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User Manual

For

Asset Management Web Configuration Panel

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1. Background

The asset management tools comprising a mobile app, a web dashboard, and a configuration panel are developed to support the management of assets and making asset management plans for water systems. To completely understand the concepts of asset management and the use of these tools, there is an entire e-learning platform that can be accessed at the following URL.

<https://elearning.assetmgmttool.com/>

Following is a brief introduction to important concepts of asset management to help users understand different features of the tools while going through this manual.

1.1 Assets

An asset is a useful object or one of its components that is expected to provide benefits to the user, a person, or a company. For water systems, assets are the physical components of the system that allow for reliable, and safe water supply to the users. For example, wells, filtration units such as chlorination tanks, sedimentation tanks, roughing filters, hydrants, pipes, valves, bolts, overhead tanks, pumps, and household taps with meters.

1.2. Maintenance

Maintenance is the activity to ensure that assets keep on fulfilling their intended function during their full lifetime. Maintenance is important to reduce the risk of failure, ensure the system is reliable, and (in the case of water systems) provide clean water continuously to end-users.

1.3. Service level

The service level (SL) of a water system is the agreed quantity and quality of water supply during a certain time.

1.4. Asset Management

Asset management is the activity of maintaining the agreed service level during a sustained period of time at a certain cost.

2. Asset Management Plan

An Asset Management Plan is developed applying a community-led approach and supports stakeholders to ensure the required service level during a period of time. It includes:

1. An asset inventory

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2. A risk assessment
3. A maintenance plan
4. An income and optimization analysis: A financial projection of what income (= water tariff and extra-governmental or charity contributions) is required to cover the costs for the agreed SL.

An Asset Management plan needs to be updated regularly since financial projections might not match reality, or some maintenance might be unforeseen and not included in the plan and cost estimates.

3. Introduction

Asset management tools for individual water system includes the following,

1. A mobile app
2. A web dashboard
3. A configuration panel

The mobile app is a password-protected application that allows operational staff members of the water system to view and add information into the water system. The web dashboard is a publicly accessible web link that presents information about the water system. The configuration panel in the password-protected data management area for the entire system. Data and settings for the water system can be managed from the configuration area.

When a new water system is added, a web dashboard link and a user for configuration panel is created. Users for mobile applications can be then created from the configuration panel.

The entire tool set focuses on 3 major areas of asset management for water systems, finance, maintenance, and service.

The configuration panel is used to manage general information about the water system, expected and actual income and expenditure, asset components with lifespan, risks and costs, and quality test parameters. The mobile app lets staff members fill in actual monthly transactions, view a list of asset components for maintenance and fill in maintenance logs, add water supply records and add water test results. The web dashboard combines data from both the configuration panel and the mobile app to present a visualization of finance, maintenance, and service of the water system.

4. The Configuration Panel

This manual guides users to use the configuration panel of the asset management tools. The configuration panel in the password-protected data management area for the entire system.

Login URL for the configuration panel:

<https://assetmanagementsystem.netlify.app/#/auth/home>

Note: In case of lost username and password for the configuration panel, please contact the corresponding administrator agency who have provided the login details prior.

The configuration panel has five major sections, home, finance, maintenance, water quality and quantity, and notifications. A detailed explanation of each function under each section is present in the corresponding section of this manual. A basic overview of functions under each section is as follows:

a. Home

The Home section lets users view and manage the following data:

- i. General information about the water system.
- ii. Information about the beneficiaries of the water system.
- iii. Mobile app users of the water system.
- iv. Supply schedule of the water system.

b. Finance

Finance has four subsections expected income – water tariff, expected income/expenditures (other), expected inflation, actual income/expenditure (cashbook)

- i. Expected income – water tariff

Users can manage information about the type of tariff (fixed or progressive/regressive) to be applied to the water system. Users can manage the tariff rates, which may be applicable at different dates and get visual estimation of the yearly and all-time income.

- ii. Expected income/expenditure (other)

Users can manage other expected income and expenditure of the water system. These expected income and expenditure may be applicable at or from different dates.

iii. Expected inflation

Users can set the expected inflation rate for the period of financial analysis.

iv. Actual income/expenditure (cashbook)

Users can view and manage all actual transactions of the water system.

c. Maintenance

Maintenance has three sub-sections, asset inventory, expected risk, activities and cost, actual maintenance (logs)

i. Asset inventory

Users can manage inventory of asset components under different categories.

ii. Expected risk, activities and cost

Users can manage expected risk, costs and maintenance parameters for each asset component.

iii. Actual maintenance (logs)

Users can manage actual maintenance logs for the water system.

Maintenance is the event that occurs during operation. Most of the maintenance is pre-scheduled and can also be added if occurred during the inspection. The cost of maintenance is reflected in both the maintenance visualization and the actual expenditures in the cash book financial visualization. Maintenance logs can be entered both from the web dashboard and the mobile app.

d. Service

Service has two sub-sections:

i. Water supply record

Users can define total water supply at a specific date.

ii. Water quality test

Users can define the parameters to test the quality of water. They will be able to fill in records for only the defined parameters from the mobile application.

e. Notifications

- i. Users can set time intervals to receive notifications in the mobile application. These intervals can be set for all input activities available in the mobile application.

5. Using the Web Configuration Panel

When a Water System's User logs into the web application, the Configuration Panel is the first screen he/she will see.

Action Date:

The date that is decided for the maintenance of a particular component. The caretaker adds this date to the component if/when he/she has determined the exact date for maintenance of the component. Until added manually the system records the first date of its next maintenance period as the action date.

5.1 Home

In the home tab of the configuration panel, users can add General Information, Beneficiary details, Water Supply Schedule, Disallow app editing after month closing, and add Mobile App users of the Water System. Users can also see the tariff rates, based on the Use Based and Fixed Based option.

lubhu test
lubhu

Home
Finance
Maintenance
Service
Notifications

2079-06-03 biju

General Information

Scheme Name: lubhu test

Location: lubhu

Water Source: river and boring

System Built Date: 1/1/2079

Beneficiary Information

Apply Date	Household	Institutions	Public	Commercial
2079-01-01	1450	0	0	0

Mobile App users

x General Manager 1234567889

Water Supply Schedule

Tariff Rates

2079-01-01 Use Based

2079-01-07 Use Based

2079-01-15 Use Based

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5.1.1 Add/Edit General Information

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Users can add the General information of the Water Scheme by clicking on the edit icon placed in the right corner of the content.

Then a pop-up form is displayed where the following details have to be filled up:

1. Scheme Name: Add the Name of the Water System
2. Location: Add the location & address of the Water System
3. Water Source: Add source of water e.g. Boring water, Spring water, etc
4. Daily Target: Add total water supply (in Liters) per day. It doesn't affect any data projection & displayed in Dashboard only.
5. Visualize data for (Year): Add the period (number of years) for which the data will be projected.
6. Currency: Add the unit of currency to be used
7. System Date Format: Select the format and month names to display with Visualization. Current options are EN for English and NP for Nepali. The date format can be changed later as per requirements.
8. System Built Date: Add a calendar date on which the water system was built
9. Longitude: Add Longitude to identify the location of the water system.
10. Latitude: Add Latitude to identify the location of the water system.
11. Tool Start Date: Add the calendar date on which this tool is initiated for this water system. All projections and records start on this date.

The screenshot shows a web application interface with a sidebar on the left and a main content area. The sidebar has a menu icon and the word 'system'. The main content area has a date '3/14/2022' in the top right corner. A modal window titled 'Edit General Information' is open, displaying a form with the following fields and values:

Field	Value
Scheme Name	Bankatuwa Water System
Location	Banke
Water Source	spring water
Daily Target	252000
Visualize data for (Year)	15
Currency	Rs
System Date Format	EN
System Built Date	2020-01-01
longitude	2.33
latitude	2.33
Tool Start Date	2020-03-01

At the bottom right of the modal, there are two buttons: 'Save' (blue) and 'Cancel' (white).

5.1.2 Add/Edit Mobile App Users

Mobile App Users are those users who will get access to use the mobile app of AMS. All the **Mobile App Users** will get the same app with the same authorities over the app.

After adding General information, the User has to click on the Mobile App Users where a pop-up form will be displayed. In order to add the Mobile App Users, the following details have to be filled up:

1. Name: Add the name of the mobile app user
2. Phone: Add the Ten Digit phone number of the mobile App User
3. Password (PIN): Add a password that should be at least four number digits. Alpha characters and special characters are not used in this field.
4. Re-enter Password (PIN) for confirmation: Add the same Password (PIN) for confirmation.
5. Save the added data by clicking on the Save Button
6. In case of loss of password, app users can contact the admin for the reissue of password.

Bankatuwa Water System

Bankatuwa Water System

Home Finance Maintenance Water Quality and Q Notifications

Add / Edit Mobile App users

Name: Phone: Password (PIN)

Re-enter Password (PIN) for confirmation:

Save **Cancel**

S.N	Name	Phone	Action
1	Aashutosh	9841014795	
2	Rup	9823349642	
3	admin	9898989898	
4	bankatwa	9841367057	

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5.1.3 Add/Edit Beneficiary Information

In order to add and edit Beneficiary Information of the Water System, the following details have to be filled in:

1. Institutional Connection: Add the number of the institutional connections (Connections like schools, colleges, offices, etc.)
2. Commercial Connection: Add the number of the commercial connections (Connections for commercial purposes)

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3. Household Connection: Add the number of total households connection (private household connections)
4. Public Connection: Add the number of public connections (Connections in public places like temples, parks, etc.)
5. Apply Date: Add the date from which this record should be applied to the system.
6. Save the added data by clicking on the Save Button

The different beneficiary information can be added for different periods of time.

Beneficiary information for different time periods can be added using the different time periods. Year 1, Year 2, and so on can have different beneficiary information on the basis of apply date.

Edit Beneficiary Information

Institutional Connection : Commercial Connection : Household Connection :

Public Connection: Apply Date [?]:

S.N	Apply Date	Institutional Connection	Commercial Connection	Household Connection	Public Connection	Action
1	2020-03-03	15	100	993	1	

5.1.4 Tariff Rates

In the Tariff Rate Section, users can view different tariff rates by clicking on the fixed and user-based rates of Institution, Commercial, Households & Public for the respective years.

Tarrif Rates	
2020-03-01	Fixed ▾
Rate For Institution	Rs 550
Rate for Households	Rs 450
Rate for Public	Rs 0

5.1.5 Add/ Edit Water Supply Schedule

In order to add Water Supply Schedule, the following details have to be filled in:

You can select any time from morning to evening. It accepts the 24 hrs. format timings.

1. Day: Add the name of Days (Example: SUN- WED) Day can be a single day (like sun, mon, etc.) or day range (like sun-mon, tue-fri, etc.). If there are multiple supplies in a single day, multiple entries need to be added.
2. Time From: Add the time from (Example: 1:00).
3. Time To: Add the time to(Example: 20:00)
4. Comment: You can add specific comments on each water supply schedule if required.

Add / Edit Water Supply Schedule

Day of the Week [?] Time From Time To

Comment

S.N	Day of the Week	Time From	Time To	Comment	Action
2079-01-01	1450	0	0	0	

5.1.6 Allow changes in the cashbook via the app after the month is closed

There are two options available: Yes & No for disallowing app edit after month closing. This will affect the cashbook month closing while using the Mobile App. If admin users select yes, then he/she will be able to edit the cash book or can change the data after the month closes also. But if users select no, then he/she will not be able to edit the cash book or change any data after the month closes.

Allow changes in cashbook via the app after the month is closed. [?]:

x

5.2 Finance

In the Finance tab, there are mainly four sub-menus. Expected Income- Water Tariffs, Expected Income/Expenditures (Other), Inflation Rate(%), and Actual Income/Expenditure (Cash Book). In order to add these, the following details have to be filled:

5.2.1 Expected Income- Water Tariffs

There is the option to choose between two types of schemes. They are **fixed rate** and **use based**.

In fixed rate, the rate of water for specific connections is fixed regardless of the water used. Tariff rates for different time periods can be added using the different time periods. Year 1, Year 2, and so on can have different tariff rates on the basis of apply date.

In use based, the rate of water is determined as per the amount of water consumption.

5.2.1.1 Add/Edit Expected Income-Water Tariffs

In order to add **Fixed Based** Tariff Rates, the following details have to be filled:

1. Apply date: Add the date from which this record should be applied to the system.
2. Rate for Households): Add the water tariff rate for the households connection, use the previously selected currency
3. Rate for institutions: Add the water tariff rate for the institutional connection, use the previously selected currency
4. Rate for Public: Add the water tariff for the public connection, use the previously selected currency
5. Rate for Commercial: Add the water tariff for the commercial connection, use the previously selected currency
6. Estimated paying connection Households (%): Add the estimated paying connection Households in % (eg: 20%)
7. Estimated paying connection Institution(%): Add the estimated paying connection Institution in % (eg: 30%)
8. Estimated paying connection public(%): Add the estimated paying connection public in % (eg: 40%)
9. Estimated paying connection commercial(%): Add the estimated paying connection Commercial in % (eg: 10%)
10. Save the added data by clicking on the Save Button

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new project fixed based

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Home

Finance

Expected Income - Water Tariff

Expected Income/Expenditures (other)

Inflation Rate(%)

Actual Income/Expenditure (Cashbook)

Maintenance

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Expected Income - Water Tariff

☒ Fixed rate

Apply Date [?]

Rate for Households (per month)

Rate for Institution (per month)

Rate for Public (per month)

Rate for Commercial (per month)

EPC Households [?]

EPC Institution [?]

EPC Public [?]

EPC Commercial [?]

Save Cancel

S.N	Apply Date	Rate for Households (per month)	Rate for Institution (per month)	Rate for Public	Rate for Commercial	EPC Households	EPC Institution	EPC Public	EPC Commercial
1	2022-01-01	Rs.. 100 (Per Month)	Rs.. 200 (Per Month)	Rs.. 50 (Per Month)	Rs.. 300 (Per Month)	80 %	85 %		9

Users can view the graph in the configuration panel and other short information regarding tariff rates in the income estimates for the current year of water systems and also include other years as well.

Finance

Expected Income - Water Tariffs

Expected Income/Expenditures (other)

Inflation Rate(%)

Actual Income/Expenditure (Cashbook)

Maintenance

Income Estimates

- This Year

Rs. 2184480

Households	Public	Institutions	Commercial	Total Connection
993	1	15	100	1109

Rate for Commercial	Rate for Public	Rate for institution	Rate for households	EPC Commercial	EPC Public	EPC Institution	EPC Households	Total
Rs 0	Rs 0	Rs 550	Rs 450	0 %	0 %	40 %	40 %	2184480
Other Expected Transactions								0
Total								2184480



This graph refers to the Expected income and expenses. Therefore, if the expected tariff maintains the same the expected income will remain the same. Meaning that there is only one date, and one tariff introduced in the system.

5.2.1.2 Add/Edit Expected Income-Water Tariffs

In order to add **Use Based** Tariff Rates, the following details have to be filled:

11. Apply date: Add the date from which this record should be applied to the system.
12. Unit starting from: Add the Unit (Example: 10)
13. Unit up to and including : Add the Unit (Example: 30)
14. Rate (per unit): Add the tariff rate for water units
15. EPC (%): Add the paying connection for water units(70%)

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16. Save the added data by clicking on the Save Button

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Home

Finance

Expected Income - Water Tariff

Expected Income/Expenditures (other)

Inflation Rate(%)

Actual Income/Expenditure (Cashbook)

Maintenance

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Expected Income - Water Tariff

☒ Use Based

Apply Date: 2079-01-01

Unit Starting From: Unit up to and including: Rate (Per Unit) (Rs): EPC (%):

Add Save Cancel

S.N	Applied Date	Action
0	2079-01-01	
0	2079-01-07	

Type here to search

12:22 PM 9/19/2022

Users can view the graph and other short information regarding tariff rates in the income estimates for the current year of water systems and also including other years as well.

Expected Income - Water Tariffs

Expected Income/Expenditures (other)

Inflation Rate(%)

Actual Income/Expenditure (Cashbook)

Maintenance

Water Quality and Quantity

Income Estimates

Households 2

Public 2

Institutions 2

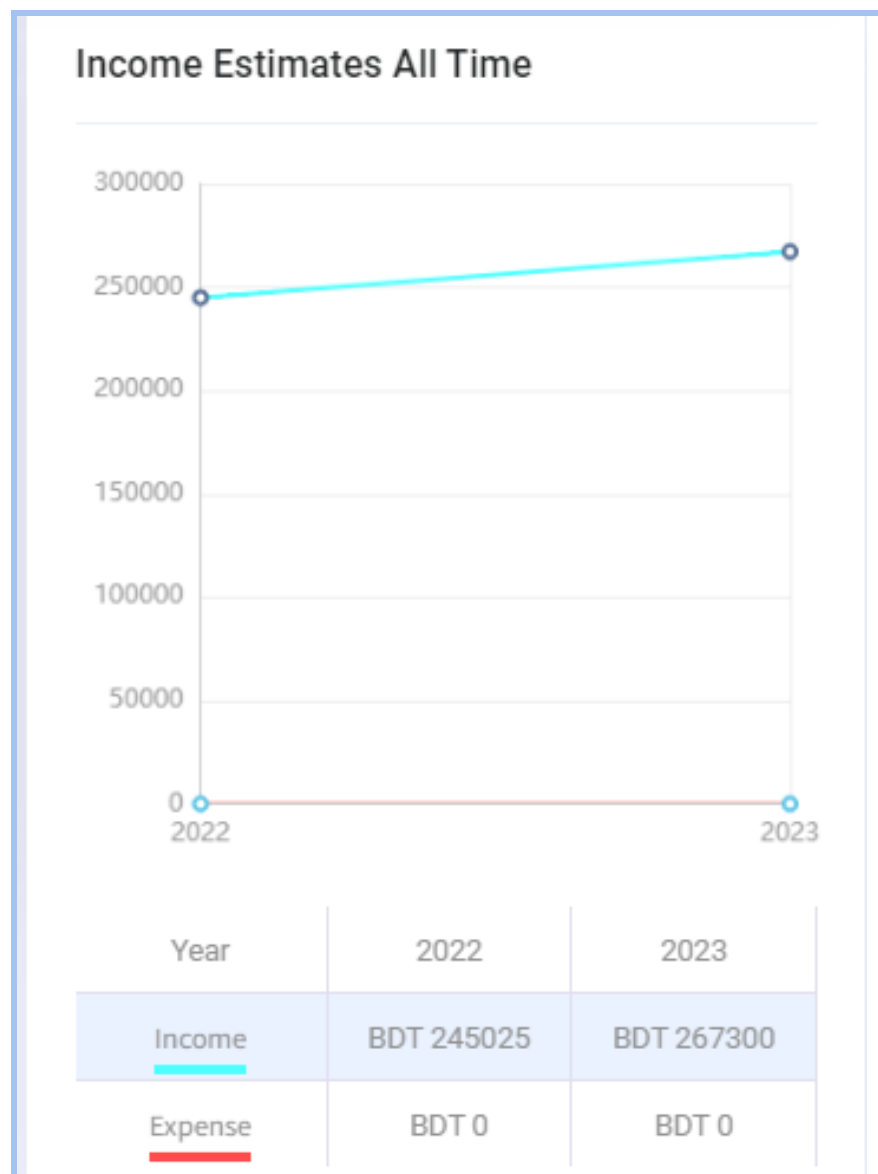
Commercial 3

Total Connection 9

- This Year

BDT. 267300

S.N	Unit Range	Rate	Estimated Paying Connections (%)	Total
1	1 - 99 Units	BDT 50	50 (BDT. 22275) x 12	BDT. 267300
Other Income				-
Total				267300



5.2.1.3 How EPC is calculated?

EPC (Estimated Paying Connections) is the estimated number of connections (represented in percentage) that will pay for the water service. EPC assumes that all connections subscribed to the service may not make the payment due to various reasons.

The following calculations will help to understand the concept of EPC better.

Let's assume that there are different unit ranges, rates and EPCs as following:

There are two options for tariff collection in the system.

I. Fixed Rate

The cost is fixed for each beneficiary regardless of the use of water.

Beneficiary	Total Beneficiaries	EPC (%)	Description
Household	100	65%	Out of 100 connections, 65 households are expected to pay.
Institution	20	80%	Out of 20 connections, 16 institutions are expected to pay.
Public	10	70%	Out of 10 connections, 7 public beneficiaries are expected to pay.
Commercial	5	80%	Out of 5 connections, 4 commercials are expected to pay.

II. Used Base

The cost is variable according to the number of units of water used by the beneficiary. There is always a minimum charge for the service regardless of the units used.

Minimum Unit Charge: All the beneficiaries are charged a minimum amount for usage of units up to a certain unit range. E.g. up to 10 units (0-10 units) cost is 125(currency), beneficiaries are charged (currency) 125 for use of water up to 10 units. This means that whether the beneficiaries have utilized water or not, they must pay the minimum amount after taking a water connection.

Unit Range	Percentage of Beneficiaries under unit rates	EPC	Description
0-10 (minimum unit)	Percentage of Beneficiaries under this unit rate:35%	30%	Out of 140 connections, 49 beneficiaries are expected to use ONLY the minimum unit range. But in total, the remaining 20%, 30%, and 15% of to the total users are also included under the minimum range during calculation. However, from the 49 beneficiaries that fall under this unit range, we can assume that only 42 will be paying the water tariff, the rest will not pay. Therefore, the EPC for this unit range is: $(42/140)*100= 30\%$
11-15	Percentage of Beneficiaries under this unit rate: 20%	15%	Out of 140 connections, 28(20%) beneficiaries are expected to use more than 10 units up to 15 units. From the 28 beneficiaries, only 21 will be paying the water tariff, the rest will not pay. In this case, the EPC can be calculated as: $(21/140)*100=15\%$ The remaining 30% and 15% of the total users also fall under this unit range.
16-20	Percentage of Beneficiaries under this unit rate:30%	25%	Out of 140 connections, 42(30%) beneficiaries are expected to use more than 15 units up to 20 units. From the 42 beneficiaries that fall under this unit range, only 35 will be paying the water tariff, the rest will not pay. For this case, the EPC can be calculated as: $(35/140)*100=25\%$

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			The remaining 15% of the total users also fall under this unit range.
21-30	Percentage of Beneficiaries under this unit rate:15%	10%	Out of 140 connections, 21(15%) beneficiaries are expected to use more than 20 units up to 30 units. From this 21 beneficiaries, only 14 will be paying the water tariff, the rest will not pay. The EPC can be calculated as: $(14/140)*100=10\%$
Total number of beneficiaries = 140	Users: 100% EPCtotal: 80%		Note: <ol style="list-style-type: none"> 1. All unit ranges input should be within the total of 100% EPC as shown under Unit Range and EPC title and <i>should not exceed 100% in Total. EPC cannot exceed the percentage of beneficiaries under the selected unit rate.</i> 2. In Each unit range above the minimum unit range, beneficiaries under the mentioned range will be included in all the unit range below the particular unit range.

Calculation of Expected Income

Calculation of Fixed Base:

Beneficiary	Total Beneficiaries	EPC (%)	Rate (Currency)	Number of months	Calculation
Household	100	65%	120	12	$= 100 * (65\%/100) * 120 * 12$
Institution	20	80%	140	12	$= 20 * (80\%/100) * 140 * 12$
Public	10	70%	80	12	$= 10 * (70\%/100) * 80 * 12$
Commercial	5	80%	160	12	$= 5 * (80\%/100) * 160 * 12$

Calculation of Used Base:

Unit Range	EPC(%)	Rate (Currency)	Number of months	Calculation
0-10 (minimum unit)	35%	125 (minimum charge)	12	$=140*125*(35\%/100)*12$

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11-15	20%	25	12	$=140*125*(20\%/100)*12 + 140*25*(20\%/100)*12*5$ <p>Here, 5 is the difference in unit range, there are 5 units if we calculate the units greater than 10 units up to 15 units.</p>
16-20	30%	35	12	$=140*125*(30\%/100)*12 + 140*25*(30\%/100)*12*5 + 140*35*(30\%/100)*12*5$
21-30	15%	45	12	$=140*125*(15\%/100)*12 + 140*25*(15\%/100)*12*10 + 140*35*(15\%/100)*12*10 + 140*45*(15\%/100)*12*10$ <p>Here, every calculation is multiplied by 10 (max range difference and the highest range includes all the EPC below this range).</p>
Total number of beneficiaries = 140	100%			<p>Note:</p> <ol style="list-style-type: none"> 1. 140 = Total number of beneficiaries 125 = Minimum charge for every beneficiary must pay 12 = number of months % = EPC 5, 10 = Max unit difference taken for calculation

5.2.2 Expected Income/Expenditure (Other)

In order to add expected income/expenditure(Other), the following details have to be filled:

1. Apply Date: Add the date from which this record should be applied to the system.
2. Transaction Heading: Add the transaction heading.
3. Yearly Amount: Add the yearly amount for the transaction.
4. Transaction Type: Select either income or expenditure as per the transaction heading.
5. Apply for a specific date: Add “yes” if the transaction refers to a specific date or “No” and the transaction will be distributed evenly over all the months in the year
6. Repeats every year?: Add “yes” or “No” depending if the same expenditure/income repeats every year.

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Home

Finance

Expected Income - Water
Tariff

Expected
Income/Expenditures
(other)

Inflation Rate(%)

Actual
Income/Expenditure
(Cashbook)

Maintenance

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Expected Income/Expenditures (other)

Apply Date: Transaction Heading: Yearly Amount (Rs.): Transaction Type: Select...

Apply for specific date: Repeats every year?:
☒ Yes ☐ No ☐ Yes ☒ No

Save Cancel

S.N	Transaction Type	Transaction Heading	Yearly Amount	Action
1	Income	Income	Rs.. 2000	

Income/Expenditure Estimation of All Time:

Expected income/expenditure is calculated on the basis of the prediction that the transaction will occur in the future.

Factors affecting the Expected income/expenditure

- I. Expected income is calculated from the transactions that are under the Income categories, Expected Income/Expenditures (other), and the expected income from the water tariff rate used in Fixed and Use Based .
- II. Expected expenditure is calculated from the transactions that are under the Expenditure categories, Expected Income/Expenditures (other), and Maintenance under Expected risks, activities and cost (Component Information).

- III. First Year Calculation (assume the first year is 2022):

Expected Income: Rate applied in the Expected Income water tariff and the transactions in Expected Income/Expenditures (others) under the category Income are included.

Expected Expenditure: Transaction in Expected Income/Expenditure (others) under the category Expenditure and the expected maintenance cycle added from the Component Information. The inflation rate (if any) is applicable in the coming years,excluding the first year.

Real Income is calculated on the basis of real income under the Cash Book.

Real Expenditure is calculated on the basis of real expenditure under the Cash Book and the expenditures that occurred during the Maintenance Cycle.

Note: See EPC Calculation for Expected Water Tariff

- IV. Expected Income/Expenditure is affected by different factors that impact the calculation in the first year and the upcoming years (Visualize data for specified years): :

- a. Apply for specific date:

Yes: The transaction is applicable for the specified date only

No: The transaction is distributed evenly over all the months in the year.

- b. Repeats every year?
 Yes: Specified transaction will repeat every year
 No: Specified transaction will be applicable to either Apply Date (if chosen No for Specific Date) or Specific Date(if chosen Yes) and this transaction will not repeat in coming years.
- c. Matrix Representation of the factors affecting expected income/expenditure:

Apply for specific date	Repeats every year?	Result
Yes	Yes	The transaction is applied on a specific date and the same transaction will repeat in coming years on the same date.
Yes	No	The transaction is applied on a specific date only and will not repeat in the coming years.
No	Yes	The transaction is distributed evenly over all the months in the year and will repeat in the coming years evenly.
No	No	The transaction is distributed evenly over all the months in the year and will not repeat in the coming years.

Fig. Matrix Representation

- d. Expected income tariff rate applied in Used and Fixed Based makes a difference in the calculation if the Apply Date is different from the first year.
- e. Inflation rate (if applied) ensures an increase in the value of expected expenditures over the years. Not applicable in the first year.

5.2.3 Inflation Rate(%)

The screenshot displays the 'Bankatuwa Water System' web application. The left sidebar contains a navigation menu with the following items: Home, Finance, Expected Income - Water Tariffs, Expected Income/Expenditures (other), Inflation Rate(%), Actual Income/Expenditure (Cashbook), Maintenance, and Water Quality and Quantity. The 'Inflation Rate(%)' option is currently selected. The main content area is titled 'Inflation Rate (%)' and features a text input field labeled 'Inflation Rate (%)' with the value '6' entered. A blue 'Save' button is positioned to the right of the input field. The top of the interface shows the date '3/14/2022' and the currency 'Rupee'. The browser address bar at the bottom shows the URL 'https://assetmanagementsystem.netlify.app/#/auth/inflation-parameters'.

In order to add inflation Rate(%), the following details have to be filled:

1. Inflation(%): Add the country inflation rate (The inflation rate is applied only for expenditure and maintenance)

The future values of maintenance and expenditure can be determined by the following formula:

$$FV = PV(1+i)^{n-1}$$

where, FV= Future value

PV= present value

i= inflation rate

n= no. of years

2. Save the added data by clicking on the Save Button

5.2.4 Actual Income/Expenditure (Cash Book)

In the actual income/expenditure (cash book) tab, there are mainly two sections. These are Income and Expenditure. There is also a date filter By Month & By Date in the right-up corner of the tab, where the user can select the date as per the date requirement in order to see income and expenses records for the given years.

These data can also be entered via mobile application.

By Month

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tuwa Water System

3/14/2022 Rupeeta

me

finance

Expected Income - Water Tariffs

Expected Income/Expenditures (other)

Inflation Rate(%)

Actual Income/Expenditure (Cashbook)

Maintenance

Water Quality and Quantity

Cash Book (Mar)

Income

Expenditure

By Date

By Month

Select Month

Add Transaction

Manage Income Categories

Date	Description	Donation	Households	Institutions	Other	Water Sales	Action
	Previous month data	-	-	Rs 500	-	-	
2022-03-02	water sales total	-	-	-	-	Rs 12000	
2022-03-03	Water sales Title	-	-	-	-	Rs 1500	
	TOTAL	-	-	-	-	Rs 13500	

By Date

tuwa Water System

3/14/2022 Rupeeta

me

finance

Expected Income - Water Tariffs

Expected Income/Expenditures (other)

Inflation Rate(%)

Actual Income/Expenditure (Cashbook)

Maintenance

Water Quality and Quantity

Cash Book (Sep - Dec)

Income

Expenditure

By Date

By Month

Date From

2021-09-15

Date To

2021-12-15

Add Transaction

Manage Income Categories

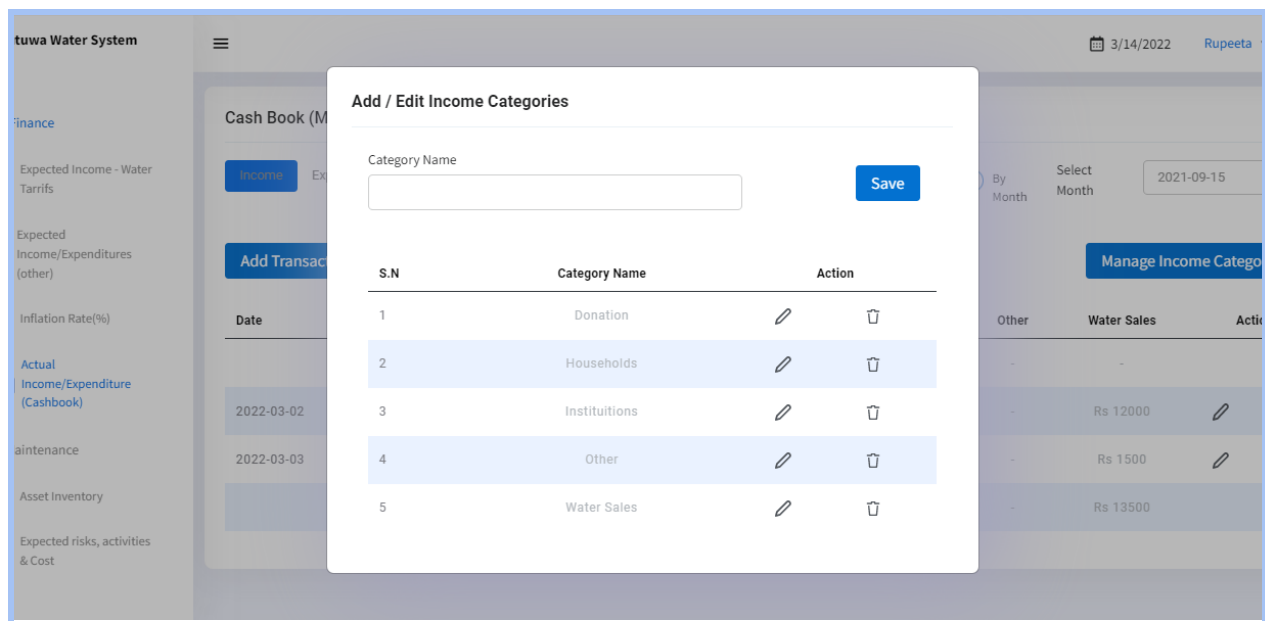
Date	Description	Donation	Households	Institutions	Other	Water Sales	Action
2021-09-30	All the income from households and institutions	-	Rs 413500	-	-	-	
2021-10-30	Income from all the households and institutions	-	Rs 420500	-	-	-	
2021-11-15	Water Sold	-	-	-	-	Rs 14000	
2021-11-19	Household income	-	Rs 430500	-	-	-	
2021-12-15	Income (No.332- 662 Houses)	-	Rs 132400	-	-	-	
2021-12-15	Income (No.333-993 houses)	-	Rs 132400	-	-	-	
2021-12-15	Institutional Income (15 schools)	-	-	Rs 7500	-	-	

5.2.3.1 Manage Income Categories

In order to add income categories, the following details have to be filled:

1. Category Name: Add a category name for the Income.
2. Save the added data by clicking on the Save Button.

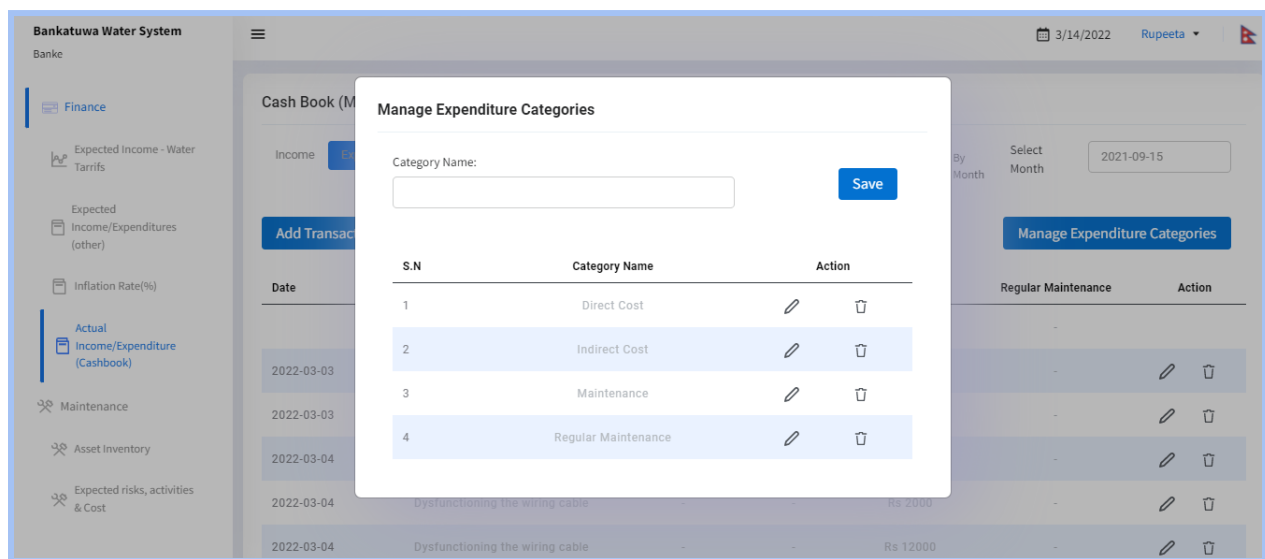
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5.2.3.2 Manage Expenditure Categories

In order to add expenditure categories, the following details have to be filled:

1. Category Name: Add a category name for the Expenditure
2. Save the added data by clicking on the Save Button



5.2.3.3 Add/Edit Income

In order to add the income, the following details have to be filled:

1. Category: Select category from the given income category list
2. Date: Today's date will come by default. If the user wants to change the date, it can be changed.
3. Title: Add the income title
4. Amount: Add the income amount
5. Water Supplied (Liters): Add the total water supplied for the month in Liters. This field will appear only after selecting the "Water Sales" category from the given categories.
6. Remarks: Add remarks for income title (optional)
7. Save the added data by clicking on the Save Button

The screenshot shows the 'Add / Edit Income' modal form overlaid on the 'Cash Book (M)' page of the Bankatuwa Water System. The modal form contains the following fields:

- Category :** A dropdown menu with 'Select...' as the placeholder.
- Date :** A text input field containing '2022-03-29'.
- Title:** A text input field.
- Amount :** A text input field.
- Remarks:** A text input field.
- Save** button.

The background page shows the 'Cash Book (M)' section with a table of transactions. The table has columns for 'Date', 'Income', and 'Expenditure'. The 'Income' column is currently selected, showing a list of transactions with dates like '2022-03-02' and '2022-03-03'. The 'Expenditure' column is also visible, showing transactions with amounts like 'Rs 12000', 'Rs 1500', and 'Rs 13500'. The 'Water Sales' category is highlighted in the 'Expenditure' column.

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5.2.3.4 Add/Edit Expenditure

In order to add the expenditure, the following details have to be filled:

1. Category: Select category from the given expenditure category list
2. Date: By default, there will be a date for the expenditure since the date would have already been selected by the user beforehand.
3. Title: Add the expenditure title
4. Amount: Add the expenditure amount. The option adding “cost separately” will be available there if the users select the “Maintenance” category from given categories. Then the segregated costs for the maintenance only can be added in the form of Labour, Consumables or Replacement.
5. Remarks: Add the remarks for expenditure title (optional)
6. Save the added data by clicking on the Save Button

Add / Edit Expense

Category:

Date:

Title:

Amount:

Remarks:

Save

5.3 Maintenance

In the Maintenance tab, there are mainly three sub-tabs. These are Asset Inventory, Expected risk activities & cost, and Actual maintenance (Logs). In order to add the multiple data regarding this, the following details have to be filled:

5.3.1 Asset Inventory

5.3.1.1 Add/Edit Asset Inventory (Component Categories)

In order to add the Asset Inventory, the following details have to be filled:

1. Title: Add the title of the component category
2. Save the added data by clicking on the Save Button.

The screenshot displays the 'Component Categories' section of the Asset Inventory management interface. On the left is a sidebar with navigation options: Home, Finance, Maintenance, Asset Inventory (selected), Expected risks, activities & Cost, Actual Maintenance (Logs), Service, and Notifications. The main area is divided into two panels. The left panel, titled 'Component', contains a 'Category:' dropdown menu with 'Select...' as the current selection, a 'Name:' text input field, and a 'Save' button. Below this is a table with the following data:

S.N	Category	Component
1	Main component	Dome tank surface-parts (inside and outside surface)
2	Main component	Metal structure(main part)
3	Main component	Metal structure (sub part)

The right panel, titled 'Component Categories', contains a 'Title:' text input field with 'Main component' entered, and a 'Save' button. Below this is a table with the following data:

S.N	Category Name	Action
1	Main component	
2	Meter and transformer	
3	Supply of HDP Pipe	
4	CI/HDP Flange set	
5	GI/HDP flange set	

5.3.1.2 Add/ Edit Component

In order to add the component, the following details have to be filled:

1. Category: Select category from the given Component category lists
2. Name: Add the component name
3. Save the added data by clicking on the Save Button.

The screenshot displays the 'Component' section of the Asset Inventory management interface. The sidebar is the same as in the previous screenshot. The main area is divided into two panels. The left panel, titled 'Component', contains a 'Category:' dropdown menu with 'Meter and transformer' selected, a 'Name:' text input field, and a 'Save' button. Below this is a table with the following data:

S.N	Category	Component
1	Main component	Dome tank surface-parts (inside and outside surface)
2	Main component	Metal structure(main part)
3	Main component	Metal structure (sub part)
4	Main component	Office buildings/ stores/Compound wall

The right panel, titled 'Component Categories', contains a 'Title:' text input field with 'Main component' entered, and a 'Save' button. Below this is a table with the following data:

S.N	Category Name	Action
1	Main component	
2	Meter and transformer	
3	Supply of HDP Pipe	
4	CI/HDP Flange set	
5	GI/HDP flange set	

5.3.2 Expected risks, activities & Cost

In order to add the information regarding asset components, the following details have to be filled:

5.3.2.1 Add/Edit Component Info

In order to add component info, the following details have to be filled:

1. Component Name: Select the component name from the component lists
2. Component Number: Add the total number of components present in the system. It affects the calculation of costs. **The number of components will be multiplied with either unsegregated costs or with individual labor, replacement, and consumable cost depending upon the data input.**
3. Possible failure: Add the possible failure of the component category
4. Maintenance action: Add the maintenance action required for the component category
5. Maintenance Interval: Add the maintenance interval of the component. Year/Month/Days can be selected from the dropdown list. Maintenance action needs to be repeated after the every selected time duration. If the maintenance action needs to be done before the predefined maintenance interval, the interval can be edited in the “Add/edit component Info” section.
6. Executed Maintenance cost: Add total maintenance cost without any segregation. If the user wants to add the segregated cost for maintenance, he/she needs to click on the add cost separately check box.
 - Labor cost : Refers to the labor costs for providing a one-time maintenance/repair to the system component.
 - Consumable Cost: Refers to all materials costs for a one-time maintenance/repair to the system component.
 - Replacement Cost: Add the total costs of completely replacing the system component (so both labor & material costs).

NOTE: The same component should be added twice if it has both repair and replacement needs. E.g., Valve needs to be replaced once every 5 years. Then you should add the component and include replacement costs and keep Labour and Consumable costs at 0 (zero). Valve also needs lubrication every 3 months. Then you should add the same component again and insert the Labour and Consumable costs of that, but keep Replacement cost at 0 (zero).

7. Likelihood of Failure: Select one of the likelihood of failure from the given list
8. Impact of Failure: Select one of the impacts of failure from the given lists

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9. Mitigation: Here, mitigation refers to the types of component to which maintenance action has to be done later on. Select one of the mitigation from the given lists
 - Reactive: One reacts when the asset breaks down or fails.
 - Inspection: One uses regular pre-planned inspections to determine the state of the assets, and plan maintenance based on that.
 - Preventive: One does maintenance when a certain specified parameter reaches a certain value/level (e.g. replacement of a valve after 10,000 liters or water supplied).
10. Designated Person: Write the name of the designated person, responsible for maintenance of the component used in the system.
11. Apply Date: The date from which this record should be applied to the system.
12. Next Planned Action date: The date on which the next maintenance action is scheduled. Leave the field empty if the next planned action date is not applicable.
13. Component picture: Add the component picture which should be less than 10Mb
14. Save the added data by clicking on the Save Button.

The screenshot shows a web application interface with a sidebar on the left containing navigation icons for 'Inflation', 'Actual Income (Cash)', 'Maintenance', 'Asset', 'Expense & Cost', 'Actual Logs', 'Service', and 'Notification'. The main content area displays a modal window titled 'Add/Edit Component Info'. The form within the modal includes the following fields and controls:

- Component Name :** A dropdown menu with 'Select...' as the placeholder.
- Number of Components :** A text input field.
- Possible Failure:** A text input field.
- Maintenance Action:** A text input field.
- Maintenance Interval:** A text input field with a 'Year' dropdown menu.
- Add Cost Separately :** A checkbox.
- Maintenance Cost (Rs.):** A text input field with '0' entered.
- Likelihood Of Failure :** A dropdown menu with 'Select...' as the placeholder.
- Impact Of Failure:** A dropdown menu with 'Select...' as the placeholder.
- Mitigation:** A dropdown menu with 'Select...' as the placeholder.
- Designated Person:** A text input field.
- Apply Date :** A date input field showing '2022-01-01'.
- Next Planned Action Date :** A date input field.
- Component Picture:** A file upload area with a 'Choose Files' button and the text 'No file chosen'.
- Buttons:** 'Save' (blue) and 'Cancel' (white) buttons at the bottom right.

5.3.2.2 Add/ Edit Issue (Logs)

In order to add the Issue logs, the following details have to be filled:

1. Component: Select the component category from the given lists
2. Issue date: Add the Issue date for the component category
3. Cause of failure: Add the cause of failure of the component

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4. Maintenance Action Proposed: Add the maintenance action proposed for the component to solve the problem
5. Time required: Add the interval in days/months/year on which the maintenance action should be taken of the component in order add the log (interval in days/month/year)
6. Total Cost: Add the total cost of the component (without any segregation cost)
For segregated cost, see point 5.3.2.1 of this manual:
Add:
Labor cost: Add the labor cost (if there is segregation of the cost)
Consumable Cost: Add the material cost (if there is segregation of the cost)
Replacement Cost: Add the replacement cost (if there is segregation of the cost)
7. Log status: Mark Resolved or Unresolved, depending on whether the issue has been solved or not
8. Remarks: Add the remarks for the component (optional)
9. Component Picture: Component Picture will be shown here if the users have added image(s) from the mobile app only .
10. Save the added data by clicking on the Save Button.

5.3.2.3 Add/ Edit Actual Maintenance Logs

In order to add the Maintenance log, the following details have to be filled:

1. Component: Select the component category from the given lists
2. Maintenance date: Add the maintenance date for the component category
3. Cause of failure: Add the possible cause failure of the component

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4. Maintenance Action Executed: Add the last maintenance action executed for the component
5. Time required: Add the interval on which the maintenance action was performed (it can be days/month/year).
6. Total Cost: Add the total cost of the component (without any segregation cost)
For segregated cost, see point 5.3.2.1 of this manual:
Add:
Labor cost: Add the labor cost (if there is segregation of the cost)
Consumable Cost: Add the material cost (if there is segregation of the cost)
Replacement Cost: Add the replacement cost (if there is segregation of the cost)
7. Remarks: Add the remarks for the component
8. Component Picture: Component Picture will be shown here if the users have added image(s) from the mobile app only.
9. Save the added data by clicking on the Save Button.

The screenshot displays a web application interface for 'new project fixed based'. The top navigation bar shows the date '11/10/2022' and the user 'biju111'. A sidebar on the left contains navigation links: Home, Finance, Maintenance (highlighted), Service, and Notifications. The main content area features a modal form titled 'Add / Edit Maintenance Log'. The form includes the following fields and controls:

- Log Type:** A dropdown menu with 'Maintenance' selected.
- Component:** A dropdown menu with 'Select...' as the placeholder.
- Executed Maintenance Date:** An empty text input field.
- Cause of failure :** An empty text input field.
- Maintenance Action Executed:** An empty text input field.
- Time Required:** An empty text input field with a 'Year' dropdown arrow.
- Add Cost Separately:** An unchecked checkbox.
- Total Cost:** A text input field containing the value '0'.
- Component Picture:** A button labeled 'Choose Files' next to the text 'No file chosen'.
- Remarks :** An empty text input field.
- Buttons:** 'Save' and 'Cancel' buttons at the bottom right of the form.

At the bottom left of the application, it states: 'Developed by : Smart Tech' and 'Contact: info@smarttech.com.np'.

5.4 Service

In the Service tab, there are two sub-tabs. They are the Water Supply Record & Water Quality Test. In order to the multiple data regarding this, the following details have to be filled:

5.4.1 Water Supply Records

5.4.1.1 Add/ Edit Water Supply Record

All the water supply records that are saved via the mobile app will be available here to edit. In order to add and edit the Water Supply Records, the following details have to be filled:

1. Total Supply (liters): Add the total daily water supply in liters
2. Supply Date: Add a calendar date to record the daily water supply. Users can also add date range.

The screenshot displays the 'Water Supply Records' interface. On the left, a sidebar menu lists various system components, with 'Water Supply Record' highlighted. The main area contains a form with the following elements:

- Form Fields:**
 - Total Supply (In Liters):** A text input field.
 - Supply Date:** A date picker field.
 - Supply End Date:** A date picker field, accompanied by a checked checkbox labeled 'Add Supply End Date' with a help icon.
- Buttons:** 'Save' (blue) and 'Cancel' (white) buttons.
- Date Range:** 'Date From:' and 'Date To:' fields with a range icon.
- Table:** A table with headers 'S.N', 'supplystartDate', 'Total Supply (In Liters)', and 'Action'. The table body is empty, showing 'No Data Available'.

The top of the interface shows the user's profile 'biju111' and the current date '9/19/2022'.

5.4.2 Water Quality Test

In order to add the water quality test, there are two tabs: Quality Test Parameters & Water Test Result on the same page.

5.4.2.1 Add/ Edit Quality Test Parameter

In order to add the water quality test Parameter, the following details have to be filled:

1. Parameter name: Add the parameter name for the water quality test (e.g. Turbidity, residual coliform, pH, Iron)
2. Unit: Add the unit of the quality test parameter

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3. National Drinking Water Quality (NDWQ) Standard: Add the given NDWQ Standard for the water quality test parameter. It is the quality standard for drinking water.
4. Types: Select the types, either chemical or other from the lists.
5. Save the added data by clicking on the Save Button.

S.N	Parameter	Units	NDWQ Standard	Action
1	Turbidity	NTU	5	
2	Aluminium	mg/l	0.2	
3	Zinc	mg/l	3	
4	Copper	mg/l	1.0	
5	Sulphate	mg/l	250	
6	Maganese	mg/l	0.20	

5.4.2.2 Add/ Edit Water Test Result

All the water test results that are filled & saved via the mobile app will be available here to edit. In order to add and edit the water test result, the following details have to be filled:

1. Date: Add a calendar date to record the water test result

The parameters entered in the Quality Test Parameter will show here.

Users can add and edit the water test result as per the given water test parameters respective to their units.

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Water Quality Test

Quality Test Parameters **Water Test Result**

Date : Turbidity : Aluminium : Zinc :

Copper : Sulphate : Manganese : Ammonia (NH3) :

Iron : Arsenic : Colour : pH :

Save

S.N	Date	Action
1	2021-10-20	

5.5 Notifications

In the notification tab, there is a tab named manage notifications. All the notifications visible on the top of the mobile app are managed from this section. Users can manage the notification by adding the date with the specific time period for income notification, expenditure notification, test result notification, supply record notification and when to do maintenance notification so that the mobile app user can be notified on time.

5.5.1 Manage Notifications

In order to manage notifications, the following details have to be filled:

1. Initial date: Add the initial date for the notifications
2. Income notifications period: Add the income notifications period in days
3. Expenditure notifications period: Add the expenditure notifications periods in days.
4. Test result notifications period: Add the test result notifications periods in days.
5. Supply record notifications period: Add the supply record notifications periods in days.
6. Maintenance Notify Before: Add the time period for maintenance Notify Before
7. Maintenance Notify After: Add the time period for maintenance Notify After
8. Save the added data by clicking on the Save Button.

The screenshot shows the 'Manage Notifications' configuration panel. On the left is a sidebar with the following items: (other), Inflation Rate(%), Actual Income/Expenditure (Cashbook), Maintenance, Asset Inventory, Expected risks, activities & Cost, Actual Maintenance (Logs), and Water Quality and Quantity. The main content area is titled 'Manage Notifications' and contains several input fields for configuring notifications:

Notification Type	Field Label	Current Value
Initial Date	Initial Date:	2021-10-03
	Income notifications period:	30
Expenditure notifications period	Expenditure notifications period:	30
	Test Result notifications period:	30
Supply Record notifications period	Supply Record notifications period:	30
	Maintenance Notify Before:	0
Maintenance Notify After	Maintenance Notify After:	0

A 'Save' button is located at the bottom right of the main content area.

5.6 Change Language

There is an availability of two languages: English and Nepali in the configuration web utility. Users can select the language by:

1. Clicking on the top right corner where there is an Icon of Flag in the configuration panel.

5.7 Logout

Users can logout from the web configuration by:

1. Clicking on the name of the user placed on the right side of the panel near the language selection and clicking on the Logout displayed text.

Thank you