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| **FUNCTIONALITY AND SUSTAINABILITY STATUS OF WASH SERVICES**  GAUDHARA CHIPCHIPE WATER SUPPLY AND SANITATION SYSTEM (गौधारा छिपछिपे खानेपानी तथा सरसफाइ प्रणाली ) Code Number 11301003 | Abstract  This report of Gaudhara Chipchipe Water Supply and Sanitation System presents the summary of the assessment of the functionality and sustainability of water supply and sanitation system. It also assess the quality of services delivered by WSUCs. This report is generated by NWASH MIS. (http://nwash.mowss.gov.np/ )  Gaudhara Water Supply and Sanitation Users Committee, Ghodagaun Rural Municipality, NEPAL 17th July, 2018 |

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**ABOUT THIS REPORT**

This is the report of summary status of Gaudhara Chipchipe Water Supply and Sanitation System. This report presents the summary of assessment of the functionality and sustainability of i) water supply system and ii) the quality of service delivered by this WSUC. It covers the overall achievement of the WSUC with physical and statistical summary according to the data collected. The objective of the report is to present the:

* Summary of condition assessment that determines functionality and sustainability status of the Water Supply System and services it is providing
* Summary of the interventions required to bring back the system in the functional and sustainable status.
* Summary of costs required to implement the intervention measures.

This report is generated from the data available in NWASH MIS (<http://nwash.mowss.gov.np/> ), so the accuracy of this report is dependent on the trueness of the data collected for NWASH MIS. The NWASH MIS is developed by the Ministry of Water Supply, with financial and technical assistance from World Bank under Rural Water Supply and Sanitation Improvement Project- Component C2 (Credit: IDA 5446-NP, Grant: IDA H945-NP).

It is expected that this report will be useful to stakeholders in promoting long–term sustainability of community managed rural water supply schemes.

**ORGANIZATION OF REPORT**

This report has four parts:

**PART I: TECHNICAL GUIDELINE**

This part briefly describes the theoretical concepts, explanations of standard terminologies, methods used in data collection. This part is intended for the readers who are not familiar with the WASH sector. This part is the same for all schemes.

**PART II: FUNCTIONALITY AND SUSTAINABILITY ASSESSMENT**

This part deals with the assessments of the scheme based on the indicators that are described in part I. This part only shows the present scenario of the scheme. This actually shows the health of the scheme. This find out the gaps in the project and indicates the field of interventions that is necessary to fill this gap.

**PART III: RESTORING FUNCTIONALITY**

This part is useful to the stakeholder, planner and WUC itself. With the help of this the WSUC can have the clear picture of where they are and what they need to do to restore functionality. This part describes the issues that are negatively effecting the functionality. This part examines the probable root cause of the issues that are negatively effecting the functionality of the schemes.

This also describes the nature of interventions that are required to overcome the issues and to restore the functionality of this scheme. The interventions are not described in details but there is indication that can be sufficient enough to design the level and nature of detail interventions.

This part can be a good example of how any MIS can be used in planning WASH interventions.

**PART IV: ESTIMATE FOR FUNCTIONALITY IMPROVEMENT**

This report is prepared for the preliminary cost estimation for the functionality improvement of XXXX system. The cost presented in this report is the summary cost of interventions that are stipulated in PART III of this report. This report sets out the basis of the capital cost estimate and is presented in following 4 components.

**CONTRIBUTORS**

The following organization has contributed in collecting data of the status of WASH services of this scheme. Their efforts and inputs is highly acknowledged:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S.N.** | **Organizations** | **Address** | **Number of Taps covered** | **Populations covered** |
| 1 | Ministry of Water Supply | Singhdurbar, Kathmandu | 250 | 20000 |

**DATA AGE**

This report is generated from the NWSH System, the newness (freshness) of data solely depends on the following factor:

Inventory collection date: 17th March, 2017 to 3rd July, 2018

Report Generated Date: 25th July, 2017, 13:17:32 (Now)

**PART I: TECHNICAL GUIDELINE**

# **MONITORING FRAMEWORK**

The Monitoring and Evaluation (M&E) framework of Functionality and Long-term Sustainability for the Community Managed Water Supply Systems (CMWSS) in Nepal had been approved by the Ministry of Water Supply and Sanitation. This Results Framework is outlined that reviews the Nepal RWSS Sector Policy and arranges it into a hierarchical series of results - Goals (or impacts), outcomes and outputs and linkages to log-term sustainability. Utilizing this Result Framework, the Key Performance Areas in terms of Functionality and Sustainability and associated "Indicators", had been developed, that would demonstrate progress towards, or achievement of, sector outcomes, goals and policy.

The web based GIS enabled National WASH MIS is developed (<http://nwash.mowss.gov.np/> ) based on this M&E Framework and hence all data collection efforts are in line with this National WASH MIS. This M&E Framework is available in website for reference.

# **DATA COLLECTION**

Two separate mobile applications (NWASH inventory and NWASH Project Sustainability ) were used for data collection from project area and then uploaded to MIS. The enumerators visited each and every structures, pipeline and taps to ensure that all institutional and household sanitation facilities in the project districts like: age and origin of facilities, asset inventories, functionality status, record keeping, existence of maintenance schedules, operational staff and tools, WSUC status, financial and administration status, linkages with O&M service providers, sanitation coverage, ODF status etc. are well captured. The “Procedural Guideline For NWASH App Users” has been developed which clearly indicates the procedures that need to be maintained during data collection. The guideline is downloadable from (<http://nwash.mowss.gov.np/> )

# **DATA QUALITY**

To draw conclusions over a period of time, decision-makers must be certain that they are looking at data which measure the same phenomenon (often called reliability). The data collection must therefore remain consistent each time it is carried out. Enumerators were well oriented with the “Procedural Guideline For NWASH App Users”, this guideline emphasis on maintaining the quality of data, involvement of stakeholders in data collection process and ownership of the WSUC and stakeholders on data collection outcome:

1. The enumerator needs to check the completeness of data capture before leaving the scheme. The representative of the scheme signs the testimony of the completeness on the layout map prepared during survey.
2. The enumerator needs to check if all schemes in a ward are captured before he leaves the ward. The member or ward representative from ward office certifies that the every schemes in a ward is visited and captured.
3. When the data collection is completed the collecting agency should present the findings in DWASHCC/MWASHCC

# **SOURCES OF INFORMATION**

This report is based on the information obtained from NWASH MIS. Data in this report are extracted from the MIS. This report gives us contextual information based on Status of the project, its functionality and sustainability facts and core information about the project.

# **INFORMATION UTILIZATION**

The information available in this report will help WSUC and stakeholders to make their decision more realistic. The “Framework for utilization of national WASH M&E system” has envisaged following 9 key areas of information Utilization:

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | Reporting towards goals; | 6 | Backstopping and technical advice; |
| 2 | Benchmarking; | 7 | WSUC grading and Grant Eligibility; |
| 3 | Performance improving, M&E; | 8 | WASH Planning and prioritization; |
| 4 | Networking, Market Search, Service Promotion and Partnership Building; | 9 | Transparency. |

|  |  |  |  |
| --- | --- | --- | --- |
| 5 | Special Study, Research, Learning, Innovation and Development; |  |  |

# **ASSESSMENT**

Structures, like people, never get younger. Structures, like people, can maintain their good health with age, if properly cared for, examined, and treated when needed. Structures, like people, need periodic check-ups as part of their preventive care to ensure their fitness; and need examination when exhibiting signs of illness. Interestingly, structural condition is often referred to as fitness-for-service.

However, intake, reservoir, BPT and all other structures do deteriorate with time as the result of repeated loadings, exposure to the elements, aging of materials, wear-and-tear from normal use, abuse, inadequate maintenance, and other factors. We design structures for strength, stability and deformation, but the most common problems that occur are those of deteriorations, durability and serviceability.

In simplified terms, structural condition assessment consists of activities of visual observation, measuring, photographing, record keeping, documentation, and report preparation

## **RVT ADEQUACY ASSESSMENT**

The reservoir should be assess based on the adequacy. This is the perception of users rather the mathematical calculation to determine the required size and its adequacy.

## **CIVIL ASSET ASSESSMENT**

During the survey each and every component (structures and pipeline) should be assessed. The following table defines the standard terms used in this report for asset conditions.

\*Key structures are defined as that influential structure which if in need of any type of repair will considerably affects the functionality of the system as a whole. Such structures are related to Production, Transmission, Storage and Distributions (eg. intake, reservoir, pipeline). But structures like tapstands, valve chamber are not key structures.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Conditions** | **Definition** | **Asset Physical Conditions** | **Asset Functional Status** | **Asset Defects** | | | **Applicability** | **For schemes** |
| **Extent** | **Severity** | **Priority** |
| Good | Structures/schemes that need no repair | An asset in very good condition is near new and requires only minimal predictive or preventative maintenance to maintain proper function. | **No Loss of Function:** Little or no loss of service, however, minor disruption to functional performance that can be tolerated for an extended period of time. | Insignificant | Insignificant | No | Structures and schemes (System) | When all key components\* are in good condition |
| Need Minor Repair | Structures/schemes that are functioning and need repairs that are within the capacity of users (with no external inputs required) | An asset in this condition is assumed to require average levels of predictive and preventative maintenance and may require minimal corrective maintenance or minor adjustments to optimize performance and restore it to near new condition | **Functional Inconvenience:** No major loss of service, however some disruption to functional performance of the asset can be tolerated for short periods. | Minor | Mild | Low | Structures and schemes (System) | When one or more key components\* need minor repair |
| Need Major Repair | Structures/schemes that are functioning but need major repairs (with external inputs for construction components and technical supports required). | An asset in this condition is operational but requires significant, timely refurbishment to avoid further deterioration and/or failure. If attention is not received, the asset could decline to a condition where corrective action is no longer cost effective | **Major Functional Disruption:** Significant disruption to the functional performance with elements of the asset being unstable, requiring immediate rectification. | Significant | Moderate | Medium | Structures and schemes (System) | When one or more key components\* need major repair |
| Need Re-construction | Structures/schemes that are serving least and need major technical and financial inputs from external sources as well as sizeable contributions from users before they can function again. | An asset in this condition is generally past cost effective refurbishment and needs to be replaced, and/or the asset is likely to fail in the near future | **Loss of Function:** The majority of the asset is unusable, causing very significant disruption to asset users and major disruption to functional performance, requiring immediate rectification. | Considerable | Severe | High | Structures and schemes (System) | Defined separately below |

## **SCHEME ASSESSMENT**

The decision whether the particular scheme as a whole should be categorized as ‘good’, ‘need minor repair’, ‘need major repair’, ‘need rehabilitation’ or ‘need reconstruction’ needs analysis of multiple parameters, and explained below:

### **ASSESSMENT FOR ‘GOOD CONDITIONS’**

In a scheme if all structures and pipeline are in good conditional then the scheme is categorized as ‘good’. Such scheme should also have all pipelines in good conditions.

### **ASSESSMENT FOR ‘NEED MINOR REPAIR’**

In a scheme if one or more key structure need minor repair then the scheme is categorized as ‘needing minor repair.

If schemes have pipeline that need minor repair. It is also considered as ‘needing minor repair. Such pipeline should not have more than one leak in two kilometer.

### **ASSESSMENT FOR ‘NEED MAJOR REPAIR’**

In a scheme if one or more key structure need major repair then the scheme is categorized as ‘needing major repair.

If schemes have pipeline that need major repair. It is also considered as ‘needing major repair. Such pipeline should not have more than one leak in two kilometer.

### **ASSESSMENT FOR ‘NEED REHABILITATION’**

**Definition of rehabilitation:** Rehabilitations is defined as schemes that are functioning at their design level but are incapable of meeting present demand in quantity and/or quality.

**Functioning at design level:** Functioning at design level is a vague term to define. There can be several factors which determines whether the system is functioning at design level such as population, quality, quantity, pressure, velocity, supply hours etc.

*Method to check:* Due to the lack of the actual data and its complex nature, we can safely assume that if the source is still supplying water at 45 lpcd, the system is functioning at design level.

**Incapable of meeting present demand in quality**: If the system demands the quality improvement then it is not capable to meet present demand of quality.

*Method to check:* Here for the simplicity we assume that the system will be incapable to meet the present demand for quality if any of the water sources needs treatment.

Or, If more than 30% taps have turbidity then system will be termed as incapable to meet the present demand for quality.

**Incapable of meeting present demand in quantity**: Ideally 45 lpcd should be able to meet “all purpose” of domestic demand of the rural areas. Here we are supplying water at 45 lpcd, in such case our assumptions will be that more than 50% of taps will say they have water ‘sufficient for all daily needs”. When the condition arises even supplying with 45 lpcd, only less than 50% of taps say they have water ‘sufficient for all daily needs”, then we can say their domestic demand had increased a lot, only 45 lpcd will not be sufficient to satisfy them for their present daily need, then this system is not capable of meeting present demand in quantity. It might be their present living conditions had increased, so demands more water.

*Method to check:* Less than 50% of taps have the conditions of water ‘sufficient for all daily needs”,

When we assess system for ‘rehabilitation need’ we should keep in mind that the system should be functioning at design level, if it is not functioning at design level then we have to assess for ‘reconstruction need’.

Decision whether that particular scheme needs rehabilitation depends upon the following conditions. If any conditions one and of the following conditions is satisfied then the scheme needs rehabilitation.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S.N.** | **Area of test** | **Explanation** | **Indicator** | **Guiding value** |
| 1 | Design level | It tests if the system is functioning at design level | Percapita water available at source (lpd), calculated as: (sum of safe yields(l/s))\*86400÷Present population | >=45  (If this condition does not satisfy then do not perform the test for Rehabilitation) |
| 2 | Present Demand |  |  |  |
| 2.1 | Quality | This tests if the system is capable of meeting present demand in terms of quality |  |  |
| 2.1.1 | Quality at water source | This tests if the sources are capable of meeting present demand in terms of quality | Water quality at source | Any of the water sources need treatment |
| 2.1.2 | Quality at Taps | This tests if the taps are capable of meeting present demand in terms of quality | Turbidity at taps | if more than 30% of taps are in conditions “No water at all” and “There is water but not sufficient for drinking, cooking and toilet use” |
| 2.2 | Quantity | This tests if the system is capable of meeting present demand in terms of quantity |  |  |
| 2.2.1 | Quantity at Taps | This test if the present demand of the consumers is increased | Water available at taps | less than 50% of taps has the conditions as "Sufficient for all daily need" (All purpose)" |

When 1 + (2.1.1 or 2.1.2 or 2.2.1) then rehabilitation.

### **ASSESSMENT FOR ‘NEED RECONSTRUCTION’**

**Definition of reconstruction**: Scheme that is serving least and need major technical and financial inputs from external sources as well as sizeable contributions from users before it can function again is defined as the scheme that needs reconstruction.

**Definition of Serving least:** Serving least is the condition in which the system is not serving to its fullest capacity.

The serving least can be in due to the deteriorating i) Quantity, ii) Quality, iii)Service level

*Method to check:*

1. **Deteriorating Quantity**
2. Water available at source < 45 lpcd (calculated as: Sum of all trapped discharges)\*86400/Present population)
3. Whatever be the reasons if more than 30% of taps are in conditions “No water at all” and “ There is water but not sufficient for drinking, cooking and toilet use”, then the system is termed as serving least in terms of quantity.
4. **Deteriorating Quality**
5. if more than 30% of taps have turbidity then it is termed as serving least in terms of quality.
6. If any of water source need treatment then it is termed as serving least in terms of quality.
7. **Deteriorating Service level**
8. If the majority of taps (> 30%) are serving for less than 2 hours then the system need reconstruction.

**Definition of Need major technical and financial inputs from external sources as well as sizeable contributions**: If any problem which is beyond the technical and financial capacity of WSUC the external support is required. As per policy any repair conditions that demands other than minor repair needs are termed as needing major technical and financial inputs from external sources as well as sizable contributions from WSUC.

*Method to check:*

All conditions explained above needs major technical and financial inputs from external sources as well as sizable contributions from WSUC.

1. If any of the above three conditions satisfies and any of the key structures and pipeline demand “need major repair or/and need reconstruction” then the system needs major technical and financial inputs from external sources as well as sizable contributions from WSUC.
2. If any of the above three conditions satisfies and there is need to add structures and pipelines then the system needs major technical and financial inputs from external sources as well as sizable contributions from WSUC.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S.N.** | **Area of test** | **Explanation** | **Indicator** | **Guiding value** |
| 1 | **Serving least** |  |  |  |
| 1.1 | Deteriorating Quantity |  |  |  |
|  |  | This tests if water available from the source is sufficient. | Water available at source | Water available at source < 45 lpcd (calculated as: Sum of all trapped discharges)\*86400/Present population) |
|  |  | This tests if water available in the tap is adequate. Whatever be the reason, such as conditions of structures, pipeline, improper alignment of pipeline etc., if adequate water is not available in the tap the system is serving least | Tap flow conditions | More than 30% of taps are in conditions “No water at all” and “There is water but not sufficient for drinking, cooking and toilet use” |
| 1.2 | Deteriorating Quality |  |  |  |
| 1.2.1 |  | This tests if there is turbidity at taps | Turbidity at Taps | More than 30% of taps have turbidity in all seasons |
| 1.2.2 |  | This test if water at the source need major treatment | Quality of water at source- if water source need treatment | Any of water source need treatment |
| 1.3 | Deteriorating Service level |  |  |  |
|  |  | This tests if the system is serving in terms of least service. | Supply hour at taps- taps with less than 2 hours of supply | Majority of taps (> 30%) are serving for less than 2 hours |
| 2 | **Requirement of external inputs** |  |  |  |
| 2.1 |  | This test if any of key structures and/or pipeline need major repair or reconstruction, i.e need external support. | Maintenance need of structures and pipeline | Any of key structures and/or pipeline need major repair or reconstruction |
| 2.2 |  | This tests if there is need of additional structures, i.e need external support | Sufficiency of structures and pipeline | The system need new treatment plant or new source |

Note: When (1.1 or 1.2.1 or 1.2.2 or 1.3 ) + (2.1 or 2.2) then need reconstruction.

### **DECISION ON CONDITION ASSESSMENT OF SCHEME**

Following is the decision matrix:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| SN | Condition of Schemes | System Assessment | | | | |
| 1 | Good Condition | Yes | No | No | No | No |
| 2 | Minor Repair | No | Yes | Yes or No | Yes or No | Yes or No |
| 3 | Major Repair | No | No | Yes | Yes or No | Yes or No |
| 4 | Rehabilitation | No | No | No | Yes | Yes or No |
| 5 | Re-construction | No | No | No | No | Yes |
|  | **Scheme condition decision** | **Good** | **Minor Repair** | **Major Repair** | **Rehabilitation** | **Re-construction** |

So the system needs **…………..**

(Example: Suppose we have to decide “xxxx scheme” falls in which category?

1. First perform the assessment as per 6.3.1 for ‘Good condition’, suppose the result is ‘No’
2. Then, perform the assessment as per 6.3.2 for ‘Need minor repair’, suppose the result is ‘Yes’
3. Then, perform the assessment as per 6.3.3 for ‘Need major repair’, suppose the result is ‘Yes’
4. Then, perform the assessment as per 6.3.4 for ‘Need rehabilitation’, suppose the result is ‘Yes
5. Then, perform the assessment as per 6.3.5 for ‘Need reconstruction, suppose the result is ‘No’

Then as per decision matrix 6.3.6:

|  |  |  |
| --- | --- | --- |
| SN | Condition of Schemes | System Assessment Result |
| 1 | Good Condition | No |
| 2 | Minor Repair | Yes |
| 3 | Major Repair | Yes |
| 4 | Rehabilitation | Yes |
| 5 | Re-construction | No |
|  | **Scheme condition decision** | **Rehabilitation** |

The system needs **rehabilitation**.)

## **FUNCTIONALITY ASSESSMENT**

Here for monitoring purpose, the functionality is defined as a measure of the percentage4 of water facilities1 that are working2 at any given time3.

Functionality is normally measured by a one-time check and when repeated over time is often used as a proxy measure for sustainability.

1Water facilities: the term ‘Water facilities’, as a whole indicates the water supply system which provides the services, it includes all the components from intakes, pipeline, reservoir, valves to tap.

To be considered the water supply system (or water facility) there should at least be one permanent structure except tapstand.

It would always be better to check the functionality of all these components, but would be very expensive and time consuming and making the measuring system more complicated, difficult and beyond the capacity. So, for measuring purpose we take "Tap" representing a water facility.

2Working: Defining 'working' is little bit complicated and needs comprehensive elaborations. Here we have limited the definition of terms 'working facility' as 'working tap' and working is taken synonymous as ‘Functional’.

The 'working tap' indicates that water is 'running' through the tap. When we are considering about ‘running’ tap it indicates five characters viz. there is a) Quantity, b) Velocity, c) Pressure d) Quality of water at a tap and e) Duration of flow. Every tap is designed with different flow, velocity, pressure and quality of water and duration of flow. So, it is quite difficult, expensive and time consuming and lack of skill at present to measure all these five characters to check whether tap is working or not. So, for this monitoring purpose we will limit our self to only three characters- a) quantity, b) quality and c) duration of flow (supply hour), which are easy to measure.

The functional tap should meet the following three (ALL) conditions:

1. Tap should have sufficient water quantity, and
2. Tap should have acceptable water quality, and
3. Tap should have adequate supply hours.

These three conditions are described in detail below:

1. **Sufficient quantity:** Quantity in a tap indicates the quantity of water and is measured in liters/second. In a water supply system tap flow are designed to meet the demand of water of that population which the tap serves. Taps are often designed with different flow in different taps. Most of the taps in community managed water supply systems are not metered or even if metered not sensitive enough to show the small flow. Thus, for developing indicator, we will measure the quantity in the following five perception levels:

|  |  |
| --- | --- |
| **Level** | **Description** |
| a | No water at all |
| b | There is water but not sufficient for drinking, cooking and toilet use |
| c | Sufficient for drinking, cooking and toilet use |
| d | Sufficient for drinking, cooking, washing utensil, toilet use and bathing |
| e | Sufficient for all daily needs |

Only the tap with conditions ‘c’ or ‘d’ or ‘e’ is considered as the tap with ‘sufficient water quantity’.

1. **Acceptable quality**: National Drinking Water Quality Standards (NDWQS) had defined the quality of water for community managed water supply projects. Though the NDWQS had demanded the regular water quality check in all parameter it is beyond the capacity of present service providers (WSUCs) in terms of their financial and human resource strength. So, to develop the indicator, we represent water quality in perspective of turbidity only other parameter as prescribed by NDWQS is not considered at this moment. When the technical and financial strength of WSUC is further developed, we can take other parameters of water quality also. For developing indicator, we will measure the quality in the following three levels:

|  |  |
| --- | --- |
| **Level** | **Description** |
| a | No turbidity |
| b | Turbid water during rainy season |
| c | Always turbid water |

Turbid during rainy season is only the seasonal condition, which lasts only about two months. So, this condition is also considered as the ‘no turbid’ condition for developing indicator.

Only tap with conditions ‘a’ or ‘b’ is considered as tap with acceptable water quality.

1. **Adequate supply hour at tap**: Most of the water supply projects have intermittent services. Only few of them have 24 hours supply, most of them are operating for few hours in a day. 'Supply hour' would be a good indicator to measure the service level. Supply hours can also be used to check the equitable service distribution.

When supply hour is at least two hours then it is considered as "adequate", because generally taps have 0.1 lps flow, so it means 0.1\*2\*60\*60=720 liters in a day, which is sufficient for 720÷45= 16 persons for a day (@ 45 lpcd). The average family size in rural Nepal is 4.8, so this much supply hour is sufficient to cover 3.3 houses. The analysis of collected data from 4 pilot districts of this project has shown that there is in an average 2.7 household per taps, so assuming 2 hours of supply as adequate supply, which covers 3.3 houses, is fair enough.

Only tap, which has, at least two hours of supply is considered as tap with adequate supply hour.

3Given time: Given time is defined, as the time of monitoring activity be it by service provider itself, Municipality WASH Unit, WSSDO, or any other external agencies to service providers. It is taken as the time of spotting.

4Measure of the percentage: It is defined as the percentage of the number of taps in a water supply system, running at given time to the all the taps in the system. Or, it is percentage of the taps satisfying all three conditions, at the given time, to all taps in the system.

### **EXTENT OF THE FUNCTIONALITY**

If the functionality is expressed as the ‘tap functionality’ it does not gives us the clear picture, in term of extent of functionality, as shown in the following example:

Suppose a system has two Taps, T1 and T2, if T1 is not ‘working’ and T2 is ‘working’ then the functionality of the system is 50% (As measured by indicator F2A). Suppose T1 has 100 population and T2 has 8 population serving with, then will it still be logical to say functionality of system is 50%?.

So, this concept of weighted functionality with population is introduced. Then in this case, 92.59% of population are affected and only 7.41% of population are getting water from functional taps.

### **SCORING OF FUNCTIONALITY ASSESSMENT**

**Relative weightage of Indicators:** Indicators for functionality and sustainability are divided in two parts as Evaluation indicator and Monitoring indicators and sometimes referred as output indicator and input indicators. The output indicator provides the direct measurement of if the system is functional/sustainable or not while input indicators measure the inputs that create favorable environment for functional/sustainable system. The output indicators assure the measure of functionality/ sustainability while input indicators assure the favorable environment to produce result but do not assure the result.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Functionality Indicators** | | **100** |  |  |  |
| **Result Indicators: (60% Weightage)** | | | **60** |  |  |
| 1. Outcome indicators: | | | | 30 |  |
| F1A | Percentage of population served by functional Taps. |  |  |  | 30 |
| 2. Output Indicators: | | | | 30 |  |
| F2A | Percentage of functional taps |  |  |  | 30 |
| **Input Indicators:(40% Weightage)** | | | **40** |  |  |
| 3. Institutional: | |  |  | 15 |  |
| F3A | Provision of operation and maintenance service |  |  |  | 8 |
| F3A-a | Presence of outsourced maintenance service |  |  |  |  |
| OR |  |  |  |  |  |
| F3A-b | Number of VMWs |  |  |  |  |
| F3B | Percentage of VMWs who perceive tools are adequate |  |  |  | 7 |
| 4. Technical: | |  |  | 25 |  |
| F4A | Number of months in which water source is available |  |  |  | 7 |
| F4Bi | Percentage of structures needing repair |  |  |  | 11 |
| F4Bii | Number of leakages in conveyance |  |  |  | 7 |

### **INTERPRETATION OF SCORING FOR FUNCTIONALITY**

|  |  |
| --- | --- |
| **Total Score** | **Interpretation** |
| >= 70 | No or less risk for functionality |
| >=60 to < 70 | Some risk for functionality |
| <60 | High risk for functionality |

### **PRESENTATION OF FUNCTIONALITY SCORE**

Indicators for functionality are divided in two parts as Result Indicators (60%) and Input Indicators (40%). The result indicator is the **‘service delivery efficiency indicator’** while the input indicator is ‘**favorable environment indicators’.** The first measures if the system is delivering its service or not, while the second measure if the system has the enough favorable environment to deliver those services.

Further, the results indicators are divided in two parts outcome indicator and output indicator.

The score on result indicator provides the direct measurement of if the water supply system is functional or not. While, score on input indicator only measures the input or efforts that create favorable environment that leads to functionality of the system, but does not assures the functionality.

Such that:

The score on functionality indicators (100%) = Score on outcome Indicator (30%) + Score on output Indicator (30%) + Score on input indicator (40%)

Or,

The score on functionality indicators (100%)= Score on ‘Percentage of population served by functional Taps’ (30%) + Score on ‘Percentage of functional taps’ (30%) + score on input indicators(40%)

## 

### **INTERPRETATION OF FUNCTIONALITY SCORE**

According to score, the functionality shall be interpreted as:

|  |  |
| --- | --- |
| **Total Score** | **Interpretation** |
| >= 70 | No or less risk for functionality |
| >=60 to < 70 | Some risk for functionality |
| <60 | High risk for functionality |

Example of Interpretation:

|  |  |  |
| --- | --- | --- |
| **Example Score** | **Example Score Breakdown** | **Interpretation** |
| Example I 70=15+25+30 (No or less risk for functionality) | Score on outcome Indicator (Population served by functional Taps, full marks=30)= 15 | %Score on outcome indicator=15/30=50% %Score on output indicator=25/30=83.33% %Score on input indicator=30/40=75%  Here, score on input indicator and output indicator are good, it means there exists favorable environment for functionality and functionality of taps is good (83.33% taps are functional). Even in such good condition, the population served by functional taps are only 50%, which means the taps, which are not functioning, are serving remaining 50% population. That means 16.67% non-functional taps are serving rest 50% population. It indicates, increasing the functionality of only 16.67% taps can increase the serving population by 50%. It means if immediate attention is provided to those non-functional taps, the functionality will largely increase. |
| Score on output Indicator (Functional Taps, full marks=30)=25 |
| Score on input indicator (Favorable environment, full marks=40)=30 |
| Example II 70=25+15+30 (No or less risk for functionality) | Score on outcome Indicator (Population served by functional Taps, full marks=30)= 25 | %Score on outcome indicator=25/30=83.33%  %Score on output indicator=15/30=50% %Score on input indicator=30/40=75% Here, score on outcome indicator and input indicator are good, it means there exists favorable environment for functionality, even then only 50% taps are functional. Though 50% taps are non-functional, the population served by functional taps are quite optimistic, i.e. 83.33%, it means the taps, which are not functioning, are serving less population than other functional taps. It means even immediate attention is provided, the functionality will not largely increase as in Example I. |
| Score on output Indicator (Functional Taps, full marks=30)=15 |
| Score on input indicator (Favorable environment, full marks=40)=30 |
| Example III 70=25+25+20 (No or less risk for functionality) | Score on outcome Indicator (Population served by functional Taps, full marks=30)= 25 | %Score on outcome indicator=25/30=83.33% %Score on output indicator=25/30=83.33% %Score on input indicator=20/40=50% Here, score on outcome indicator and output indicator is good whereas score on input indicator is not that much appreciable. It means 83.33% Taps are functional and serving 83.33% population. Though the system is serving now immediate attention is needed in either VMWs or tools or water source. This may also be due to the worsening situation of structures or pipeline. Detail interpretation is needed as below. |
| Score on output Indicator (Functional Taps, full marks=30)=25 |
| Score on input indicator (Favorable environment, full marks=40)=20 |
|  |  |  |
| Elaborated interpretation of score on Input indicator on Example III: | | |
| Example III-a (Input Indicator only) 20=8+7+0+5+0 | Score on input indicator (Number of adequate VMWs, full marks=8)= 8 | %Score on Number of VMWs =8/8=100% %Score on VMWs who perceive tools are adequate =7/7=100% %Score on Number of months in which water source is available =0/7=0% %Score on structures needing repair=5/11=45.45% %Score on leakages=0/7=0% Here, though there is adequate VMWs and tools, the system still does not have favorable environment because physical structures are not good as 45.45% structures require repair and the water source is not reliable serving less than 11 months and there is more than 1 leakages per two kilometer in pipeline. |
| Score on input indicator (Percentage of VMWs who perceive tools are adequate, full marks=7)= 7 |
| Score on input indicator (Number of months in which water source is available, full marks=7)= 0 |
| Score on input indicator (Percentage of structures needing repair , full marks=11)= 5 |
| Score on input indicator (Number of leakages in conveyance, full marks=7)= 0 |
| Example III-b (Input Indicator only) 20=0+0+7+11+2 | Score on input indicator (Number of adequate VMWs, full marks=8)= 0 | %Score on Number of VMWs =0/8=0% %Score on Percentage of VMWs who perceive tools are adequate =0/7=0% %Score on Number of months in which water source is available =7/7=100% %Score on Percentage of structures needing repair=11/11=100% %Score on number of leakages=2/7=28.57% Here, though the physical condition of the system is quite good, there is no VMWs, means the system will not capable in maintaining services. This also may indicate that the system is relatively new (as physical conditions are good), but in absence of VMWs and tools the functionality may further worsen. This also indicate that though the structures are in good conditions, the pipeline is having some problem as its score 2. Therefore, we need to pay some attention to pipeline also. |
| Score on input indicator (Percentage of VMWs who perceive tools are adequate, full marks=7)= 0 |
| Score on input indicator (Number of months in which water source is available, full marks=7)= 7 |
| Score on input indicator (Percentage of structures needing repair , full marks=11)= 11 |
| Score on input indicator (Number of leakages in conveyance, full marks=7)= 2 |

**How to address the popular question “Is the scheme functional?”**

This question can be addressed with reference to the indicator F2A (the output indicator), which provides the direct measure of how many taps are functional. Suppose if the scheme scores 25 marks in this indicator then we can interpret that 25÷30= 83.33% {(score obtained for F2A) ÷ (Fullmarks for F2A)}, taps are functional.

The tap is the representation of the system so we can say system is 83.33% functional.

## **SUSTAINABILITY ASSESSMENT**

When functionality is repeated over time is often used as a proxy measure for sustainability. This definition is simple and easy to measure. The most of data collected for functionality will also serve the purpose, thus it is cost-effective and affordable definition.

### DEFINITION OF SUSTAINABILITY

Sustainability is a term with numerous interpretations, one of the most basic and useful being by Abrams (1998) as: "whether or not something continues to work over time" (meaning, in this case, the indefinite provision of a water, sanitation or hygiene service (with certain agreed characteristics) over time). It is the likelihood of structures, facilities, projects, initiatives continuing to provide a good service over the longer term beyond the lifetime of the project. The length of time that the same are expected to be sustainable depends on the design of the facility or project and may be time bound, or sustainability may be interpreted as having no time-line but continuing forever.

A service is sustainable when:

* It functions and is being used;
* It is able to deliver an appropriate level of benefits (quality, quantity, convenience, comfort, continuity, affordability, efficiency, equity, reliability, health);
* It continues over a prolonged period of time (which goes beyond the life-cycle of the system and equipment);
* Its management is institutionalized (community management, gender perspective, partnership with local authorities, involvement of formal / informal private sector);
* It's operation and maintenance, administrative and replacement costs are covered at local level (through user fees, or alternative financial mechanisms);
* It can be operated and maintained at local level with limited but feasible, external support (technical assistance, training, monitoring)
* It does not affect the environment negatively.

### **DEFINITIONS FOR M&E PURPOSE**

#### **DEFINITION**

For M&E purpose, when functionality is repeated over time, it is often used as a proxy measure for sustainability. This definition is simple and easy to measure. The most of data collected for functionality will also serve the purpose, thus it is cost-effective and affordable definition.

#### **TREND OF FUNCTIONALITY**

The functionality shows the ‘present status’ of the system. That is why we say, “The system is functional.” Whereas the sustainability shows the ‘trend’ of the system. That is why we say “The system tends to be sustainable”. The sustainability only shows if the system is likely to be sustain for coming years.

When we have to find the future trend, the best and simple way is to forecast the trend based on the past years’ performances (generally 3 years).

### **SUSTAINABILITY MARKING SYSTEM**

This presents the marking system for the **present** year:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sustainability Indicators** | **100** |  |  |  |  |
| **Result Indicator (50% weightage)** |  | **50** |  |  |  |
| **1. Overall Sustainability** |  |  | **50** |  |  |
| S1A: Percentage of Population served by functional system |  |  |  | 50 |  |
| **Input Indicators (weightage 50%)** |  | **50** |  |  |  |
| 1. **Institutional** |  |  | **14** |  |  |
| S2A: Number of meetings with decision recorded per year |  |  |  | 5 |  |
| S2B: Annual general meeting conducted with decision recorded (AGM) |  |  |  | 5 |  |
| S2C: Account is looked after by the employed accountant |  |  |  | 4 |  |
| **3. Technical: System is delivering quality services** |  |  | **9** |  |  |
| S3A: Need of treatment |  |  |  | 4 |  |
| S3B: Standard Operating Procedure (SOP) of regular inspection prepared and followed |  |  |  | 5 |  |
| **4. Social and Environment** |  |  | **12** |  |  |
| S4A: Source registration and dispute in the source. |  |  |  | 5 |  |
| S4B: Percentage of households using water for income generating activities |  |  |  | 3 |  |
| S4C: Percentage of Women representation on Water and Sanitation User Committee |  |  |  | 4 |  |
| **5. Financial: System is financially sound** |  |  | **15** |  |  |
| S5A: Presence of financial auditing system |  |  |  | 3 |  |
| S5B: Presence of provision of remuneration for VMW |  |  |  | 4 |  |
| S5C: Presence of provision of water supply system insurance |  |  |  | 2 |  |
| S5D: Operation Ratio |  |  |  | 6 |  |

### **SUSTAINABILITY SCORING SYSTEM**

**Rational:** One of the components of the definition of sustainability is “It functions and is being used”. When we have to find the future trend, the best and simple way is to forecast the trend based on the past years’ performances (generally three years).It is assumed that if the system is serving as desired over the three years we can safely assume that the system is tending towards sustainability. The Marks obtained on each indicators for three years are weighted as 50% for the present year (n), 30% for previous year (n-1) and 20% for the year before previous year (n-2).

For previous two years, data source is NWASH-MIS, but If the System (Scheme) is surveyed for the first time, it is natural that the NWASH-MIS will not have the data of that indicator for previous years, we can assume the latest data, valid for the past years also. This is also true for the recently constructed scheme, the recent year data can be considered for other years also.

For example :

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **1. Overall Sustainability** | |  |  | **50** |  |  |
| S1A: Percentage of Population served by functional system (in last three years) | |  |  |  | 50 |  |
| a | Marks obtained in (n) Year |  |  |  |  | M(S1A)n)\*50% |
| b | Marks obtained in (n-1) Year |  |  |  |  | M(S1A)n-1\*30% |
| c | Marks obtained in (n-2) Year |  |  |  |  | M(S1A)n-2\*20% |
| Score(S1A)= | | | | | | Sum\_S1A(a,b,c) |

The Total Sustainability Score(S-Score)= Sum of scores of all indicators = Score(S1A)+ Score(S2A)+ Score(S2B)+…………+Score(S5D)

### **PRESENTATION OF SUSTAINABILITY SCORE**

Indicators for sustainability are divided in two parts as Result Indicators (50%) and Input Indicators (50%). The score on result indicator provides the direct measurement of if the water supply system is tending towards sustainability or not. While, score on input indicators only measures the input or efforts that create favorable environment that leads to sustainability of the system, but does not assures the sustainability.

Such that:

**The score on sustainability indicators (100%) = Score on result Indicator (50%) + Score on input indicator (50%)**

### **INTERPRETATION OF SUSTAINABILITY SCORE**

According to score, the sustainability shall be interpreted as:

|  |  |
| --- | --- |
| **Total Score** | **Interpretation** |
| >= 70 | No or less risk for sustainability |
| >=60 to < 70 | Some risk for sustainability |
| <60 | High risk for sustainability |

Example of Interpretation:

|  |  |  |
| --- | --- | --- |
| **Example Score** | **Example Score Breakdown** | **Interpretation** |
| Example I 75=30+45 (No or less risk for Sustainability) | Score on result Indicator (Overall sustainability, full marks=50)=30 | %Score on result indicator=30/50=60% %Score on input indicator=45/50=90%  Here, score in result indicator is not that promising, whereas score on input indicators is very good. It means the scheme has problem in functioning either this year or previous two years. However, it is not the matter of that much worry, as the favorable environment is very good, that means the WSUC has realized that their sustainability will be at risk and had worked on interventions that increases the score on result indicators. |
| Score on input indicator (Favorable environment, , full marks=50)=45 |
| Example II 75=45+30 (No or less risk for Sustainability) | Score on result Indicator (Functional Taps, full marks=50)=45 | %Score on result indicator=45/50=90%  %Score on input indicator=30/50=60%  Here, score on result indicator is very good whereas in input indicator it is not that much promising. It indicates that the scheme is new so functionality in this year and previous year seems good which helped to get higher score. However, its matter to worry that, the favorable environment that was helping to get score is slowly worsening. It means there might be problems in areas measured by indicators S2A to S5D |
| Score on input indicator (Favorable environment, full marks=50)=30 |

## **SCHEME PRIORITIZATION SCORE**

The Multi-Criteria Decision Analysis (MCDA) is used here for scoring the scheme to find the priority scale. A MCDA is a general framework for supporting complex decision-making situations with multiple and often conflicting objectives that stakeholders groups and/or decision-makers value differently.

The basic idea of MCDA methods is to evaluate the performance of alternative courses of with respect to criteria that capture the key dimensions of the decision-making problem, involving human judgment and preferences. MCDA methods are integrative evaluation methods in the sense that they combine information about the performance of the alternatives with respect to the criteria (scoring) with subjective judgments about the relative importance of the evaluation criteria in the particular decision-making context (weighting). Multi-Attribute Value Theory based MCDA methods further require subjective judgment about the normalization/scaling of impacts.

**Objective of ranking:** The ranking method should be able to determine the scheme that has WSUC with **best management capacity**1, the non-functionality of that scheme can be restored in **least cost**2 and such restoration interventions should be able to provide benefit to larger number of **people**3, most of which are socially **backward**4.

The scoring is made based on the following three criteria:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S.N.** | **Criteria** | **Weightage** | **Objective** | **Description** | **Scoring pattern** |
| 1 | Management | 30 | Determines the rank of scheme based on the managerial efficiency of WSUC. | It is expected that the WSUC having good managerial capacity will properly utilize financial and technical assistance it received. | Good performer gets highest marks. |
| 2 | Cost of interventions | 30 | Determines the rank of scheme based on the cost required to restore non-functionality | It will be wise to first intervene in the scheme whose non-functionality can be restored with least cost . | Least cost gets highest marks. |
| 3 | Effected population | 30 | Determines the urgency rank based on the number of population effected. | Tap flow is the result indicator of the performance of both scheme and WSUC. If there are adequate flow in taps it can be assumed that structures are in good conditions and WSUC is performing well. The schemes in which there are more number of population served by non-functional taps need more assistance. | More effected population gets higher ranking. |
| 4 | Socially backward Household | 10 | Determines the rank based on the number of socially backward population. | This condition respects the social justice by providing more attention to those households of socially backward population which are served by nonfunctional taps. | More HH with socially backward population will get higher ranking |

The criteria with example is illustrated below. It is assumed that there are 4 schemes in a municipality and we are ranking them.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1. Management of WSUC(30%)** | | | | |  | **Scheme1** | **Scheme2** | **Scheme3** | **Scheme4** |
| **SN** | **Status** | **Weight** | **Status (Yes/No)** | **Score** |  | **Status (Yes/No)** | **Status (Yes/No)** | **Status (Yes/No)** | **Status (Yes/No)** |
| 1.1 | WSUC registered in DWRC (Yes/No) | 1 | "Y" for Yes | If “Y”,1,0 |  | 0 | 1 | 0 | 1 |
| 1.2 | Regular meeting of WSUC conducted (yes/No) | 1 | "Y" for Yes | If “Y”,1,0 |  | 0 | 0 | 1 | 0 |
| 1.3 | Annual General Assemble meeting conducted (Yes/No) | 1 | "Y" for Yes | If “Y”,1,0 |  | 1 | 0 | 0 | 0 |
| 1.4 | Water Tariff collection practice (Yes/No) | 1 | "Y" for Yes | If “Y”,1,0 |  | 0 | 0 | 0 | 0 |
| 1.5 | Annual Auditing System (Yes/No) | 1 | "Y" for Yes | If “Y”,1,0 |  | 0 | 1 | 1 | 0 |
| 1.6 | Bank account status (Yes/No) | 1 | "Y" for Yes | If “Y”,1,0 |  | 0 | 0 | 1 | 0 |
| 1.7 | Presence of VMW (Yes/No) | 1 | "Y" for Yes | If “Y”,1,0 |  | 1 | 0 | 1 | 0 |
| 1.8 | Account keeping (Yes/No) | 1 | "Y" for Yes | If “Y”,1,0 |  | 0 | 1 | 1 | 1 |
| 1.9 | Women Representation- more than 33% (Yes/No) | 1 | "Y" for Yes | If “Y”,1,0 |  | 0 | 1 | 0 | 1 |
| 1.10 | SOP of regular maintenance prepared and followed (Y/N) | 1 | "Y" for Yes | If “Y”,1,0 |  | 0 | 0 | 1 | 1 |
| 1.11 | Management Score | ∑=SM | | |  | 2 | 4 | 6 | 4 |
| 1.12 | Fraction of Maximum value | FSM=SM/(Max(sch1, sch2,..shcn) | | |  | 0.3333 | 0.6667 | 1.0000 | 0.6667 |
| **1.13** | **Total managerial score (WSM)** | **WSM=0.3\*FSM** | | |  | **0.1000** | **0.2000** | **0.3000** | **0.2000** |
| **2. Cost of intervention (30%)** | | | | |  |  |  |  |  |
| **SN** | **Condition** | **Weight** | **Cost** | **Score** |  | **Cost** | **Cost** | **Cost** | **Cost** |
| 2.1 | Total cost of interventions | 1 | k | 1\*k |  | 521697 | 748,631 | 1,556,302 | 722,203 |
| 2.2 | Cost Score | ∑=SC | | |  | 521,697 | 748,631 | 1,556,302 | 722,203 |
| 2.3 | Fraction of Maximum value | FSC=(Min(sch1, sch2,..schn))/SC | | |  | 1.00 | 0.70 | 0.34 | 0.72 |
| **2.4** | **Weighted Score (WSC)** | **WSC=0.3\*FSC** | | |  | **0.300** | **0.209** | **0.101** | **0.217** |
| **3. Total Effected population(30%)** | | | | |  |  |  |  |  |
| **SN** | **Condition** | **Weight** | **Population Effected** | **Score** |  | **Population Effected** | **Population Effected** | **Population Effected** | **Population Effected** |
| 3.1 | Population served by non-functional Tap | 1 | i | 1\*i |  | 4763 | 7366 | 8629 | 984 |
| 3.2 | Effect Score | ∑=SE | | |  | 4763 | 7366 | 8629 | 984 |
| 3.3 | Fraction of Maximum value | FSE=SE/(Max(sch1, sch2,..schn)) | | |  | 0.5520 | 0.8536 | 1.0000 | 0.1140 |
| **3.4** | **Weighted Score (WSE)** | **WSE=0.3\*FSE** | | |  | **0.1656** | **0.2561** | **0.3000** | **0.0342** |
| **4. Socially backward Household (10%)** | | | | |  |  |  |  |  |
| **SN** | **Condition** | **Weight** | **Socially backwards HH** | **Score** |  | **Socially backwards HH** | **Socially backwards HH** | **Socially backwards HH** | **Socially backwards HH** |
| 4.1 | Number of HH of Jangatis, Dalits and Minorities that are served by non-functional taps | 1 | j | 1\*j |  | 799 | 782 | 917 | 24 |
| 4.2 | Socially backwards HH Score | ∑=SS | | |  | 799 | 782 | 917 | 24 |
| 4.3 | Fraction of Maximum value | FSS=SS/(Max(sch1,sch2,..schn)) | | |  | 0.8713 | 0.8528 | 1.0000 | 0.0262 |
| **4.4** | **Weighted Score (WSS)** | **WSS=0.1\*FSS** | | |  | **0.0871** | **0.0853** | **0.1000** | **0.0026** |
| **5. Overall Score** | | | | |  |  |  |  |  |
| **Score** | Overall weighted score | **WTs = WSM + WSE + WSC+WSS** | | |  | **0.653** | **0.750** | **0.801** | **0.454** |
| **Rank** | Rank of Schi among all schemes | Rank(Schi, (Sch1,Sch2….Schn)) | | |  | 3 | 2 | 1 | 4 |

Note: Higher scorer will be in higher priority.**PART II: FUNCTIONALITY AND SUSTAINABILITY ASSESSMENT**

# **DESCRIPTION OF PROJECT**

Gaudhara Chepchepe water supply system is located in ward no. 20 of Dharan Sub-Metropolitan City of Sunsari District, Province 1. This Community-Managed Water Supply and Sanitation system aims at providing the service of improved water supply and sanitation, and improving health and hygiene practices related to waterborne and sanitation related diseases.. This system is serving 310 households and 1850 population. The project was completed in 2042 with the financial and technical assistance by DWSS.

The project is located approximately in yyyy (latitude), xxxx (longitude). The project lies in Dharan Municipality, Ward no 20 of Province-1. Particularly, the project serves, Chiuri Danda community.

|  |  |
| --- | --- |
| **LOCATION** | **LAYOUT** |
| **Image result for map of nepal with province and municipalities**  Project area |  |

The general feature of the project is shown below:

|  |  |  |
| --- | --- | --- |
| **SN** | **Parameters** | **Description** |
| 1 | Name of the Scheme | Gaudhara Chipchipe Water Supply and Sanitation system, गौधारा छिपछिपे खा.पा.आ |
| 2 | Code number | 11301003 |
| 3 | Location/ Address(Province, Municipality, Ward no, Name of the Community) | Dharan Municipality, Ward no 20, Chiuri Danda |
| 4 | Population Coverage | 1850 |
| 5 | Total No. of HH served | 310 |
| 6 | Name; Location(Municipality-Ward no) | Gaudhara Chepchepe; Dharan-20 |
| 7 | Project complete year(BS) | 2042 |
| 8 | Implementing Agency | DWSS |
| 9 | Supporting Agency | DWSS |
| 10 | Inventory Agency | MOWSS |
| 11 | Nos. of HH having Toilet | 300 |
| 12 | Percentage of HH having Toilet | 96.77% |

# **COVERAGE**

This community has 18 households which are having access to water supply from this system. The system serves total of 36 populations. The majority are Janjatis.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Total Nos. of HH Served** | **Nos. of HH having toilet** | **Population** | | | **Nos. of HH** | | | |
| **Male** | **Female** | **total** | **BC** | **Janajati** | **Dalit** | **Minority** |
| 310 | 300 | 940 | 910 | 1850 | 277 | 30 | 3 | 0 |

The community has (some/~~full~~) access to sanitation services, the coverage of toilet is 83%, which is (below/~~above~~) the national average of 93%, so more efforts is required to improve the sanitation condition.

# **COMPOSITION OF WSUC**

Name of the WSUC: Gaudhara Water Supply and Sanitation User’s Committee

The Water and Sanitation Users Committee (WSUC) has been active since 2042. This WSUC, which is the community’s representative body, is assuming full responsibility for running and managing these projects. Key responsibilities of the WUSC include: Regular office administration; O&M of the system; Establish and collect water tariffs; Generate and mobilize resources; Regulate service quality; Regulate water quality

Promoting equality between women and men and gender relations is relevant to the main aim of the project as well as to the project strategies. In this initiative, the focus was on gender equality and social inclusion, with an emphasis on inequalities among women and men, and among people from various castes and ethnic minorities. The Rural Water Supply and Sanitation Policy has set concrete targets for the participation of women and ethnic minorities in committees. The target was 33% representation for women in both executive and general membership in water users’ and sanitation committees (WSUCs) and proportional representation of all castes and ethnic groups (proportional to their actual distribution in the specific population).

The following table shows the detail compositions of WSUC:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SN** | **Name** | **Designation** | **Male/ Female** | **Contact Nos.** |
| 1 | अध्यक्ष (President) | Ramlal Tamang | Male | 9841201801 |
| 2 | सचिव (Secretary) | Shreeman Tamang | Male | 9841201802 |
| 3 | कोषाध्यक्ष (Treasurer) | Laxmi. Tamang | Female | 9841201803 |
| 4 | सदस्य (Member) | Buddha Singh Tamang | Male | 9841201804 |
| 5 | सदस्य (Member) | Chandra maya Tamang | Female | 9841201805 |
| 6 | सदस्य (Member) | Tek Ba. Tamang | Male | 9841201806 |
| 7 | सदस्य (Member) | Tek Ba. Tamang | Male | 9841201807 |

The following table shows the institutional features of WSUC and the administrative measures they have taken to run the WSUC office and the system as a whole.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SN** | **Parameters** | **Guiding Value** | **Observed** | **Intervention Need (Y/N)** |
| 1 | WSUC registered in DWRC (Yes/No) | Yes | No | Y |
| 2 | Nos. of member in WSUC | <9 | 7 | N |
| 3 | Women Representation (%) | 33% | 28.50% | Y |
| 4 | WSUC Office building (Yes/No) | Yes | No | Y |
| 5 | Presence of VMW(Yes/No) | Yes | No | Y |
| 6 | Account keeping(Self/Staff) | Staff | Self | Y |
| 7 | Number of VMW | At least 1 VMW per 200 community taps + per 1000 yard taps | 0 | Y |
| 8 | Regular meeting of WSUC conducted (yes/No) | Yes | No | Y |
| 9 | Annual General Assemble meeting conducted (Yes/No) | Yes | No | Y |
| 10 | Water Tariff collection practice (Yes/No) | Yes | No | Y |
| 11 | Annual Auditing System (Yes/No) | Yes | No | Y |
| 12 | Bank account status (Yes/No) | Yes | No | Y |
| 13 | Insurance of the water supply system (Y/N) | Yes | No | Y |
| 14 | VMWs have adequate tools (Y/N) | Yes | No | Y |
| 15 | Provision of remuneration for VMW (Y/N) | Yes | No | Y |
| 16 | Operation ratio | <75% | No | Y |
| 17 | Have and followed SOP (Y/N) | Yes | No | Y |
| 18 | Water used for income generation activities (Y/N) | Yes | No | Y |

As shown above this WSUC need some level of intervention to improve itself, these are management level efforts that WSUC itself can do. The WSUC may require some degree of training and orientation to gain management skills and procedural guideline.

There is only 28.5% of female representation in the WSUC, which is less than 33% as required by the policy.

# **CONDITION ASSESSMENT**

## **INTAKE AND WATER SOURCE ASSESSMENT**

The following table presents the condition assessment of the sources.

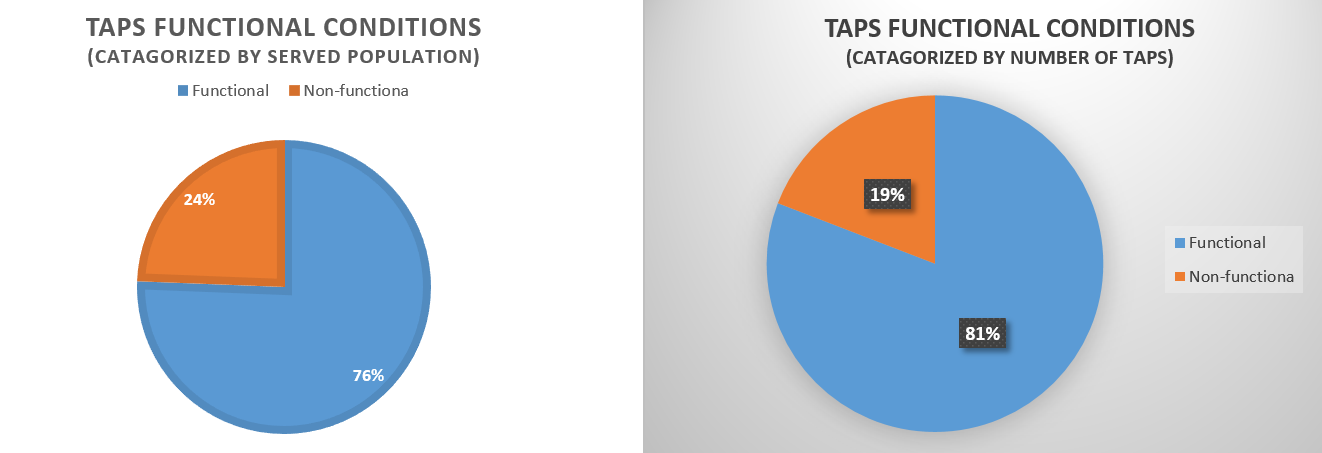
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.N** | **Parameters** | **Guiding Value** | **Bhulbhule** | | **Susaune** | |
| **Observed** | **Interventions (Y/N)** | **Observed** | **Interventions (Y/N)** |
| 1 | Type of Source |  | Spring |  | Spring |  |
| 2 | Type of intake |  | Spring |  | Spring |  |
| 3 | Safe Yield(lps) |  | 0.18 |  | 0.46 |  |
| 4 | Registration | Registered and no obstruction | Source in private land and obstructed by owner | Y | Source in private land and obstructed by owner | Y |
| 5 | Safe Yield(lps) | Sufficient for population @ 45lpcd > (Popn\*45/86400) | 0.96 Which is >0.18 so not sufficient | Y | 0.96 Which is >0.46 so not sufficient | Y |
| 6 | Source Protection | Safe in all respect | Vulnerable | Y | Vulnerable | Y |
| 7 | Water Quality | Clean round the year | Turbid in rainy season | Y | Turbid in rainy season | Y |
| 8 | Flow Regularity | Whole year | 11 months | Y | 11 months | Y |
| 9 | Treatment Facilities | Suitable treatment facilities exist or no need of treatment | PS | N | PS | N |
| 10 | Condition of Source | Good | Good | N | Reconstruction | Y |

## **TAPS CONDITION AND FLOW CONDITION ASSESSMENT**

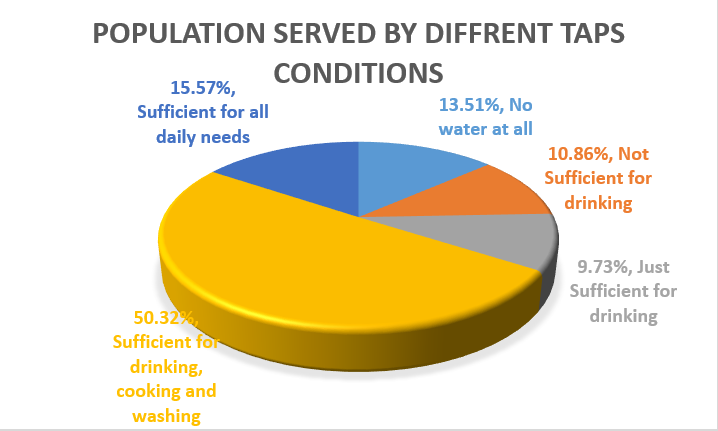
The M&E Framework and the scoring system associated with it, greatly emphasis the assessment of tap flow condition which is considered as the major aspect to determine whether the system is in functional conditions.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S.N.** | **Parameter** | | | **Guiding Value** | **Observed (Numbers)** | | | | | | **Interventions (Y/N)** |
| **Taps** | **%** | **HH** | **%** | **Population** | **%** |
| 1 | **Total** |  |  |  | **50** |  | **310** |  | **1850** |  |  |
| 2 | Tap Type | Community | | Yard/Institutional | 12 | 24.00% | 112 | 36.13% | 672 | 36.32% | Y |
| Yard | | 32 | 64.00% | 192 | 61.94% | 1142 | 61.73% | N |
| Institutional | | 6 | 12.00% | 6 | 1.94% | 36 | 1.95% | N |
| 3 | Connection | Metered | | Metered | 32 | 64.00% | 192 | 61.94% | 1152 | 62.27% | N |
| Unmetered | | 18 | 36.00% | 118 | 38.06% | 698 | 37.73% | Y |
| 4 | Supply Hrs | >2 Hrs | | >=2 hrs | 15 | 30.00% | 90 | 29.03% | 550 | 29.73% | N |
| < 2Hrs | | 35 | 70.00% | 220 | 70.97% | 1300 | 70.27% | Y |
| 5 | Complaints logged this year | | | 0 | 2 |  |  |  |  |  | Y |
| 6 | WQ in Tap | Free of Turbidity | | Free of Turbidity | 22 | 44.00% | 132 | 42.58% | 792 | 42.81% | N |
| With Turbidity | | 28 | 56.00% | 178 | 57.42% | 1058 | 57.19% | Y |
| 7 | Taps physical conditions | Good | | Good | 39 | 78.00% | 234 | 75.48% | 1404 | 75.89% | N |
| Minor Repair | | 6 | 12.00% | 46 | 14.84% | 266 | 14.38% | Y |
| Major Repair | | 3 | 6.00% | 18 | 5.81% | 108 | 5.84% | Y |
| Reconstruction | | 2 | 4.00% | 12 | 3.87% | 72 | 3.89% | Y |
| 8 | Taps Flow condition | Non-Functional | No water at all | Functional | 5 | 10.00% | 30 | 9.68% | 250 | 13.51% | Y |
| There is water but not sufficient for drinking, cooking and toilet use | 4 | 8.00% | 24 | 7.74% | 201 | 10.86% | Y |
| Functional | Sufficient for drinking, cooking and toilet use | 5 | 10.00% | 30 | 9.68% | 180 | 9.73% | Y |
| Sufficient for drinking, cooking, washing utensil, toilet use and bathing | 28 | 56.00% | 178 | 57.42% | 931 | 50.32% | N |
| Sufficient for all daily needs | 8 | 16.00% | 48 | 15.48% | 288 | 15.57% | N |

The above table shows that 1399 population are served from functional Tap. 451 population are served from non-functional tap. It means 76% of population are getting water from functional taps where as 24% of population are deprived from the adequate supply of water.



The table below shows the number of population served from the different tap flow conditions. The majority of population are getting adequate water for drinking washing and cooking.

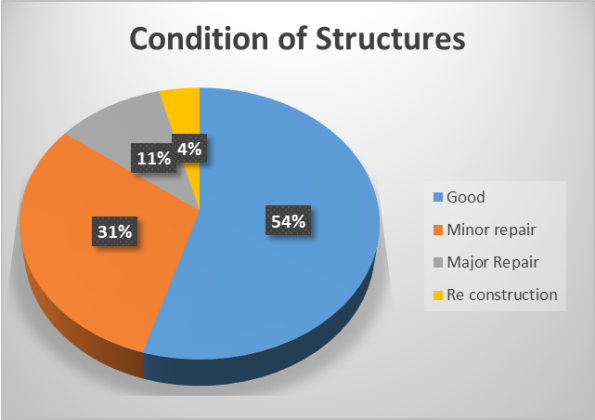
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## **CONDITION ASSESSMENT OF STRUCTURES**

The following is the assessment for the conditions of the ALL structures and Pipelines for Gaudhara Chhipchipe system.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SN** | **Condition** | **Number of structures** | | | | | | | | | | **Guiding Value** | **Intreventions (Y/N)** |
| **INT** | **CC** | **WO** | **Av** | **RVT** | **JN** | **VC** | **Taps** | **Total** | **%** |
| 1 | Good |  | 1 |  |  | 1 |  |  | 39 | 41 | 54.7% | 100.0% | N |
| Minor repair | 2 |  | 1 |  |  | 14 |  | 6 | 23 | 30.7% | 0.0% | Y |
| Major Repair |  |  | 5 |  |  |  |  | 3 | 8 | 10.7% | 0.0% | Y |
| Re construction |  |  |  |  | 1 |  |  | 2 | 3 | 4.0% | 0.0% | Y |
| 2 | Total | 2 | 1 | 6 | 0 | 2 | 14 | 0 | 50 | 75 | 100.0% |  |  |

The summary of conditions is presented below in pie chart:



## **CONDITION ASSESSMENT OF PIPELINE**

Each and every pipe segment in both transmission and distribution length are assessed for its condition. The team did not dig the pipeline but asked the WSUC members to find the conditions.

### **PHYSICAL CONDITION ASSESSMENT OF PIPELINE**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SN** | **Condition** | **Pipeline (Km)** | | | | **Guiding Value** | **Interventions (Y/N)** |
| **Trans** | **Distri** | **Total** | **%** |
| 1 | Good | 3756 | 1298 | 5054 | 84.9% | 100.0% | N |
| Minor repair |  | 900 | 900 | 15.1% | 0.0% | Y |
| Major Repair |  |  | 0 | 0.0% | 0.0% | Y |
| Re construction |  |  | 0 | 0.0% | 0.0% | Y |
| 2 | Total | 3756 | 2198 | 5954 | 100.0% |  |  |

### **LEAKAGE CONDITION ASSESSMENT OF PIPELINE**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.N** | **Pipeline** | **Length (Km)** | **No. of leakages** | **Leakages Per 2 km** | **Guiding value** | **Interventions (Y/N)** |
| 1 | Transmission | 12 | 0 | 0 | 0 | N |
| 2 | Distribution | 34 | 0 | 0 | 0 | N |
| 3 | Total | 46 | 0 | 0 | 0 | N |

### **BURIAL CONDITION ASSESSMENT OF PIPELINE**

The pipeline is also assessed for the burial condition. The burial conditions are summarized as follows:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SN** | **Condition** | **Pipeline (Km)** | | | | **Guiding Value** | **Interventions (Y/N)** |
| **Transmission** | **Distribution** | **Total** | **%** |
| 1 | Well Buried in ground | 5000 | 400 | 5400 | 90.7% | 100.0% | N |
| 2 | Exposed dangling pipe |  | 354 | 354 | 5.9% | 0.0% | Y |
| 3 | Can join and separate pipe as required |  | 200 | 200 | 3.4% | 0.0% | Y |
| 4 | Total | 5000 | 954 | 5954 | 100.0% |  |  |

The assessment shows that majority part of the pipeline is in good condition where as there are also some parts that need repair. There has been the event of leaking in this year, but is now solved.

## **ADEQUACY ASSESSMENT OF RVT**

Following is the result of assessment of reservoirs for the adequacy of the storage.

|  |  |  |  |
| --- | --- | --- | --- |
| **S.N.** | **Name of Reservoir** | **Location** | **Adequacy** |
| 1 | R1 | L1 | Y |
| 2 | R2 | L2 | Y |
| 3 | R3 | L3 | **N** |
| 4 | R4 | L4 | N |
| 5 | R5 | L5 | Y |
| 1 | Number of Adequate RVTs | 3 | |
| 2 | Percentage | 60% | |

The users thinks that the 60% of RVTs are adequate.

## **CONDITION ASSESSMENT OF SCHEME**

The above conditions represents the conditions of the individual structure. We yet do not know if the scheme as a whole need reconstruction or rehabilitation or do not need any such large scale interventions. The following conditions is helpful for the decision makers for such decisions.

### **REHABILITATION ASSESSMENT**

Following is the assessment of Gaudhara Chipchhipe System that determines if the system need rehabilitation:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.N.** | **Area of test** | **Explanation** | **Indicator** | **Guiding value** | **Observed value** | **Rehab Need (Y/N)** |
| 1 | Design level | It tests if the system is functioning at design level | Percapita water available at source (lpd), calculated as: (sum of safe yields(l/s))\*86400÷Present population | >=45  (If this condition does not satisfy then do not perform the test for Rehabilitation) | 48 | Y |
| 2 | Present Demand |  |  |  |  |  |
| 2.1 | Quality | This tests if the system is capable of meeting present demand in terms of quality |  |  |  |  |
| 2.1.1 | Quality at water source | This tests if the sources are capable of meeting present demand in terms of quality | Water quality at source | Any of the water sources need treatment | Source 1 needs treatment | Y |
| 2.1.2 | Quality at Taps | This tests if the taps are capable of meeting present demand in terms of quality | Turbidity at taps | if more than 30% of taps are in conditions “No water at all” and “There is water but not sufficient for drinking, cooking and toilet use” | 40% | Y |
| 2.2 | Quantity | This tests if the system is capable of meeting present demand in terms of quantity |  |  |  |  |
| 2.2.1 | Quantity at Taps | This test if the present demand of the consumers is increased | Water available at taps | less than 50% of taps has the conditions as "Sufficient for all daily need" (All purpose)" | 40% | Y |

Since 1 + (2.1.1 or 2.1.2 or 2.2.1) then rehabilitation.

### **RECONSTRUCTION ASSESSMENT**

Following is the assessment of Gaudhara Chipchhipe System that determines if the system needs reconstruction:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.N.** | **Area of test** | **Explanation** | **Indicator** | **Guiding value** | **Observed value** | **Recon Need (Y/N)** |
| 1 | **Serving least** |  |  |  |  |  |
| 1.1 | Deteriorating Quantity |  |  |  |  |  |
|  |  | This tests if water available from the source is sufficient. | Water available at source | Water available at source < 45 lpcd (calculated as: Sum of all trapped discharges)\*86400/Present population) | 30 | Y |
|  |  | This tests if water available in the tap is adequate. Whatever be the reason, such as conditions of structures, pipeline, improper alignment of pipeline etc., if adequate water is not available in the tap the system is serving least | Tap flow conditions | More than 30% of taps are in conditions “No water at all” and “There is water but not sufficient for drinking, cooking and toilet use” | 40% | Y |
| 1.2 | Deteriorating Quality |  |  |  |  |  |
| 1.2.1 |  | This tests if there is turbidity at taps | Turbidity at Taps | More than 30% of taps have turbidity in all seasons | 60% | Y |
| 1.2.2 |  | This test if water at the source need major treatment | Quality of water at source- if water source need treatment | Any of water source need treatment | Intake 1 needs treatment | Y |
| 1.3 | Deteriorating Service level |  |  |  |  |  |
|  |  | This tests if the system is serving in terms of least service. | Supply hour at taps- taps with less than 2 hours of supply | Majority of taps (> 30%) are serving for less than 2 hours | 60% | Y |
| 2 | **Requirement of external inputs** |  |  |  |  |  |
| 2.1 |  | This test if any of key structures and/or pipeline need major repair or reconstruction, i.e need external support. | Maintenance need of structures and pipeline | Any of key structures and/or pipeline need major repair or reconstruction | 2 Strs Int1: Major Repair,  RVT2: Recon | Y |
| 2.2 |  | This tests if there is need of additional structures, i.e need external support | Sufficiency of structures and pipeline | The system need new treatment plant or new source | Need to add new source | Y |

Note: Since (1.1 or 1.2.1 or 1.2.2 or 1.3 ) + (2.1 or 2.2) then need reconstruction.

### **MAJOR REPAIR ASSESSMENT**

Following is the assessment of Gaudhara Chipchhipe System that determines if the system needs major repair:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| SN | Area of Test | Explanation | Indicator | Guiding Value | Observed | Major Repair Need (Y/N) |
| 1 | Major repair need | This test if any of key structures and/or pipeline need major repair | Need of major repair in key structure | >0% of key structures need major repair | 10% | Y |
| Need of major repair in pipeline | >0% of pipelines need major repair | 20% | Y |

Since 10% of key structures and 20% of pipeline need major repair, the system needs Major repairs.

### **MINOR REPAIR ASSESSMENT**

Following is the assessment of Gaudhara Chipchhipe System that determines if the system needs minor repair:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| SN | Area of Test | Explanation | Indicator | Guiding Value | Observed | Minor Repair Need (Y/N) |
| 1 | Minor repair need | This test if any of key structures and/or pipeline need minor repair | Need of minor repair in key structure | >0% of key structures need minor repair | 0% | N |
| Need of minor repair in pipeline | >0% of pipelines need minor repair | 5% | Y |
| >0% of pipelines are exposed | 4% | Y |
| >0% of pipelines are in “join and separate” condition | 3% | Y |

Since 0% of structures need minor repair, 5% of pipeline need minor repair, 4% of pipeline are exposed and 3% of pipeline are in join and separate condition, the system needs minor repairs.

### **NO REPAIR (GOOD CONDITION) ASSESSMENT**

Following is the assessment of Gaudhara Chipchhipe System that determines if the system needs no repair (good condition):

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| SN | Area of Test | Explanation | Indicator | Guiding Value | Observed | No Repair Need (Y/N) |
| 1 | No repair need | This test if any of key structures and/or pipeline need no repair | Need of no repair in key structure | 100% of key structures need no repair | 100% | Y |
| Need of no repair in pipeline | 100% of pipelines need no repair | 100% | Y |
| 100% of pipelines are not exposed | 100% | Y |
| 100% of pipelines are not in “join and separate” condition | 100% | Y |

Since 100% of structures need no repair, 100% of pipeline need no repair, 100% of pipeline are not exposed and 100% of pipeline are not in join and separate condition, the system needs no repairs.

### **CONCLUSION ON CONDITION ASSESSMENT OF SCHEME**

Following is the decision matrix:

|  |  |  |
| --- | --- | --- |
| SN | Condition of Schemes | System Assessment Result |
| 1 | Good Condition | No |
| 2 | Minor Repair | Yes |
| 3 | Major Repair | Yes |
| 4 | Rehabilitation | Yes |
| 5 | Re-construction | No |
|  | **Scheme condition decision** | **Rehabilitation** |

So the system needs **Rehabilitation.**

# **FUNCTIONALITY ASSESSMENT**

(For details of this section please read first the “M&E Framework for Water Supply Functionality and Sustainability”, prepared

This assess the various components of a water supply facility, or group of facilities. This provides the insight of technical and managerial investigation and review of assets or system to provide findings and recommendations regarding the root cause of deterioration or failure to maintain functionality.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Functionality Indicators** | | **Expected Condition** | **Full Score** | **Observed Conditions** | **Obtained Score** | **Intvn (Y/N)** |
| F1A | Percentage of population served by functional Taps. | 100% | 30 | Total population: 11840  Population served by functional taps: 10064  Population served by functional taps= 85% | 85% of 30= 25.5 | Y |
|  | SUB TOTAL |  |  |  | **25.5** |  |
| F2A | Percentage of functional taps | 100% | 30 | 92% | 92% of 30= 27.6 | Y |
|  | SUB TOTAL |  |  |  | **27.6** |  |
| F3A | Provision of operation and maintenance service (F3A-a or F3A-b) |  | 8 |  |  |  |
| F3A-a | Presence of outsourced maintenance service | Yes |  | Not Applicable |  |  |
| OR |  |  |  |  |  |  |
| F3A-b | Number of VMWs | At least 1 VMW per 200 community tap; and at least 1 VMW per 1000 yard tap |  | The system has: actual number of VMWs= 2 and  Total number of community taps=300 Total number of yard taps= 560 Calculations: =(300÷200) + (560÷1000)=2.06 | =(8÷2.06)\*2=7.76 | Y |
| F3B | Percentage of VMWs who perceive tools are adequate | 100% of minimum required number of VMWs | 7 | Nos. of VMW who said tools are adequate=1  (1÷2.06)\*100=48.54% | =48.54%of 7=3.39 | Y |
| F4A | Number of months in which water source is available | 12 Months | 7 | 12 | 7 | N |
| F4Bi | Percentage of structures needing repair | 0% | 11 | 38% | (100-38)% of 11=6.82 | Y |
| F4Bii | Number of leakages in conveyance | 0 in 2 km length | 7 | Number of total leakages= 3,  Total pipeline length= 23 km  =2\*(3÷23)=0.26087 | =7-{7-5}\*0.26087=  6.47 | Y |
|  | SUB TOTAL |  |  |  | **41.44** |  |
|  | GRAND TOTAL |  |  |  | 25.5 + 27.6+ 31.44= **84.54** |  |

The score on functionality indicators (100%)= Score on ‘Percentage of population served by functional Taps’ (30%) + Score on ‘Percentage of functional taps’ (30%) + score on input indicators(40%)

**Result**: Since the score (84.54) is > 70 the system is functional.

# **SUSTAINABILITY ASSESSMENT**

Sustainability is a term with numerous interpretation of which the most basic and useful being by Abrams (1998) as: "whether or not something continues to work over time" (meaning, in this case, the indefinite provision of a water, sanitation or hygiene service (with certain agreed characteristics) over time). The likelihood of structures, facilities, projects, initiatives continuing to provide a good service over the longer term beyond the lifetime of the project.

Present year’s sustainability marking system:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sustainability Indicator** | **Expected Condition** | **Full Marks** | **Observed Conditions** | **Obtained Marks** | **Intrvn. (Y/N)** |
| S1A: Percentage of Population served by functional system (result indicator) | 100% | 50 | Total population: 11840  Population served by functional taps: 10064  Population served by functional taps= 85% | =85% of 50=  42.5 | Y |
| SUB TOTAL |  |  |  | **42.5** |  |
| S2A: Number of meetings with decision recorded per year | >=4 | 5 | 3 meetings | 4 | Y |
| S2B: Annual general meeting conducted with decision recorded (AGM) | Yes | 5 | Yes | 5 | N |
| S2C: Account is looked after by the employed accountant | Yes (Always by accountant) | 4 | Only by WSUC | 2 | Y |
| S3A: Need of treatment | No (Clean water round the year, naturally or with aided treatment) | 4 | Clean round the year treatment may or may not required | 3 | Y |
| S3B: Standard Operating Procedure (SOP) of regular inspection prepared and followed | Yes | 5 | No | 0 | Y |
| S4A: Source registration and dispute in the source. | Yes (Registered and no obstruction in source.) | 5 | Source registered and no obstruction | 5 | N |
| S4B: Percentage of households using water for income generating activities | 100% | 3 | 35% | 2\*35%\*3= 2.1 | Y |
| S4C: Percentage of Women representation on Water and Sanitation User Committee | Women Representation>=33% with at least one woman member in key post | 4 | >=33% with no female member in executive post | 3 | Y |
| S5A: Presence of financial auditing system | Yes | 3 | No | 0 | Y |
| S5B: Presence of provision of remuneration for VMW | Yes | 4 | Yes | 4 | N |
| S5C: Presence of provision of water supply system insurance | Yes | 2 | No | 0 | Y |
| S5D: Operation Ratio | less than 75% | 6 | 82% | 4 | Y |
| SUB TOTAL |  |  |  | **32.1** |  |
| GRAND TOTAL |  |  |  | **42.5 + 32.1 =74.6** |  |

**This year’s sustainability marks: 74.6**

The summary of three years sustainability marks:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Sustainability Indicator** | **Full score** | **This year’s marks (n year)** | **Previous year’s marks (n-1 year)** | **The year before previous year’s marks (n-2 year)** | **Sustainability Score** | **Intrvn. (Y/N)** |
| S1A: Percentage of Population served by functional system | 50 | 42.5 | 41 | 38 | 50%\*42.5 + 30%\*41 + 20%\*38 = 41.15 | Y |
| SUB TOTAL | 50 | 42.5 | 41 | 38 | 50%\*42.5 + 30%\*41 + 20%\*38 = 41.15 | Y |
| S2A: Number of meetings with decision recorded per year | 5 | 4 | 4 | 4 | 50%\*4 + 30%\*4 + 20%\*4 = 4 | Y |
| S2B: Annual general meeting conducted with decision recorded (AGM) | 5 | 5 | 5 | 5 | 50%\*5 + 30%\*5 + 20%\*5 = 5 | N |
| S2C: Account is looked after by the employed accountant | 4 | 2 | 0 | 0 | 50%\*2 + 30%\*0 + 20%\*0 = 1 | Y |
| S3A: Need of treatment | 4 | 3 | 3 | 3 | 50%\*3 + 30%\*3 + 20%\*3 = 3 | Y |
| S3B: Standard Operating Procedure (SOP) of regular inspection prepared and followed | 5 | 0 | 0 | 0 | 50%\*0 + 30%\*0 + 20%\*0 = 0 | Y |
| S4A: Source registration and dispute in the source. | 5 | 5 | 5 | 0 | 50%\*5 + 30%\*5 + 20%\*0 = 4 | Y |
| S4B: Percentage of households using water for income generating activities | 3 | 2.1 | 2.1 | 2.1 | 50%\*2.1 + 30%\*2.1 + 20%\*2.1 = 2.1 | Y |
| S4C: Percentage of Women representation on Water and Sanitation User Committee | 4 | 3 | 3 | 3 | 50%\*3 + 30%\*3 + 20%\*3 = 3 | Y |
| S5A: Presence of financial auditing system | 3 | 0 | 0 | 0 | 50%\*0 + 30%\*0 + 20%\*0 = 0 | Y |
| S5B: Presence of provision of remuneration for VMW | 4 | 4 | 0 | 4 | 50%\*4 + 30%\*0 + 20%\*4 = 2.8 | Y |
| S5C: Presence of provision of water supply system insurance | 2 | 0 | 0 | 0 | 50%\*0 + 30%\*0 + 20%\*0 = 0 | Y |
| S5D: Operation Ratio | 6 | 4 | 2 | 2 | 50%\*4 + 30%\*2 + 20%\*2 = 3 | Y |
| SUB TOTAL | 50 | 32.1 | 24.1 | 23.1 | 50%\*32.1 + 30%\*24.1 + 20%\*23.1 = 27.9 | Y |
| GRAND TOTAL |  | 74.6 | 65.1 | 61.1 | 50%\*74.6 + 30%\*65.1 + 20%\*61.1 = 69.05 | Y |

So the final Sustainability Score is represented as: 41.15+27.9= 69.05

**Result**: Since the score (69.05) is < 70 the system has some risk of sustainability.

# **SCHEME PRIORITY SCORE**

The assessment for scheme priority score is presented below:

The assessment for scheme priority score is presented below:

### 1   Management of WSUC(30%)

| **S.No.** | **Status** | **Weightage** | **Status (Y/N)** | **Score** |
| --- | --- | --- | --- | --- |
| 1.1 | WSUC registered in DWRC (Yes/No) | 1 | Y | 1 |
| 1.2 | Regular meeting of WSUC conducted (yes/No) | 1 | Y | 1 |
| 1.3 | Annual General Assemble meeting conducted (Yes/No) | 1 | 0 | 0 |
| 1.4 | Water Tariff collection practice (Yes/No) | 1 | Y | 1 |
| 1.5 | Annual Auditing System (Yes/No) | 1 | N | 0 |
| 1.6 | Bank account status (Yes/No) | 1 | Y | 1 |
| 1.7 | Presence of VMW(Yes/No) | 1 | Y | 1 |
| 1.8 | Account keeping by self (Yes/No) | 1 | N | 0 |
| 1.9 | Women Representation- more than 33% (Yes/No) | 1 | Y | 1 |
| 1.10 | SOP of regular maintenance prepared and followed (Y/N) | 1 | N | 0 |
| 1.11 | Management Score  (∑=SM) | 6 | | |
| 1.12 | Fraction of Maximum Value (FSM) | **0.75** | | |
| **1.13** | **Total Managerial Score (WSM)** | **0.225** | | |

### 2   Cost of Intervention(30%)

| **S.No.** | **Condition** | **Weight** | **Cost** | **Score** |
| --- | --- | --- | --- | --- |
| 2.1 | Total cost of Interventions | 1 | 510383 | 510383 |
| 2.2 | Cost Score | 510383 | | |
| 2.3 | Fraction of Minimum value (FSC) | 0.4473 | | |
| **2.4** | **Weighted Score (WSC)** | **0.1342** | | |

### 3   Total Effected population(30%)

| **S.No.** | **Conditions** | **Weight** | **Population Effected** | **Score** |
| --- | --- | --- | --- | --- |
| 3.1 | Population served by non-functional tap | 1 | 208 | 208 |
| 3.2 | Effect Score | 208 | | |
| 3.3 | Fraction of Maximum value (FSE) | 0.4271 | | |
| **3.4** | **Weighted Score (WSE)** | **0.1281** | | |

### 4   Socially backward Household (10%)

| **S.No.** | **Conditions** | **Weight** | **Population Effected** | **Score** |
| --- | --- | --- | --- | --- |
| 4.1 | Number of HH of Janjatis, Dalits and Minorities that are served by non-functional taps | 1 | 64 | 64 |
| 4.2 | Socially backwards HH Score | 64 | | |
| 4.3 | Fraction of Maximum value FSS | 0.1003 | | |
| 4.4 | Weighted Score (WSS) | 0.0301 | | |

### 5   Overall Score

|  |  |  |
| --- | --- | --- |
| **Score** | Overall Weighted Score (WTS = WSM + WSE + WSC+WSS) | **0.5174** |
| **Rank** | Rank of एैसेलुचाैर खा. पा. आ. among all schemes |  |

# **SUMMARY OF ASSESSMENT**

The summary of Scheme status is presented below:

|  |  |  |  |
| --- | --- | --- | --- |
| **S.N.** | **AREAS** | **INDICATORS** | **VALUE** |
| 1 | Coverage | The number of population having access to water supply facility (Number; HH) | 1850; 310 |
| The number of population having access to sanitation facility (Number, HH) | 1780; 300 |
| 2 | Functionality | The population served by functional taps (Number; %) | 1399;76% |
|  | Service Quality | Number of complaints registered by user this year | 2 |
| 4 | Maintenance Need Conditions | The structures in good conditions and (+) needing minor repair (%) | 54.7%+30.7% |
| The structures needing major repair and (+) needing reconstruction (%) | 12.3%%+15.1% |
| The pipeline in good and (+) needing minor repair (%)+needing major repair (%)+needing reconstruction (%) | 84.9%+15.1%+0%+0% |
| System conditions (Good, need minor repair, need major repair, need rehab, need reconstruction) | Need Rehab |
| 5 | Score | The functionality score (input; output; effect) (%) | Functionality at high risk (48%;100%, 76%) |
| The sustainability score (input; output) (%) | Sustainability at high risk (46%;0%) |
| Scheme Prioritization (Score; Rank in Municipality) | 33.6; 65th |
| 6 | System Improvement Cost | Total cost for system improvement (Summary from Part IV of this document) | NRs. xxxxxxxxxx |

To restore the functionality, there are 45 issues (count “Y” in the below table) identified that needs interventions, of which 30 issues can be taken care by WSUCs and for other 15 major issues the WSUC need external support. The issues and required interventions are listed in part III of this report.

**PART III: RESTORING FUNCTIONALITY**

Water supply systems are ideally renewed through the incremental replacement of individual components, while the overall function of the system, and hence the services delivered, are maintained. In the water sector, assets refer to the physical components of water systems (e.g. pipes, pumps, meters, generators, storage tanks, valves) whilst their management refers to the processes and decisions that ensure services are maintained at agreed levels and that the value of the assets is maintained by ensuring the maximum functional life and optimum performance at the lowest possible cost. Well and resourced plan helps avoid the large lump sum replacement and rehabilitation costs associated with premature failure and unplanned breakdowns.

Decreasing service levels over time as well as the premature failure of rural water infrastructure is well documented (Smits and Lockwood, 2011; RWSN, 2008). Effective O&M Plans helps avoid these problems and can be particularly useful in rapidly developing countries where coverage rates have reached a signifcant level but sustainability is becoming the main issue. Emphasizing O&M is a way to address sustainability since it focuses on understanding how existing assets should be managed for optimal performance and cost effectiveness. In practice it is about balancing priorities between extending coverage and sustaining service delivery or even increasing the level of existing services.

# **KEY INTERVENTIONS AREAS**

In the rural water sector, responsibility for maintaining functionality is typically more fragmented and distributed amongst a number of different stakeholders. In most cases, overall coordination is ensured by the WSUC. The precise balance of these activities will depend on the scale and complexity of technology included in the system(s), the viability of financial and technical resources, and other factors, such as geographic characteristics and government capacity. For example in rural areas, regardless of their technical and human capacities, WSUC will typically have the responsibility for operation, maintenance and minor repairs of their water system, whilst government authorities will monitor the functionality of water system and take strategic decisions related to investment for major repair, rehabilitation, reconstruction and decommissioning of infrastructure.

The following table presents the O&M and its management interventions to maintain the functionality of Gaudhara Chipchepe Water Supply system.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S.N.** | **Issues** | **Desired Conditions** | **Observed Conditions** | **Intvn Need** | **Issue Creator** | **Root cause of Issues** | **Key intervention areas** | |
| **WSUC** | **Non-WSUC** |
| **A** | **ASSETS CONDITIONS** | | | | | | | |
| **A1** | **Civil Structures** |  |  |  |  |  |  |  |
| A1.1 | Conditions |  |  |  |  |  |  |  |
| A1.1.1 | Good | 100% | 54.67% | N |  |  | Maintaining the structures as it is, give more emphasis on preventive maintenance | Support WSUC in preparing maintenance plan |
| A1.1.2 | Minor repair | 0% | 30.67% | Y | WSUC | Poor routine and preventive maintenance, lack of skill in VMW, lack of fund | Employ trained VMW, introduce preventive maintenance system | Capacity development of VMWs |
| A1.1.3 | Major Repair | 0% | 10.67% | Y | Non-WSUC | Lack of skill in VMW, lack of fund, accumulation of unattended minor repair | Unskilled labour, local materials and contribution of at least 20% | Financial and technical assistance |
| A1.1.4 | Re construction | 0% | 4.00% | Y | Non-WSUC | Natural disaster, Capacity beyond WSUC, accumulation of unattended major repair | Prepare business plan which includes capital development plan, Sizable financial and labour contribution as in new project | Financial and technical assistance |
| A1.2 | Adequacy of Storage System |  |  |  |  |  |  |  |
| A1.2.1 | Adequate | 100% |  | N |  |  |  |  |
| A1.2.2 | Not adequate | 0% |  | Y | Non-WSUC | Inappropriate design, unexpected population growth, unusual consumption of water | Request for external support, manage sizable contribution | Financial and technical assistance to add another RVTs |
| A2 | **Pipeline** |  |  |  |  |  |  |  |
| A2.1 | Conditions |  |  |  |  |  |  |  |
| A2.1.1 | Good | 100% | 84.88% | N |  | Good operation and maintenance practice | Maintaining the structures as it is, give more emphasis on preventive maintenance | Support WSUC in preparing maintenance plan |
| A2.1.2 | Minor repair | 0% | 15.12% | Y | WSUC | Poor routine and preventive maintenance, lack of skill in VMW, lack of fund | Employ trained VMW, introduce preventive maintenance system | Follow up and provide continuous support as requested by WSUC |
| A2.1.3 | Major Repair | 0% | 0.00% | Y | Non-WSUC | Lack of skill in VMW, lack of fund, accumulation of unattended minor repair | Unskilled labour, local materials and contribution of at least 20% | Financial and technical assistance |
| A2.1.4 | Re construction | 0% | 0.00% | Y | Non-WSUC | Natural disaster, Capacity beyond WSUC, accumulation of unattended major repair | Prepare business plan which includes capital development plan, Sizable financial and labour contribution as in new project | Financial and technical assistance |
| A2.2 | Nos. of Leakage logged this year | 0 | 4 | Y | WSUC | Lack of complaints redrassal system, old pipe materials, pipeline exposed over earth surface, frequent breakdown of service | Address the leakage if within the capacity of WSUC otherwise ask for the help of any stakeholder who has enough technical and financial strength | Incase of major leak provide technical and financial assistance |
| A2.3 | Burial of Pipeline |  |  |  |  |  |  |  |
| A2.3.1 | Well Burried in ground | 100% | 90.70% |  |  |  |  |  |
| A2.3.2 | Exposed dangling pipe | 0 | 5.95% | Y | WSUC | Difficult and rocky terrain, Negligence from WSUC, pipe section encrusted with limes | Burry pipes | If there is lime encrustation support WSUC by providing technical and financial assistance |
| A2.3.3 | Can join and separate pipe as required | 0 | 3.36% | Y | WSUC | Bringing pipeline near to own house by user | Implement proper water distribution system |  |
| A3 | **Intake and Water Source** |  |  |  |  |  |  |  |
| A3.1 | Type of Source |  |  |  |  |  |  |  |
| A3.1.1 | Spring |  | 60.00% |  |  |  |  |  |
| A3.1.2 | Stream |  | 10.00% |  |  |  |  |  |
| A3.1.3 | Spring fed Stream |  | 30.00% |  |  |  |  |  |
| A3.1.4 | Groundwater |  | 0.00% |  |  |  |  |  |
| A3.2 | Type of Intake |  |  |  |  |  |  |  |
| A3.2.1 | Spring Intake |  | 60.00% |  |  |  |  |  |
| A3.2.2 | Stream Intake |  | 10.00% |  |  |  |  |  |
| A3.2.3 | Tubewell |  | 30.00% |  |  |  |  |  |
| A3.2.4 | No Intake Structure | 0.00% | 0.00% |  |  |  |  |  |
| A3.3 | Registration |  |  |  |  |  |  |  |
| A3.3.1 | Source registered & no Obstruction | 100.00% | 70.00% | N |  |  |  |  |
| A3.3.2 | Source registered ,in public land & obstructed by local community | 0.00% | 20.00% | Y | WSUC | No proper attention to resolve dispute before project implementation | Register the source and resolve dispute, Coordinate with local body | Support in process of registration, Support WSUC to resolve the problem |
| A3.3.3 | Source not registered, in public land & obstructed by local community | 0.00% | 10.00% | Y | WSUC | lack of knowledge on how to register the source, not proper attention to resolve dispute before project implementation | Register the source and resolve dispute | Support in process of registration |
| A3.3.4 | Source in private land & obstructed by owner | 0.00% | 0.00% | Y | WSUC | lack of knowledge on how to register the source, not proper attention to resolve dispute before project implementation | Register the source and resolve dispute | Support in process of registration |
| A3.4 | Safe Yield(Lps) |  |  |  |  |  |  |  |
| A3.4.1 | Sufficient to serve population | 100.00% | 60.00% | N |  |  |  |  |
| A3.4.2 | Not sufficient to serve population | 0.00% | 40.00% | Y | Non-WSUC | Design defect, inappropriate source selection, deforestation, source drying, population increase | Find another undisputed source to include in the system | Financial and technical assistance to add another WQ |
| A3.5 | Source Protection |  |  |  |  |  |  |  |
| A3.5.1 | Safe in all aspect | 100.00% | 100.00% | N |  |  |  |  |
| A3.5.2 | Vulnerable | 0.00% | 0.00% | Y | Non-WSUC | Possibility of landslide, vandalism, etc. flood, fire | Source protection from vulnerability | Financial and technical assistance |
| A3.6 | Water Quality |  |  |  |  |  |  |  |
| A3.6.1 | Appropriate Treatment Facility exist and working | 100.00% | 50.00% | N |  | Good O&M Practices | Regular O&M of treatment plant | Provide technical support such as SOP of treatment plant operation |
| A3.6.2 | Clean round the year/treatment may or may not be needed | 0.00% | 30.00% | Y | Non-WSUC | Human activity near source |  | Financial and technical assistance to install treatment plant |
| A3.6.3 | Turbid/dirty in rainy season/Minor treatment needed | 0.00% | 20.00% | Y | Non-WSUC | Turbidity in rainy season, the case was not brought during the survey |  | Financial and technical assistance to install treatment plant or any other appropriate option to remove turbidity |
| A3.6.4 | Turbid/dirty round the year/major treatment needed | 0.00% | 0.00% | Y | Non-WSUC | In appropriate source selection, not taken consideration as it is more expensive |  | Financial and technical assistance to install treatment plant |
| A3.7 | Flow Regularity |  |  |  |  |  |  |  |
| A3.7.1 | Whole year | 100.00% | 70.00% | N |  |  |  |  |
| A3.7.2 | 11to <12 months | 0.00% | 20.00% | Y | Non-WSUC | Source drying during dry months, source used for another purpose such as irrigation | Source protection and augmentation | Financial and technical assistance to add another water source |
| A3.7.3 | <11 months | 0.00% | 10.00% | Y | Non-WSUC | Source drying during dry months, source used for another purpose such as irrigation | Source protection and augmentation | As in A3.7.2 |
| A3.8 | Treatment Facility | |  |  |  |  |  |  |
| A3.8.1 | None |  | 60.00% | Y | Non-WSUC | not required, inappropriate design | Adopt regular water testing process, adopt Water Safety Plan | Financial and technical assistance to install treatment plant if required by water quality |
| A3.8.2 | PS |  | 30.00% | N |  |  |  |  |
| A3.8.3 | PS+RF |  | 20.00% | N |  |  |  |  |
| A3.8.4 | PS+RF+SSF |  | 0.00% | N |  |  |  |  |
| A3.8.5 | Package plan |  | 0.00% | N |  |  |  |  |
| A3.9 | Condition of source |  |  |  |  |  |  |  |
| A3.9.1 | Good | 100.00% | 80.00% | N |  | Well protected or regular O&M done | Maintaining the structures as it is, give more emphasis on preventive maintenance | Support WSUC in preparing maintenance plan |
| A3.9.2 | Minor Repair | 0.00% | 15.00% | Y | WSUC | Poor routine and preventive maintenance, lack of skill in VMW, lack of fund | Employ trained VMW, introduce preventive maintenance system | Regular compliance monitoring, Technical backstopping, provide refresher training |
| A3.9.3 | Major Repair | 0.00% | 5.00% | Y | Non-WSUC | Lack of skill in VMW, lack of fund, accumulation of unattended minor repair | Unskilled labour, local materials and contribution of at least 20% | Financial and technical assistance |
| A3.9.4 | Reconstruction | 0.00% | 0.00% | Y | Non-WSUC | Natural disaster, Capacity beyond WSUC, accumulation of unattended major repair | Prepare business plan which includes capital development plan, Sizable financial and labour contribution as in new project | Financial and technical assistance |
| **B** | **SERVICE CONDITIONS** | | | | | | | |
| B1 | **Tap Type** |  |  |  |  |  |  |  |
| B1.1 | Community | 0% | 12 | Y | WSUC | Community did not prefer as project becomes expensive not sufficient water at source | Promote among community for yard connection | Technical support, Promote yard connection among WSUCs |
| B1.2 | Yard | 100% | 32 | N |  | Improved living conditions | Continue | Refresher trainings for meter reader, ledger keeping |
| B1.3 | Institutional | 0% | 6 | N | WSUC |  |  |  |
| B2 | **Connections** |  |  |  |  |  |  |  |
| B2.1 | Metered | 100% | 32 | N | WSUC |  |  |  |
| B2.2 | Unmetered | 0% | 18 | Y | WSUC | Community did not prefer as project becomes costly, perceive maintenance problem by WSUC, difficult to read, resistance by community as frequent clogging | Promote among community for metered connection | Support in preparing meter installation, calibration and meter change guideline |
| B3 | **Supply Hrs.** |  |  |  |  |  |  |  |
| B3.1 | >2 Hrs | 100% | 15 | N | WSUC |  |  |  |
| B3.2 | < 2 Hrs | 0% | 35 | Y | WSUC | Inappropriate design, inappropriate valve operations, unjustifiable water consumption by some users | Implement demand side management plan | Financial and technical assistance to add another water source if it is due to scarcity of source |
| B4 | **Complaints logged this year** | 0 | 2 | Y | WSUC | No proper OM, no proper complaint redressal system, | Establish and operationalize complaint redressal mechanism | Follow up the reports send by WSUC, provide suggestions |
| B5 | **WQ in Tap** |  |  |  |  |  |  |  |
| B5.1 | Free of Turbidity | 100% | 22 | N | WSUC | Good O&M Practice | Continue WQ test and Water safety plan |  |
| B5.2 | With Turbidity | 0% | 28 | Y | WSUC | Turbid nature of water itself, Turbid water at source, pipeline leakage, lack of provision of frequent cleaning of structures and pipeline | System cleaning such as washing all structures and pipeline | Financial and technical assistance to install treatment plant if it is due to inherent water quality |
| B6 | **Taps Conditions** |  |  |  |  |  |  |  |
| B6.1 | Good | 100.00% | 39 | Y | WSUC |  | Maintaining the structures as it is, give more emphasis on preventive maintenance | Support WSUC in preparing operations and maintenance plan |
| B6.2 | Minor Repair | 0.00% | 6 | Y | WSUC | Poor routine and preventive maintenance, lack of skill in VMW, lack of fund | Employ trained VMW, introduce preventive maintenance system | Capacity development of VMWs |
| B6.3 | Major Repair | 0.00% | 3 | Y | WSUC | Lack of skill in VMW, lack of fund, accumulation of unattended minor repair | Unskilled labour, local materials and contribution of at least 20% | Financial and technical assistance |
| B6.4 | Reconstruction | 0.00% | 2 | Y | WSUC | Natural disaster, Capacity beyond WSUC, accumulation of unattended major repair | Prepare business plan which includes capital development plan, Sizable financial and labour contribution as in new project | Financial and technical assistance |
| B7 | **Tap flow Conditions** |  |  |  |  |  |  |  |
| B7.1 | No water at all | 0.00% | 5 | Y | WSUC | Inappropriate design, inappropriate demand side management such as unequal distribution of water and unauthorized or improper valve operations, structures and pipelines leaking or broken, unequal pressure at water distribution system, no sufficient water available at source, unauthorized connections, connections from main line, population increase, VMW do not have required skill | Implement balanced and justifiable water distribution program and schedule, if it is due to unbalanced water distribution problem | Financial and technical assistance to add another water source or change in pipeline if there is unbalanced water distribution |
| B7.2 | There is water but not sufficient for drinking, cooking and toilet use | 0.00% | 4 | Y | WSUC | " (same as B7.1) | Implement balanced and justifiable water distribution program and schedule, if it is due to unbalanced water distribution problem | As in B7.1 |
| B7.3 | Sufficient for drinking, cooking and toilet use | 0.00% | 5 | Y | WSUC | (same as B7.1) | Implement balanced and justifiable water distribution program and schedule, if it is due to unbalanced water distribution problem | As in B7.1 |
| B7.4 | Sufficient for drinking, cooking, washing utensil, toilet use and bathing | 0.00% | 28 | N | WSUC |  | Maintain the status |  |
| B7.5 | Sufficient for all daily needs | 100.00% | 8 | N | WSUC |  | Maintain the status |  |
| **C** | **MANAGEMENT EFFICIENCY** | | | | | | | |
| C1 | Nos. of member in WSUC | <9 | 7 | N | WSUC |  | Make it inclusive as far as possible with less than 9 members. |  |
| C2 | Women Representation (%) | 33.0% | 28.5% | Y | WSUC | Hesitance from women, male member undermine it, lack of social awareness | Increase women participation | Policy enforcement |
| C3 | WSUC Office building (Yes/No) | Yes | No | Y | WSUC | WSUC think it is costlier or no need as business is not that big | Provision of office building (rent or own construction) |  |
| C4 | WSUC registered in DWRC (Yes/No) | Yes | No | Y | WSUC | WSUC not formally formed, lack of skill to write constitution of WSUC, Community did not prioritize it, not aware that there exists such mandatory provision, not aware of registration process | Prepare constitution, conduct AGM and Register WSUC in DWRC | Support in preparing constitution, explain and support in process of registration |
| C5 | Water Tariff collection practice (Yes/No) | Yes | No | Y | WSUC | Hesitance/oppose by community, lack of tariff design skill, provision of contribution by community as when and where required, fear among WSUC member that they may lose their next term | Introduce tariff collection, provision of meter reader, ledger system etc. | Support in capacity development such as training for meter reader |
| C6 | Bank account status (Yes/No) | Yes | No | Y | WSUC | No credible bank at project area, interest rate is low in bank compare to local merchants, no sufficient source to operate at bank, WSUC thinks it is extra burden | Use credible bank for financial operations | Regular training and monitoring support to make 100% WSUC have bank account |
| C7 | Adequacy of VMWs or out sourced O & M services | At least 1 no per 100 taps | No provision of VMW | Y | WSUC | Frequent turn over, lack of remuneration system, no motivation from community member to assume as VMW | Engage adequate number of VMWs | Support in capacity building of VMWs |
| C8 | Percentage of VMWs who perceives tools are adequate | At least 50% of VMWs say tools are adequate | No provision of VMW | Y | WSUC | Lack of minimum required tools | Provide adequate tools to VMW | Capacity development support to use and maintain tools |
| C9 | Presence of provision of remuneration for VMW | All three years | Absence of provision for remuneration | Y | WSUC | No sufficient income of WSUC, Community thinks it is voluntary job | Provide adequate remunerations to VMW so that he will be retained longer | Promote among WSUC the benefit of retaining VMW |
| C10 | Operating Ratio | Less than 75% | No Internal income | Y | WSUC | No sufficient income, unplanned and inappropriate expenditure, Lack of financial management skill | Introduce sustainable tariff, Improve collection efficiency, increase fundraising activities, optimize expenditure | Capacity development support |
| C11 | Number of meetings with decision recorded per year | Minimum 4 meetings every year | No Data Available | Y | WSUC | No culture of meetings, WSUC thinks it is not necessary, fear of transparency from WSUC, priority to domestic activities by WSUC members | Introduce the culture of transparency with in WSUC with at least 4 meetings in a year, record every decisions | Capacity development support |
| C12 | Annual general meeting (AGM) in last three years | All three years | 1 AGM conducted in recent year | Y | WSUC | Fear of transparency from WSUC members, reluctance by community members | Organize AGM every year and record decisions. Review the decisions made last year. | Promote among WSUC the benefit AGM |
| C13 | Account Staff: Account is looked after by the employed accountant(last three years) | Every year by accountant | None Responsible | Y | WSUC | WSUC thinks it is expensive to have accountant so want to maintain it by itself, fear of transparency by WSUC, no competent accountant available, Available but WSUC could not afford, not in priority of WSUC | Make a provision to get the service of competent accountant. | Promote among WSUC the benefit getting service by competent accountant |
| C14 | Standard Operating Procedure (SOP) of regular inspection prepared and followed (in last three years) | All three years | SOP not prepared and followed | Y | WSUC | Lack of knowledge to prepare SOP, no VMW to follow it, very small scheme so WSUC think not required, VMW thinks he has been doing these works without SOP | Prepare SOP with responsibilities clearly defined. Develop compliance mechanism to check if this SOP is properly followed. | Support to develop SOP |
| C15 | % of households using water in income generating activities | 50% or more household | More than 50 % household | N | WSUC | No sufficient water to use as income generating, Lack of knowledge in community | Aware and promote the community to use waste water in kitchen garden. |  |
| C16 | Presence of Bookkeeping or auditing system (In 3 three years) | All three years | Absence of auditing system | Y | WSUC | Lack of knowledge of this mandatory provision, Registered auditors not available, not in priority of WSUC, WSUC thinks it is expensive | Get the service of registered auditor to audit the financial expenditure. | Promote among WSUC the benefit auditing |
| C17 | Presence of provision of water supply system insurance (In last three years) | All three years | Absence of provision for insurance | Y | WSUC | Lack of knowledge in WSUC, not in priority, community thinks it is extra burden to them, no insurance agents available, WSUC thinks no need as government has to support WSUC for major maintenance | Insure the water supply system and its component structures | Support and aware WSUC for the benefit of insurance. |
| **D** | **SANITATION CONDITIONS** | | | | | | | |
| D1 | Number of Toilets |  |  |  |  |  |  |  |
| D2 | HH having toilets | 100% | 96.77% |  |  | Internalization by community the value of using toilets | Use different tools to convince users the value of using toilet | Regular monitoring, Post ODF campaign |
| D3 | HH without toilet | 0% | 3.23% | Y | WSUC | Lack of awareness, lack of technical knowledge, Social taboo, community thinks it is expensive and not comfortable | Awareness program to increase toilet coverage | Sanitation campaign |

**PART IV: ESTIMATE FOR FUNCTIONALITY IMPROVEMENT**

# **COST ESTIMATE**

## **INTRODUCTION**

This report is prepared for the preliminary cost estimation for the functionality improvement of XXXX Scheme. The cost presented in this report is the summary cost of interventions that are stipulated in PART III of this report. This report sets out the basis of the capital cost estimate and is presented in following 4 components.

*Capacity Development:* This represents the summary cost required for the process through which WSUC obtains, strengthens and maintains the capabilities to set and achieve its own development objectives over time. This component also includes capacity development activities to accelerate total sanitation program. This represents the summary cost required to provide a systematic ways for WSUC to develop its own action plan based on existing sanitation conditions and processes to pursue its total sanitation priorities.

*Procurement of Goods:* This represents the summary cost for materials, equipment, pipes, fittings and tools that are required for the maintenance of the schemes.

*Maintenance of Civil Structures and Pipelines:* This represents the summary cost of only those civil structures and segment of pipeline that require maintenance.

*Contingencies & Overhead:* This is represented as the summary of percentage of the above costs.

## **COST ESTIMATE BASIS**

The costs presented in this report are at FY 2075/76 price and are subjected to a (+/- ) 15% - 30% variation. The assumptions for estimation are:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S.N.** | **AREA** | **DETAIL** | **COST** | **BASIS OF COST/ASSUMPTIONS** | **COST SHARING** |
| 1 | Capacity Development | Project Management Training | 50000.00 | This is 3-4 days training to enhance skill of WSUC’s members on office and system management to address all skill gaps as assessed and listed in part III of this document. While designing this training the IA need to look in to and analyze part III in detail to find what types of skills gaps are to be addressed. | IA\* |
| VMWs Training shared by several WSUCs | 25000.00 | This is 7 days training for VMWs to gain skills on Operation and minor repairs of the system. With this training he should be able to perform his duty efficiently. The actual amount of such training will be much higher than this cost, so several WSUCs will form a group and contribute Rs 25000/- each for such training. | IA |
| WASH Promotional Training and Post ODF activities | 100000.00 | This includes all activities that are demanded by the “Total Sanitation Guideline” of MOWS. The actual cost to perform such activities will be much higher, so all schemes within the municipality will contribute Rs 1000000/- each towards the activities. | IA |
| 2 | Procurement of Goods | Materials for Civil structures |  | Materials required for civil structures are not calculated separately, it is included in the cost of Civil structures in S.N. 3. |  |
| Pipes | Calculated | This includes GI and HDPE required to maintain the system: |  |
| *Good:* Even though the pipelines are in good conditions 10% of pipelines are procured as a maintenance purpose and emergency stock. | IA |
| Minor, major and reconstruction: 10% of pipe length + actual length of pipeline that requires Minor + major + reconstruction. | IA |
| Costing Assumption: It is difficult to find the actual size of the buried pipe so for this purpose the required pipe is costed as 50 mm 6 kg HDPE pipe |  |
| Fittings | Calculated | All GI and HDPE fittings are costed as 15% cost of required pipe (as calculated above) | IA |
| Tools | 25000.00 | Minimum but sufficient and most commonly used tools that a VMW requires to maintain Water Supply system. | IA |
| 3 | Maintenance Works | Civil structures | Calculated | *Minor repair:* 15 % of actual cost of structure | WSUC\* |
| *Major repair:* 40 % of actual cost of structure | IA |
| *Reconstruction:* 100 % of actual cost of structure | IA |
| Pipeline | Calculated | This cost includes excavation and jointing of 50 mm 6 kg HDPE of the calculated pipelength. | IA |
| Professional services |  | Cost of professional services are calculated separately, it is included in the cost of Civil structures and pipeline. This also includes cost of skilled, semi- skilled and unskilled labours. |  |
| 4 | Contingencies |  | Calculated | 5% of Total cost | IA and WSUC |
| 5 | Cost Sharing |  | Calculated | 80% of total cost is subsidized by IA, where as 20% is shared by WSUC. As per the above calculations, if:  1. The proportion of WSUC’s share is less than 20%: The WSUC should increase it’s sharing proportion to make it minimum of 20%, in such cases WSUC may contribute in pipeline excavation, local material, manual transportation etc.  2. The proportion of WSUC’s share is more than 20%: The actual estimate will not be adjusted |  |

(\* IA: Implementing Agency, \*\*WSUC: Water Supply and Sanitation Users Committee)

## **SCOPE OF ESTIMATION**

For the determination of the cost for all the work items, unit cost charts (rate analysis) were developed based on the district rate of Makwanpur, 2075/76, for each work category for the civil works and pipelines The rates in this chart include all costs of materials supply, transportation and storage, installation, testing and skilled and semi-skilled labours and professional services.

## **SOURCE OF DATA**

The data required for the condition assessment of civil structures and pipelines are from the NWASH-MIS. (nwash.mowss.gov.np/ ). so the accuracy of this report is dependent on the trueness of the data collected for NWASH MIS.

## **COST ESTIMATE LIMITATIONS**

This estimate serves as the entry point estimate. The cost estimate of the following works are included in the estimate, but are presented in preliminary engineering level and will need to be confirmed in the next phase, when the actual decision to implement the maintenance works:

* The need assessment and design of the training for WSUCs management, VMWs and WASH promotional trainings to accelerate Post ODF activities
* Detail condition assessment of pipeline to find the actual length, size, series and types of pipe
* Detail condition assessment of civil structures to find the actual maintenance need and associated fittings
* The need assessment for tools and their actual numbers

# **TOTAL COST**

Summary of Total estimated cost for the functionality improvement for this scheme is presented as: