



SOFTWARE REQUIREMENT SPECIFICATION

One City One Operator

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SILEO TECHNOLOGIES PRIVATE LIMITED

4th Floor Salarpuria Towers-01, Hosur Road,
Koramangala, Bengaluru-560095 KA

Email: info@thesileo.com Web: <http://www.thesileo.com>

Revision Log

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1. INTRODUCTION

The introduction section serves as the opening part of the System Requirements Specification (SRS) document, providing a brief overview and context for the project. It is essential in setting the foundation and presenting a clear understanding of the objectives and scope of the project to all stakeholders involved.



1.1 PURPOSE

The purpose of the Introduction section in the System Requirements Specification (SRS) document is to provide a clear understanding of why the document is being created and what it aims to achieve. This section serves as an opening statement that outlines the objectives and goals of the project in relation to the development of the system. It sets the stage for the entire document and helps stakeholders, developers, and readers to align their understanding and expectations.

The purpose of this section is to clearly state the reason for creating this document and to establish the goals and objectives of the OCOP (One City One Operator) Project under the Jaal Nigam program.

In summary, the "Purpose" section within the introduction sets the stage for the entire SRS document. It ensures that stakeholders and readers understand the objectives, scope, and

context of the project, enabling them to engage with the document with a clear understanding of what is to come and why it matters.

1.2 SCOPE


The scope of this project includes the development, implementation, and maintenance of a sewage infrastructure to purify dirty water under the Jal Nigam program. Multiple firms will be involved in the operation and maintenance of sewage treatment plants (STPs). In-house monitoring and daily checks will be conducted, and the Uttar Pradesh Pollution Control Board (UPCB) and Third-party inspection will respond based on the results provided by the STPs and weekly checks will be conducted.

Water is an essential input for agriculture and industrial growth and existing conventional water resources are limited and hard-pressed to sustain growth, thus recycle and reuse of waste water, especially of the sewage is well established and can be done at a very low cost and supplied to the local industry and for irrigation purposes.

To ensure better co-ordination and improved quality of water, the government plans to have a single operator maintain all sewage treatment plants (STPs) in a city, as part of its efforts to clean the river.

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About **One City One Operator**

Under the Namami Gange program, the new sewage infrastructure created were to be developed on either on Design, Build and Operate (DBO) Model or Hybrid Annuity (HAM) Model and also adopt new technologies. Both these models had an inbuilt long term Operation and Maintenance (O&M) contract for a period of ten to fifteen years. Further, some of the old sewage treatment plants were also to be rehabilitated and upgraded with long term Operation and Maintenance Contracts. Inspired by the idea of long term O&M contracts of Namami Gange projects, the State Ganga River Conservation Authority (SGRCA), Uttar Pradesh (U.P) an agency that coordinates various conservation activities, decided to pursue Long Term Operation and Maintenance (O&M) contracts for the sewage treatment infrastructure of major cities in UP in a unique One City One Operator model. SGRCA mooted this idea as they realized that major cities of UP were plagued with huge sewage infrastructural issues, specifically that of sewage collection system network. The SGRCA decided this contract duration should be a minimum of 10 years with a possible extension of another 5 years and also that the contract scope would include operation and maintenance of the entire sewage network of the city, pumping stations and sewage treatment plants (STP). The STP upon treatment shall discharge the treated effluent as per stipulated norms, thus bringing the entire sewage infrastructure management of the city under one contract.

1.3 DEFINITIONS, ACRONYMS, and ABBREVIATIONS

- ❖ OCOP: One City One Operator Project
- ❖ Jal Nigam: A government initiative to clean and rejuvenate and its tributaries
- ❖ STP: Sewage Treatment Plant
- ❖ TPI: Third Party Inspection
- ❖ UPCB: Uttar Pradesh Pollution Control Board
- ❖ BOD: Biochemical Oxygen Demand
- ❖ COD: Chemical Oxygen Demand
- ❖ TSS: Total suspended solids
- ❖ FC: Faecal coliforms
- ❖ MOM: Minutes of meetings

2. SYSTEM OVERVIEW

2.1 SYSTEM DESCRIPTION

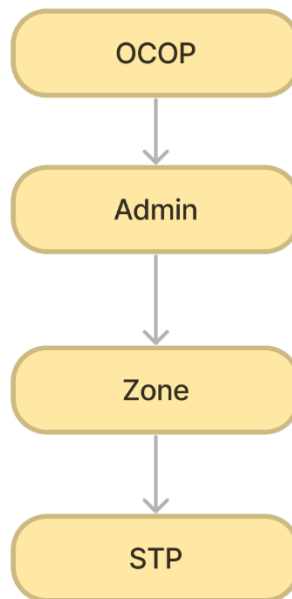
The "System Description" sub-section aims to provide a comprehensive understanding of the OCOP (One City One Operator) Project and its components. It elaborates on what the system comprises and how it functions.

Most of the cities and towns are now growing both vertically and horizontally. Despite on best efforts, the municipal bodies have not been able to cope with maintaining the sewage infrastructure, mostly due to ageing assets and poor maintenance.

The long-term O&M contracts in One City One Operator model would establish new bench mark for system maintenance and effluent treatment standards. The new bench mark in-turn invites professional companies to manage these infrastructure assets.

Components of the System:

The OCOP system encompasses various components, including sewage treatment plants (STPs), monitoring systems, reporting mechanisms, data management systems, and response protocols. These components work collaboratively to achieve the goal of establishing new sewage infrastructure and improving water quality.



❖ **Sewage Treatment Plants (STPs):**

- These are the central components responsible for purifying dirty water.
- They are equipped with advanced technology and processes to treat sewage and ensure it meets environmental standards before being released.

❖ **Monitoring Systems:**

- The OCOP system includes mechanisms for real-time or regular monitoring of the STPs' performance.
- This involves tracking parameters such as water quality, treatment efficiency, and plant operations.
- Inhouse will generate a test report on daily basis.
- TPI and UPPCB will generate a test report on weekly basis.
- After the bill generation JE (Jal Nigam, Jal Kaal, OM&M), will monitor the further billing process.

❖ **Reporting Mechanisms:**

- The system facilitates the generation of reports based on the data collected from monitoring.

- These reports provide insights into the performance of STPs and are used for decision-making and compliance purposes.

❖ Data Management Systems:

- The OCOP system incorporates data management solutions to handle the vast amount of data generated from monitoring and reporting activities.
- These systems ensure data is organized, stored securely, and easily accessible for analysis and reporting.
- Bill generates after testing and proceed to Admin. Whole month report will generate.
- All the report is stored in our database.

❖ Response Protocols:

- The system defines protocols for responding to the results obtained from STPs.
- Depending on the outcomes, appropriate actions and responses are initiated to address any issues or deviations from the desired water quality standards.

2.2 SYSTEM CONTEXT

The "System Context" sub-section elaborates on the larger environment in which the OCOP (One City One Operator) Project operates. It defines the system's boundaries, stakeholders, and interfaces with external entities.

a. System Boundaries:

- ❖ Defining system boundaries is essential to clarify what is within the scope of the OCOP project and what is external to it. It establishes the extent to which the system is responsible for certain functions and interactions.
- ❖ For OCOP, the boundaries may include the geographical area of the sewage treatment infrastructure, the specific components of the system, and any interactions with external systems.

b. Collaborators:

Stakeholders are individuals, groups, or organizations who have an interest or influence in the project. In the context of the OCOP system, stakeholders may include:

- ❖ Government Authorities: Regulatory bodies responsible for overseeing the project and ensuring compliance with environmental standards.

- ❖ Sewage Treatment Plant Operators: Entities responsible for the day-to-day operation and maintenance of sewage treatment plants.
- ❖ In-House Monitoring Teams: Teams designated to monitor the performance of sewage treatment plants and ensure compliance with established parameters.
- ❖ Third-Party Inspection (TPI) Agencies: Independent agencies responsible for conducting inspections and audits to verify the effectiveness and compliance of the sewage treatment process.
- ❖ Uttar Pradesh Pollution Control Board (UPCB): A regulatory body overseeing environmental aspects and ensuring compliance with pollution control standards.
- ❖ General Public: Citizens residing in the areas served by the sewage treatment plants and impacted by the water quality improvements.

Interfaces with External entities:

The system interfaces with various external entities to function effectively and fulfil its objectives. These interfaces might include:

- ❖ Data Exchange with Environmental Agencies: Sharing data on water quality and treatment performance with environmental agencies to ensure compliance with regulations.
- ❖ Integration with Monitoring Tools: Interfacing with monitoring tools to collect real-time data on water quality and treatment process efficiency.
- ❖ Communication Channels for Response: Establishing interfaces for communication with regulatory bodies and other stakeholders to report results and initiate responses based on STP performance.

By defining these aspects in the "System Context" section, the SRS document lays the foundation for a clear understanding of how the OCOP system operates within its defined boundaries, engages with stakeholders, and interacts with external entities to achieve its goals and objectives. This clarity is vital for effective development, implementation, and maintenance of the system.

2.3 USER CHARACTERISTICS

i. Government Authorities and Regulators:

- ❖ **Role:** Government authorities and regulators play a critical role in overseeing and managing the OCOP project. They are responsible for defining policies, regulations, and guidelines that the project must adhere to. Additionally, they monitor and evaluate the progress of the project to ensure compliance with environmental and legal standards.
- ❖ **Knowledge and Expertise:** Expertise in environmental regulations, policy-making, legal frameworks, and understanding of the broader goals of the Jal Nigam program.
- ❖ **Interactions with the System:** They interact with the system to access reports, compliance data, and performance metrics of the sewage treatment plants (STPs) to ensure adherence to set regulations and environmental norms.

ii. Sewage Treatment Plant Operators:

- ❖ **Role:** These individuals or teams are responsible for the day-to-day operation, maintenance, and management of the sewage treatment plants. They ensure that the STPs function optimally, treating sewage effectively and efficiently to meet the required water quality standards.
- ❖ **Knowledge and Expertise:** Technical knowledge of sewage treatment processes, equipment operation, maintenance practices, and safety protocols related to sewage treatment plants.
- ❖ **Interactions with the System:** Their interactions include data input related to STP operation, maintenance records, and performance monitoring. They may also access reports and alerts generated by the system to optimize plant operations.

iii. In-house Monitoring Teams:

- ❖ **Role:** In-house monitoring teams are responsible for regularly monitoring the water quality measures the parameters (BOD, COD, TSS and FC). Basically, it is for daily purpose, one day at a time.
- ❖ **Knowledge and Expertise:** Understanding of water quality parameters, monitoring techniques, data collection procedures, and familiarity with sewage treatment plant operations.

iv. Third-Party Inspection (TPI) Agencies:

- ❖ Role: TPI agencies conduct independent inspections and examine of the sewage treatment plants their parameters (BOD, COD, TSS and FC). They verify compliance with regulatory and performance standards, ensuring impartial assessments of the STPs' functioning.
 - ❖ Basically, TPI is used for weekly purposes.
 - ❖ Knowledge and Expertise: Expertise in environmental regulations, sewage treatment processes, examine and inspection methodologies, and data analysis.
- v. Uttar Pradesh Pollution Control Board (UPPCB) Officials:
- ❖ Role: Officials from UPPCB are responsible for regulating pollution control and environmental compliance within the Uttar Pradesh region. They oversee the implementation of projects like OCOP to ensure they align with environmental policies and standards.
 - ❖ Knowledge and Expertise: Deep understanding of environmental laws, pollution control measures, regulatory frameworks, and experience in evaluating and monitoring environmental projects.
 - ❖ The UPPCB conducts weekly checks, meticulously reviewing parameters one at a time throughout the week for thorough and comprehensive monitoring.

Understanding the distinct user characteristics is vital in designing and developing the OCOP system, ensuring that it meets the specific needs, requirements, and expertise of the various stakeholders involved in the project.

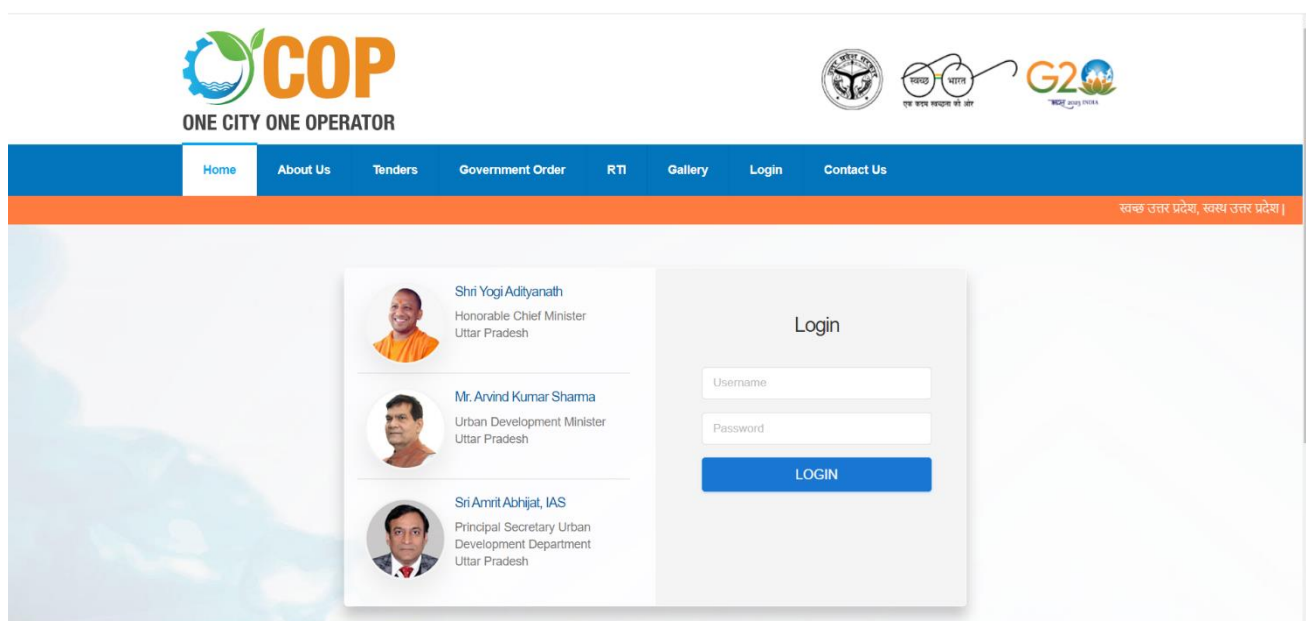
3. FUNCTIONAL REQUIREMENTS

Certainly! Let's elaborate on the functional requirements related to the establishment and operation of sewage treatment plants (STPs) for purifying dirty water within the context of the OCOP (One City One Operator) project.

In order to ensure prompt replacement of defunct or obsolete equipment, special funding arrangement is provided for and is called the Major Replacement Fund. This fund is available for both the plant systems and the network / collection system. This fund is to be placed in an escrow account and made available for replacement of major equipment.

Due to growing awareness of water borne diseases these days, there is huge public concern over health and environment hence 24X7 customer care centre is mandated in this model, thus propelling the services to several notches higher than what is presently being delivered.

It is mandatory that the contractor resolves the problem in 24 hours so the response time to attend to a problem is cut down and ensures customer satisfaction.



3.1 ESTABLISHMENT OF SEWAGE INFRASTRUCTURE

This requirement focuses on the functionalities necessary to establish and operate sewage treatment plants (STPs) effectively, ensuring they are capable of purifying contaminated water to meet environmental standards.

a. Design and Construction of STPs

- ❖ **Functionality:** Develop detailed designs for sewage treatment plants (STPs) based on the specific needs and capacity requirements of the target area.
- ❖ **Description:** This involves collaborating with engineers and environmental experts to create comprehensive plans for the layout, construction, and installation of STPs that can efficiently treat sewage and purify dirty water.

b. Compliance with Environmental Standards

- ❖ **Functionality:** Ensure that the design, construction, and operation of STPs comply with local, state, and national environmental regulations and standards.
- ❖ **Description:** This includes adhering to specific guidelines related to discharge limits, waste disposal, and water quality standards, which are crucial for maintaining a sustainable and ecologically sound sewage treatment process.

c. Capacity Scaling and Expansion

- ❖ **Functionality:** Design the STPs with the capacity to be easily scaled or expanded in the future, accommodating potential increases in sewage load.
- ❖ **Description:** Anticipate future growth and population expansion, and design the infrastructure so that it can be expanded efficiently to handle increased sewage volumes without major disruptions or significant overhauls.

d. Operational Monitoring and Control Systems

- ❖ **Functionality:** Implement real-time monitoring and control systems to track the operational status of STPs and ensure optimal performance.
- ❖ **Description:** Develop mechanisms to continuously monitor key parameters like water flow rates, treatment levels, and equipment functionality. Automated systems should trigger alerts and notifications for any anomalies, allowing for timely intervention and maintenance.

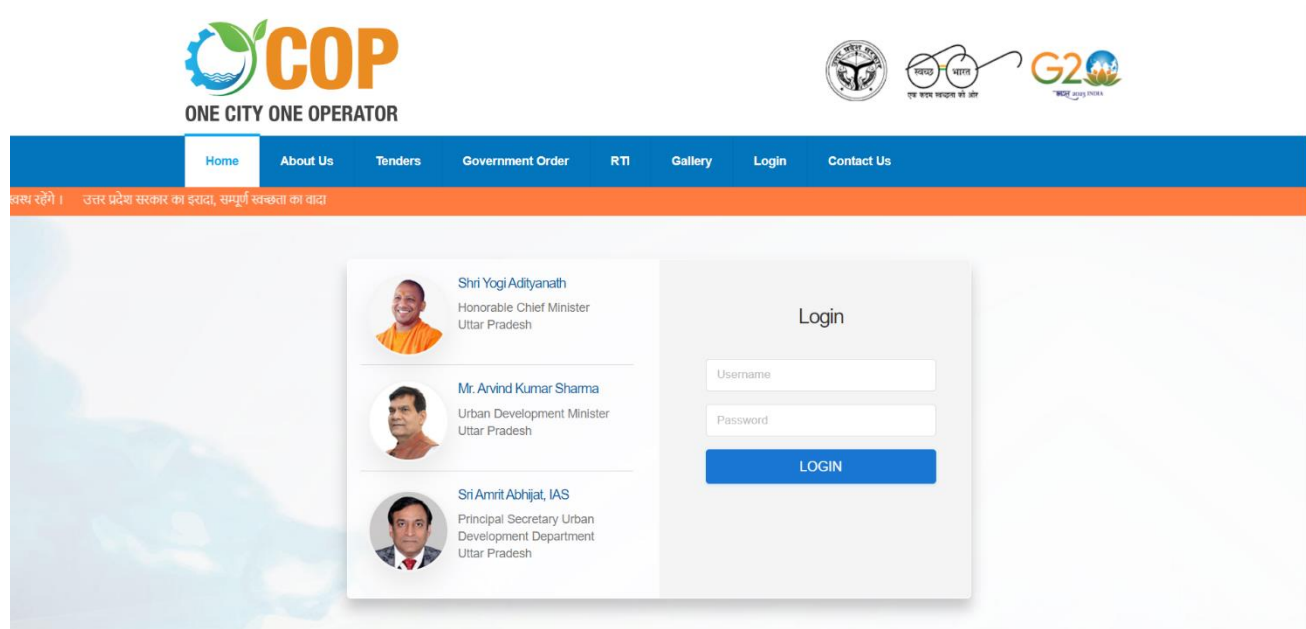
e. Training and Capacity Building

- ❖ **Functionality:** Develop training programs to enhance the skills and knowledge of STP operators and maintenance staff.
- ❖ **Description:** Conduct training sessions to educate the operators about the efficient operation, maintenance, and troubleshooting of STPs. This helps in ensuring that the infrastructure is utilized effectively and that potential issues are addressed promptly.

Requirement 1 emphasizes the essential functionalities related to establishing sewage treatment plant infrastructure. It involves designing, constructing, and maintaining STPs to effectively purify dirty water while adhering to environmental standards and ensuring sustainability and efficiency in operations. These functionalities are fundamental in achieving the project's goals of improving water quality and contributing to the objectives.

3.2 MONITORING & REPORTING

This requirement focuses on the functionalities essential for the daily monitoring, data collection, and reporting of sewage treatment plant (STP) performance, ensuring effective and efficient treatment of sewage.



a. Real-time Monitoring of Key Parameters

- ❖ **Functionality:** Implement a system for real-time monitoring of critical parameters within the STPs.
- ❖ **Description:** Enable continuous monitoring of parameters such as

E.g.: -

- ☐ BOD – 0 – 30,
- ☐ COD – 0 - 100,
- ☐ TSS – 0 - 60,
- ☐ FC – 0 – 1000

water flow rates, treatment efficiency, levels of pollutants, pH levels, and other relevant factors critical to the sewage treatment process. This ensures that the treatment process is functioning as intended and allows for immediate corrective actions if deviations occur.

Parameters are dynamic, it can be varied according to STP configuration. Parameters set by Admin.

b. [Historical Data Storage](#)

- ❖ **Functionality:** Create a structured database to store historical performance data of the STPs.
- ❖ **Description:** Store data collected over time, allowing for trend analysis, performance evaluation, and the identification of long-term patterns or issues that may require specific interventions or modifications to the treatment process.

c. [Data Analysis and Insights](#)

- ❖ **Functionality:** Develop tools and algorithms for data analysis to drive meaningful insights from the collected data.
- ❖ **Description:** Utilize analytical tools to process the data, identify trends, anomalies, or areas for improvement, and generate actionable insights to optimize the performance and efficiency of the STPs.

d. [Performance Dashboards](#)

- ❖ **Functionality:** Design intuitive and informative dashboards to visualize STP performance data in real-time.
- ❖ **Description:** Create graphical interfaces that provide a quick overview of key performance indicators, allowing operators and stakeholders to easily interpret the data and make informed decisions regarding STP operations and maintenance.

e. [Compliance Reporting](#)

- ❖ **Functionality:** Generate automated compliance reports based on the monitored parameters and local environmental regulations.
- ❖ **Description:** Automate the process of generating compliance reports, ensuring that the STP's adhere to prescribed environmental standards. These reports may be required for regulatory submissions and internal monitoring.

f. [Regular Performance Review Meetings](#)

- ❖ **Functionality:** Schedule regular performance review meetings based on the generated reports and data analysis.
- ❖ **Description:** Establish a routine for conducting performance review meetings, during which the insights derived from the data analysis are discussed, and action plans are devised to address any identified concerns or optimize STP operations.

g. **Regular Bill review meetings:**

- ❖ **Functionality:** Schedule regular Bill review meetings based on the generated reports and data analysis.
- ❖ **Description:** Establish a routine for conducting bill review meetings, during which the insights derived from the data analysis are discussed, and action plans are devised to address any identified concerns or optimize STP operations.

Requirement 2 underscores the vital functionalities related to the daily monitoring, data collection, and reporting of sewage treatment plant (STP) performance. These functionalities are crucial in ensuring the efficient and effective treatment of sewage, complying with environmental standards, and facilitating data-driven decision-making to enhance the performance of the STPs.

3.3 BILL PAYMENT PROTOCOL

Step of Bill's proceeding of zone under One City One Operator Programme:

- ☐ Initially, the firm will submit reports and measurements in a systematic manner, organized by date.
- ☐ When measurements will upload, LD charges enables if BOD, COD, TSS, FC, cross the defined parameters limits.
- ☐ In case, Inhouse parameters correct but TPI/UPPCB checks weekly and if they crossed the parameters that are already defined. LD charges enabled and continued until and unless STP's and TPI/UPPCB data matched.
- ☐ If the data remains unchanged for the past three instances, the last actual achieved data (whole line) will be highlighted.
- ☐ If the data will be highlighted, then Firm and Admin will get a notification.
- ☐ Add their Electricity Bill, fill the month start meter reading and fill the month end meter reading, by default they fill the total unit of that month.

- ☐ If once in a month electricity bill was generated then again you can't upload the bill of that month.
- ☐ Add DG billing, when Power cut duration time start and end time, by default they fill the DG start time and end time.
- ☐ But the time difference should be greater than 5 minutes, otherwise bill will not generate.
- ☐ Automatically, the DG will switch on within 5 minutes of power cut and when power comes back on the DG will switch off within a minute.
- ☐ DG running time will be calculated, depend upon the DG start time and end time.
- ☐ When all the three (Upload measurement, Electricity bill, DG bill) bills will upload then generate a bill, with these bills. If you didn't upload the rest two bills (Electricity bill, DG bill) still bill can generate.
- ☐ Verification list will show status whether it is pending or complete.
- ☐ Where it is pending, how many entries are left, number of entries and with status.
- ☐ User must declare the checkbox that above mentioned information is true.
- ☐ At last, again ask to firm are you sure, want to generate a bill.
- ☐ **New page, will open for upload documents/reports (Cover letter, TPI report, LD sheet, other docs) and fill the complaints fields.**
- ☐ Once, if you generate a bill, you can't able to edit existed bill.
- ☐ Generated bill proceeds to Junior Engineer (Jal Kal, Jal Nigam, OM&M) and Admin get a notification.
- ☐ After all generated bills or pending bills will be automatically directed to the "JE" (Junior Engineer) i.e. 'Jal Kal, Jal Nigam, OM&M' all these three departments for further processing.
- ☐ These departments can change specific details like
 - a. Jal Nigam can change the parameters (BOD, COD, TSS, FC) numbers, if they seem they are wrong.
 - b. Jal Kaal can apply the LD charges, according to complaints if they are seeming wrong.
 - c. OM & M can change the actual achieved data.
- ☐ They have the authority to change the following criteria according to their profile.
- ☐ It is mandatory, that bill will approve by all the three mentioned departments of JE.
- ☐ JE (Jal Nigam, Jal Kaal, OM&M) at last all have to give the remarks.

- ☐ JE approves the bill; it will be forwarded to that particular zone's "SE" (Superintendent Engineer) for approval and recommendation.
- ☐ The authority to whom the SE will delegate approval will be determined by their discretion.
- ☐ Approved by authorities to whom SE recommend.
- ☐ The Superintendent Engineer (SE) will designate final bill generation authority to a singular person.
- ☐ Now Final bill will generate, proceed for payment.

3.4 RESPONSE & ACTION PROTOCOL

The Response and Action Protocol defines the systematic approach and procedures for responding to the results obtained from monitoring sewage treatment plant (STP) performance. It delineates the actions to be taken based on the assessment of these results to ensure optimal operation and compliance with environmental standards.

a. Result Evaluation

- Upon receiving the STP performance results, the first step is a comprehensive evaluation.
- This involves analysing the data and comparing it against predefined benchmarks and environmental regulations to determine if the STP is operating within acceptable parameters.

b. Categorization of Results

Based on the evaluation, results are categorized into distinct levels of severity:

- Normal Operation: STP is operating within acceptable parameters.
- Critical Level: Significant deviations or non-compliance with regulations requiring immediate and substantial action.

c. Response Actions Based on Categorization

❖ Normal Operation:

- Action: Regular monitoring and routine maintenance as per schedule.
- Frequency: Ongoing, routine monitoring and maintenance activities.

❖ Warning or Alert Level:

- Action: Implement minor adjustments, optimize processes, or conduct targeted maintenance to rectify the deviations.

- Frequency: Immediate adjustments and subsequent monitoring to ensure corrections.
- ❖ Critical Level:
 - Action: Immediate intervention and corrective measures to bring the STP back to compliance.
 - Frequency: Continuous monitoring, immediate adjustments, and escalated response actions.
- ❖ Escalation Procedures
 - If the deviations persist or worsen despite corrective actions, the protocol defines an escalation process, which may involve:
 - Internal Escalation: Notifying higher-level operations or management for further action.
 - External Escalation: Alerting regulatory bodies or external experts for consultation or intervention if necessary.
- ❖ Documentation and Reporting
 - All responses and actions, including the evaluation, categorization, and steps taken, are documented comprehensively for future reference, compliance reporting, and continuous improvement.
- ❖ Post-Action Review and Continuous Improvement
 - After implementing the necessary actions, a post-action review is conducted to evaluate the effectiveness of the measures taken.

The protocol emphasizes continuous improvement, encouraging the integration of lessons learned into future protocols and operations to enhance overall efficiency and performance.

4. ADMIN LAYER MODULE

An overview of the real time statistics and key performance indicators displayed on the dashboard for administrators.

a. Dashboard

- Filter according to your requirement.
- No of total firms, no of total STP, % Utilization of STP,
- Treated water volume, Complaints received, Complaints resolved,
- Bill generated; bill approved.
- Annual Complaints report in a bar graph format,
- Overall analysis in a Pie chart.
- When a new bill generates than Admin will get a notification on an Admin's dashboard.

b. Performance Dashboard

- Performance dashboard will show the data according to selection in a calendar (date, month, year), zone wise, STP's wise, Flow trend.
- Separately shows a data of Zone in a Table format.
- Separately shows a graph of parameters (BOD, COD, TSS, FC)

c. Master

❖ Department

- Administrators possess the exclusive authority to seamlessly add new departments, update existing department details for accuracy, and judiciously delete departments as needed within the OCOP system.
- Admin has defined three departments, are as follows: Jal Nigam, Jal Kal and OM&M.
- Admin can add the department, as per the guidelines.

❖ Designation

- Administrators hold exclusive authority to effortlessly introduce new designation, ensure precision by updating existing designation details, and judiciously remove designations as required within the OCOP system.

❖ Inspection Agency

- Admin can add the Inspection agency, by selecting the zone, by selecting the Inspection type, give an Agency name, and some contact details (Contact person name, M.no, Add).
- Administrators possess the capability to update inspection agency details, that password and login ID remain unalterable(unchangeable), maintaining default consistency across all agencies for seamless access and security.

❖ Inspection

- The admin interface exclusively presents a streamlined list of Inspection names. There is no any other option.

❖ Zone contract

- Empowered with administrative authority, the admin can effortlessly input comprehensive zone details, including selecting the designated zone, specifying start and end dates, and providing information such as contract amount, LD charges, total charges, and the number of STPs within that specific zone.
- The admin holds the exclusive capacity to input the number of STPs, establishing a limit that firms can adhere to for registration. Once the limit is reached, firms are restricted from adding additional STPs, ensuring effective management of resources.

❖ Bill flow mapping

- Select a zone, shows a list of Employees for Bill flow.
- Grant authority and access for bill forwarding, document verification, and final approval, enabling seamless control over the bill flow process within the selected zone.

d. Security

❖ Officer

- Admin can view the list of registered officers.
- While the Admin holds the capability to seamlessly add new officers by selecting all required fields and specifying the desired zone for their assignment.

❖ Set permission

- Select the Officer and select the specific menu, granting precise permissions to create a personalized dashboard that displays relevant information, making it easier for efficient and meaningful use.

❖ Role Permission

- Define the role's experience by selectively choosing menus, enabling the permission settings to give a customized dashboard that showcases relevant information for optimal efficiency.
- This configuration will seamlessly extend to the dashboards of all officers holding the designated role, ensuring uniformity and consistency across the user experience.

e. Firm

❖ Firm's list

- Admin have the privilege to access a comprehensive list of firms, including their contact details (contact person name, mobile number), login credentials, and affiliated zones, facilitating efficient oversight and management.
- Admin can add a new Firm, select a Zone, enter a firm name, by default random password will generate automatically from backend.
- Admin has the authority to seamlessly update and modify these details.
- Multiple firms are accommodated within a single zone, fostering a collaborative and diverse ecosystem within the designated area.

❖ STP's list

- Admin have the capability to effortlessly access a comprehensive list of multiple STPs within a single Firm, inclusive of their detailed information (capacity, meter load, LD charges, parameters limits, city, etc.) facilitating efficient monitoring and management.
- Admin can view the details of each STP, with precision.

f. Bill's

❖ Process's

- The "Process Bill" feature presents a curated list of bills, categorized by the respective firm, month, and year. It includes a comprehensive overview of pending status, showcasing profiles with designation, department, and date where approval is pending for enhanced clarity and streamlined bill management.
- Approved column will show a status of approval or it is still pending.
- Bill part was divided into three (Approval details, Bill details, Bill document) sections.
- Approval details will show a detailed format of Bill, where it is pending their Officer's name and from where it is approved with their pending status and since date.

- Bill details will show a billing report in a wide range on next page.
 - Bill document will show the list of documents, Admin has the authority to download the document with their LD charges, status (pending or approval) on next page.
- ❖ Paid Bill's
- The "Paid Bills" section offers a structured presentation of bills, organized by month and year, zone-wise, and further categorized by firms. Each entry is accompanied by a status indicator, distinguishing between bills in process and those successfully paid, ensuring a clear and concise overview.
 - The "Action" feature is divided for enhanced usability: the "View" option provides a detailed tabular representation of the invoice bill, while the "Print" option offers the convenience of generating an invoice report or receipt for comprehensive documentation.
- ❖ Pumping Station's
- It constitutes a comprehensive list detailing the number of pumping stations, sewers, and drains, each associated with their corresponding Sewage Treatment Plant (STP) and designated zone, providing a thorough overview of infrastructure distribution.
 - The "Action" feature unveils detailed information, including sewer length, peak designed discharge, and relevant factors, for each sub-pumping station within an easily accessible pop-up box, ensuring a user-friendly and informative experience.
- g. MoM
- MOM (Minutes of Meetings) is a curated list featuring letters, meeting dates, and downloadable PDFs, providing a comprehensive and organized repository of meeting details for convenient reference.
 - User can add a new meeting.

Note:**a. Filtration:**

The dashboard is equipped with convenient filtration features, enabling users to select specific fields based on their requirements. By choosing the desired criteria, users can efficiently retrieve relevant data, enhancing the precision and ease of obtaining the information they need. This allows for a tailored and streamlined experience, ensuring users can quickly access the most pertinent data for their tasks.

b. Searching:

The dashboard incorporates a user-friendly search bar, providing a seamless experience for users to search and find specific information according to their requirements. This feature allows users to input keywords or queries, and the system responds by presenting pertinent data that matches the search criteria. This functionality enhances the efficiency of data retrieval, ensuring users can quickly and accurately locate the information they need, contributing to a more productive and streamlined user experience.

c. Deletion:

The admin can delete individual records when needed, but this ability is not applicable across all modules. This means the admin has to remove data one item at a time, ensuring a cautious and controlled approach to data management in specific areas of the system.

5. FIRM PANEL

An overview of the real time statistics and key performance indicators displayed on the dashboard for administrators.

a. Dashboard

- Filter according to your requirement, select STP Month and Year.
- No of total firms, no of total STP, % Utilization of STP,
- Treated water volume, Complaints received, Complaints resolved,
- Bill generated; bill approved counts.
- Monthly LD report and Monthly Complaints report in a bar graph format,
- Overall analysis (LD count) in a Pie chart.
- When a new bill generates than Firm will get a notification on a dashboard in header.
- Along with this, notification of Actual achieved data of a particular STP (If any STP has similar data 3 times then it shows a notification).
- At last, List of Top invoice's Details are showing below on a Dashboard.

b. STP master

- This is a comprehensive list showcasing Sewage Treatment Plants (STPs) along with pertinent details such as firm name, capacity, BOD, COD, FC, TSS parameters, pumping station name, account number, discharge amount, and sub-pumping station numbers, providing a thorough overview of the sewage infrastructure.
- Presenting a curated list of sub-pumping stations, each viewable in a user-friendly pop-up box format for easy and detailed access to relevant information.
- Firms have the capability to delete individual Sewage Treatment Plants (STPs) one at a time, allowing for a controlled and specific data management approach.
- Firms can seamlessly add a new Sewage Treatment Plant (STP) by completing all mandatory fields, including STP name, capacity, electricity meter load (KWH), account number, city, location, BOD, COD, TSS, FC parameter limits, details of the main pumping station, and affirming the accuracy of declaration details, ensuring a comprehensive and accurate record.

c. Monthly bill's

❖ Upload Measurement

- Initially, the firm will submit reports and measurements in a systematic manner, organized by date.
- When measurements will upload, LD charges enables if BOD, COD, TSS, FC, cross the defined parameters limits.
- In case, Inhouse parameters correct but TPI/UPPCB checks weekly and if they crossed the parameters that are already defined. LD charges enabled and continued until and unless **Inhouse and 3rd agency data matched.**
- If the data remains unchanged for the past three instances, the last actual achieved data (whole line) will be highlighted.

❖ Electricity Bill

- Add their Electricity Bill, fill the month start meter reading and fill the month end meter reading, by default they fill the total unit of that month.
- If once in a month electricity bill was generated then again you can't upload the bill of that month.

❖ DG Billing

- Add DG billing, when Power cut duration time start and end time, by default they fill the DG start time and end time.
- Automatically, the DG will switch on within 5 minutes of power cut and when power comes back on the DG will switch off within a minute.
- DG running time will be calculated, depend upon the DG start time and end time.

❖ Generate Bill's

- When all the three (Upload measurement, Electricity bill, DG bill) bills will upload then generate a bill, with these bills. If you didn't upload the rest two (Electricity bill, DG bill) bills still bill can generate.
- User must declare the checkbox that above mentioned information is true.
- At last, again ask to firm are you sure, want to generate a bill.
- **New page, will open for upload documents/reports (Cover letter, TPI report, LD sheet, other docs) and fill the complaints fields.**
- Once, if you generate a bill, you can't able to edit existed bill.

❖ Pending Monthly Bill's

- Presenting a curated list of bills currently in process, accompanied by attached documents. Additionally, offering a convenient view of the Billing Report, complete with details of the testing agency for comprehensive insights.
- Displaying the current status and a comprehensive list of Bill Approval details, highlighting instances where approval is pending.
- This includes associated usernames and profiles, status indicators (pending or approved), remarks, and the respective dates for enhanced transparency and accountability.

❖ Paid Monthly Bill's

- Presenting an organized compilation of paid bills, each accompanied by specific details such as the month, year, designated zone, and firm name, offering a comprehensive overview of financial transactions for efficient record-keeping and management.
- The "Remarks Status of Paid" feature offers insight into the approval details of paid bills, showcasing a concise list in a pop-up box format.
- This includes key information such as usernames, approval status, and associated dates, providing a convenient and accessible overview for efficient tracking and reference.
- The "Attached Document" feature seamlessly opens a new page, offering an in-depth view of the Bill document with comprehensive details.
- Additionally, it provides a downloadable list of associated documents, ensuring convenient access and reference.

❖ Decline Documents

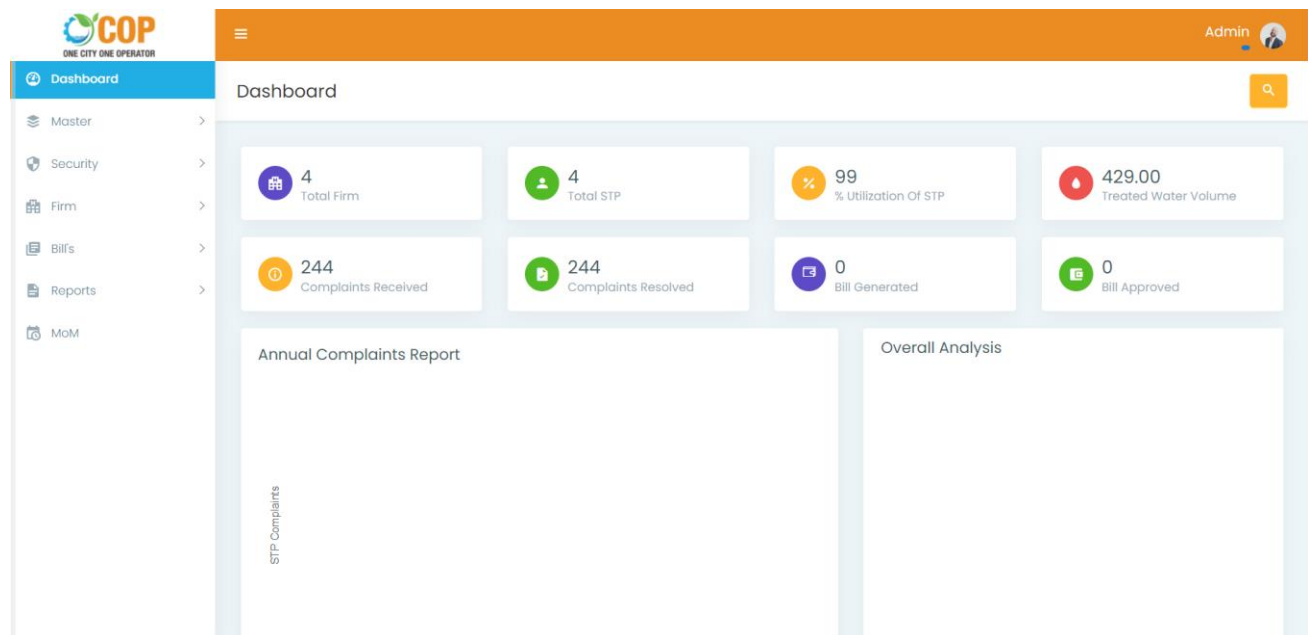
- Presenting a detailed compilation of declined bills, inclusive of specific details such as the month, year, designated zone, and firm name, providing a comprehensive overview of bills that have undergone the declined status for accurate record-keeping and upload a new.

d. MOM:

- User can add a new Meeting and download the details as a pdf format.

6. USE CASES

6.1 ADMIN MODULE



a. Login Admin

- First, login the admin profile.

b. Update Admin Profile

- Name, field is mandatory you must have to fill it.
- Mobile.no, this field is mandatory, you must have to enter 10-digit number.
- Email Id – Field is validated for only alphanumeric, special characters symbols (@) and (.) required characters in this form
- For E.g., Abc@gmail.com
- Profile Picture, is mandatory it is in Jpg, Png, Jpeg files only allowed.
- Click on Reset button. For again set the all fields.
- Then it will successfully Update your profile.

Profile

Name
Name

Mobile No
Mobile no.

Email Id
Enter Email

Profile Picture
Choose File No file chosen
Only .jpg, .png and .jpeg files are allowed.

Update Reset

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c. Change Password

- Old Password – You must have to first fill the old password.
- New Password *
- Confirm Password *
- Both new password or confirm password should be same.
- Otherwise, it won't change.

Change Password

Old Password
Old Password

New Password
New Password

Confirm Password
Confirm Password

Change Password

d. Filtering

- STP should be created and displayed in the dropdown.
- Calendar should be displayed.
- Months data should be appeared in the dropdown.

- Then click on, search it.
- e. Master
 - ❖ Department
 - Add new Department, after clicking on add sign.
 - Enter your department name, submit it.
 - Department can be update also, for this click on edit button.
 - Department can be deleted.
 - ❖ Designation
 - Add new Designation, after clicking on add sign.
 - Enter your designation name, submit it.
 - Designation can be update also, for this click on edit button.
 - Designation can be deleted.
 - ❖ Inspection agency
 - Add Inspection agency, Zone is mandatory field
 - Enter Agency name, required field *
 - Select Inspection type, required field.
 - Enter Contact person name, should be enter *
 - Enter Mobile no, it should be validated 10 digits.
 - Enter Address of agency, required field *
 - Edit Inspection agency, click on update after edit the fields.
 - ❖ Zone registration
 - Zone, add a zone type
 - Enter contract year *
 - Date calendar should be showing here
 - For entering – From date and To date.
 - Enter contract amount, LD charges in Rs. *
 - Enter Total Capacity *
 - Enter number of STP.
 - Zone can be deleted
 - Pagination is available.

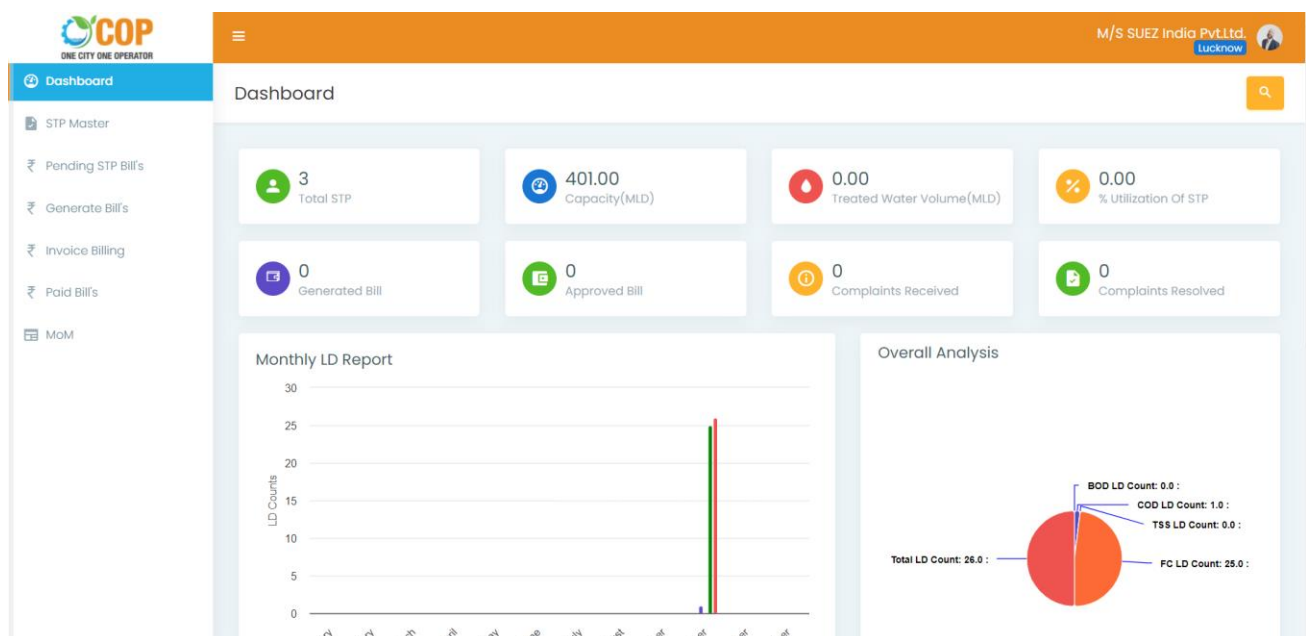
- Search anything in search bar.
- f. Security
 - Employee Registration
 - Select Department from there list required *.
 - Select Designation from there list drop down required *.
 - Select City from there drop-down list required *.
 - Enter first name, **middle name**, last name required *
 - Enter E-mail ID - Field is validated for only alphanumeric, special characters symbols (@) and (.) required characters in this form
For E.g., Abc@gmail.com
 - Enter Mobile no - it should be validated 10 digits.
 - Password – By default, password is filled, you can change it.
 - Address – Enter address of Employee *
 - Below, selects the Zone.
- g. Firm
 - For add a new Firm – Firm Registration should be done.
 - Select Zone from there drop-down list, mandatory *
 - Enter firm name.
 - Password – By default, password is filled, you can change it.
 - After filling all the fields, click on submit button.
 - Firms can be update also.
 - Firm can be deleted.
 - Filtration is available
 - Pagination is available.
- h. Bill's
 - ❖ Firm Daily Billing
 - Daily Billing report list is available
 - Filtration is available.
 - Pagination is there.
 - Filter Zone, Firm, STP, Month, from there drop-down list.

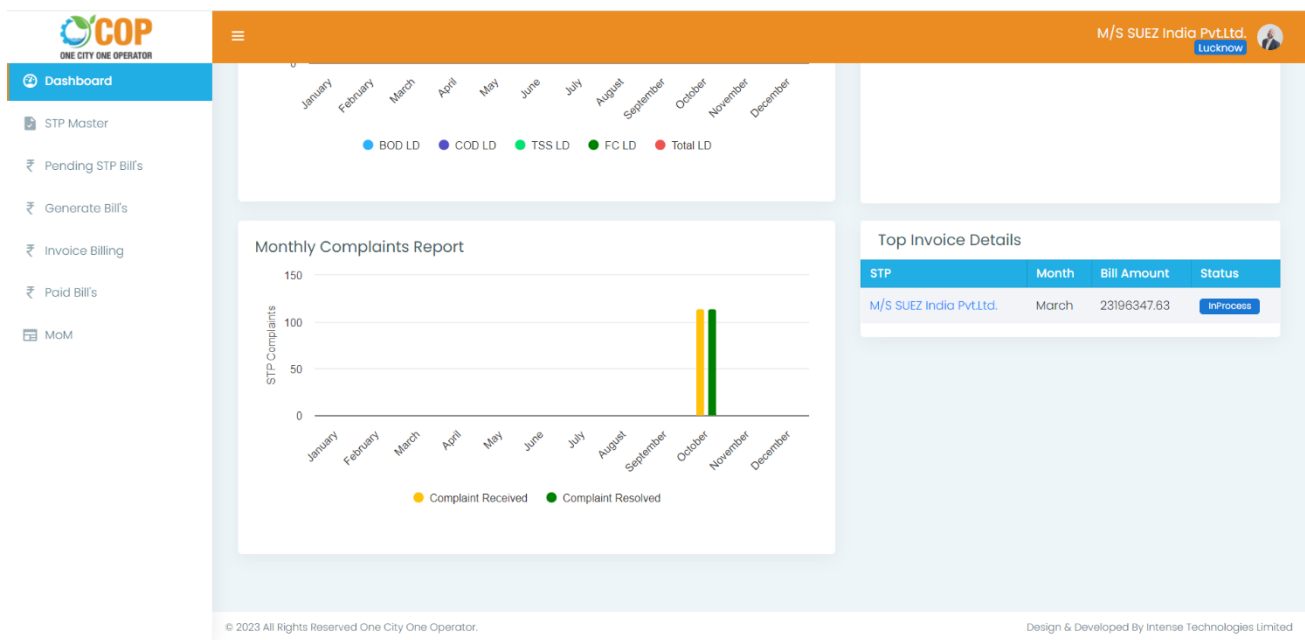
- Calendar is showing select you from date, To date
- ❖ Approve Billing
- Approved Bill list shows here.
- Filtration is available here.
- Select Zone, select firm, select month, from date – to date, then search it.

6.2 FIRM MODULE

a. Login firm

- For this, first user must have to Login for firm profile.





b. Update Firm profile

- Name, field is mandatory you must have to fill it.
- Mobile.no, this field is mandatory, you must have to enter 10-digit number.
- Email Id – Field is validated for only alphanumeric, special characters symbols (@) and (.) required characters in this form
- For E.g., Abc@gmail.com
- Profile Picture, is mandatory it is in Jpg, Png, Jpeg files only allowed.
- Click on Reset button. For again set the all fields.
- Then it will successfully Update your profile.

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c. Change Password

- Old Password – You must have to first fill the old password.
- New Password *
- Confirm Password *
- Both new password or confirm password should be same.
- Otherwise, it won't change.

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d. Filtration

- STP should be created and displayed in the dropdown.

- Calendar should be displayed.
- Months data should be appeared in the dropdown.
- Then click on, search it.

e. STP Master

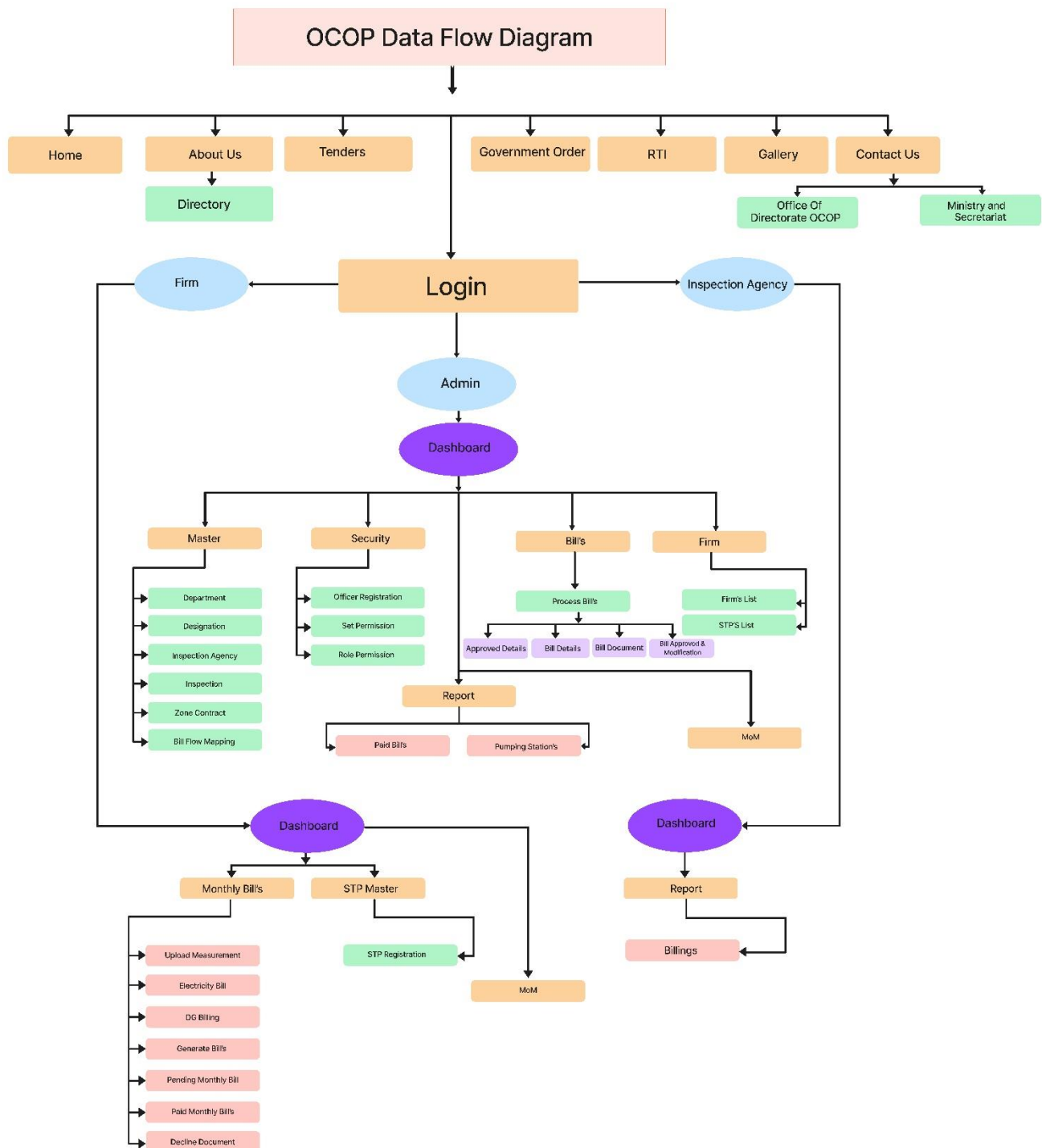
❖ STP registration

- STP name required *
- Enter design capacity required *
- Electricity meter load required *
- Electricity account number required *
- Bill cycle required *
- Select city from there given drop down list *
- By default, BOD, COD, TSS and FC is optional.

❖ Sewer load type details

- Enter name of main pumping station required *
- Enter Pumping station meter load required *
- Enter Pumping station account number required *
- Enter pumping bill cycle required *
- Enter Main Drain name required *
- Enter Main sewer length (K.M.) required *

- Enter Peek designed discharge required *
 - Enter peek designed factor required *
 - Enter number of pumping stations required *
 - If all the fields were done then submit the form.
- f. Pending STP Bill's
- For adding a new STP Billing, fill the form.
 - Select STP from there drop – down list required *
 - Enter billing date required *
 - Enter Water discharge, fill the amount *
 - Select Testing agency, checkbox
 - Fill the required test reports
 - Enter total complaint received required *
 - Enter total complaint resolved required *



7. NON-FUNCTIONAL REQUIREMENTS

The "Non-Functional Requirements" section of the SRS document focuses on aspects of the system that are not related to specific functionalities or behaviours but are essential for evaluating its overall performance, efficiency, security, and other critical attributes.

7.1 PERFORMANCE

The "Performance" sub-section under non-functional requirements elaborates on the criteria and expectations related to how the system should perform in terms of speed, responsiveness, scalability, and efficiency.

a. Speed and Response Time

- ❖ Requirement: The system should respond to user interactions within a predefined time frame, ensuring a smooth and responsive user experience.
- ❖ Description: Define the maximum acceptable response time for various interactions within the system, such as loading data, generating reports, or executing queries. For example, the system should respond to user queries within two seconds.

b. Throughput

- ❖ Requirement: The system should be able to handle a specified number of transactions or operations per unit of time effectively.
- ❖ Description: Specify the expected throughput, i.e., the number of operations (e.g., data transactions, requests, or transactions) the system should be able to handle per second, minute, or hour.

c. Scalability

- ❖ Requirement: The system should be scalable to accommodate an increase in the user base or data volume without a significant degradation in performance.
- ❖ Description: Describe how the system can scale horizontally or vertically to handle increased load. This includes measures like adding more servers, optimizing algorithms, or database scaling strategies.

d. Load Handling Capacity

- ❖ Requirement: The system should have the ability to handle a specific load or number of concurrent users without experiencing performance degradation.

- ❖ Description: Define the maximum number of concurrent users or transactions the system should handle without performance issues, ensuring a seamless user experience even during peak usage.
- e. **Resource Utilization**
 - ❖ Requirement: The system should use hardware resources (CPU, memory, etc.) efficiently and effectively.
 - ❖ Description: Specify the optimal utilization levels for key hardware resources. For example, the system should not use more than 80% of available CPU resources under normal operation.
- f. **Reliability and Availability**
 - ❖ Requirement: The system should be available and reliable, ensuring minimal downtime and data loss.
 - ❖ Description: Define the expected uptime percentage (e.g., 99.9%) and establish measures for fault tolerance, disaster recovery, and redundancy to maintain system availability and reliability.
- g. **Latency**
 - ❖ Requirement: The system should minimize latency, ensuring timely processing and response to user requests.
 - ❖ Description: Define the acceptable latency for different operations within the system, ensuring that delays in data processing and retrieval are minimized to enhance user satisfaction.

The "Performance" sub-section under non-functional requirements addresses critical aspects related to the system's speed, responsiveness, scalability, resource utilization, and overall efficiency. These requirements are essential to ensure the system performs optimally, even under varying workloads, contributing to a positive user experience and efficient operation of the OCOP project.

7.2 SECURITY

The "Security" sub-section under non-functional requirements elaborates on the criteria and expectations related to ensuring the security of the system, protecting data, preventing unauthorized access, and maintaining confidentiality, integrity, and availability.

a. Authentication

- ❖ Requirement: The system must implement strong user authentication mechanisms.
- ❖ Description: Specify the authentication protocols and requirements (e.g., multi-factor authentication, biometrics, etc.) that need to be in place to verify the identity of users accessing the system.

b. Authorization and Access Control

- ❖ Requirement: Access to system resources and functionalities should be based on roles and permissions.
- ❖ Description: Define the access control mechanisms to ensure that users can only access information and perform actions relevant to their roles and responsibilities.

c. Data Encryption

- ❖ Requirement: Sensitive data should be encrypted during transmission and storage.
- ❖ Description: Specify encryption standards and protocols to be used for protecting data in transit and at rest, ensuring confidentiality and compliance with data privacy regulations.

d. Audit Trail and Logging

- ❖ Requirement: The system should maintain an audit trail and detailed logs of user activities.
- ❖ Description: Define the logging requirements, including the type of events to be logged, level of detail, and how the logs will be stored and reviewed for security auditing and incident response purposes.

e. Secure Communication

- ❖ Requirement: All communication between system components and with external systems should be secure.
- ❖ Description: Specify the protocols (e.g., HTTPS, TLS) and encryption standards to ensure that data transmitted between different parts of the system and external entities is secure and protected from interception or tampering.

f. Vulnerability Management

- ❖ Requirement: The system should undergo regular vulnerability assessments and patching.
- ❖ Description: Define a process for identifying, assessing, and patching vulnerabilities in the system to mitigate potential security risks and ensure that the system is protected against known vulnerabilities.

g. Disaster Recovery and Backup

- ❖ Requirement: The system should have a disaster recovery plan and regular backups.
- ❖ Description: Specify the disaster recovery plan, backup frequency, and recovery time objectives to ensure that the system can quickly recover in the event of a disaster or data loss.

h. Compliance and Regulatory Requirements

- ❖ Requirement: The system should comply with relevant laws, regulations, and industry standards.
- ❖ Description: Specify the specific legal and regulatory requirements (e.g., GDPR, HIPAA) that the system must adhere to and describe how compliance will be ensured.

The "Security" sub-section under non-functional requirements addresses critical aspects related to ensuring the security and integrity of the system, protecting data, and mitigating potential risks. These requirements are essential to safeguard sensitive information, prevent unauthorized access, and comply with applicable regulations, contributing to a secure and trustworthy OCOP project.

7.3 RELIABILITY

The "Reliability" sub-section under non-functional requirements elaborates on the criteria and expectations related to the system's ability to consistently and accurately perform its intended functions without failures or interruptions.

a. System Availability

- ❖ Requirement: The system should be available for use within agreed-upon time frames.
- ❖ Description: Specify the expected system uptime and define any maintenance windows during which the system may be temporarily unavailable to users.

b. Fault Tolerance

- ❖ Requirement: The system should remain operational even in the presence of certain faults or failures.
- ❖ Description: Define the system's ability to detect and handle faults, ensuring that the failure of a component or process does not cause a complete system outage.

c. Error Handling and Recovery

- ❖ Requirement: The system should have mechanisms in place to handle errors gracefully and recover from failures.
- ❖ Description: Specify how the system will identify errors, provide meaningful error messages to users, and implement recovery procedures to restore normal operation after an error occurs.

d. Redundancy

- ❖ Requirement: The system should have redundant components to ensure continued operation in case of component failures.
- ❖ Description: Define the redundancy strategy, including backup servers, databases, or failover mechanisms, to minimize disruptions and ensure system availability in case of failures.

e. Performance Stability

- ❖ Requirement: The system's performance should remain stable under varying workloads and usage patterns.
- ❖ Description: Specify how the system will maintain consistent performance levels, ensuring that it can handle peak loads and fluctuations in user activity without significant performance degradation.

f. Predictability

- ❖ Requirement: The system's behaviour and performance should be predictable and consistent.
- ❖ Description: Define the expected response times, throughput, and resource utilization levels under different conditions to ensure a consistent and predictable user experience.

g. Monitoring and Alerts

- ❖ Requirement: The system should have monitoring in place to detect anomalies and generate alerts for potential issues.
- ❖ Description: Define the monitoring mechanisms, thresholds, and alerts to proactively identify and address deviations from expected behaviour, allowing for timely intervention and maintenance.

h. Data Integrity

- ❖ Requirement: The system should ensure data integrity, preventing unauthorized or accidental modification or deletion of data.
- ❖ Description: Specify measures to guarantee the integrity of the system's data, including access controls, validation checks, and backup and recovery procedures to safeguard against data corruption.

The "Reliability" sub-section under non-functional requirements addresses critical aspects related to the system's ability to consistently perform its intended functions, ensuring availability, fault tolerance, error handling, and predictability. These requirements are essential to establish a reliable OCOP system that operates dependably and can quickly recover from failures or errors, ultimately providing a consistent and reliable user experience.

7.4 USABILITY

The "Usability" sub-section under non-functional requirements describes the criteria and expectations related to the system's ease of use, user interface design, and overall user satisfaction.

a. Intuitive User Interface

- ❖ Requirement: The system should have an intuitive and user-friendly interface.
- ❖ Description: Specify that the user interface design should be intuitive and easy to navigate, ensuring that users can perform tasks efficiently without unnecessary confusion or complexity.

b. Consistency in Design

- ❖ Requirement: The user interface elements and design should be consistent throughout the system.
- ❖ Description: Define a consistent design language, including layout, colour schemes, fonts, and iconography, to ensure a cohesive and familiar user experience across all parts of the system.

c. Accessibility

- ❖ Requirement: The system should be accessible to all users, including those with disabilities.

- ❖ Description: Specify the accessibility standards (e.g., WCAG) to be followed and describe how the system will accommodate users with disabilities, providing features like screen reader compatibility, keyboard navigation, and other accessibility enhancements.
- d. **User Training and Help**
 - ❖ Requirement: The system should provide sufficient user training and help resources.
 - ❖ Description: Specify the provision of user guides, tutorials, tooltips, or in-app help sections to guide users on using the system effectively and efficiently.
- e. **Error Prevention and Handling**
 - ❖ Requirement: The system should minimize errors and provide clear instructions to users in case of errors.
 - ❖ Description: Define mechanisms to prevent common errors, guide users to correct their actions, and provide meaningful error messages to assist users in resolving issues.
- f. **Efficiency and Speed**
 - ❖ Requirement: The system should enable users to perform tasks quickly and with minimal effort.
 - ❖ Description: Specify design optimizations, such as shortcuts, efficient workflows, and responsive interfaces, to enhance user productivity and reduce the time needed to complete tasks.
- g. **User Feedback and Satisfaction**
 - ❖ Requirement: The system should collect and utilize user feedback to enhance usability continuously.
 - ❖ Description: Define methods for gathering user feedback (e.g., surveys, feedback forms) and how this feedback will be analysed and utilized to make informed decisions to improve the system's usability.
- h. **Multilingual Support**
 - ❖ Requirement: The system should support multiple languages to cater to a diverse user base.
 - ❖ Description: Specify the languages the system should support, and ensure that all user-facing elements, including labels, instructions, and content, are translatable and displayed in the user's preferred language.

The "Usability" sub-section under non-functional requirements addresses crucial aspects related to the system's ease of use, accessibility, user interface design, and overall user satisfaction. These requirements are essential to ensure that the OCOP system is user-centric, intuitive, efficient, and accessible to a diverse user base, ultimately enhancing user adoption and satisfaction.

8. INTERFACES

The "Interfaces" section of the SRS document delineates how the system interacts and communicates with users, other systems, or external entities. It includes various components, sub-systems, and external entities that the system interacts with.

8.1 USER INTERFACES

The "User Interfaces" sub-section within interfaces elaborates on the aspects related to the interface between the system and the end-users, defining the user experience, presentation, and interaction design.

a. User Login Interface

- ❖ Interface Description: This interface is the point of interaction where users input their credentials to access the system.
- ❖ Features and Functionalities:
 - Input fields for username and password.
 - "Forgot password" functionality for password recovery.
 - "Remember me" option for convenience.
 - "Login" button to initiate authentication.
- ❖ Design Requirements: Intuitive design with clear instructions and user-friendly layouts to facilitate easy user login.

b. Dashboard Interface

- ❖ Interface Description: The main interface after login, presenting an overview of key information and functionalities.
- ❖ Features and Functionalities:
 - Graphical representation of performance metrics.
 - Access to various modules and functionalities via intuitive icons or menu options.
 - Notifications or alerts for important updates.
- ❖ Design Requirements: Clear, organized layout, visually appealing graphics, and an intuitive navigation system for efficient access to system features.

c. Data Entry Interface

- ❖ Interface Description: Interface for users to input data into the system.

❖ Features and Functionalities:

- Relevant input fields and data validation mechanisms.
- Drop-down lists, radio buttons, or checkboxes for selecting options.
- Error handling and feedback for incorrect inputs.

❖ Design Requirements: Intuitive design with easily identifiable input fields, clear instructions, and visual cues for required actions.

d. [Report Generation Interface](#)

❖ Interface Description: Interface for users to generate various reports based on system data.

❖ Features and Functionalities:

- Options to select report parameters and criteria.
- Different report formats (PDF, CSV, etc.).
- Preview functionality before generating the final report.

❖ Design Requirements: Intuitive design with step-by-step guidance for report generation, options for customization, and a user-friendly preview interface.

e. [Settings and Preferences Interface](#)

❖ Interface Description: Interface for users to customize system settings and preferences.

❖ Features and Functionalities:

- Ability to modify user profile details.
- Options to change passwords and security settings.
- Preference settings for language, notification preferences, etc.

❖ Design Requirements: Clearly labelled settings, intuitive layout, and ease of navigation for users to customize their preferences.

The "User Interfaces" sub-section defines the various interfaces that users interact with when using the system. These interfaces are critical in ensuring an intuitive, efficient, and enjoyable user experience. The design and functionality of these interfaces are key to facilitating effective interaction between the users and the system, ultimately contributing to user satisfaction and successful system usage.

8.2 HARDWARE INTERFACES

The "Hardware Interfaces" sub-section within interfaces elaborates on the aspects related to the interaction between the software system and the hardware components it relies upon or interacts with.

a. Sensors and Monitoring Devices

- ❖ **Interface Description:** Interaction with sensors and monitoring devices used to collect data related to sewage treatment and environmental parameters.
- ❖ **Features and Functionalities:**
 - Data collection from sensors measuring water quality, flow rates, etc.
 - Integration of monitoring devices to track the performance of sewage treatment processes.
- ❖ **Compatibility Requirements:** The system must be compatible with various types of sensors and monitoring devices to ensure seamless data integration.

b. Server and Network Infrastructure

- ❖ **Interface Description:** Interaction with the server and network infrastructure where the system is hosted and operates.
- ❖ **Features and Functionalities:**
 - Data transmission and processing through the server.
 - Utilization of network protocols for communication between components.
- ❖ **Compatibility Requirements:** The system should be compatible with the specific server configurations and network protocols in use, ensuring efficient communication and data transfer.

c. Data Storage Devices

- ❖ **Interface Description:** Interaction with data storage devices for saving and retrieving system and user data.
- ❖ **Features and Functionalities:**
 - Data storage for system logs, user data, performance metrics, etc.
 - Efficient data retrieval and update mechanisms.
- ❖ **Compatibility Requirements:** The system should be compatible with the designated data storage devices and should adhere to specified data storage and retrieval protocols.

d. Input and Output Devices

- ❖ Interface Description: Interaction with input and output devices used for user interaction and data input.
- ❖ Features and Functionalities:
 - Interaction with keyboards, mice, touchscreens, etc., for user input.
 - Output display on monitors or other output devices.
- ❖ Compatibility Requirements: The system should be compatible with commonly used input and output devices to facilitate smooth user interaction.

e. Control Systems

- ❖ Interface Description: Interaction with control systems that govern various operations within the sewage treatment infrastructure.
- ❖ Features and Functionalities:
 - Integration with control systems for sewage treatment plant operations.
 - Synchronization of system activities based on control system inputs.
- ❖ Compatibility Requirements: The system should seamlessly interface with the existing or designated control systems to coordinate and optimize sewage treatment operations.

The "Hardware Interfaces" sub-section defines the interfaces between the software system and various hardware components critical to its operation. These interfaces are pivotal for seamless communication and integration, ensuring the software system effectively interacts with sensors, servers, storage devices, input/output devices, and control systems to achieve its objectives within the OCOP project.

8.3 SOFTWARE INTERFACES

The "Software Interfaces" sub-section within interfaces elaborates on the aspects related to the interaction and integration with other software components, systems, or external applications.

a. Application Programming Interfaces (APIs)

- ❖ Interface Description: Interaction with external APIs for data exchange and integration with third-party systems.
- ❖ Features and Functionalities:

- Data retrieval or sending data to external systems (e.g., weather APIs, mapping services).
 - Integration with other software components via standardized API calls.
 - ❖ **Compatibility Requirements:** The system should support commonly used API standards (e.g., REST, SOAP) to ensure seamless integration with external systems.
- b. **Database Management Systems (DBMS)**
- ❖ **Interface Description:** Interaction with the underlying database management system for data storage and retrieval.
 - ❖ **Features and Functionalities:**
 - Data storage, querying, and management.
 - Database connection, authentication, and transactions.
 - ❖ **Compatibility Requirements:** The system should be compatible with specified DBMS (e.g., PostgreSQL, MySQL) and follow standard database communication protocols.
- c. **Messaging Protocols**
- ❖ **Interface Description:** Interaction using messaging protocols for communication between system components or external systems.
 - ❖ **Features and Functionalities:**
 - Real-time data exchange and communication.
 - Notifications and alerts to users or administrators.
 - ❖ **Compatibility Requirements:** The system should support common messaging protocols (e.g., MQTT, SMTP) for efficient communication.
- d. **File Transfer Protocols**
- ❖ **Interface Description:** Interaction using file transfer protocols for secure and efficient file exchange.
 - ❖ **Features and Functionalities:**
 - Secure file transfers between systems.
 - Large file handling and optimization.
 - ❖ **Compatibility Requirements:** The system should support standard file transfer protocols (e.g., FTP, SFTP) for seamless file exchanges.
- e. **Authentication and Authorization Interfaces**
- ❖ **Interface Description:** Interaction with authentication and authorization systems to manage user access and security.

❖ Features and Functionalities:

- User authentication and authorization workflows.
 - Integration with identity providers (e.g., LDAP, OAuth) for secure login.
- ❖ Compatibility Requirements: The system should integrate with standard authentication and authorization systems and follow recognized security protocols.

The "Software Interfaces" sub-section defines the interfaces between the software system and various other software components, systems, or external applications. These interfaces are crucial for seamless integration, ensuring the software system effectively communicates, exchanges data, and interacts with external software components, databases, messaging systems, and authentication mechanisms within the OCOP project.

8.4 COMMUNICATION INTERFACES

The "Communication Interfaces" sub-section within interfaces elaborates on the aspects related to the exchange of information and data between the system and external entities, systems, or users.

a. Web-based Communication

- ❖ Interface Description: Communication via web-based protocols and technologies, often involving HTTP/HTTPS.
- ❖ Features and Functionalities:
 - Web services for data exchange with other systems or applications.
 - APIs accessible over HTTP/HTTPS.
- ❖ Requirements: The system should support standard web-based communication protocols, ensuring secure and efficient data exchange.

b. Email Communication

- ❖ Interface Description: Communication via email protocols (e.g., SMTP, IMAP).
- ❖ Features and Functionalities:
 - Sending notifications or alerts to users via email.
 - Receiving requests or data via email for processing.
- ❖ Requirements: The system should be capable of sending and receiving emails, adhering to relevant email protocols.

c. Real-time Communication

- ❖ Interface Description: Real-time communication interfaces for instantaneous data exchange.
- ❖ Features and Functionalities:
 - Real-time chat functionality for immediate user interaction.
 - Notifications or updates pushed in real-time to users.
- ❖ Requirements: The system should support real-time communication mechanisms for efficient and prompt data exchange.

d. Messaging Systems

- ❖ Interface Description: Communication using messaging systems, both internal and external.
- ❖ Features and Functionalities:
 - Internal messaging for users within the system.
 - Integration with external messaging platforms (e.g., Slack, Microsoft Teams).
- ❖ Requirements: The system should integrate with both internal and external messaging systems to facilitate efficient communication.

e. Telecommunication Interfaces

- ❖ Interface Description: Communication via telecommunication protocols and technologies.
- ❖ Features and Functionalities:
 - Integration with phone systems for alerts or notifications via calls or SMS.
 - Support for telecommunication-based authentication (e.g., OTP via SMS).
- ❖ Requirements: The system should integrate with telecommunication interfaces to enable secure and reliable communication.

The "Communication Interfaces" sub-section defines the interfaces related to the exchange of information and data between the system and external entities using various communication protocols. These interfaces are crucial for enabling effective communication and data exchange within the OCOP project, ensuring seamless interaction with users and external systems via web-based, email, real-time, messaging, and telecommunication communication methods.

9. CONSTRAINTS

The "Constraints" section of the SRS document outlines limitations or conditions that the system must adhere to during its development and operation. These constraints are crucial in ensuring compliance with various legal, regulatory, or industry standards.

9.1 LEGAL & REGULATORY REQUIREMENTS

The "Legal & Regulatory Requirements" sub-section within constraints defines the constraints imposed by laws, regulations, and standards that the system must comply with.

a. Data Privacy Regulations

- ❖ Description: Compliance with laws and regulations related to data privacy and protection.
- ❖ Constraints: The system must comply with applicable data privacy laws such as GDPR, HIPAA, or other regional data protection laws, ensuring the privacy and security of user and system data.

b. Environmental Regulations

- ❖ Description: Compliance with laws and regulations related to environmental protection and sustainability.
- ❖ Constraints: The system must adhere to environmental regulations concerning sewage treatment and pollution control, ensuring that the OCOP project's objectives align with environmental conservation and improvement.

c. Health and Safety Standards

- ❖ Description: Compliance with occupational health and safety standards.
- ❖ Constraints: The system must follow safety guidelines and standards to ensure the well-being and safety of personnel involved in the operation, maintenance, and monitoring of sewage treatment plants and related facilities.

d. Accessibility Standards

- ❖ Description: Compliance with accessibility standards to ensure usability for all individuals, including those with disabilities.
- ❖ Constraints: The system must adhere to relevant accessibility standards (e.g., WCAG) to ensure that all users, including those with disabilities, can access and use the system effectively and efficiently.

e. Intellectual Property Rights

- ❖ Description: Compliance with intellectual property laws and regulations.
- ❖ Constraints: The system must respect and comply with intellectual property rights, ensuring that all software components used or developed within the project adhere to licensing and copyright laws.

The "Legal & Regulatory Requirements" sub-section under constraints highlights the constraints imposed by laws, regulations, and standards that the system must strictly adhere to. These constraints are critical to ensure the system's compliance with legal, ethical, and societal obligations, and they contribute to the responsible and lawful development and operation of the OCOP project.

9.2 TECHNICAL REQUIREMENTS

The "Technical Requirements" sub-section within constraints defines the constraints related to the technical aspects that the system must adhere to.

a. Technology Stack

- ❖ Description: Specifies the required technology stack for development and operation.
- ❖ Constraints: The system must utilize specific programming languages, frameworks, libraries, databases, and other relevant technologies defined in the technology stack to ensure compatibility and maintainability.

b. Performance Constraints

- ❖ Description: Defines the performance limitations or expectations for the system.
- ❖ Constraints: The system must perform within predefined speed, throughput, and latency thresholds to meet the expected performance criteria and provide a satisfactory user experience.

c. Compatibility

- ❖ Description: Specifies the compatibility requirements with other systems or platforms.
- ❖ Constraints: The system must be compatible with specified hardware, software, browsers, operating systems, or other integrated systems to ensure seamless interaction and interoperability.

d. Scalability

- ❖ Description: Defines the system's scalability requirements to handle growing data and user loads.
- ❖ Constraints: The system must be designed to scale horizontally or vertically to accommodate an increasing number of users, data, and transactions while maintaining performance and responsiveness.

e. Reliability and Availability

- ❖ Description: Specifies the system's reliability and availability requirements.
- ❖ Constraints: The system must maintain a specified level of uptime and reliability, ensuring that it is accessible and functional within defined time frames and availability percentages.

f. Security

- ❖ Description: Defines the security requirements to protect the system and its data.
- ❖ Constraints: The system must implement specific security measures, such as encryption, access controls, and authentication mechanisms, to ensure data integrity, confidentiality, and protection against unauthorized access.

g. Data Storage and Management

- ❖ Description: Specifies constraints related to data storage, processing, and management.
- ❖ Constraints: The system must comply with data storage limitations, database types, data processing mechanisms, and other data-related constraints to ensure efficient and effective data management.

The "Technical Requirements" sub-section under constraints focuses on delineating the technical boundaries and expectations that the system must adhere to. These constraints are pivotal in guiding the development, implementation, and performance of the OCOP project, ensuring that the system operates efficiently, securely, and reliably within defined technical parameters.

9.3 ENVIRONMENTAL CONSTRAINTS

The "Environmental Requirements" sub-section within constraints defines the constraints related to the system's impact on the environment and the expectations for environmental sustainability.

a. Energy Efficiency

- ❖ Description: Specifies requirements related to the system's energy consumption and efficiency.
- ❖ Constraints: The system must be designed and operated with energy-efficient practices to minimize its environmental impact and reduce energy consumption.

b. Emission Reduction

- ❖ Description: Defines the requirements to reduce emissions and pollutants.
- ❖ Constraints: The system must be designed and operated in a manner that minimizes or eliminates emissions and pollutants to contribute to environmental conservation and sustainability.

c. Waste Management

- ❖ Description: Specifies requirements related to waste management and reduction.
- ❖ Constraints: The system must follow environmentally friendly waste management practices, aiming to reduce waste generation and promote recycling and proper disposal.

d. Sustainable Materials

- ❖ Description: Defines the use of environmentally sustainable materials.
- ❖ Constraints: The system must utilize materials that are eco-friendly, recyclable, and sourced sustainably, promoting responsible use of resources.

e. Noise Reduction

- ❖ Description: Specifies requirements to minimize noise pollution.
- ❖ Constraints: The system must be designed to operate with minimal noise emissions to prevent noise pollution and maintain a positive environmental impact.

The "Environmental Requirements" sub-section under constraints focuses on delineating the environmental boundaries and expectations that the system must adhere to. These constraints are crucial in guiding the development, implementation, and operation of the OCOP project, ensuring that the system aligns with environmental sustainability goals, minimizing its ecological footprint, and contributing to a greener and more sustainable future.

10. ASSUMPTIONS and DEPENDENCIES

The "Assumptions and Dependencies" section of the SRS document outlines the assumptions made during the requirements analysis phase and the external factors or components upon which the system's functionality and success are dependent.

10.1 ASSUMPTIONS

In this subsection, we outline the key assumptions made during the requirements analysis:

❖ Assumption about Stakeholder Cooperation:

Assumption: It is assumed that all stakeholders involved in the OCOP project, including government authorities, sewage treatment plant operators, and third-party inspection agencies, will actively cooperate and contribute to the successful implementation of the system.

❖ Assumption about Data Accuracy:

Assumption: It is assumed that the data collected from sensors and monitoring devices regarding water quality, flow rates, and other parameters are accurate and reliable. The system's functionality and outcomes are based on this assumption.

❖ Assumption about Regulatory Compliance:

Assumption: It is assumed that the system's design and implementation will comply with all relevant legal and regulatory requirements, including data privacy, environmental standards, health, and safety regulations.

10.2 DEPENDENCIES

In this subsection, we highlight the key external dependencies that may impact the system's development and operation:

❖ Regulatory Approvals:

Dependency: The system's development and deployment are dependent on obtaining necessary approvals and clearances from regulatory bodies, such as environmental agencies, for compliance with environmental standards and regulations.

❖ Sensor and Monitoring Device Integration:

Dependency: The proper functioning of the system depends on the successful integration of sensors and monitoring devices to collect accurate data for sewage treatment plant performance evaluation. Delays or issues in the integration process can impact the system's effectiveness.

❖ Availability of Necessary Infrastructure:

Dependency: The availability of required hardware, network infrastructure, and data storage systems is crucial for the system's successful operation. Any delays or limitations in obtaining or setting up the necessary infrastructure can affect the system's performance and reliability.

The "Assumptions and Dependencies" section provides an understanding of the assumptions made and the dependencies identified during the requirements analysis phase. These assumptions and dependencies are crucial for planning and managing the OCOP project effectively, ensuring that the system's development and operation align with the assumed conditions and depend on key external factors for success.

11. CONCLUSION

In conclusion, the System Requirements Specification (SRS) document for the One City One Operator Project (OCOP) under the Jal Nigam program lays the foundation for the successful development and implementation of a robust sewage infrastructure to improve water quality and contribute to the objectives of the Jal Nigam initiative.

This SRS document serves as a vital guide, ensuring a common understanding of project requirements and constraints among all stakeholders. Adhering to these specifications will be instrumental in the successful planning, development, and operation of the sewage infrastructure, aligning closely with the goals of the Jal Nigam program to purify water and promote environmental sustainability in the respective city.

To conclude, the One City One Operator in India marks a paradigm shift in the sewage management sector with single point accountability and these contracts will create new benchmark in the industry for treatment standards and will also ensure cleaner and healthier ecosystems thus contribute to the rejuvenation of the Water and its tributaries.