land facilities, responsibility of O&M, establishment of a maintenance fund, construction of household toilets, nomination of VMW/s, sanitation motivator/s, etc

5. Detailed Engineering Study Design Report

The detailed study report will highlight all the listed issues and preferably include the site map marked on a district map. The report shall comprise four sections with major headings and sub-headings suggested below.

- A) Project Summary
- B) Abstract of Costs and Quantities
- C) Drawings
- D) Appendices

A) Project Summary

- a) Salient features:
 - Salient Features of Project
 - Scheme-wise Salient Features
- b) Project Costs:
 - Summary of Project Costs
 - Scheme-wise Costs
 - Operation and maintenance costs: sustainability analysis if required
- c) Introduction/Background Information/Brief Description:
 - Project area: location, accessibility
 - Physical features: topography, climate, vegetation etc.
 - Socio-economic conditions: ethnic composition, gender distribution, occupation, educational and health services, socio-economic activities etc.
 - Existing water supply situation: quantity, general quality, hardship
 - Existing sanitary environment: general practices and conditions regarding personal, household and community hygiene and sanitation
- d) Project Features/Details:
 - Proposed scheme/s: number and name of scheme/s, type of system
 - Proposed water source/s: yield, location, protection and conservation measures, water right guarantee
 - Water quality: physical, chemical and microbiological qualities, remedies for quality improvement
 - Technology adopted: discuss with justification, alternatives
 - Design criteria: give justifications if necessary
 - Population coverage
 - Water Demand
 - Components of the project
 - Sanitation: methods to be adopted for sanitation promotion
 - Environmental consideration: impacts and mitigation measures

- Construction materials: availability and distances for transportation of local materials, nearest market and road head and distances involved for importation of materials
 - Remarks and conclusion
- e) Annexes:
- | | |
|------------|---|
| Annex-1 | General information |
| Annex-2 | Existing situation of water supply & sanitation in the project area & VDC |
| Annex-3 | Proposed water sources |
| Annex-4 | Household and population survey |
| Annex-5 | Existing public institutions in the project area |
| Annex-6 | Household and population projection |
| Annex-7 | Total water demand and water flow calculation |
| Annex-8(A) | Storage tank sizing (Continuous system) |
| Annex-8(B) | Storage tank sizing (Intermittent system) |
| Annex-9 | Hydraulic design of pipeline |
| Annex-10 | Layout plan |
| Annex-11 | Schematic flow diagram |
| Annex-12 | Water sample analysis report |
| Annex-13 | Financial Analysis and affordability |
| Annex-14 | Checklist for Environmental Parameters (IEE) |
| Annex-15 | Name and persons contacted during survey |
| Annex-16 | Tracking of main structures and pipe line alignment in GPS |
| Annex-17 | Social map |

Methodology

- Standard departmental guidelines will be followed;
- Population projections will normally take into account the VDC growth rate, site specific growth rates may be used if it is validated by household survey;
- Scheme layout plan (*not to scale*) and schematic flow diagram will be drawn on A4 size paper separately for each scheme;
- Standard formats will be used for the annexes. Layout plan and schematic flow diagram of all schemes will be arranged in sequence as *Annex-10* and *Annex-11* respectively. Water quality analysis report obtained from water sample testing laboratory will be submitted as *Annex-12*.

B) Abstract of Costs and Quantities

a) Abstract of Costs and Quantities shall consist of

- Cost estimate
- Quantity estimate
- Rate analysis: basis for calculations

Methodology

- Rates of locally available construction materials such as stone, sand, aggregates and timber are worked out summing up the cost of collection of materials and transportation cost (manual or vehicular);
- Rates of labour and non-local construction materials are adopted from district approved rate adding the transportation cost (manual or vehicular);

- Unit rates of relevant work items are developed according to the GON and departmental norms adding 15% contractor's overhead in the total cost of materials and labours;
- Quantities of items for each component are calculated from corresponding drawings;
- Fittings with required size and quantity for each component are estimated separately;
- The costs of proposed components are estimated using worked out unit rates separately for each component with an addition of 13 percent value added tax (VAT) in total cost;
- Provisions of costs for pre-construction, VMWs, motivators and post construction training and costs for the construction of institutional toilets should be made for each scheme according to the departmental norms and guidelines;
- Scheme costs are worked out summing up the costs of components included in the scheme; and the project costs, summing up the costs of the schemes;
- The costs for detailed survey and detailed study report, project appraisal and agreement and sanitation awareness program should be included in the total project costs;
- Grand total of the project cost should be worked out adding up 2.5 % as contingencies for miscellaneous minor expenses, 10 % price contingencies and 10 % physical contingencies on the total project costs;
- The cost to be borne by GON and the community in each scheme and project in total should be summarized in a separate sheet listing the item of works and estimated costs for community contribution.

C) Drawings

The following drawings, complete and clear, shall be submitted in the report:

- | | | |
|-----------------------------|---|--|
| a) Location Map
The main | - | District map shall be used for the location map. structures shall be located in contour map. |
| b) Layout Plan | - | The plan shall be drawn free of scale in separate sheet for each scheme and should give the following information: <ul style="list-style-type: none"> ▪ Name, type and safe yield of source; ▪ Location of intake, reservoir and public tap stand posts; ▪ Pipe lengths and relative elevation difference between the structures provided, such as intake, sedimentation tank, break pressure tank, reservoir, distribution chambers, crossings, etc.; ▪ Name of village/community, ward no.; ▪ Prominent community buildings and institutions; ▪ Natural water bodies such as river, stream, lakes and ponds, if any; ▪ Major roads, highways. |
| c) Water Flow Diagram | - | The diagram should contain the following information: <ul style="list-style-type: none"> ▪ Pipe lengths and size, type and class of pipe used in each segment as per design; |



7. Mode of Payment

The concerned Regional Monitoring and Supervision Office or Municipal office shall pay the amount to the Municipal employees as per Municipal Norms and to the consultant (if employed) as per Agreement as stated below. However, each payment, either in installment or in full, to both the departmental employees and the consultant shall be made as per the prevailing laws and rules of the GON.

a) To departmental employees:

The amount shall be paid to the Engineer assigned for the study as follows:

- For mobilization and field work - 0 percent of the total amount
- Upon submission and acceptance of detailed field study and survey report - 0 percent of the total amount
- Upon submission and acceptance of detailed engineering design draft report - 0 percent of the total amount
- Upon submission and acceptance of detailed engineering study and design final report - 100 percent of the total amount

b) To consultant (if employed):

The amount shall be paid as per agreement to the consultant assigned for the study. However, the consultant can claim the payment either in a single instalment after submission and acceptance of the detailed engineering study and design final report or in instalment as follows:

- First instalment (if necessary), 0% of the total amount upon submission;
- First instalment, 0% (or 0 %, if the first instalment is not materialized) of the total amount upon submission and acceptance of detailed field study and survey report;
- Final or remaining 100% of the total amount upon submission and acceptance of detailed engineering study and design final report.

The final payment in both the cases (a and b) shall be made only after approval/of the Report

काठमाडौं महानगरपालिका
वोलखा
बागमती प्रदेश
नेपाल

सुदूरपश्चिम प्रदेश
काठमाडौं महानगरपालिका
कार्यालयको कार्यालय
काठमाडौं, दोलखा
२०७३



सुदूरपश्चिम प्रदेश
प्रमुख प्रशासकीय अधिकृत

**8. TEAM COMPOSITION**

S.N	Position	Qualification
1	Team Leader/water supply engineer/Civil engineer	Masters in Sanitary Engineering/ Environmental Engineering Master's Degree in civil engineering with 7+ years of experience .
2	Civil Engineer/Design engineer	Degree in Civil Engineering, design, Quantity Surveying, or related field with 5+ years of experience in cost estimation.
3	Sub Engineer/Draft Person	Diploma in Civil Engineering or relevant field
4	Surveyor	Diploma in Civil Engineering

Shailung Rural Municipality
Office Of Rural Municipal Executive
Katakuti , Dolakha
Bagmati Province , Nepal



Preparation of Detail Project Report of Bottle Gochet Bhurunga Drinking Water Supply Project
Bill of Quantity

Location: Shailung 3

S.N	Description of Work	Unit	Qty	Rate (In figure)	Rate(In words)	Amount (NRs.)	Remarks
1	Preparation of Detail Project Report of Bottle Gochet Bhurunga Drinking Water Supply Project	NO	1				
	Total						
	Vat 13%						
	Grand Total with VAT						

[Signature]

R.M. Shilung
 Executive Officer

[Signature]

R.M. Shilung
 Executive Officer