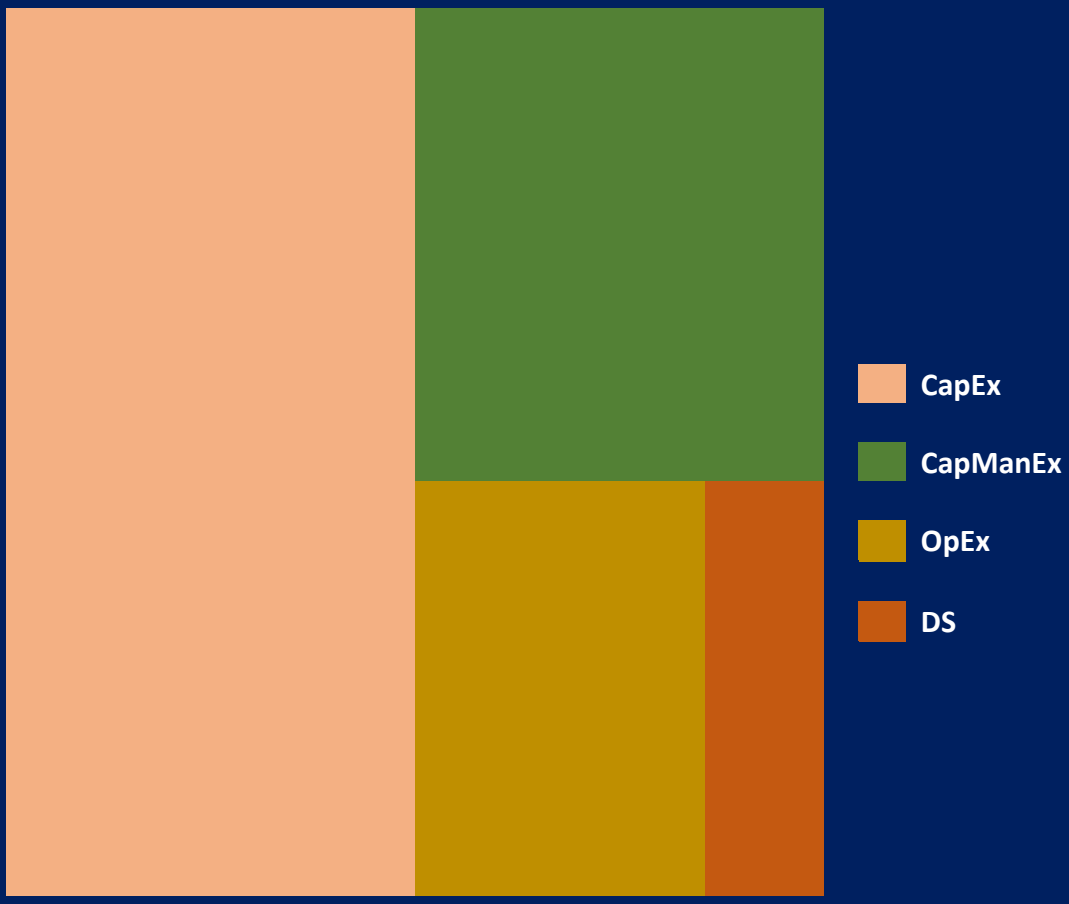
MUNICIPALITY WASH PLAN

(Calculation Framework and methods)



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1. Assumptions and Principles behind WASH Plan

As far as possible, joint monitoring program (JMP) indicators for water supply and sanitation have been adopted for the planning purpose. The WASH planning at the Municipality level has been considered as an important milestone in localization of Sector Development Goal (SDG). The planning takes the core principles from WASH Sector Development Plan (SDP)

Most of the baseline data are real time data and can be extracted from NWASH system. It has been assumed that after addition of few modules (e.g. Water quality; Sanitation) all the data can be retrieved from NWASH. Further. a WASH plan module in the NWASH has been envisioned. This module will generate automated WASH plan report for the municipality which can be customized later as per the requirement. The WASH Plan module will have a graphical dashboard which updates in real time according to the inputs provided. Therefore, it is assumed that the planner will see the result immediately and improve or modify inputs as per availability of budget, resources and other constraints to fit the plan to its best form.

JMP indicators for Water Supply Services:

Table 1-1 JMP indicators for water supply services

Service Level	Definition
Safely Managed	Improved source located on premises, available when needed, and free from microbiological and priority chemical contamination.
Basic	Improved source within 30 minutes round trip collection time
Limited	Improved source over 30 minutes round trip collection time
Unimproved	Unimproved source that does not protect against contamination
No service	Surface water

Following definition has been adopted in the NWASH M&E and WASH Planning:

Table 1-2 Adopted indicator for water supply service level

Service level	Indicator adopted in M&E and WASH planning
Safely Managed	1. Tap connection should be private (to be located on premise) 2. Connection should have the availability of 24 hours (for available when needed) 3. System should have availability of treatment unit (In absence of Water Quality module in NWASH). Water should be free from fecal and priority chemical contamination (In the process of integrating water quality module in NWASH MIS, the indicators of free from fecal and priority chemical contaminations such as frequency of testing, compliance of testing and location of testing would be decided.)

Service level	Indicator adopted in M&E and WASH planning
Basic	1. JMP indicator only indicate the fetching time however in NWASH MIS population with basic water supply service level is decided by population getting water from functional public taps and functional private taps without treatment unit or private taps where absence of contaminants is not sure (Those taps who fail in Water quality module)
Limited	1. Where the system is present but does not suffice basic or safely managed criteria
Unimproved/No service	1. These both service level has been put in one block, where there is no system is available

JMP indicator for sanitation facility

Table 1-3 JMP indicator for sanitation facility

Service Level	Definition
Safely Managed	Private improved facility where faecal wastes are safely disposed on site or transported and treated off site; plus, a handwashing facility with soap and water.
Basic	Private improved facility which separates excreta from human contact
Limited	Improved facility shared with other households
Unimproved	Unimproved facility which does not separate excreta from human contact
No service	Open defecation

Following definition has been adopted in the NWASH M&E and WASH Planning for sanitation:

Table 1-4 Adopted indicators for sanitation facilities

Service level	Indicator adopted in M&E and WASH planning
Safely managed services	1. The facility should be private /the feacal management options should be safe (Flush, pour flush, composting, pit latrine with slab are considered safe whereas hanging, bucket are considered not safe). 2. Handwashing facility and availability of soap. Taps location within 50-meter distance of toilet is checked. If that tap is functional then it is considered that water is available
Basic	The facility should be private /the feacal management options should be safe (Flush, Pour flush, composting, pit latrine with slab are considered safe whereas hanging, bucket are considered not safe)
Limited	Facility seperates excreta from human contact (Flush, Pour flush, composting, pit latrine with slab etc.) however, facility is shared
Unimproved /no service	The ones which does not satisfy above conditions

JMP indicators for WaSH in schools:

JMP has let the country decide its advanced facilities and tried to come up with three layers of service levels

Table 1-5 JMP service ladder for WASH in school

Service Level	Drinking Water	Sanitation	Hygiene
Basic	Drinking water from an improved source and water is available at the school at the time of the survey	Improved sanitation facilities at the school that are single-sex and usable (available, functional and private) at the time of survey	Handwashing facilities with water and soap available at the school at the time of survey
Limited	Drinking water from an improved source but water is unavailable at the school at the time of survey	Improved sanitation facilities at the school that are either not single sex or not usable at the time of survey	Handwashing facilities with water but no soap available at the school at the time of the survey
No Service	Drinking water from an unimproved source or no water source at the school	Unimproved sanitation facilities or no sanitation facilities at the school	No handwashing facilities available or no water available at the school

Following indicators for service ladder has been adopted for planning purpose

Table 1-6 Adopted indicators for service ladder of WASH in school

Service Levels	Indicators adopted in WASH Plan
Advanced	**Water-** ✓ Adequate water availability [will be retrieved from NWASH F&S module] ✓ Fetching time less than 30 minutes (would be decided by taps location from NWASH inventory) ✓ Available all the time decided by adequacy and water tank available with adequate size ✓ Safe decided by absence of fecal and priority chemical contaminants ✓ Presence of functional tap for persons with limited mobility **Sanitation** ✓ Presence of single sex usable* toilets with MHM facilities for girls **Hygiene** ✓ Handwashing facilities where water is available all the time ✓ Presence of soap in toilet ✓ MHM products provided ✓ MHM education given ✓ Incinerator for MHM available
Basic	**Water** ✓ Adequate water availability decided by using information available in NWASH inventory F&S module

Service Levels	Indicators adopted in WASH Plan
	✓ Fetching time less than 30 minutes (would be decided by taps location from NWASH inventory) **Sanitation** ✓ Presence of single sex usable* toilets Hygiene- if the handwashing facility is present /soap is available and water is adequate
Limited	Services are present but either one of the components of the basic is missing or not adequate
No service	No services are present

* JMP definition of 'usable'

Indicators for WASH in Health Care Facilities:

Following indicators are considered

Table 1-7 Indicators for service ladder in HCF WASH

Service Level	Water	Sanitation	Hygiene	Waste Management	Environmental Cleaning
Basic	Water is available from an improved source on the premises	Improved sanitation facilities are usable with at least one toilet dedicated for staff, at least one sex separated toilet with MHM facilities, and at least one toilet accessible for people with limited mobility	Functional hand hygiene facilities (with water and soap and/ or alcohol-based hand rub are available at points of care, and within five meters of toilets	Waste is safely segregated into at least three bins and sharps and infectious waste are treated and disposed of safely.	Basic protocols for cleaning are available and staff with cleaning responsibilities have all received training.
Limited	An improved water source within 500 m of the premises but not all requirements of basic services are met	At least one improved sanitation facility is available but not all requirements of basic services are met	Functional hand hygiene facilities are available either at points of care or toilets but not both	There is limited sanitation and/or treatment and disposal of sharps and infectious waste, but not all requirements for basic service are met	There are cleaning protocols and/or at least some staff have received training on cleaning
No Service	Water is taken from unprotected dug wells of	Toilet facilities are unimproved (e.g. pit latrines without a slab	NO functional hand hygiene facilities are available	There are no separate bins for sharp or infectious waste,	No cleaning protocols are available and no staff have

	springs; or surface water sources; or an improved source that is more than 500 m from the premises; or there is no water source	platform, hanging latrines, bucket latrines) or there are no toilets.	either at points of care or toilets	and sharp and/or infectious waste are not treated/disposed or safety	received training or cleaning

2. Water Supply System

Existing WSS

Data Processing

Baseline Data

The following baseline data for planning can be extracted from NWASH F&S module. A separate module (Quality module) will be used to retrieve quality related data (E.WSS.B.8 and E.WSS.B.9). However, all the existing WSS might not have data related to quality as the quality module has been considered to be used as an optional module. The utility, which is capable or supported on running water quality tests can upload the quality related data to quality module of NWASH system

To understand the indicators used in classifying the functionality of tap, you are suggested to read "*M&E Framework for water supply system functionality and sustainability"* available in http://nwash.mowss.gov.np/documents

To understand the process/algorithm involved in computation of repair cost, you are suggested to read *Sample F&S report – project* available in http://nwash.mowss.gov.np/documents

Table 2-1 Baseline information from NWASH F&S module

Index	Data description		Data Type
E.WSS.B.1	Project Name		String
E.WSS.B.2	Scheme type		String (Choice List)
E.WSS.B.3	Population served by connection private tap within premises	Population served by functional tap	Integer
E.WSS.B.4		Population served by limited functionality	Integer
E.WSS.B.5	Population served by public connections	Population served by functional tap	Integer
E.WSS.B.6		Population served by limited functionality	Integer
E.WSS.B.7	Treatment plants availability		Boolean
E.WSS.B.8	Fecal contamination		Boolean
E.WSS.B.9	Priority chemical contamination		Boolean
E.WSS.B.10	Completed year		Integer
E.WSS.B.11	Schemes original cost		Float
E.WSS.B.12	Repair cost		Float

Output 1 –Existing WSS related output

Table 2-2 Output related to existing WSS

SN	Indicator		Calculation Process
WSS.EWRO.1	Population under limited water supply service level		E.WSS.B.4 + E.WSS.B.6
WSS.EWRO.2	Population under basic water supply service level	Scenario-1 (based upon treatment plan)	If E.WSS.B.7 = False Then E.WSS.B.3 + E.WSS.B.5 Otherwise E.WSS.B.5
		Scenario-2(based upon WQ data)	1. If both the data related to fecal contamination (E.WSS.B.8) and priority contamination (E.WSS.B.9) are not available then calculation cannot be made. (No data) 2. If one data is not available and another is available with False result (negative result), then calculation won't be made (No data) 3. If any data from pair of dataset has positive (True) result, then E.WSS.B.3 + E.WSS.B.5 4. If both the data are available and both E.WSS.B.8 = E.WSS.B.9 = False then E.WSS.B.5
		Decision	As long as Scenario 2 gives the result, that result is used otherwise result from Scenario 1 is used
WSS.EWRO.3	Population under safely managed swater supply service level	Scenario-1 (based upon treatment plan)	If E.WSS.B.7 = True Then E.WSS.B.3 Otherwise 0
		Scenario-2(based upon WQ data)	1. If both the data related to fecal contamination (E.WSS.B.8) and priority contamination (E.WSS.B.9) are not available then calculation cannot be made. (No data) 2. If one data is not available and another is available with False result (negative result), then calculation won't be made (No data) 3. If any data from pair of dataset has positive (True) result, then 0 4. If both the data are available and both E.WSS.B.8 = E.WSS.B.9 = False then E.WSS.B.3

		Decision	As long as Scenario 2 gives the result, that result is used otherwise result from Scenario 1 is used
WSS.EWRO.4	Age		Current Year – Completed Year (E.WSS.B.10)

Planning

Required Capital Expenditure for Existing WSS:

Following Capital expenditure has been considered for the calculation of total required capital expenditure in existing WSS.

1. The cost required to convert all the existing public connection to private connection (Population served by public connection (E.WSS.B.5 + E.WSS.B.6) * per capita cost for specific scheme type (E.WS.B.2) to make water available within premises (See Annex I -Reference Data *Table 7-1*)
2. If supplied water doesn't have both fecal contamination (E.WSS.B.8) and priority contamination (E.WSS.B.9) then no investment is needed in quality improvement.
3. If treatment plant is not available in the existing system investment for required WQI is needed. (Total population * per capita cost for specific scheme type (E.WS.B.2) related to WQI (See Annex I -Reference Data *Table 7-1*)

Capital Expenditure Distribution for existing WSS

Considering the priority of the project, CapEx total requirement is distributed in planning horizon. For example if the project is considered to be of 'Low priority' 10% of total CapEx requirement for that particular project is planned to be invested in year 2027, 40% in year 2028, another 40% in year 2029 and remaining 10% in year 2030.

Figure 2-1 CapEx distribution based on project priority

CapManEx Distribution for existing WSS

A) Onetime repair requirement for the existing project is retrieved from NWASH F&S module (E.WSS.B.12), the repair requirement is distributed in planning horizon considering the priority of the project. (Factors as shown in **Error! Reference source not found.**)

Figure 2-2 Distribution factor for one-time repair requirement based upon the priority of the project

B) **Annual repair requirement** for the existing project is calculated based upon the existing age of the project (WSS.EWRO.4) and age wise Capital Maintenance cost. (See Annex I -Reference Data *Table 7-23*). While calculating this cost along planning horizon, the age in every next year is updated.

Annual age wise capital maintenance cost for existing system = Factor based upon age from *Table 7-23* * Schemes original cost (E.WSS.B.11)

C) The project of very high priority is assumed to be completed by year 2023, similarly project of high priority is assumed to be completed by year 2025 and project of medium and low priority are assumed to be completed by year 2027 and 2030 respectively. The next year of project completion it might require the annual repair. Therefore, considering the updated age in each year of planning horizon and age wise capital maintenance cost (See Annex I -Reference Data *Table 7-23*), the annual repair requirement for newly completed project is forecasted along planning horizon.

Annual age wise capital maintenance cost for newly completed project = Factor based upon age from *Table 7-23* * Total capital expenditure requirement (See page 13)

The summation of (A), (B) and (C) along planning horizon gives CapManEx distribution.

OpEx Distribution for Existing WSS

The distribution of operation expenditure is made based upon per capita operation expenditure for basic or safely managed water supply from particular type of scheme (E.WSS.B.2). The national average of

operation cost according to type of scheme has been taken into consideration as reference data for this calculation (See 64Annex I -Reference Data *Table 7-18*)

Note:

The project completion year according to the priority of the project is different (See above CapManEx Distribution; C). The OpEx will be different once the project is completed as all population under that system will start receiving safely managed water after completion of project. This assumption has been considered while calculating the total OpEx.

Direct Support (DS) for existing WSS

Direct support for existing water supply system is derived from Annex I -Reference Data Table *7-20*. The project starting year and project completion year according to the priority of project is carefully taken into consideration while calculating the DS cost for planning horizon.

Existing Tubewells

The sample survey method is adopted in baseline data collection. A 10% sample size has been considered as threshold minimum. From sample data analysis estimation of population (census) data is made.

Data Processing

Table 2-3 Sample survey data

Sampling size	N
Tubewell number in sampling size	T
Total household	N
Total Tubewell number as per population census	T
Total Tubewell number as per sampling size (T_s)	t * N/n

Baseline Data:

Table 2-4 Baseline information

Index	Data Description		Data type
T.B.1	Project Name		String
T.B.2	Scheme type		Defined data (Tubewell)
T.B.3	Is tube well under New project+ ongoing project area of piped system?		Boolean
T.B.4	Population served by connection private tube wells within premises	Served by functional tube wells	Integer
T.B.5		Served by limited functionality	Integer

Index	Data Description		Data type
T.B.6	Population served by public connections	Served by functional tube wells	Integer
T.B.7		Served by limited functionality	Integer
T.B.8	Treatment Units availability		Boolean
T.B.9	Fecal contamination		Boolean
T.B.10	Priority chemical contamination		Boolean
T.B.11	Completed year		Integer (Year)
T.B.12	Schemes original cost		Float
T.B.13	Repair cost		Float

Output 1 – Existing Tubewells

Table 2-5 Output - Tubewell

SN	Indicator		Calculation Process
W.ET.1	Population under limited water supply service level		T.B.5 + T.B.7
W.ET.2	Population under basic water supply service level	Scenario-1 (based upon treatment plan)	If no treatment is available (T.B.8 = False); T.B.4 + T.B.6 otherwise T.B.6 only
W.ET.3		Scenario-2(based upon WQ data)	Similar as Output 1 –Existing WSS related output; please see above.
W.ET.4		Decision	As long as Scenario 2 gives the result, that result is used otherwise result from Scenario 1 is used
W.ET.5	Population under safely managed water supply service level	Scenario-1 (based upon treatment plan)	If T.B.8 = True Then T.B.4 Otherwise 0
W.ET.6		Scenario-2(based upon WQ data)	Similar as Output 1 –Existing WSS related output; please see above.
W.ET.7		Decision	As long as Scenario 2 gives the result, that result is used otherwise result from Scenario 1 is used

Output 2 – Summary of Tubewells

Table 2-6 Tubewell Summary

Particulars	Surveyed Tubewells	Extrapolated tubewells	Extrapollated population	Population/HH
Number	t	(T_s)	P = (T.B.4 + T.B.5 + T.B.6 + T.B.7) * T_s/t	P/ T_s

Limited functionality	Total count of tubewells under limited water service level from W.ET.1 (t_l)	$T_l = t_l * T_s/t$	Total of W.ET.1 * T_s/t	
Basic service	Total count of tubewells under basic water service level from W.ET.4 (t_b)	$T_b = t_b * T_s/t$	Total of W.ET.4 * T_s/t	
Safely managed tubewells	Total count of tubewells under safely managed water service level from W.ET.7 (t_{sm})	$T_{sm} = t_{sm} * T_s/t$	Total of W.ET.7 * T_s/t	
Tubewell within New + Ongoing piped service area (Not existing service area)	Total count of True value in T.B.3 (t_n)	$T_n = t_n * T_s/t$	T_n * Household Size	

Output – 3 Related to cost

Table 2-7 Summary table related to cost of tubewells

Particulars	Cost	Limited Service level	Basic service level	Safely Managed service level
	(NRs.)	(NRs.)	(NRs.)	(NRs.)
Extrapolated existing investment	Total of T.B.12* T_s/t	Total of schemes original cost of tubewells which has the limited water service level * T_s/t	Total of schemes original cost of tubewells which has the basic water service level * T_s/t	Total of schemes original cost of tubewells which has the safely managed water service level * T_s/t
Extrapolated repair requirements	Total of T.B.13* T_s/t	Total of repair cost of tubewells which has the limited water service level * T_s/t	Total of repair cost of tubewells which has the basic water service level * T_s/t	Total of repair cost of tubewells which has the safely managed water service level * T_s/t

Planning

The planning for tubewells is focused on its quality advancement from basic to safely managed. Tubewells which are present inside service area of ongoing piped water supply system are expected to be replaced ultimately when the piped water project completes. Planners are required to estimate the percentage of tubewells whose service level needs to be improved and the priority of executing planned activities.

Table 2-8 Planning for Tubewell replacement

Tubewell Priority	Tubewell %	Number of Tubewell	Explanatory note
High	X	X * Ts	Planners set this percentage
Low	Y = 1 – X - Z	Y *Ts	Z is constant, so planner should rationally choose X for valid Y %
No	$Z = T_n / T_s$		Tubewell in service area of ongoing piped water supply project.

Capital Expenditure requirement for existing tubewells

Total CapEx requirement for high priority tubewells = X % of total tubewells under basic service level (T_b) from *Table 2-6 Tubewell Summary* * rate associated with tubewells for basic to safely managed conversion (Annex I -Reference Data *Table 7-1*)

Total CapEx requirement for low priority tubewells = Y % of total tubewells under basic service level (T_b) from *Table 2-6 Tubewell Summary* * rate associated with tubewells for basic to safely managed conversion (Annex I -Reference Data *Table 7-1*)

Capital Expenditure distribution for existing tubewells

The calculated total capital expenditure is distributed in planning horizon adopting the factor and starting year as per their priority as shown in *Figure 2-3*

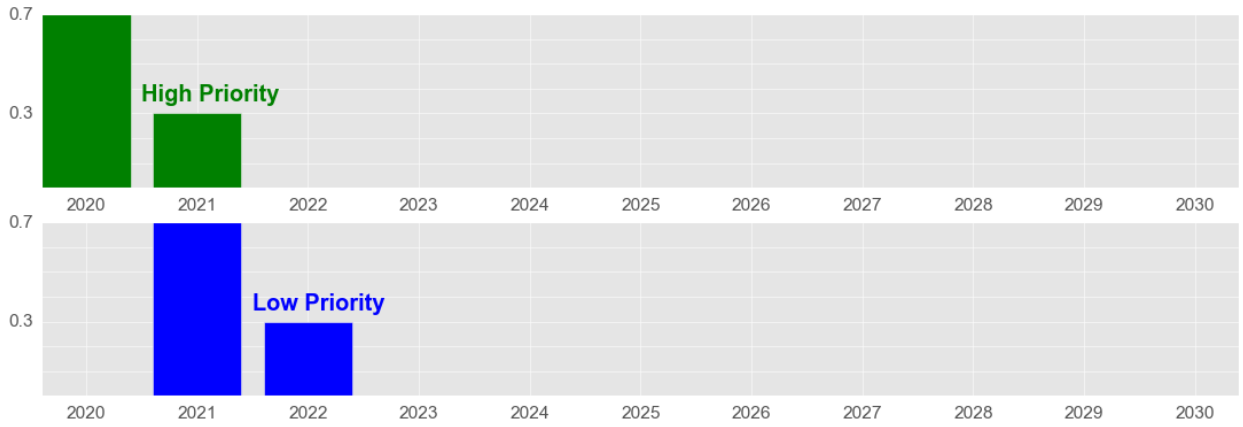

Figure 2-3 Capital investment distribution as per the priority of tubewell replacement

CapManEx Distribution for existing tubewell

For High priority:

A. **One time repair requirement** for high priority tubewells (X% of Extrapolated repair requirements (total, from Table *2-7* is distributed in planning horizon adopting the factor and starting year as shown in Figure *2-4*

B. **Annual repair requirement** is distributed annually along planning horizon (X% of Extrapolated existing investment (total, from Table *2-7*) * average of age-wise capital maintenance cost from Annex I -Reference Data Table *7-23*)
C. **The annual repair requirement for the new capital investment** (See page 19 above) is distributed from the next year of investment along planning horizon adopting same methodology as described at point B.

For Low priority:

A. **One time repair requirement** for high priority tubewells (Y% of Extrapolated repair requirements (total, from Table *2-7* is distributed in planning horizon adopting the factor and starting year as shown in Figure *2-4*
B. **Annual repair requirement** is distributed annually along planning horizon (Y% of Extrapolated existing investment (total, from Table *2-7*) * average of age-wise capital maintenance cost from Annex I -Reference Data Table *7-23*)
C. **The annual repair requirement for the new capital investment** (See page 19 above) is distributed from the next year of investment along planning horizon adopting same methodology as described at point B.

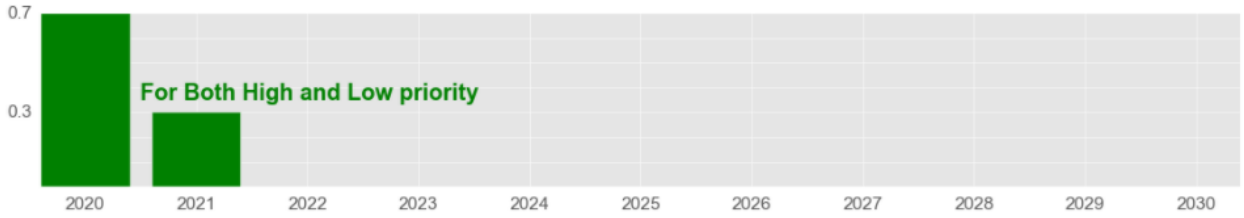

Figure 2-4 Onetime CapManEx distribution factor

Operation Expenditure (OpEx) for existing tubewell

Operation expenditure is distributed in planning horizon adopting the OpEx rate for basic and safely managed tubewells as mentioned in Annex I -Reference Data *Table 7-18*). While distributing the OpEx, completion year of system conversion project from basic to safely managed according to the priority should be taken into consideration and OpEx rate should be updated accordingly. For example,

For High priority project

1. 70 % of tubewells delivering basic water supply will be converted into safely managed system at the starting of second year of planning horizon.
2. Remaining 30% of tubewells delivering basic water supply will be converted into safely managed system at the starting of third year of planning horizon.

Direct Support (DS) for existing tube-wells

Following factors has been used in calculation of DS for existing tubewells.

$$F_{h/l} = \frac{Number\ of\ high\ /\ low\ priority\ project\ (From\ \text{Table 2-8})}{Scheme\ equivalent\ (From\ \text{Table 7-20})}$$

$X = (Training + Monitoring + TA\ cost\ From$ Table 7-20)

$$DS_{2020,High/Low} = 70\ \%\ of\ F_{h/l} * X + 2\ \%\ of\ CapEx\ in\ year\ 2020\ for\ high/low\ priority\ project + F_{h/l} * cost\ required\ for\ tool\ set\ for\ tubewell$$

$$DS_{2021,High/Low} = F_{h/l} * X + 2\ \%\ of\ CapEx\ in\ year\ 2021\ for\ high/low\ priority\ project$$

$$DS_{2022,High/Low} = F_{h/l} * X + 2\ \%\ of\ CapEx\ in\ year\ 2022\ for\ high/low\ priority\ project$$

$$DS_{2023\ to\ 2030,High/Low} = F_{h/l} * X$$

New WSS

Data Processing

Baseline Data

Following baseline data will be used in the planning of new WSS. New WSS is assumed to be safely managed and fulfill all the requirements of safely managed WSS.

Index	Data Description	Data type
N.WSS.B.1	Project Name	string
N.WSS.B.2	Scheme type	String (choice list)
N.WSS.B.3	Population	Integer
N.WSS.B.4	DPR/Feasibility report prepared	Boolean
N.WSS.B.5	Cost from DPR/Feasibility (only if DPR is prepared)	float

Cost of Planning

If DPR/feasibility report is ready, then cost as per DPR. (N.WSS.B.5), Otherwise population (N.WSS.B.3) * per capita cost according to scheme type from Annex I -Reference Data *Table 7-1*

Planning

Planning for new WSS is done by choosing the priority for project completion.

Capital Expenditure requirement and Distribution for new WSS

CapEx Requirement = Cost of Planning

The methodology adopted in CapEx distribution of existing WSS (See Page 13 above) is valid here.

Capital Maintenance Expenditure for New WSS

The project of very high priority is assumed to be completed by year 2023, similarly project of high priority is assumed to be completed by year 2025 and project of medium and low priority are assumed to be completed by year 2027 and 2030 respectively. The next year of project completion it might require the annual repair. Therefore, considering the updated age in each year of planning horizon and age wise capital maintenance cost (See Annex I -Reference Data *Table 7-23*), the annual repair requirement for newly completed project is forecasted along planning horizon.

> Annual age wise capital maintenance cost for newly completed project = Factor based upon age from *Table 7-23* * Total capital expenditure requirement (See CapEx requirement above)

Operation Expenditure for New WSS

The OpEx depends upon priority of the projects. As no projects completes before 2023 (See Table *2-9*), no OpEx is required from year 2020 to 2023. After 2023 depending upon priority and scheme type OpEx is distributed along planning horizon as per Annex I -Reference Data Table *7-40*

Table 2-9 Project Completion Year according to its priority

Priority	Expected Completion Year	OpEx starting year
Very High	2023	2024
High	2025	2026
Medium	2027	2028
Low	2030	2031

Direct Support for New WSS

The calculation of Direct support for New WSS is based on Table *7-20* of Annex I -Reference Data. Following three type of DS cost has been incurred in the plan.

Starting year of CapEx investment (As per priority)	2 % of CapEx if DPR is not ready yet DS for one-time pre construction training (See Table *7-20* from Annex I -Reference Data)
End year of CapEx investment (As per priority)	Training cost at the year of project completion Cost of tools at the year of project completion
From next year of project completion (Project completion year depends upon the priority)	Training cost /scheme/year + Monitoring cost/scheme/year + Technical assistance cost/scheme/year

Ongoing WSS

Data Processing

Baseline Data

Following baseline data is expected to be acquired for the planning of ongoing WSS

Index	Data Description	Data Type
O.WSS.B.1	Project Name	String
O.WSS.B.2	Scheme type	String (Choice List)
O.WSS.B.3	Population	Integer
O.WSS.B.4	Is DPR available?	Boolean
O.WSS.B.5	Population that will be benefited by private Tap connection	Integer
O.WSS.B.6	Treatment plants availability in the Ongoing project	Boolean
O.WSS.B.7	Project cost as per DPR	Float
O.WSS.B.8	Is Projects expenditure till 2020 Known?	Boolean
O.WSS.B.9	Project expenditure till 2020	Float
O.WSS.B.10	Project start year	Integer

Output 1 WSS ongoing project

Index	Description	Calculation
O.WSSO.1	Population that will be benefited by public Tap connection	O.WSS.B.3 – O.WSS.B.5
O.WSSO.2	Estimated project cost	If DPR/feasibility report is ready (O.WSS.B.4 = True), then cost as per DPR. (O.WSS.B.7), Otherwise population (O.WSS.B.3) * per capita cost according to scheme type from Annex I - Reference Data Table *7-1*
O.WSSO.3	Estimated expenditure %	For the projects whose expenditure is unknown, the expenditure is estimated as % of project cost (O.WSSO.2) based on the number of years that has been lapsed till base year of WASH planning from starting year of the project. (See Annex I -Reference Data Table *7-16*)
O.WSSO.4	Estimated project expenditure	O.WSSO.3 * Estimated project cost for projects whose expenditure is unknown.

Planning

Capital Expenditure (CapEx) Requirement for Ongoing WSS

1. Investment required to complete the project: O.WSSO.2 - O.WSSO.4 (CapEx1)
2. Investment required to make water supply service safely managed (CapEx2)

This consists two components:

Cost required to replace all the public connections to the service within premises = population that will be benefited by public tap (O.WSSO.1) * per capita cost according to type of scheme (see Annex I - Reference Data*Table 7-1 Per capita cost of water supply componentTable 7-1*)

Cost required for fulfilling WQI requirement = If the system doesn't have treatment unit in its design (O.WSS.B.6 = False), then required cost is population (O.WSS.B.3) * per capita cost for WQI according to scheme type (see Annex I -Reference Data*Table 7-1 Per capita cost of water supply componentTable 7-1*)

$$Total\ CapEx\ =\ CapEx1\ +\ CapEx2$$

Capital Expenditure (CapEx) Distribution for Ongoing WSS

The distribution of investment required to complete the project (CapEx1) based on the priorities is made adopting the factors as shown in Figure 2-5 below.

The investment required to make ongoing project safely managed is distributed in planning horizon adopting the factors as shown in *Figure 2-6* below.

Figure 2-5CapEx distribution factor (Investment required to complete the ongoing project)

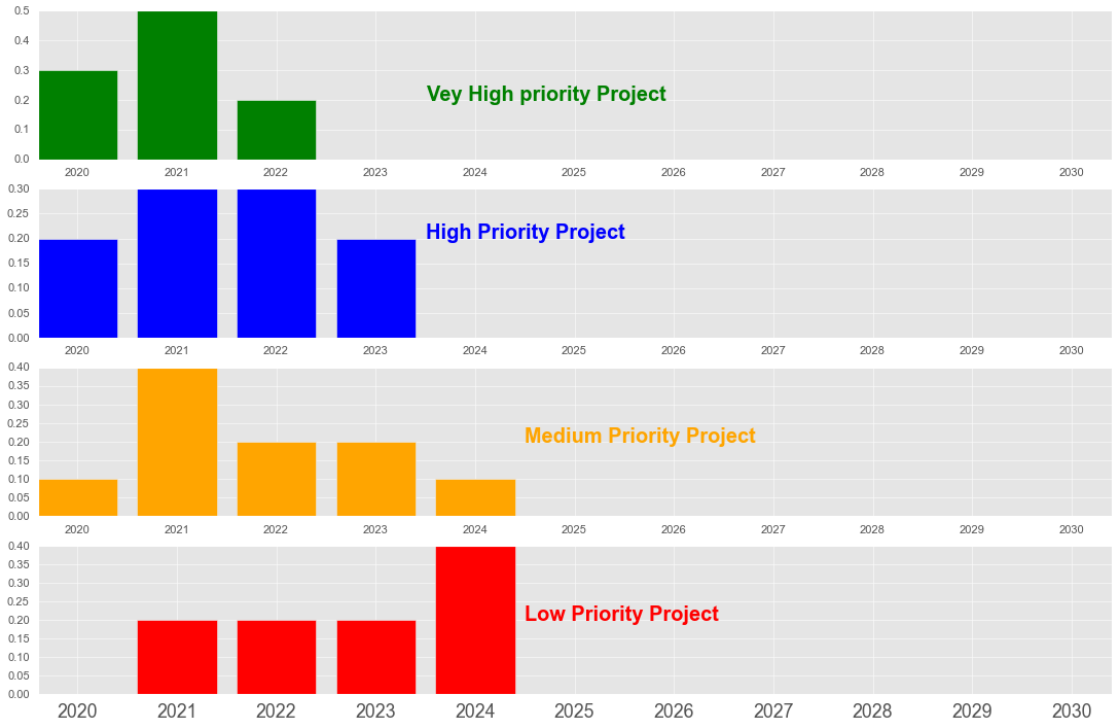

Figure 2-6 CapEx distribution factor for investment required to make ongoing water supply project safely managed

Capital Maintenance Expenditure (CapManEx in ongoing WSS)

CapManEx of ongoing project is distributed in planning horizon adopting age wise capital maintenance cost as mentioned in

Table 7-2 and *Table 7-3* of Annex I -Reference Data.

Operatio Expenditure (OpEx in ongoing WSS)

If CapManEx in particular year along planning horizon is zero then no OpEx required in that year. Otherwise OpEx = Per capita OpEx according for safely managed water supply as per the scheme type (From *Table 7-18* of Annex I -Reference Data) * total population (O.WSS.B.3)

Direct Support in Ongoing WSS

The first year of planning horizon requires 2% of investment required to make water supply service safely managed. Other Direct Support in planning horizon is distributed as per *Table 7-4* and

Table 7-5 of Annex I -Reference Data based on priority of the ongoing projects.

3. Sanitation Services

Household Sanitation

Data Processing

Baseline Data

A sample survey will be conducted to get the baseline data for the household sanitation. Sanitation module of the NWASH will be used for this purpose. Some of the information can be acquired from NWASH F&S module.

For example:

To know whether water is available in toilet or not (HSS.B.13), the NWASH system search the nearest tap in the from the household location (X, Y). If the tap is found within 50 m of household location and the functionality of the tap good, then it will be concluded that toilet has the accessibility of water.

Table 3-1 Baseline data for HH sanitation

Index	Data Description	Data Type
HSS.B.1	Household owner	String
HSS.B.2	Male population	Integer
HSS.B.3	Female Population	Integer
HSS.B.4	Is any member in household differently abled?	Boolean
HSS.B.5	GPS address (X)	Float
HSS.B.6	GPS address (Y)	Float
HSS.B.7	Toilet type	String (Choice List)
HSS.B.8	Is toilet Private	Boolean
HSS.B.9	Fecal management option	String (Choice List)
HSS.B.10	Presence of handwashing facility	Boolean
HSS.B.11	Presence of Soap near to handwashing facility	Boolean
HSS.B.12	is toilet disable friendly?	Boolean
HSS.B.13	Presence of water in toilet	Boolean

Output 1 – HH Sanitation

From the baseline information, some planning focused output can be derived.

Table 3-2 Output 1 - Household Sanitation

Index	Output	Calculation Process
HHS.O.1	Total Population	HSS.B.2 + HHS.B.3
HHS.O.2	Status	The status of the sanitation facilities of HH has been divided into five categories; **No toilet, Limited, Basic, Unimproved and Safely managed** The process of categorizing has been explained in Table *3-3* below.
HHS.O.3	Existing Asset cost	
HHS.O.4	Improvement cost to convert toilet with septic tank and focusing differently able people	
HHS.O.5	Improvement cost Handwashing facility	

Table 3-3 Status identification algorithm for HH sanitation

Index	Status	Identification Process
HSS.O.Status.1	No Toilet	HHS.B.7 = No then status is 'No Toilet'
HSS.O.Status.2	Unimproved	If toilet type (HHS.B.7) = Hanging or Bucket, then the status is classified as unimproved.
HSS.O.Status.3	Limited	If toilet type (HHS.B.7) is other than Hanging or Bucket and toilet is not private (HHS.B.8 = False) then classified as limited.
HSS.O.Status.4	Safely Managed	If following conditions are satisfied then the household sanitation can be classified as 'safely managed' a) Toilet type (HHS.B.7) is other than Hanging or Bucket and b) Toilet is private (HHS.B.8 = True) and c) Presence of handwashing facility (HHS.B.10) = True and d) Presence of soap near to handwashing facility (HSS.B.11) = True and e) Presence of water in toilet (HSS.B.13) = True
HSS.O.Status.5	Basic	Otherwise the status is basic

Table 3-4 Output 2 Household Sanitation

Parameters	Value
Total population	Total Population of the Municipality
Total HH	Total Household within municipality
Extrapolation factor	Total Household / Considered household (Sample Size)

Table 3-5 Output 3 - Household Sanitation

Sanitation service standard	Sampling		Extrapolated		
	HH	Population	HH	Population	Population per HH
Safely managed	Will be segregated from baseline according to status classified in *Table 3-3* above.	Will be segregated from baseline according to status classified in *Table 3-3* above.	Extrapolation factor * Sample HH of respective service standard	Extrapolation factor * Sample HH of respective service standard	Population /HH
Basic					
Limited					
Unimproved					
No toilet					
Total	Sum of all	Sum of all	Sum of all	Sum of all	Average of all

Planning

The planners can select the number of years to make toilet safely managed from HH side. The options available are 1, 2, 3, 4,5 and 6 years. The CapEx, CapManEx, OpEx etc depends

CapEx

CapManEx

CapManEx of existing Asset

CapManEx of New Asset

OpEx HH Sanitation

Sanitation & Hygiene

Solid waste

DS

Existing Sanitation System

Data Processing

Baseline Data

Following data will be acquired from sanitation module of NWASH as baseline data for existing sanitation system planning.

Table 3-6 Baseline data (Existing Sanitation)

Index	Data Description	Data Type
ESS.B.1	Name	String
ESS.B.2	Type (FSM, WWTP with Sewer, SWM)	String (Choice List)
ESS.B.3	Household	Integer
ESS.B.4	Population	Integer
ESS.B.5	Completed year	Integer (Year)
ESS.B.6	Asset value of conveyance at completed year (As per Detailed estimate)	Float
ESS.B.7	Is treatment plant available	Boolean
ESS.B.8	Asset value of treatment unit if available at completed year	Float
ESS.B.9	Repair condition of conveyance	String (Choice list)
ESS.B.10	Repair condition of treatment plant	String (Choice list)

Output 1 – Existing Sanitation

Table 3-7 Output 1 - Existing Sanitation

Index	Output		Calculation Process
ESS.O.1	Scheme Age		Calculated from completed year
ESS.O.2	If DPR is available	Estimated Asset value of conveyance	If Asset value of conveyance (ESS.B.6) is not available, then calculation cannot be made, otherwise $ESS.B.6 * (1 + inflation)^{ESS.O.1}$ – See Table *7-29*
ESS.O.3		Estimated Asset value of treatment unit	If ESS.B.7 = False, then asset value = 0, if ESS.B.7 = True but ESS.B.8 is not available, then calculation

Index	Output		Calculation Process
			cannot be made, otherwise $ESS.B.8 * (1 + inflation)^{ESS.O.1}$
ESS.O.4		Total value	Sum of ESS.O.2 and ESS.O.3
ESS.O.5	If DPR is not available	Total value	Calculation is made according to type of sanitation system and total per capita cost as mentioned in Annex I -Reference Data Table *7-30* (per capita cost * population (ESS.B.4)) – if treatment facility is not available the per capita cost of conveyance is taken as total per capita cost
ESS.O.6		Estimated Asset value of conveyance	Calculation is made according to type of sanitation system and per capita conveyance cost as mentioned in Annex I -Reference Data Table *7-30* (per capita cost * population (ESS.B.4))
ESS.O.7		Estimated Asset value of treatment unit	ESS.O.5 – ESS.O.6
ESS.O.8	Decision (Asset Value)	Total Value	First priority is given to ESS.O.2, ESS.O.3 and ESS.O.4. If these values are not available, then estimated cost in ESS.O.5, ESS.O.6 and ESS.O.7 are adopted
ESS.O.9		Estimated Asset value of conveyance	
ESS.O.10		Estimated Asset value of treatment unit	
ESS.O.11	Total CapEx required		If existing system doesn't have treatment facility (ESS.B.7 = False) then CapEx will be required to construct treatment facility. Per capita cost of treatment facility * population (See Annex I - Reference Data Table *7-30*)
ESS.O.12	Repair required	Conveyance	Calculated as per repair condition of conveyance. According to the condition the repair fraction is adopted from Table *7-31* and calculation is made based on existing asset value of conveyance (ESS.O.9 * repair fraction)
ESS.O.13		Treatment plant	If treatment unit is not available in the existing system, no repair cost is required otherwise Calculation is made as per repair condition of treatment. According to the condition the repair fraction is adopted from Table *7-31* and calculation is made based on existing asset value of treatment (ESS.O.10 * repair fraction)
ESS.O.14		Total	Total of ESS.O.11 and ESS.O.12

Planning

Depending upon urgency of execution and availability of resources the priority for the project can be chosen and accordingly investment requirements can be forecasted. There are four options to chose the priority; 'Very High', 'High', 'Medium' and 'Low'

Capital Expenditure Distribution in Existing SS (CapEx)

The total capital Expenditure requirement is distributed along planning horizon adopting the factors according to the priority of the project (Factors are chosen as per Figure *2-1* CapEx distribution based on project priority)

Capital Maintenance Expenditure (CapManEx) in existing SS

One-time repair requirement (ESS.O.14) is distributed in planning horizon based upon priority of the project (See **Error! Reference source not found.**)

Annual repair requirement is distributed in planning horizon adopting the agewise cap maintenance cost form Table *7-23*, every year the age is updated and factor is readjusted. (ESS.O.8 * factor)

Annual age wise capital maintenance cost for newly completed project is considered from next year of the project completion.Once the project completes the annual CapManEx will be calculated as = Factor based upon age from *Table 7-23* * Total capital expenditure requirement (ESS.O.11)

Note - Project completion year depends upon the priority and

Operating Expenditure (OpEx) in existing SS

The operation expenditure is calculated and distributed in planning horizon based upon the per capita OpEx of different type of sanitation system. (See Annex I -Reference Data Table *7-22*). If treatment unit is not available in the existing sanitation facility, then capital investment is made to build treatment unit as described above. Once the construction for treatment unit is completed, the OpEx will be required for this new facility. Considering this, OpEx calculation is updated from the next year, if in any year some project completes.

Direct Support (DS) in existing Sanitation System

Direct support cost in planning horizon is distributed as per Annex I -Reference Data Table *7-21*.

Each year in planning horizon	Training cost /scheme/year + Monitoring cost/scheme/year + Technical assistance cost/scheme/year
Starting year of CapEx investment (As per priority)	2 % of CapEx
End year of CapEx investment (As per priority)	DS for tools

New Sanitation System

It has been assumed that NSS will have treatment unit as its component.

Data Processing

Baseline Data

Table 3-8 Baseline data for NSS

Index	Data Description	Data Type
NSS.B.1	System	String
NSS.B.2	Type	String (Choice List)
NSS.B.3	Household	Integer
NSS.B.4	Population	Integer
NSS.B.5	Total Estimate as per DPR	Float

Output 1 – New Sanitation System

Table 3-9 Output 1 - New Sanitation System

Index	Output	Process
NSS.O.1	Estimate as per per capita	Calculation is made according to type of sanitation system and total per capita cost as mentioned in Annex I -Reference Data *Table 7-30*
NSS.O.2	Decision	If Total Estimate as per DPR (NSS.B.5) is available, NSS.B.5 is adopted, otherwise Estimate as per capita (NSS.O.1) is adopted

Capital Expenditure (CapEx) for New Sanitation System

The total capital Expenditure requirement (NSS.O.2) is distributed along planning horizon adopting the factors according to the priority of the project (Factors are chosen as per *Figure 2-1 CapEx distribution based on project priority*)

Capital Maintenance Expenditure (CapManEx) for New Sanitation System

Annual age wise capital maintenance cost after completion of project is considered from next year of the project completion. Project completion year depends upon the priority of the project. Once the project completes the annual CapManEx will be calculated as = Factor based upon age from *Table 7-23* * Total capital expenditure requirement (ESS.O.11). The age of the project is updated every next year.

Operation Expenditure (OpEx) for NSS

OpEx is required when sanitation project completes. The OpEx is calculated and distributed in planning horizon taking per capita operation cost from Annex I -Reference Data *Table 7-22*

Direct Support for NSS

Direct support will be needed in different phases of planning horizon. For details please see Annex I - Reference Data *Table 7-21*.

Starting year of CapEx investment (As per priority)	2 % of CapEx if DPR is not ready yet DS for one time pre construction training
End year of CapEx investment (As per priority)	DS for tools
From next year of project completion (Project completion year depends upon the priority)	Training cost /scheme/year + Monitoring cost/scheme/year + Technical assistance cost/scheme/year

Ongoing Sanitation System

Data Processing

Baseline Data

Table 3-10 Baseline data for OSS

Index	Data Description	Data type
OSS.B.1	Project Name	String
OSS.B.2	Scheme type	String (Choice list)
OSS.B.3	Household	Integer
OSS.B.4	Population	Integer
OSS.B.5	Is DPR available?	Boolean
OSS.B.6	Project cost as per DPR	Float
OSS.B.7	Is Projects expenditure till 2020 Known?	Boolean
OSS.B.8	Project expenditure till 2020	Float
OSS.B.9	Project start year	Integer

Output 1 – Ongoing Sanitation System

Table 3-11 Output 1 - OSS

Index	Output	Process
OSS.O.1	Estimated project cost	If DPR is available (OSS.B.5 = True) then the project cost according to DPR, otherwise cost is estimated using per capita cost as mentioned in Annex I -Reference Data Table *7-30*
OSS.O.2	Estimated expenditure %	For the projects whose expenditure is unknown, the expenditure is estimated as % of project cost (OSS.O.1) based on the number of years that has been lapsed till base year of WASH planning from starting year of the project. (See Annex I -Reference Data Table *7-16*)
OSS.O.3	Estimated project expenditure	• OSS.O.2 * Estimated project cost for projects whose expenditure is unknown. • OSS.B.9 for project whose expenditure is known (OSS.B.7 = True)
OSS.O.4	Investment required to complete the project	OSS.O.1 – OSS.O.3

Capital investment distribution (CapEx) for OSS

Capital investment requirement (OSS.O.4) for the ongoing project is distributed along planning horizon taking factors as per Annex I -Reference Data Table *7-6*.

Capital Maintenance Expenditure (CapManEx) for OSS

Capital Maintenance cost will be required once the project completes. CapManEx is calculated and distributed along planning horizon taking factors as per Annex I -Reference Data Table *7-6*.

CapManEx = factor * total estimated project cost (OSS.O.1)

Operation Expenditure (OpEx) for OSS

OpEx is required when sanitation project completes. The OpEx is calculated and distributed in planning horizon taking per capita operation cost from Annex I -Reference Data Table *7-22*. The project completion year depends upon the priority of the project.

Direct Support (DS) for OSS

Direct support will be distributed in planning horizon as per Annex I -Reference Data

Table *7-8*. In addition to it, if DPR is not ready yet, 2% of total estimated cost of the project will be invested as DS at the beginning year of implementation.

4. WASH in School

WASH in Schools not only promotes hygiene and increases access to quality education but also supports national and local interventions to establish equitable, sustainable access to safe water and basic sanitation services in schools. (UNICEF, 2012). Thus, it is a vital component of Municipal WASH plan. This chapter describe overall process of WASH planning in school.

Data Processing

Baseline WASH Data

Table 4-1 Details of Baseline Data (Survey Data)

SN	Data Description		Data Type
B- 1	School name		String
B- 2	School category		String (Choice List)
B- 3	Students	Boys (3.1)	Integer
		Girls (3.2)	Integer
B- 4	Staffs	Male (4.1)	Integer
		Female (4.2)	Integer
B- 5	Existing Water Supply Details	Water supply ownership of main drinking water source (5.1)	String (Choice List)
		Water Supply system (5.2)	String (Choice List)
		Adequate Water availability (5.3)	Boolean
		Fetching time (< 30 m) (5.4)	Boolean
		water tank (5.5)	Boolean
		Capacity of water tank (5.6)	Integer
		Treatment unit available (5.7)	Boolean
		condition of treatment unit (5.8)	String (Choice List)
B- 6	Taps (in number)	Physically intact (excluding disables friendly taps) (6.1)	Integer
		Number of physically intact disable friendly taps (6.2)	Integer
		Minor repair (6.3)	Integer
		Major repair (6.4)	Integer
		Reconstruction (6.5)	Integer

SN	Data Description		Data Type
B- 7	Existing Sanitation and hygiene Details	Fecal contamination (7.1)	Boolean
		Priority chemical contamination (7.2)	Boolean
		Number of usable toilets for boys (7.3)	Integer
		Total number of toilets for girls (7.4)	Integer
		Number of usable toilets for girls with MHM facility (7.5)	Integer
		Number of usable toilets for girls without MHM facility (7.6)	Integer
B- 8	Number of usable common toilet		Integer
B- 9	Number of usable disable friendly toilet		Integer
B- 10	Number of toilets with minor repair required		Integer
B- 11	Number of toilets with major repair required		Integer
B- 12	Number of toilets with reconstruction required		Integer
B- 13	Number of usable handwashing facilities for boys		Integer
B- 14	Number of usable handwashing facilities for girls		Integer
B- 15	Number of usable common handwashing facilities		Integer
B- 16	Number of usable disable friendly handwashing facilities		Integer
B- 17	Soap present in Handwashing facility		Boolean
B- 18	MHM products provided		Boolean
B- 19	MHM education given		Boolean
B- 20	Number of handwashing facilities with minor repair required		Integer
B- 21	Number of handwashing facilities with major repair required		Integer
B- 22	Number of handwashing facilities with reconstruction required		Integer
B- 23	Incinerator for MHM available		Boolean
B- 24	Condition of incinerator		String (Choice List)

Output 1 – Water Related Output

Table 4-2 Water Related Output in School WASH

SN	Output	Calculation Process
WRO - 1	Total population	Summation (3) & (4)
WRO - 2	Improved/unimproved	From Existing Water Supply Details (5.2 & 5.4), the system is categorized as improved or unimproved. For details refer to Annex I -Reference Data *Table 7-33 Conditions for Improved Water facilities*
WRO - 3	Capacity of tank required	Population * Water Supply demand rate (12 L per student per day has been assumed)
WRO - 4	Status	Status has been divided into four categories No service, Advanced, Basic and Limited. (For details Pease see Table 4-3 Status identification Algorithm (Related to Output 1 , Water Related Output - *School)*
WRO - 5	Existing Total number of taps	Summation of All the Taps (B- 6)
WRO - 6	Required number of taps as per norms	Population covered by 1 Handwashing tap as per norms of Ministry of education is 15 – (WRO – 1) / 15
WRO - 7	Additional number of taps required	(WRO – 6) – (WRO – 5) – Negative tap numbers, if computed will be rounded up to Zero (0)
WRO - 8	final number of taps	(WRO – 5) + (WRO – 7)

Table 4-3 Status identification Algorithm (Related to Output 1 , Water Related Output - School)

SN	Status Type	Identification Algorithm
WRO - Status 1	No Service	Water supply ownership of main drinking water source (B-5 - 5.1) – No System Present
WRO - Status 2	Advanced	Adequate water availability (B-5 - 5.3) – True and Output 1 Water Related - (WRO– 2) – Improved and Output 1 Water Related (WRO – 3) > = Capacity of Water Tank (B – 5 – 5.6) and Physically intact (excluding disables friendly taps) (B – 6 – 6.1) > 0 and Fecal contamination (B – 7 – 7.1) – False and Priority chemical contamination (B – 7 – 7.2) – False
WRO - Status 3	Basic	Adequate water availability (B-5 - 5.3) – True and Output 1 Water Related - (WRO – 2) – Improved
WRO - Status 4	Limited	Otherwise

The baseline data will be collected using NWASH mobile application. By procession collected raw data, following output can be generated. The assumptions and process of calculation has been described here in the tabular form.

Output 2 – Sanitation Related Output

Table 4-4 Sanitation Related Output in School WASH

SN	Output	Calculation Process
SRO - 1	Status	Status has been divided into four categories No service, Advanced, Basic and Limited. (For details Pease see Table 4-5 Status identification Algorithm (Related to Output 2, Sanitation Related Output, *School)*
SRO - 2	Existing number of toilets for girls	Total Numbers of Toilets for girls (B – 7 – 7.4)
SRO - 3	Existing number of toilets for boys	Number of usable toilets for boys (B – 7 – 7.3) + Number of usable toilets for girls with or without MHM facility [(B – 7 – 7.5) + (B – 7 – 7.6)] + Number of usable common toilet (B-8) + Number of usable disable friendly toilet (B – 9) + Number of toilets with minor repair required (B-10) + Number of toilets with major repair required (B- 11) + Number of toilets with reconstruction required (B-12)] – Existing number of toilets for girls (SRO – 2)
SRO - 4	Required number of toilets for boys	Population covered by 1 Toilet as per norms of Ministry of education is 50; Male Population [(B – 3 – 3.1) + (B – 4 – 4.1)] / 50
SRO - 5	Required number of toilets for girls	Population covered by 1 Toilet as per norms of Ministry of education is 50; Female Population [(B – 3 – 3.2) + (B – 4 – 4.2)] / 50
SRO - 6	Additional number of toilets required for girls	(SRO – 5) – (SRO – 2) Negative numbers, if computed will be rounded up to Zero (0)
SRO - 7	Additional number of toilets required for boys	(SRO -4) – (SRO – 3) Negative numbers, if computed will be rounded up to Zero (0)
SRO - 8	Final number of toilets of boys	(SRO -3) + (SRO – 7)
SRO - 9	Final number of toilets for girls	(SRO – 4) + (SRO – 6)

Table 4-5 Status identification Algorithm (Related to Output 2, Sanitation Related Output, School)

SN	Status Type	Identification Algorithm
SRO - Status 1	Advanced	Number of usable toilets for boys (B – 7 – 7.3) > 0 and Number of usable toilets for girls with MHM facility (B – 7 – 7.5) > 0 and Number of usable disable friendly toilet (B – 9) > 0
SRO - Status 2	Basic	Number of usable toilets for boys (B – 7 – 7.3) > 0 and Number of usable toilets for girls with or without MHM facility [(B – 7 – 7.5) + (B – 7 – 7.6)] > 0
SRO - Status 3	Limited	[Number of usable common toilet (B-8) + Number of toilets with minor repair required (B-10) + Number of toilets with major repair required (B- 11) + Number of toilets with reconstruction required (B-12)] > 0
SRO - Status 4	No Service	No toilets available

Output 3 – Hygiene Related Output

Table 4-6 Hygiene Related Output in School WASH

SN	Output	Calculation Process
HRO - 1	Status	Status has been divided into four categories No service, Advanced, Basic and Limited. (For details Pease see Table 4-7 Status Identification Algorithm (Related to Output 3, Hygiene Related Output, *School)*

Table 4-7 Status Identification Algorithm (Related to Output 3, Hygiene Related Output, School)

SN	Status Type	Identification Algorithm
HRO- Status 1	Advanced	Adequate water Availability (B – 5 – 5.3) – True and Output 1 Water Related (WRO – 3) > = Capacity of Water Tank (B – 5 – 5.6) and Soap present in Handwashing facility (B – 17) – True and MHM products provided (B – 18) – True and MHM education given (B – 19) – True and Number of usable disable friendly Handwashing facilities (B – 16) > 0 and Incinerator for MHM available – True
HRO- Status 2	Basic	Adequate water Availability (B – 5 – 5.3) – True > 0 and Soap present in Handwashing facility (B – 17) – True and [(B – 13) + (B – 14) + (B – 15) + (B – 16)] > 0
HRO- Status 3	Limited	Adequate water Availability (B – 5 – 5.3) – True > 0 and

		[(B – 13) + (B – 14) + (B – 15) + (B – 16) + (B – 20) + (B – 21) + (B – 22)] > 0
HRO- Status 4	No Service	No Hygiene Related Service available

Planning

This section illustrates the assumptions, calculations etc. involved in the planning of WASH in school. The Municipality in wider consultation with the concerned stakeholders will choose the 'status' and 'priority' for WASH in schools. The calculations will be performed based on the chosen 'status' and 'priority' of the WASH services and an investment requirement for next ten years will be forecasted.

The planner can plan for 'Basic' or 'Advanced' WASH facilities in the school. The priority for the Planning can be chosen as 'Very High', 'High', 'Medium' or 'Low' according to the urgency and available resources.

Calculation of existing asset value

This estimates the total asset value of WASH facilities in school.

Table 4-8 Existing Asset Value of WASH facilities

SN	Item	Calculation
EAV.1	Asset value of water supply	Addition of following items gives total asset value of water Supply: 1. Capacity of Water Tank (B – 5 – 5.6) * Water Tank per L cost (From Annex I -Reference Data *Table 7-35*) 2. Asset Value of Treatment unit (If treatment unit is available, its asset value is assumed to be related to type of school (See Annex I -Reference Data *Table 7-36*) 3. Asset Value of Physically intact taps (excluding disable friendly taps) – Number of taps (Sum of all taps B – 6 – 6.1, 6.3, 6.4 and 6.5) * cost per tap stand rate (See Annex I -Reference Data *Table 7-37*) 4. Asset Value of Physically intact disable friendly taps = Numbers * rate (See Annex I -Reference Data *Table 7-37*)
EAV.2	Asset value of sanitation	1. Existing Numbers of toilets for girls (SRO – 2) / N * Rate of girls' toilet 2. Existing Numbers of toilets for boys (SRO – 3)/N * Rate of boys' toilet 3. Number of usable disable friendly toilet (B – 9) * Rate (See Annex I -Reference Data *Table 7-37* for more details)
EAV.3	Asset value of hygiene facilities	Number of handwashing facilities available (B-13 + B-14 + B-15 + B-16 + B-20 + B-21 + B-22) * Rate of handwashing facility (See Annex I -Reference Data *Table 7-37* for more details)
EAV.4	Asset value of solid waste management	Asset Value of incinerator (NRS 20000 taken) [See Annex I -Reference Data *Table 7-37*]
EAV.5	Total	EAV.1 + EAV.2 + EAV.3 + EAV.4

Required Capital Expenditure (CapEx) for WASH in School

To achieve the planned status of WASH facilities in school, an effective investment plan is required. This section describes the calculation process and assumptions adopted in estimating capital investment requirement.

Table 4-9 Capital Expenditure Requirement

SN	Items	Calculation Process	Elaboration
CE.1	Water tank cost	Rate * additional Capacity (WRO-3 – B-5-5.6)	Estimated only when Advanced WASH facility status in school is deemed
CE.2	Treatment unit cost	Treatment unit cost for respective school type is taken from reference data. ((See Annex I -Reference Data *Table 7-36*)	Estimated only when there is no existing treatment unit available and Advanced WASH facility status in school is deemed
CE.3	Additional Tap cost	Additional number of taps required (WRO – 7) * Tap construction cost from reference data (See Annex I -Reference Data *Table 7-37* for detail)	Estimated for both 'Advanced' and 'Basic' status condition
CE.4	Cost of making at least one tap disable friendly	Cost of making disable friendly tap is taken from reference data (See Annex I -Reference Data *Table 7-37* for detail)	Estimated only when Advanced WASH facility status in school is deemed and if school doesn't have physically intact such tap in its existing WASH facility.
CE.5	Additional toilet block required for boys	Additional Numbers of block required * Rate from reference data (See Annex I -Reference Data *Table 7-37* for detail)	Estimated for both 'Advanced' and 'Basic' status condition
CE.6	Additional toilet block required for girls	Additional Numbers of block required * Rate from reference data (See Annex I -Reference Data *Table 7-37* for detail)	Estimated for both 'Advanced' and 'Basic' status condition
CE.7	Cost of making at least one toilet disable friendly	Cost of making disable friendly toilet from reference data (See Annex I -Reference Data *Table 7-37* for detail)	Estimated for both 'Advanced' and 'Basic' status condition and if (B – 9) = 0
CE.8	cost of making handwashing block	Cost for making one handwashing block (taken from reference data) (See Annex I -Reference Data *Table 7-37* for detail)	Estimated if Number of existing handwashing block = 0
CE.9	cost of making handwashing block disable friendly	Cost of making one handwashing block disable friendly (taken from reference data) (See Annex I -Reference Data *Table 7-37* for detail)	Estimated only when Advanced WASH facility status in school is deemed and number of existing disable friendly handwashing block (B – 16) = 0
CE.10	Cost of making incinerator	Cost of making one incinerator is taken from reference data (See Annex I -Reference Data *Table 7-37* for detail)	Estimated if Incinerator for MHM available (B – 23) = False
CE.11	Total cost	Sum (CE.1 to CE.10)	

Repair Requirement for WASH in School

Table 4-10 Repair Requirement One time and Annual

SN	Item	Calculation Process	Note
RR.1	One-time repair required in water supply	[Number of taps requiring minor repair (B – 6 – 6.3) *Repair Fraction for Minor + Number of taps requiring major repair (B – 6 – 6.4) * Repair Fraction for Major + Number of taps requiring reconstruction (B – 6 – 6.5) * Repair Fraction for Reconstruction] * Tap construction cost + Treatment unit Condition* Respective Repair Fraction * Respective rate for type of school	Repair Fraction and Rates are taken from reference data. Please see Annex I -Reference Data *Table 7-32*, *Table 7-36*, *Table 7-37* and *Table 7-58* for more details.
RR.2	One-time repair required in sanitation	[Number of toilets requiring minor repair (B – 10) *Repair Fraction for Minor + Number of toilets requiring major repair (B – 11) * Repair Fraction for Major + Number of toilets requiring reconstruction (B – 12) * Repair Fraction for Reconstruction] / (Number of toilets in one block) * construction cost of one block	Repair Fraction, Numbers of toilet in a block and Rates are taken from reference data. Please see the Annex I -Reference Data *Table 7-32* and *Table 7-37*
RR.3	One-time repair required in hygiene	[Number of handwashing facilities requiring minor repair (B – 20) *Repair Fraction for Minor + Number of handwashing facilities requiring major repair (B – 21) * Repair Fraction for Major + Number of handwashing facilities requiring reconstruction (B – 22) * Repair Fraction for Reconstruction] / construction cost	Repair Fraction and Rates are taken from reference data. Please see Annex I -Reference Data *Table 7-32* and *Table 7-37*
RR.4	One-time repair required in SWM	Cost requirement according to condition of incinerator (B – 24)	Rate taken form Annex I -Reference Data *Table 7-37*
RR.5	Total one-time repair required	Summation of RR.1 to RR.4	
RR.6	Total annual repair required	Average Capital Maintenance cost (in %) * Total Existing Asset Value (CE.11)	Average Capital Maintenance Cost = 2.26% Adopted (See Annex I -Reference Data *Table 7-23*)

Capital Expenditure Distribution for WASH in School

Based upon the chosen priority, the total cost of required capital expenditure is distributed yearly for next 10 years (2020 to 2030) adopting Capex factor as presented in the Annex I -Reference Data *Table 7-9 Capex Factor for WASH in institution*

CapManEx Distribution for WASH in School

This is an important component of investment planning. The capital maintenance expenditure for each year is distributed based upon the chosen priority and is the sum of following three components

1. Total One time Repair – it is distributed in the plan horizon for some chosen priority adopting the distribution fraction as mentioned in Annex I -Reference Data *Table 7-10 CapManEx Factor for WASH in institution (One-time Repair)*
2. Total annual repair required = *Table 4-10 Repair Requirement One time and Annual* (RR.6), taken constant for all years of planning horizon
3. Capital Maintenance of new facilities – it is estimated based upon the chosen priority. Capital investment requirement as calculated in *Table 4-9 Capital Expenditure Requirement* (CE.11) and Age wise capital maintenance factor from Annex I -Reference Data *Table 7-11 CapManEx factor for WASH in institution (for new facilities)*

Existing Operation Expenditure for WASH in School

Table 4-11 Existing Operation Expenditure

SN	Items	Calculation	Note
EOpEx.1	Existing OpEx WS	This is calculated by summing the cost associated with 1. VMW work which can be outsourced 2. Spare Parts 3. Water tank and treatment unit cleaning (if wash facilities in school have water tank or treatment unit or both – (*Table 4-1 Details of Baseline Data (Survey Data)* B – 5 – 5.5 = True OR B – 5 – 5.7 = True) 4. Cost associated with water quality testing if status in *Table 4-2 Water Related Output in School WASH* is 'Advanced' Total OpEx for Water Service = 1.1 * Sum (1 to 4) [10% extra to cover other unforeseen operation cost]	For associated rate of each OpEx go to Annex I -Reference Data *Table 7-40 Operation Expenditure for Water Service*
EOpEx.2	Existing OpEx Sanitation	Total number of toilets [Existing toilet for girls (SRO – 2) + Existing toilet for boys (SRO – 3)] * toilet operation expenditure See *Table 4-4 Sanitation Related Output in School WASH*	For operation expenditure per toilet go to Annex I -Reference Data *Table 7-41 Toilet Operating Expenditure for SchoolTable 7-52 Toilet Operation Expenditure for HCF (per toilet per year)*
EOpEx.3	Existing OpEx Hygiene	This is calculated by summing the cost associated with 1. Cost associated with soap = population (WRO-1) * cost of soap/population/year	For more details in operation expenditure for

SN	Items	Calculation	Note
		2. If MHM product is provided in school (B-18 = True) then the cost associated with MHM 3. If MHM education is given in school (B-19 = True) then incentive for MHM promotion Total OpEx for Hygiene = 1.1 * Sum (1 to 3) [10% extra to cover other unforeseen operation cost]	Hygiene in school, go to Annex I - Reference Data *Table 7-42 Operating Expenditure in Hygiene in School*
EOpEx.4	Existing OpEx SWM	If incineration facility is available in school (B -23 = True) then operation cost associated with SWM providing 10% extra to cover other unforeseen OpEx	Annex I -Reference Data; *Table 7-43 OpEx for Solid Waste Management in school* has the details
EOpEx.5	Total	Sum (EOpEx.1 to EOpEx.4)	

After Completion OpEx For WASH in School

Table 4-12 Operation Cost after completion of proposed WASH facilities establishment

SN	Items	Calculation	Note
ACOpEx.1	After Completion OpEx WS	If the planned status is advanced, Water supply OpEx for advanced status condition from reference data will be taken otherwise EOpEx.1 form *Table 4-11 Existing Operation Expenditure* will be used	For associated rate for OpEx for advanced go to Annex I -Reference Data *Table 7-40 Operation Expenditure for Water Service*
ACOpEx.2	After Completion OpEx Sanitation	Total number of toilets after Sanitation project completion [Final numbers of toilet for girls (SRO – 9) + Final numbers of toilet for boys (SRO – 8)] * toilet operation expenditure See *Table 4-4 Sanitation Related Output in School WASH*	For operation expenditure per toilet go to Annex I -Reference Data *Table 7-41 Toilet Operating Expenditure for School*
ACOpEx.3	After Completion OpEx Hygiene	If the planned status is advanced , This is calculated by summing the cost associated with 1. Cost associated with soap = population (WRO – 1) * cost of soap/population/year 2. Cost associated with MHM 3. Cost required for incentive for MHM promotion Total OpEx for Hygiene = 1.1 * Sum (1 to 3) [10% extra to cover other unforeseen operation cost] Otherwise,	For more details, go to Annex I - Reference Data *Table 7-42 Operating Expenditure in Hygiene in School*

SN	Items	Calculation	Note
		EOpEx.3 from *Table 4-11*	
ACOpEx.4	After Completion OpEx SWM	The operation cost associated with SWM	Annex I -Reference Data; *Table 7-43 OpEx for Solid Waste Management in school* has the details
ACOpEx.5	Total	Sum (ACOpEx.1 to ACOpEx.4)	

OpEx Distribution in planning horizon

The results from *Table 4-11*and *Table 4-12* are distributed yearly in planning horizon based upon following assumption.

Priority	Expected Completion Year
Vey High	2023 (OpEx is required after completion)
High	2025 (OpEx is required after completion)
Medium	2027 (OpEx is required after completion)

Direct Support (DS) in planning horizon

The distribution of DS in planning horizon is made considering two type of direct supports and the chosen priority.

Considered Direct Support:

1. Annual DS
2. One-time DS

The annual DS is distributed for each year of planning horizon considering the total support cost as mentioned in *Table 7-44 Table 7-44 Annual Direct Support in WASH in Schools* [Annex I -Reference Data].

The distribution of one time DS depends upon the priority and distributed as mentioned in Annex I -Reference Data *Table 7-45* and *Table 7-46*

Summary of all the investment requirement for WASH in School

Category	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**Total**
	NRs	NRs	NRs	NRs	NRs	NRs	NRs	NRs	NRs	NRs	NRs	NRs
CapEx	Capital Expenditure Distribution											
CapManEx	CapManEx Distribution											
OpEx	OpEx Distribution in planning horizon											
DS	Direct Support (DS) in planning horizon											

Dividing the total Expenditure (Sum of CapEX, CapManEx, OpEx and DS) by population, the per capita expenditure can be calculated.

5. WASH in Health Care Facility

Data Processing

Baseline WASH Data

Table 5-1 Baseline Data of HCF WASH

Index	Data Family	Sub Index	Data Description	Data Type
HCF.B.1	Health care facility Name			String
HCF.B.2	Population	2.1	Male	Integer
		2.2	Female	Integer
		2.3	Staffs	Integer
HCF.B.3	Existing Water Supply details	3.1	Water supply ownership of main drinking water source	String (Choice List)
		3.2	Water Supply system	String (Choice List)
		3.3	Adequate Water availability	Boolean
		3.4	Fetching time (< 30 min)	Boolean
		3.5	water tank	Boolean
		3.6	Capacity of water tank	Integer
		3.7	Treatment unit available	Boolean
		3.8	Condition of treatment unit	String (Choice List)
HCF.B.4	Taps condition (in number)	4.1	Physically intact (excluding disables friendly taps)	Integer
		4.2	Number of physically intact disable friendly taps	Integer
		4.3	Minor repair	Integer
		4.4	Major repair	Integer
		4.5	Reconstruction	Integer
HCF.B.5	Water quality	5.1	Fecal contamination	Boolean
		5.2	Priority chemical contamination	Boolean

Index	Data Family	Sub Index	Data Description	Data Type
HCF.B.6	Existing Sanitation details	6.1	Number of usable toilets for male	Integer
		6.2	Total number of toilets for female	Integer
		6.3	Number of usable toilets for female with MHM facility	Integer
		6.4	Number of usable toilets for staff	Integer
		6.5	Number of usable disable friendly toilet	Integer
		6.6	Number of toilets with minor repair required	Integer
		6.7	Number of toilets with major repair required	Integer
		6.8	Number of toilets with reconstruction required	Integer
HCF.B.7	Existing Handwashing details	7.1	Soap present in Handwashing facility	Boolean
		7.2	Alcohol based rub present in point of care	Boolean
		7.3	Number of usable handwashing facilities present at point of care	Integer
		7.4	Number of handwashing facilities with minor repair	Integer
		7.5	Number of handwashing facilities with major repair	Integer
		7.6	Number of handwashing facilities with reconstruction required	Integer
HCF.B.8	Existing Solid waste, hospital waste and placenta management	8.1	Number of bins	Integer
		8.2	Sharp and infectious waste separated and disposed	Boolean
		8.3	incinerator for MHM available	Boolean
		8.4	condition of incinerator for MHM	String (Choice List)
		8.5	incinerator for Hazardous waste available	Boolean
		8.6	Condition of incinerator for Hazardous waste	String (Choice List)
		8.7	Placenta pit available	Boolean
		8.8	condition of placenta pit	String (Choice List)
HCF.B.9	Environment cleaning	9.1	Protocol for environmental cleaning	Boolean
		9.2	Staff for environmental cleaning	Boolean

Output 1 – Water Related Output

Table 5-2 Water Related Output in HCF WASH

SN	Output	Calculation Process
H.WRO.1	Total population	Sum of three items: (HCF.B.2 – 2.1) +(HCF.B.2 – 2.2) + (HCF.B.2 – 2.3)
H.WRO.2	Improved/unimproved	From Existing Water Supply Details HCF.B.3 (3.2 & 3.4), the system is categorized as improved or unimproved. For details refer to Annex I -Reference Data *Table 7-33 Conditions for Improved Water facilities*
H.WRO.3	Capacity of tank required	water required for patients /staffs of healthcare facilities = 100 L assumed (Check Annex I -Reference Data *Table 7-48* for details) = H.WRO.1 * 100 (Upper nearest 1000 L)
H.WRO.4	Status	Status has been divided into three categories No service, Basic and Limited. For details see *Table 5-3*
H.WRO.5	Existing Total number of taps	Sum of Total taps in HCF.B.4
H.WRO.6	Required number of taps as per norms	As per norms one tap can serve up to 15 population (Check Annex I -Reference Data *Table 7-47* for details) – H.WRO.1/15
H.WRO.7	Additional number of taps required	If H.WRO.5 ≥ H.WRO.6 then no additional tap is required otherwise H.WRO.6 – H.WRO.5 numbers of additional tap is required.
H.WRO.8	final number of taps	H.WRO.5 + H.WRO.7

Table 5-3 Status Identification Algorithm, Water Related Output in HCF

SN	Status Type	Identification Algorithm
H.WRO.Status.1	No Service	Water supply ownership of main drinking water source (HCF.B.3-3.1) – No System Present
H.WRO.Status.2	Basic	Adequate water availability (HCF.B.3-3.3) – True and Output 1 Water Related - (H.WRO– 2) – Improved and Output 1 Water Related (H.WRO – 3) ≥ Capacity of Water Tank (HCF.B.3-3.6) and Fecal contamination (HCF.B.5-5.1) – False and Priority chemical contamination (HCF.B.5-5.2) – False
H.WRO.Status.3	Limited	Otherwise

Output 2 – Sanitation Related Output

Table 5-4 Sanitation Related Output in HCF WASH

SN	Output	Calculation Process
H.SRO.1	Status	Status has been divided into three categories No service, Basic and Limited. If HCF.B.6-6.1 > 0 and HCF.B.6-6.3 > 0 and HCF.B.6-6.4 > 0 and HCF.B.6-6.5 > 0 – The status is classified as 'Basic' If [(HCF.B.6-6.1) + (HCF.B.6-6.3) + (HCF.B.6-6.4) + (HCF.B.6-6.5)] > 0 – The status is classified as 'Limited' Otherwise status is classified as 'No Service'
H.SRO.2	Existing number of toilets for female	HCF.B.6-6.2
H.SRO.3	Existing number of toilets for male	Sum of (HCF.B.6-6.1 to HCF.B.6-6.2) – H.SRO.2 gives the total number of existing toilets for male
H.SRO.4	Required number of toilets for male	This is calculated based upon recommended bed to toilet ratio of National standard for WASH in healthcare facilities of Nepal, For male the ratio is 1:8 (1/8 * HCF.B.2-2.1) – See Annex I -Reference Data *Table 7-47*)
H.SRO.5	Required number of toilets for female	This is calculated based upon recommended bed to toilet ratio of National standard for WASH in healthcare facilities of Nepal, For male the ratio is 1:6 (1/6 * HCF.B.2-2.2) – See Annex I -Reference Data *Table 7-47*)
H.SRO.6	Additional number of toilets required for female	If H.SRO.2 ≥ H.SRO.5 then no additional toilet is required otherwise H.SRO.5 – S.WRO.2 numbers of additional toilets are required.
H.SRO.7	Additional number of toilets required for male	If H.SRO.3 ≥ H.SRO.4 then no additional toilet is required otherwise H.SRO.4 – S.WRO.3 numbers of additional toilets are required.
H.SRO.8	Final number of toilets of male	H.SRO.3 + H.SRO.7
H.SRO.9	Final number of toilets for female	H.SRO.2 + H.SRO.6
H.SRO.10	Additional number of toilets required for staffs	If HCF.B.6-6.4, Number of usable toilets for staff = 0 and (H.SRO.8 + H.SRO.9) < 4 then one number of additional toilets is required for staffs
H.SRO.11	Additional number of toilets required for people with limited mobility	If HCF.B.6-6.5, Number of usable disable friendly toilet = 0 and (H.SRO.8 + H.SRO.9 + S.SRO.10) < 4 then one number of additional toilets is required for people with limited mobility

Output 3 – Hygiene Related Output

Table 5-5 Hygiene Related Output in HCF WASH

SN	Output	Calculation Process
H.HRO.1	Status	The status is divided into three categories Basic, Limited and No-Service. For Basic status following conditions should be satisfied a) Number of usable toilets for male (HCF.B.6-6.1) > 0 b) Number of usable toilets for female with MHM facility (HCF.B.6-6.3) > 0 c) Number of usable toilets for staff (HCF.B.6-6.4) > 0 d) Number of usable disable friendly toilet (HCF.B.6-6.5) > 0 e) Number of usable handwashing facilities present at point of care (HCF.B.7-7.3) > H.WRO.1/15 (One handwashing station can serve up to 15 people – see Annex I -Reference Data *Table 7-47*) f) Alcohol based rub present in point of care (HCF.B.7-7.2) -True OR ['Soap present in Handwashing facility' (HCF.B.7-7.1) – True and 'Capacity of water tank' (HCF.B.3-3.6) ≥ H.WRO.3 and 'Adequate Water availability' (HCF.B.3-3.3) – True] For following conditions status can be classified as 'No service' (HCF.B.6-6.1) + (HCF.B.6-6.3) + (HCF.B.6-6.4) + (HCF.B.6-6.5) = 0 and (HCF.B.7-7.3) = 0 Otherwise status is 'Limited'
H.HRO.2	Additional Number of Handwashing Facilities	Existing Handwashing facilities available is sum of following (E-HWF) ➢ Number of usable handwashing facilities present at point of care (HCF.B.7-7.3) ➢ Number of handwashing facilities with minor repair (HCF.B.7-7.3) ➢ Number of handwashing facilities with major repair (HCF.B.7-7.3) ➢ Number of handwashing facilities with reconstruction required (HCF.B.7-7.3) Required Handwashing facilities is (R-HWF) ➢ H.WRO.1/15 (One handwashing station can serve up to 15 people – see Annex I -Reference Data *Table 7-47*) If R-HWF > E-HWF then, Additional Number of Handwashing facilities would be (R-HWF) – (E-HWF)
H.HRO.3	Final Number of Handwashing Facilities	E.HWF + H.HRO.2

Output 4 – SWM related output

Table 5-6 Solid Waste Management related output in HCF WASH

SN	Output	Calculation Process
H.SwmRO.1	Status	The status is divided into three categories Basic, Limited and No-Service. For **Basic** status following conditions should be satisfied: a) Number of bins (HCF.B.8-8.1) ≥ 3 b) Sharp and infectious waste separated and disposed (HCF.B.8-8.1) - True For **Limited** status following conditions should be satisfied: a) Number of bins (HCF.B.8-8.1) = 2 b) Sharp and infectious waste separated and disposed (HCF.B.8-8.1) - True Otherwise **'No-Service'**

Output 5 – Environmental Cleaning related output

Table 5-7Environmental Cleaning Related output in HCF WASH

SN	Output	Calculation Process
H.ERO.1	Status	The status is divided into three categories Basic, Limited and No-Service. For **'Basic'** status following conditions should be satisfied: a) Adequate Water availability (HCF.B.3-3.3) – True b) Protocol for environmental cleaning (HCF.B.9-9.1) – True c) Staff for environmental cleaning (HCF.B.9-9.2) - True Following situations leads to **'No-Service'** status a) Protocol for environmental cleaning (HCF.B.9-9.1) – False b) Staff for environmental cleaning (HCF.B.9-9.2) - False Otherwise **'Limited'**

Planning

This section illustrates the assumptions, calculations etc. involved in the planning of WASH in Health Care Facility. The planner chooses the 'priority' for WASH in HCF. The calculations will be performed based on the chosen 'priority' of the WASH services and an investment requirement for next ten years will be forecasted.

The priorities are 'Very High', 'High', 'Medium' or 'Low' according to the urgency and available fund.

Calculation of existing asset value

Table 5-8 Existing Asset Value of HCF

SN	Item	Calculation
H.EAV.1	Asset value of water supply	Addition of following items gives total asset value of water Supply: 5. Capacity of Water Tank (HCF.B.3-3.6) * Water Tank per L cost (From Annex I -Reference Data *Table 7-35*) 6. Average treatment unit cost of healthcare facilities (If treatment unit is available, its asset value is taken into consideration (Annex I -Reference Data *Table 7-48*) 7. Asset Value of Physically intact taps (excluding disable friendly taps) – Number of taps (Sum of HCF.B.4-4.1, 4.3, 4.4, 4.5) * per tap stand rate (See Annex I -Reference Data *Table 7-37*) 8. Asset Value of Physically intact disable friendly taps - Numbers * rate (See Annex I -Reference Data *Table 7-37*)
H.EAV.2	Asset value of sanitation	[Existing number of toilets for female (H.SRO.2) + Existing number of toilets for male (H.SRO.3)] * rate + Number of usable disable friendly toilet (HCF.B.6-6.5) * rate (Rate from Annex I -Reference Data *Table 7-48*)
H.EAV.3	Asset value of hygiene facilities	Number of handwashing facilities available (HCF.B.7-7.3 to HCF.B.7-7.6) * Rate of handwashing facility (See Annex I -Reference Data *Table 7-37*)
H.EAV.4	Asset value of solid waste management	The Asset value of following gives the total asset value of SWM. a) If incinerator for MHM available (HCF.B.8-8.3) = TRUE, then asset value of incinerator b) If incinerator for Hazardous waste available (HCF.B.8-8.5) = TRUE, then asset value of incinerator c) If placenta pit available (HCF.B.8-8.7) = TRUE then asset value of placenta pit. (See Annex I -Reference Data*Table 7-37* and *Table 7-48*)
H.EAV.5	Total	H.EAV.1 + H.EAV.2 + H.EAV.3 + H.EAV.4

Required Capital Expenditure

Table 5-9 Capital Expenditure Requirement in HCF

SN	Items	Calculation Process	Elaboration
H.CE.1	Water tank cost	Rate * additional Capacity (H.WRO-3 – HCF.B.3-3.6)	
H.CE.2	Treatment unit cost	Treatment unit cost for HCF is taken from reference data. (Annex I -Reference Data *Table 7-48*)	Treatment unit cost is computed if existing facilities don't have treatment unit (HCF.B.3-3.7 = False)
H.CE.3	Additional Tap cost	Additional number of taps required (H.WRO.7) * Tap construction cost from reference data	

SN	Items	Calculation Process	Elaboration
		(See Annex I -Reference Data *Table 7-37* for detail)	
H.CE.4	Cost of making at least one tap disable friendly	Cost of making disable friendly tap is taken from reference data (See Annex I -Reference Data *Table 7-37* for detail)	The cost is computed if existing facilities don't have any disable friendly tap (HCF.B.4-4.2 = 0)
H.CE.5	Additional toilet required for male	Additional Numbers of toilet required for male (H.SRO.7) * Rate from reference data (See Annex I -Reference Data *Table 7-48* for detail)	
H.CE.6	Additional toilet block required for female	Additional Numbers of block required for female (H.SRO.6) * Rate from reference data (See Annex I -Reference Data *Table 7-48* for detail)	
H.CE.7	Cost of making at least one toilet disable friendly	Cost of making disable friendly toilet from reference data (See Annex I -Reference Data *Table 7-48* for detail)	The cost is computed if existing facilities don't have any disable friendly toilet available. (HCF.B.6-6.5 = 0)
H.CE.8	cost of making handwashing facilities in point of care	Additional Handwashing facilities required (H.HRO.2) * Rate (See Annex I -Reference Data *Table 7-48* for detail)	
H.CE.9	Cost of making incinerator for MHM	Cost of making incinerator for MHM facility (See Annex I -Reference Data *Table 7-37* for detail)	The cost is computed if existing facilities don't have MHM incinerator (HCF.B.8-8.3 = False)
H.CE.10	Cost of making incinerator for hazardous waste	Cost of making incinerator for hazardous waste (See Annex I -Reference Data *Table 7-37* for detail)	The cost is computed if existing facilities don't have such incinerator (HCF.B.8-8.5 = False)
H.CE.11	Cost of making placenta pit	Cost of Making Placenta pit (See Annex I -Reference Data *Table 7-48* for detail)	The cost is computed if existing facilities don't have such pit (HCF.B.8-8.7 = False)
H.CE.12	Total cost	Sum (H.CE.1 to H.CE.11)	

Onetime Repair Requirement

Table 5-10 Repair requirement in HCF

SN	Items	Calculation Process	Elaboration
H.RR.1	One-time repair in water supply treatment unit	Treatment unit Condition [HCF.B.3-3.8] * Respective Repair Fraction * Respective rate of treatment facility in school [Calculation is made if existing HCF has the treatment unit]	Repair Fraction and Rates are taken from Annex I -Reference Data Table 7-48 and *Table 7-58* for more details.
H.RR.2	One-time repair required in water supply tap	[Number of taps requiring minor repair (HCF.B.4-4.3) * Repair Fraction for Minor + Number of taps requiring major repair (HCF.B.4-4.4) * Repair Fraction for Major + Number of taps requiring reconstruction (HCF.B.4-4.5) * Repair Fraction for Reconstruction] * Tap construction cost	Repair Fraction and Rates are taken from Annex I -Reference Data *Table 7-32*, and *Table 7-37*
H.RR.3	One-time repair required in sanitation	[Number of toilets requiring minor repair (HCF.B.6-6.6) *Repair Fraction for Minor + Number of toilets requiring major repair (HCF.B.6-6.7) * Repair Fraction for Major + Number of toilets requiring reconstruction (HCF.B.6-6.8) * Repair Fraction for Reconstruction] * toilet construction cost	Repair Fraction and Rates are taken from Annex I -Reference Data *Table 7-32* and *Table 7-58*
H.RR.4	One-time repair required in hygiene	[Number of handwashing facilities requiring minor repair (HCF.B.7-7.4) *Repair Fraction for Minor + Number of handwashing facilities requiring major repair (HCF.B.7-7.5) * Repair Fraction for Major + Number of handwashing facilities requiring reconstruction (HCF.B.7-7.6) * Repair Fraction for Reconstruction] *construction cost	Repair fraction and Rate are taken form Annex I -Reference Data *Table 7-32* and *Table 7-58*
H.RR.5	One-time repair required in incinerator MHM	Incinerator repair cost associated with incinerator condition (HCF.B.8-8.4)	See Annex I -Reference Data *Table 7-38*
H.RR.6	One-time repair required in incinerator hazardous waste	Incinerator repair cost associated with incinerator condition (HCF.B.8-8.6)	See Annex I -Reference Data *Table 7-38*
H.RR.7	One-time repair required in placenta pit	Placenta pit repair cost associated with its condition (HCF.B.8-8.8)	See Annex I -Reference Data *Table 7-49*

SN	Items	Calculation Process	Elaboration
H.RR.8	Total one-time repair required	Total H.RR.1 to H.RR.6	
H.RR.9	Total annual repair required	Average Capital Maintenance cost (in %) * Total Existing Asset Value (H.CE.12)	Average Capital Maintenance Cost = 2.26% Adopted (See Annex I -Reference Data *Table 7-23*)

Capital Expenditure Distribution (CapEx Distribution) for WASH in HCF

Based upon the chosen priority, the total cost of required capital expenditure is distributed yearly for next 10 years (2020 to 2030) adopting Capex factor as presented in the Annex I -Reference Data *Table 7-9*

CapManEx Distribution for WASH in HCF

The capital maintenance expenditure for each year in planning horizon is distributed based upon the chosen priority and is the sum of following three components

1. Total One time Repair (H.RR.9) – it is distributed in the planning horizon for some chosen priority adopting the distribution fraction as mentioned in Annex I -Reference Data *Table 7-10 CapManEx Factor for WASH in institution (One-time Repair)*
2. Total annual repair required = *Table 5-10* (H.RR.9), taken constant for all years of planning horizon
3. Capital Maintenance of new facilities – it is estimated based upon the chosen priority. Capital investment requirement as calculated in *Table 5-9* (H.CE.12) and Age wise capital maintenance factor from Annex I -Reference Data *Table 7-11 CapManEx factor for WASH in institution (for new facilities)*

Existing Operation Expenditure

Table 5-11 Existing Operation Expenditure (HCF)

SN	Items	Calculation	Note
H.EOpEx.1	WS	This is calculated by summing the cost associated with 1. VMW work which can be outsourced/acquired 2. Spare Parts 3. Water tank and treatment unit cleaning (if wash facilities in school have water tank or treatment unit or both – (*Table 5-1 Baseline Data of HCF*, HCF.B.3-3.5 = True OR HCF.B.3.-3.7 = True) 4. Cost associated with water quality testing 5. Cost associated with chlorine dosing	For associated rate of each OpEx go to Annex I -Reference Data *Table 7-51Table 7-40 Operation*

SN	Items	Calculation	Note
		[10% extra to cover other unforeseen operation cost]	*Expenditure for Water Service*
H.EOpEx.2	Sanitation	Total number of toilets [Existing toilet for female (H.SRO.2) + Existing toilet for male (H.SRO.3)] * toilet operation expenditure	See Annex I - Reference Data Table *7-52*
H.EOpEx.3	Hygiene	This is calculated by summing the cost associated with 6. Cost associated with soap = population (H.WRO.1) * cost of soap/population/year 7. Cost related to sanitary pad (proportion of female population* rate) Total OpEx for Hygiene = 1.1 * Sum (1 and 2) [10% extra to cover other unforeseen operation cost]	See Annex I - Reference Data Table *7-53Table 7-42 Operating Expenditure in Hygiene in School*
H.EOpEx.4	SWM	This is calculated by summing the cost associated with 8. If incineration facility for MHM is available (HCF.B.8-8.3 = True) then cost related to burning /cleaning. 9. If incineration facility for Hazardous material is available (HCF.B.8-8.5= True) then cost related to burning /cleaning. 10. If placenta pit is available (HCF.B.8-8.7= True) then cost related to emptying the pit 11. Number of solid waste segregation bins (HCF.B.8-8.1) * rate of bin	Annex I - Reference Data; Table *7-54* and **Error! eference source not found.**; Table *8-1* RatesTable *8-1*
H.EOpEx.5	Total	Sum (H.EOpEx.1 to H.EOpEx.4)	

Total OpEx after completion of projects

Table 5-12 Operation Cost after completion of proposed WASH facilities establishment (HCF)

SN	Items	Calculation
H.ACOpEx.1	WS	Water supply OpEx from Annex I -Reference Data Table *7-51*
H.ACOpEx.2	Sanitation	Total number of toilets after Sanitation project completion [Final numbers of toilet for male (H.SRO.8) + Final numbers of toilet for female (H.SRO.9) + Additional number of toilets required for staffs (H.SRO.10) + Additional number of toilets required for people with limited mobility (H.SRO.11)] * toilet operation expenditure (See Annex I -Reference Data Table *7-52*)
H.ACOpEx.3	Hygiene	Same as existing OpEx for Hygiene in HCF

SN	Items	Calculation
H.ACOpEx.4	SWM	Assuming total 7 numbers of bins; the total OpEx in SWM after completion of SWM project is taken from Annex I -Reference Data Table *7-53*
H.ACOpEx.5	Total	Sum (H.ACOpEx.1 to H.ACOpEx.4)

OpEx Distribution in planning horizon

The results from Table *5-11* and Table *5-12* are distributed in annual basis for adopted planning horizon based upon following assumption.

Priority	Expected Completion Year
Vey High	2023 (additional OpEx is required after completion of WASH projects)
High	2025 (additional OpEx is required after completion of WASH projects)
Medium	2027 (additional OpEx is required after completion of WASH projects)

Direct Support (DS) in planning horizon

The distribution of DS depends upon the priority and distributed as mentioned in Annex I -Reference Data

Table *7-56* (Distribution of direct support in HCF)

Summary of all the investment requirement for WASH in HCF

Category	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
	NRs	NRs	NRs	NRs	NRs	NRs	NRs	NRs	NRs	NRs	NRs	NRs
CapEx	Capital Expenditure Distribution											
CapManEx	CapManEx Distribution											
OpEx	OpEx Distribution in planning horizon											
DS	Direct Support (DS) in planning horizon											

6. WASH in Public Places

Data Processing

Baseline WASH Data

Following baseline data is acquired from NWASH for planning of WASH in public places

Index	Data Description	Data Type
PP.B.1	Recommended public places name	String
PP.B.2	Status of Toilet construction in public place (Existing or Yet to Construct)	String (Choice List)
PP.B.3	Number of male toilets in recommended public place	Integer
PP.B.4	Number of female toilets in recommended place	Integer
PP.B.5	Has at least one toilet the provision for people with limited mobility	Boolean
PP.B.6	Has at least one toilet the provision for Children	Boolean
PP.B.7	Number of blocks with handwashing facilities	Integer
PP.B.8	Number of blocks without handwashing facilities	Integer
PP.B.9	Handwashing accessibility (Accessible to all, Not accessible to children, Not accessible to People with limited mobility, Not accessible to children and people with limited mobility)	String (Choice List)
PP.B.10	is soap available in all handwashing facilities	Boolean
PP.B.11	Adequate water available in all handwashing facilities and toilets	Boolean
PP.B.12	water tank availability	Boolean
PP.B.13	is water tank big enough to reserve sufficient water for one day	Boolean
PP.B.14	Overall physical condition	String (Choice List)

Output 1 – WASH Status

Index	Output	Calculation Process
PP.WRO.1	Status	Status has been divided into four categories No service, Advanced, Basic and Limited. **Required conditions for advanced status:** a) PP.B.2 = Existing b) PP.B.3 > 0, PP.B.4 > 0, PP.B.5 = True, PP.B.6 = True and PP.B.8 = 0 c) PP.B.10 = PP.B.11 = PP.B.12 = PP.B.13 = True **Required conditions for Basic status:** a) PP.B.2 = Existing

Index	Output	Calculation Process
		b) PP.B.3 > 0, PP.B.4 > 0, PP.B.8 = 0 and PP.B.10 = PP.B.11 = True. **Required conditions for Limited status:** a) PP.B.2 = Existing Otherwise **'No Service'**

Planning

The priority for chosen status (Basic or Advanced) determined the overall planning in the WASH of public place.

Calculation of Existing Asset Value

The existing capital is the sum of following.

a) Number of male toilets in recommended public place (PP.B.3) * cost of one toilet + Number of female toilets in recommended place (PP.B.4) * cost of one toilet
b) If existing system has at least one toilet the provision for people with limited mobility (PP.B.5) then the cost associated to this facility.
c) If existing system has at least one toilet the provision for Children (PP.B.6) then the cost associated to this facility
d) Number of blocks with handwashing facilities (PP.B.7) * cost of the facility
e) If the existing system has water tank available (PP.B.12) then cost associated with the tank.

[See Annex I -Reference Data; *Table 7-57*]

Required Capital Expenditure

Minimum number of male/female toilets in recommended public place is assumed = 3

Additional male toilets required if existing system has less than three male toilets = (3 – PP.B.3). If existing system has already more than three male toilets; no additional toilet is required for male. (AT- male)

Additional female toilets required if existing system has less than three female toilets = (3 – PP.B.4). If existing system has already more than three female toilets; no additional toilet is required for female. (AT-female).

Depending upon the status deemed for the WASH in public place, total capital expenditure can be calculated by adding following items,

a) (AT-male + AT-female) * cost of construction of one toilet
b) If PP.B.2 = Existing then, Number of blocks without handwashing facilities (PP.B.8) *rate of construction of handwashing facilities otherwise [Handwashing facilities per compartment] * Handwashing facilities in public toilet (one for male, one for female, one for people with limited mobility and child)
c) If 'Advanced' status is deemed, following additional CapEx are taken into consideration,

1) PP.B.5 =False, then cost associated to make at least one toilet the provision for people with limited mobility
2) PP.B.6 = False, then cost associated to make at least one toilet the provision for children
3) If PP.B.12 and PP.B.13 = Ture then no CapEx required, otherwise CapEx for water tank to reserve sufficient amount of water is required.
4) If PP.B.2 = Existing then CapEx as per condition of handwashing accessibility (PP.B.9) (See Annex I -Reference Data Table *7-57*and Table *7-63*)

Capital Expenditure Distribution

Capital investment requirement as calculated above is distributed in planning horizon considering the priority of the project adopting factors as mentioned in Annex I -Reference Data Table 7-12

Repair Requirement

Onetime Repair:

Factor related to overall physical condition (PP.B.14) *Total Existing asset value

(For factor see Annex I -Reference Data *Table 7-58*)

Annual Repair:

Average Capital Maintenance cost (in %) * Total Existing Asset Value

(Average Capital Maintenance Cost = 2.26% Adopted (See Annex I -Reference Data *Table 7-23*)

CapManEx Distribution

Annual CapManEx of existing asset is distributed in each year of planning horizon

One-time repair is distributed in first two year of the planning horizon irrespective of project priority. 70% of one time repair requirement is included in first year while remaining 30% is included in second year. See Annex I -Reference Data Table 7-14

Annual capital maintenance of newly completed project will start from next year of project completion. This is distributed in planning horizon adopting the factors as mentioned in Annex I -Reference *Table 7-15*. Annual CapManEx = Factor * CapEx. The project completion year depends upon priority of the project.

Operation Expenditure

Existing OpEx

Total number of existing toilets (PP.B.3 + PP.B.4) * per toilet operation cost (See Annex I -Reference Data *Table 7-59*)

OpEx after construction

[Total number of existing toilets (PP.B.3 + PP.B.4) + Additional toilets (AT.male +AT.female)]* per toilet operation cost (See Annex I -Reference Data *Table 7-59*)

Direct Support (DS) in Planning Horizon

DS for WASH in public places are distributed in planning horizon as per the priority of the project adopting the rates mentioned in *Table 7-61* and *Table 7-62* of Annex I -Reference Data

7. Annex I -Reference Data

Ongoing sectoral documents and practices have been adopted to form the reference data set. Reference data includes the calculations which produces the per unit costs. Assumptions are mentioned in the table below. The reference data will remain fixed and won't be edited in the process of planning. It will be reviewed and updated by the National Management Information Project (NMIP), DWSSM in every two year.

Table 7-1 Per capita cost of water supply component

SN	Type	Basic	Safely managed	Basic to Safely managed		
				WQI	Premises	Both (WQI+ Premises)
1	Tube well	15000	40000	25000	0	25000
2	Gravity	10000	18000	4000	10000	12000
3	Pumping	25000	35000	4000	10000	
4	Rainwater	10000	18000	4000	10000	12000
5	Imp. Reservoir	10000	18000	4000	10000	12000
6	Solar pumping	30000	40000			
7	Mixed	20000	30000	4000	10000	12000

Table 7-2 CapManEx factor for ongoing project with safely managed service

Priority	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Very High	0	0	3.54	3.54	3.54	3.54	3.54	1.54	1.54	1.54	1.54
High	0	0	0	3.54	3.54	3.54	3.54	3.54	1.54	1.54	1.54
Medium	0	0	0	3.54	3.54	3.54	3.54	3.54	1.54	1.54	1.54
Low	0	0	0	0	3.54	3.54	3.54	3.54	3.54	1.54	1.54

Table 7-3CapManEx factor for ongoing projects with basic services

Priority	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Very High	0	0	0	3.54	3.54	3.54	3.54	3.54	1.54	1.54	1.54
High	0	0	0	0	3.54	3.54	3.54	3.54	3.54	1.54	1.54
Medium	0	0	0	0	0	3.54	3.54	3.54	3.54	3.54	1.54
Low	0	0	0	0	0	3.54	3.54	3.54	3.54	3.54	1.54

Table 7-4 DS For ongoing projects with safely managed service

Priority	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Very High	0	165000	45000	45000	45000	45000	45000	45000	45000	45000	45000

Priority	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
High	0	0	165000	45000	45000	45000	45000	45000	45000	45000	45000
Medium	0	0	165000	45000	45000	45000	45000	45000	45000	45000	45000
Low	0	0	0	165000	45000	45000	45000	45000	45000	45000	45000

Table 7-5 DS For ongoing projects with basic service

Priority	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Very High	0	0	165000	45000	45000	45000	45000	45000	45000	45000	45000
High	0	0	0	165000	45000	45000	45000	45000	45000	45000	45000
Medium	0	0	0	0	165000	45000	45000	45000	45000	45000	45000
Low	0	0	0	0	165000	45000	45000	45000	45000	45000	45000

Table 7-6 CapEx division for FSM, SWM, WWTP wih sewer

Priority	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Very High	0.7	0.3	0	0	0	0	0	0	0	0	0
High	0.5	0.3	0.2	0	0	0	0	0	0	0	0
Medium	0.3	0.3	0.3	0.1	0	0	0	0	0	0	0
Low	0.2	0.2	0.2	0.2	0.2	0	0	0	0	0	0

Table 7-7 CapManEx division for FSM,SWM,WWTP with sewer in fraction

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Very High	0	0	0.0354	0.0354	0.0354	0.0354	0.0354	0.0154	0.0154	0.0154	0.0154
High	0	0	0	0.0354	0.0354	0.0354	0.0354	0.0354	0.0154	0.0154	0.0154
Medium	0	0	0	0	0.0354	0.0354	0.0354	0.0354	0.0354	0.0154	0.0154
Low	0	0	0	0	0	0.0354	0.0354	0.0354	0.0354	0.0354	0.0154

Table 7-8 DS for Ongoing projects with safely managed service (Sanitation)

Priority	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Very High	0	215000	45000	45000	45000	45000	45000	45000	45000	45000	45000
High	0	0	215000	45000	45000	45000	45000	45000	45000	45000	45000
Medium	0	0	0	215000	45000	45000	45000	45000	45000	45000	45000
Low	0	0	0	0	215000	45000	45000	45000	45000	45000	45000

Table 7-9 Capex Factor for WASH in institution

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030

Very High	0.1	0.4	0.4	0.1							
High			0.1	0.4	0.4	0.1					
Medium					0.1	0.4	0.4	0.1			
Low								0.1	0.4	0.4	0.1

Table 7-10 CapManEx Factor for WASH in institution (One-time Repair)

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Very High	0.5	0.5									
High			0.5	0.5							
Medium					0.5	0.5					
Low							0.5	0.5			

Table 7-11 CapManEx factor for WASH in institution (for new facilities)

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Very High					0.02	0.02	0.02	0.02	0.02	0.02	0.02
High							0.02	0.02	0.02	0.02	0.02
Medium									0.02	0.02	0.02
Low											

Table 7-12 CapEx factor for public toilets

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Very High	0.7	0.3									
High			0.7	0.3							
Medium					0.7	0.3					
Low										0.7	0.3

Table 7-13 CapEx Factor depending upon the year planned to make HH safely managed

Year	1	2	3	4	5	6
CapEx Factors	0.5	0.25	0.1	0.1	0.1	0.1
	0.5	0.5	0.4	0.3	0.2	0.15
		0.25	0.4	0.3	0.2	0.15
			0.1	0.2	0.2	0.2
				0.1	0.2	0.15
					0.1	0.15
						0.1

Table 7-14 One-time repair in Public places

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Very High	0.7	0.3									
High	0.7	0.3									
Medium	0.7	0.3									
Low	0.7	0.3									

Table 7-15 CapManEx factor (WaSH in public place)

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Very High			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
High					0.02	0.02	0.02	0.02	0.02	0.02	0.02
Medium							0.02	0.02	0.02	0.02	0.02
Low											

Table 7-16 Construction trend in investment for ongoing WSS projects

Year	1	2	3	4	5	6	more than 6
Expenditure %	10	30	50	70	90	95	95

Table 7-17 National average of Unit Production cost and Operation ratio

System Type	Unit production average	Operation Ratio average
Pumping	16.386	0.898
Gravity	12.475	0.923

Table 7-18 Operation cost based on type of system

Type of system	OpEx Basic/capita/year	OpEx Safely managed/capita/year	Opex basic/scheme/year	Opex safely managed /scheme/year
Tubewell			500	1000
Gravity	189.09	368.79		
Pumping	241.66	444.71		
Rainwater	100	100		

Imp. Reservoir	200	368.79		
Solar pumping	170	265.65		
Mixed	215	395.65		

Table 7-19 HH investments to make water safely managed

Particulars	NRs./HH/Year	NRs./capita/Year
Private tap repair	100	21.74
Meter replacement	240	52.17
Leakage inside household repair	100	21.74
Total		95.65

Table 7-20 Direct Support (DS) in Water Supply Project

Direct Support (water supply)	Mandays	Transportation (Number of visit)	Number of tranings /year		Note
Training cost /scheme (LS)	NA	NA	3	15000	After project completion, starting from completed year
Monitoring cost/scheme/year	3	1		12000	After project completion, starting 1 year after completion
Technical assistance cost/scheme/year	5	1		18000	After project completion, starting 1 year after completion
One-time project cost including feasibility/detail studies (in terms of % of investment)				0.02	Beginnig year
Tools				150000	End year
Scheme equivalent				50	tubewells =1 scheme
Tool set for tube well				50000	
One-time training such as pre construction (per schemes for 11 people)	11			30000	Starting year

Table 7-21 Direct Support in Community Sanitation

Partulars	NRs.	Note
Training cost /scheme/year	15000	After project completion, starting from completed year
Monitoring cost/scheme/year	12000	After project completion, starting 1 year after completion

Technical assistance cost/scheme/year	18000	After project completion, starting 1 year after completion
One-time project cost including feasibility/detail studies (in terms of % of investment)	0.02	Beginnig year
Tools	200000	End year
One-time training such as pre construction	30000	Starting year
Number of people attaining one-time training	10	

Table 7-22 Operation Cost for Sanitation Facilities *NRs./year/capita*

Type of system	OpEx without treatment unit	OpEx with treatment unit
FSM	300	700
WWTP with Sewer	200	700
SWM	200	336

Table 7-23 Age wise cap maintenance cost (% of Capex)

Scheme age	Adopted (%)	Ref. data (%)
<5 Yrs of age	3.54	3.54
5-10 Yrs of age	1.54	0.77
10-15 Yrs of age	1.54	2.64
15-20 Yrs of age	1.54	1.21
>20 Yrs of age	3.16	3.16
Average	2.26	

Table 7-24 HH Sanitation cost of construction and cost of asset

Particular	Flush	PourFlush	Composting	PitLatrineWithSlab	Hanging	Bucket	No
Pit	20000	30000	15000	10000	0	0	0
Double pit	25000	35000	0	0	0	0	0
Septic Tank	35000	40000	0	0	0	0	0
FSM	35000	40000	0	0	0	0	0
piped sewer with WWTP	35000	40000	0	0	0	0	0
No	0	0	0	0	0	0	0

Table 7-25 Investment requirement for making toilet disable friendly and constructing handwashing facilities (HH Sanitation)

Investment required to make toilet disable friendly	10000
Handwashing facility improvement (construction)	5000

Table 7-26 HH OpEx Sanitation Components

Particular	Qty required per year	Amount	Remarks
Soap	24	720	2 soap NRs.30 per month
Brush	1	200	1 brush per year
Detergent	4	500	4 bottles per year
Pit emptying	0.2	1000	NRs. 5000 per 5 years
Sanitary pads	18	1170	Assuming 1.5 female on average family with NRs. 65 per pkt
Others		359	10% of total
Total		3949	

Table 7-27 Direct Support in HH Sanitation

Particular	Qty	Amount
Monitoring cost for man power	12	120000
Monitoring cost per toilet		
Mandays/Month	25	
Months/Year	12	
Number of toilet/days	50	
per toilet cost		8
Motivation cost		120000
Number of houses that one manpower can visit in a year	10000	

Table 7-28 HH OpEx Solid Waste Component

HH OpEx Solidwaste component per year	0.2	200	Assuming 1 unskilled labor (NRs. 1000) can dig 5 pits for composting. 1 pit can be used for 1 year

Table 7-29 Rate of inflation

Inflation rate	5

Table 7-30 Per capita cost for Conveyance and Treatment

Particulars	Total per capita	Conveyance	Treatment
FSM	10000	4000	6000
WWTP with Sewer	40000	34000	6000
SWM	7000	4000	3000

Table 7-31 CapEx Fraction for repair -1

Conveyance	CapEx fraction for repair
Physically intact	0
Requiring minor repair	0.15
Requiring major repair	0.4
requiring construction	0.9

Table 7-32 CapEx Fraction for repair - 2

Treatment unit	CapEx fraction for repair
No treatment plant	0
Physically intact	0
Requiring minor repair	0.15
Requiring major repair	0.4
requiring construction	0.9

Table 7-33 Conditions for Improved Water facilities

Piped water Inside school	Improved
Protected dug well Inside school	Improved
Rainwater harvesting Inside school	Improved
Packaged jar/bottled water Inside school	Improved
Protected Boreholes/Tube wells Inside school	Improved
Protected springs Inside school	Improved
Piped waterless than 30 minutes	Improved
Protected dug well less than 30 minutes	Improved
Rainwater harvesting less than 30 minutes	Improved
Packaged jar/bottled waterless than 30 minutes	Improved
Protected Boreholes/Tube wells less than 30 minutes	Improved
Protected springs less than 30 minutes	Improved

Table 7-34 WASH in school Norms

water required for 1 student in liters	12
Population covered by 1 Toilet as per norms of Ministry of education	50
Population covered by 1 Handwashing tap as per norms of Ministry of education	15

Table 7-35 Rate of Water Tank (School and HCF)

water tank Per liter cost	15	Assuming 1000 liter is for upto 80 , 2000 liter is for upto 160, 3000 liter is for upto 240 and so on

Table 7-36 Cost related to treatment facility (WASH in School)

School type	ECD	Basic	secondary	College	University
treatment facility	50000	100000	150000	200000	250000
Testing kit	100000	100000	100000	100000	100000

Table 7-37 Cost Related to Water, Sanitation and Hygiene (School, HCF)

Boys toilet block	600000	incl. urinals
Girls toilet block	500000	incl. MHM

Number of toilets in 1 block	5	
Number of toilets in 1 block	5	
Tap construction cost	5000	
Cost for making at least one tap disable friendly	5000	
cost for making at least one toilet disable friendly	20000	
One handwashing facility	80000	
Cost for making handwashing facilities disable friendly	5000	
Incinerator	20000	

Table 7-38 Incinerator repair cost according to its condition

No Incinerator	0
physically intact	0
minor repair required	3000
major repair required	8000
Reconstruction	18000

Table 7-39 Operation cost for WASH in school - 1

Items	Qty	Cost	Remarks
Brush	2	400	2 brush per year
Detergent	12	1500	12 bottles per year
Pit emptying	0.5	2500	per 2 years
Others		440	10% of total
Total		4840	

Table 7-40 Operation Expenditure for Water Service (In school)

Particulars	Required OpEx to run the system (NRS)
VMW work which can be outsourced	10000
Spare parts (LS)	15000
Water Tank & treatment unit cleaning	4400
Water quality testing (in advance only)	20000
Chlorine dosing	37500
Others	8690

water supply OpEx For advanced	95590

* Assuming 10 mandays per year of VMW will be required per school per year . This can be outsourced as well.
* water tank needs to be cleaned every three months by higher concentration of bleaching powder ,thorough wash of tank includes NRs. 100 for chlorine and one unskilled manday(1000 NRs.)
* 5mg bleaching powder per capita(for 12 liter, assuming 30% chlorine in bleaching powder) average 500 people in school who come to 200 days school bleaching powder per kg rate NRs.75

Table 7-41 Toilet Operating Expenditure for School

Toilet cleaner per toilet per year	2000
Cleaning/year	1900
Pit Emptying/year	2500
Others	440
Toilet OpEx per toilet per year	6840

* Assuming 1 working day of toilet cleaner is equivalent to 100 toilets and NRs. 1000 and school opens 200 day

Table 7-42 Operating Expenditure in Hygiene in School

Soap/population/year	360
Sanitary pads/female population/year	468
MHM promoter incentive per year	24000
Others/year	2400

* Assuming 60% of females in school will need sanitary pad support

Table 7-43 OpEx for Solid Waste Management in school

3 separate bins (Metal and glass, biodegradable,non biodegradable)	3000
Burning ,cleaning ,composting	1000
Total	4000

Table 7-44 Annual Direct Support in WASH in Schools

Particulars	Frequency	Cost
Cost of SWASHCC /Child club meeting per year (The allowance of this meeting can be used in making gardens and maintain the greenery)	6	6000
Integration of WaSH planning in School Improvement plan per year	1	2000
Disaster Risk Management training per year	1	5000
Disaste Preparedness and response plan of school /risk mapping	1	5000
Operation of WaSH corner (includes Publication of WaSH messages ,poster,handwritten articles from child clubs etc.)	12	6000
Educational visits /peer to peer learning /Child Clubs WaSH operational partnerships etc.	1	5000
Total		29000
Others		2900
Grand Total		31900

Table 7-45 One-time Direct Support (In School)

Tools	50000
Capacity building of WaSH focal teacher	10000
Total	60000
Others	6000
Grand Total	66000

Table 7-46 One-time Direct Support Distribution (In School)

One-time DS distribution											
Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Very High		66000									
High			66000								
Medium				66000							
Low					66000						

Table 7-47 Water, Sanitation and Hygiene Related Standard data for HCF - Dataset 1

Toilet for female	0.167	This is made based upon recommended bed to toilet ratio of National standard for WaSH in healthcare facilities Nepal
Toilet for male	0.125	This is made based upon recommended bed to toilet ratio of National standard for WaSH in healthcare facilities Nepal
Minimum handwashing stations excluding handwashing in toilets	0.0667	with ratio 1:15

Table 7-48 Water, Sanitation and Hygiene related Standard data for HCF – Dataset 2

water required for patients /staffs of healthcare facilities	100
Average treatment unit cost of healthcare facilities	100000
Cost of 1 toilet for health post	500000
Cost for making 1 toilet disable friendly	50000
Placenta pit cost	100000
cost of 1 handwashing facility at point of care	10000

Table 7-49 Placenta pit repair cost associated with the condition

No Placenta pit	0
physically intact	0
minor repair required	15000
major repair required	40000
Reconstruction	90000

Table 7-50 OpEx in HCF WASH

Items	Qty	Cost	Remarks
Brush	2	400	2 brush per year
Detergent	12	1500	12 bottles per year
Pit emptying	0.5	2500	per 2 years
Others		440	10% of total
Total		4840	

Table 7-51 Operation Expenditire in HCF (Water)

VMW work which can be outsourced	30000
Spareparts (LS)	15000
Water Tank & treatment unit cleaning	18000
Water quality testing	20000
Chlorine dosing	68437.5
Others	1500
water supply	152937.5

* Assuming 30 mandays per year of VMW will be required per school per year . This can be outsourced as well.
* water tank needs to be cleaned every month by higher concentration of bleaching powder ,thorough wash of tank includes NRs. 500 for chlorine and one unskilled manday(1000 NRs.)
* 50mg bleaching powder per capita(for 100 liter, assuming 30% chlorine in bleaching powder) average 50 people in healthcare center use water supply service daily

Table 7-52 Toilet Operation Expenditure for HCF (per toilet per year)

Operation Item	Expenditure
Toilet cleaner per toilet per year	3650
Cleaning/year	1900
Pit Emptying/year	2500
Others	440
Toilet OpEx per toilet per year	8490

* Assuming 1 working day of toilet cleaner is equivalent to 100 toilets and NRs. 1000 and health care facility opens 365 days

Table 7-53 Operation Expenditure in Hygiene (HCF)

Soap/population/year	360
Sanitary pads/female population/year	156
Others/year	51.6
Total	567.6

* Assuming 20% of female patient and staff in health care facility will need sanitary pad support
* Assuming 10 man-days per year is required for placenta pit cleaning

Table 7-54 Operation Expenditure related to Solid Waste Management in HCF

7 separate bins (Metal and glass, biodegradable, on biodegradable, infectious and sharp objects etc.)	7000
Burning, cleaning, composting per SWM pit	1000
Placenta pit cleaning	10000
Total	18000

Table 7-55 DS in HCF WASH

Items	Frequency per year	Cost per year	One-time support
Meeting of Healthcare service facility management committee	5	5000	
HCF WASH action plan preparation from Healthcare service facility management committee	1	2000	
Environmental cleanliness training for support staff	1	5000	
Preparation of cleanliness protocal			5000
Tools			50000
Spareparts			30000
Handling and disposal training for SWM including Hazardous waste for support staff	1	5000	
Total		17000	85000
Others(10%)		1700	8500
Grand total		18700	93500

Table 7-56 Distribution of direct support in HCF

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Very High	18700	112200	18700	18700	18700	18700	18700	18700	18700	18700	18700
High	18700	18700	112200	18700	18700	18700	18700	18700	18700	18700	18700
Medium	18700	18700	18700	112200	18700	18700	18700	18700	18700	18700	18700
Low	18700	18700	18700	18700	112200	18700	18700	18700	18700	18700	18700

Table 7-57 WASH in public places - Dataset I

Toilet for male including urinals	300000
Toilet for female including MHM	300000
Handwashing facilities per compartment	20000
Soap availability in toilets	
Water availability in toilets	
Water tank cost	15000
Facilities for people with limited mobility such as ramp	20000
Child friendly (low urinals, diaper changing platform etc.)	10000
Handwashing facilities in public toilet (one for male, one for female, one for people with limited mobility and child)	4

Table 7-58 One-time repair fraction

Condition	Repair Fraction
Physically intact	0
Requiring minor repair	0.15
Requiring major repair	0.4
requiring construction	0.9
No	0

Table 7-59 Toilet Operation Cost in public places

Items	Qty	Cost	Remarks
Brush	6	1200	6 brush per year
Handwash/soap/liquid	52	1560	1 soap per week
cleaning liquid	12	1500	12 bottles per year
Garbage bins	3	3000	
MHM product disposal bin	3	3000	
Freshner	12	1200	1 per month
Toilet cleaner per year	18.25	18250	1 unskilled labor can clean 20 public toilet per day
Pit emptying	0.5	2500	per 2 years
Others		3221	10% of total
Total		35431	

Table 7-60 DS in public place WASH

Particulars	Frequency	Per year	One time
Cleaning protocal preparation			5000
Cleaner training (use of disinfectants etc.)	1	5000	
Tools			50000
waste to resource trainings	1	5000	
Asset management training (when to check septic tank , water taps ,chheskini etc. with protocals)	1	5000	
Monitoring cost (days per year)	2	6000	
Technical assistance (days per year)	2	6000	
Total		27000	55000

Table 7-61 DS in public places (Existing)

Priority	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Very High	82000	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000
High	27000	82000	27000	27000	27000	27000	27000	27000	27000	27000	27000
Medium	27000	82000	27000	27000	27000	27000	27000	27000	27000	27000	27000
Low	27000	82000	27000	27000	27000	27000	27000	27000	27000	27000	27000

Table 7-62 DS in public places (New)

Priority	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Very High		55000	27000	27000	27000	27000	27000	27000	27000	27000	27000
High				55000	27000	27000	27000	27000	27000	27000	27000
Medium						55000	27000	27000	27000	27000	27000
Low											55000

Table 7-63 CapEx requirement as per handwashing accessibility in public places

Accessible to all	0

Not accessible to children	20000
Not accessible to People with limited mobility	30000
Not accessible to children and people with limited mobility	40000

8. Annex II Adopted Rate

The rate of following items is needed for overall planning of WASH within municipalities. The rate can be updated according to the rate of the concerned local unit. Finalization of rates is an important part of the planning.

Table 8-1 Rates

SN	Particulars	Unit	Rate	Remarks
1	Soap	pcs	30	
2	Brush	pcs	200	
3	Toilet cleaning detergents	pcs	125	
4	Pit Emptying cost	one time	5000	
5	Sanitary Pads	Packet	65	
6	Hygiene Inspector (HR used for monitoring the hygiene behavior, toilet conditions, solid waste segregation and other JMP indicators)	permonth	10000	It will include the monitoring of food hygiene facility and behavior/solidwaste seggregation/HH toilet and institutional toilets as per standards
7	Hygiene motivator (HR used to motivate or trigger the hygiene promotion behavior)	permonth	10000	1 man power for every 10000 householdwith per month (It will include the monitoring of food hygiene facility and behavior as well)
8	Village Maintenance worker	Mandays	1000	
8	Unskilled labor	Manday	1000	
9	Cost of water tank	NRs./liter	15	
10	Bleaching powder	Kg	75	

SN	Particulars	Unit	Rate	Remarks
11	WaSH promotion allowance for WaSH focal teacher preferably female (MHM promoter should promote the preparation of MHM products or use the products available in market, Point of use water treatment techniques and prepare the report of how school is doing that, seggregation methods of solid waste including which bin is for what purpose, reporting and monitoring of hygiene practices)	Per month	2000	
12	Solid waste seggregation bins	Pcs	1000	
13	Toilet freshner	pkt	100	
14	Transportation for monitoring	rate per visit	3000	
15	Experts cost for monitoring	Per day	3000	
17	Training cost per person	Per training	5000	
18	School WaSH CC meeting	Per meeting	1000	
19	Training on DRM for school	Per training	5000	
20	WaSH corner operation	per publication	500	
21	Educational visit	per time	5000	
22	Disaster risk management plan	per time	5000	
23	Meeting health service management committee	per time	1000	
24	WaSH action plan preparation	per time	2000	
25	Environmental cleanliness training	per person per training	5000	
26	'Handling and disposal training for SWM	per person per training	5000	
27	Cleaner training	per person per trainings	5000	
28	Waste to resource training	per person per trainings	5000	
29	'Asset management training (when to check septic tank , water taps ,chheskini etc. with protocals)	per person per trainings	5000	
30	Total sanitation campaign	per year	500000	
31	Total sanitation declaration	one time	1000000	
32	Water safe community campaign	per year	100000	

SN	Particulars	Unit	Rate	Remarks
33	Water safe community declaration	one time	1000000	
34	water safety planning training	per person per trainings	5000	
35	Climate change adaptation training	per person per trainings	5000	
36	Mainstreaming Gender equality and Social inclusion		200000	
37	IT support	per month	25000	
38	MIS update	per year	300000	
39	Contingency plan preparation /update/stockpiling	per year	1000000	
40	Cleaning campaign	per month	50000	
41	cleaner	manmonth	10000	
42	service center establishment	one time	500000	
43	service center operation	per year	250000	