Inception Report

Institutional and Organisational Strengthening of WASCO Saint Lucia and Regional Water Utilities

Saint Lucia

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<th>Full Form</th>
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<tr>
<td>CAH</td>
<td>CONSULAQUA Hamburg Beratungsgesellschaft mbH</td>
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<tr>
<td>CARICOM</td>
<td>Caribbean Community and Common Market</td>
</tr>
<tr>
<td>CARPHA</td>
<td>Caribbean Public Health Agency</td>
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<tr>
<td>CATS</td>
<td>Caribbean Aqua-Terrestrial Solutions</td>
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<tr>
<td>CAWASA</td>
<td>Caribbean Water &amp; Sewerage Association Inc.</td>
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<tr>
<td>CD</td>
<td>Capacity Development</td>
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<tr>
<td>Como</td>
<td>Como Consult GmbH</td>
</tr>
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<td>CS</td>
<td>Customer Services</td>
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<tr>
<td>GIS</td>
<td>Geographic Information System</td>
</tr>
<tr>
<td>GIZ</td>
<td>Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH</td>
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<tr>
<td>HM</td>
<td>Hydraulic Modelling</td>
</tr>
<tr>
<td>HR</td>
<td>Human Resources</td>
</tr>
<tr>
<td>HW</td>
<td>HAMBURG WASSER</td>
</tr>
<tr>
<td>ISO</td>
<td>International Organisation for Standardisation</td>
</tr>
<tr>
<td>KPI</td>
<td>Key Performance Indicator(s)</td>
</tr>
<tr>
<td>M&amp;E</td>
<td>Monitoring and Evaluation</td>
</tr>
<tr>
<td>NRW</td>
<td>Non-Revenue Water</td>
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<tr>
<td>NURC</td>
<td>National Utilities Regulatory Commission</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>Operation and Maintenance</td>
</tr>
<tr>
<td>OD</td>
<td>Organisational Development</td>
</tr>
<tr>
<td>SOP</td>
<td>Standard Operating Procedure(s)</td>
</tr>
<tr>
<td>STA</td>
<td>Strategic Alliance for Water Loss Reduction</td>
</tr>
<tr>
<td>ToR</td>
<td>Terms of Reference</td>
</tr>
<tr>
<td>ToT</td>
<td>Training of Trainer(s)</td>
</tr>
<tr>
<td>WASCO</td>
<td>Water and Sewerage Company Inc.</td>
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1 INTRODUCTION

The project “Institutional and Organizational Strengthening of WASCO Saint Lucia and Regional Water Utilities” formally started on the 1st of November 2018 and will have a duration of 13 months. It is carried out by a joint venture between CONSULAQUA Hamburg, which is a 100% subsidiary of Hamburg Wasser, the Water Utility of Hamburg, Germany, and COMO Consult, also from Germany. The firms VAG and SEWERIN are involved as sub-consultants for the project.

A first mission by a team of three experts was undertaken from 26 November – 13 December 2018 to consult with management and staff of WASCO, the Caribbean Water and Sewerage Association (CAWASA) and representatives of the Caribbean Aqua-Terrestrial Solutions (CATS) program and to prepare this Inception Report. The mission consisted of Mr. J.W. Overbeek, Project Coordinator, Ms. Valeria Corallo (M&E Expert) and Mr. Thomas Holtkamp (Organizational Development Expert). A list of persons met during the mission is attached as Annex 1. During the mission a Kick-Off Meeting with project stakeholders took place and a Workshop with WASCO Staff was organized. A report of the workshop is attached as Annex 2 to this report.

1.1 PROJECT BACKGROUND

The project is part of the Caribbean Aqua-Terrestrial Solutions (CATS) programme, which is implemented as collaboration between the Caribbean Public Health Agency (CARPHA) and the “Gesellschaft für Internationale Zusammenarbeit” (GIZ) of Germany. The programme’s donor agency is the German Federal Ministry of Economic Cooperation and Development. The three fields of action of the program are: (1) natural resource management at national and sub national level, (2) climate-adapted cultivation practices at household level and value chains, and (3) up-scaling and mainstreaming at regional level. The CATS program aims at improved management of natural resources to strengthen resilience against climate change and sustainable development for member countries.

Figure 1.1 Project Linkages with the CATS Program
By supporting WASCO and water utilities in other countries\(^1\), the CATS Programme aims at a more sustainable and efficient use of water resources and increasing resilience against climate change. The key objectives of the program as related to the current project are presented in figure 1.1.

### 1.2 The Water and Sewerage Company (WASCO)

WASCO was formally established on the 1\(^{st}\) of November 1999 under the laws of Saint Lucia and is wholly owned by the Government. WASCO falls under the Ministry of Agriculture, Fisheries, Physical Planning, Natural Resources and Cooperatives and is regulated under the Water and Sewerage Act of 2004, which among other things allows the company to recover the reasonably incurred costs of services and a reasonable return on investment. Regulation is carried out by the National Utilities Regulatory Commission (NURC), which carries out tariff reviews on an annual and tri-annual basis and in extraordinary situations.

WASCO operates the John Compton reservoir and dam, 29 other raw water sources and intakes, 9 water treatment plants, and 80 storage tanks. Its distribution system is estimated to be 800 to 960 kilometres, with parts of the system dating back to the 1940s.

WASCO provides drinking water to almost 100\% of the population of Saint Lucia. As per July 2018 it had 48,586 connections, as follows:

<table>
<thead>
<tr>
<th>Type of connection</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic</td>
<td>42,421</td>
</tr>
<tr>
<td>Commercial</td>
<td>4,234</td>
</tr>
<tr>
<td>Government</td>
<td>1,790</td>
</tr>
<tr>
<td>Hotels and ships</td>
<td>141</td>
</tr>
</tbody>
</table>

*Table 1.1: WASCO Number of Connections*

### 1.3 WASCO’s Non-Revenue Water Reduction Program

Over the past few years, WASCO estimates that its Non-Revenue Water (NRW) losses have ranged between 40\% and 60\% of the water it produces. The NRW is caused by leaks and overflows from deteriorating infrastructure, water theft, meter issues, database inaccuracies and billing discrepancies.

This high level of NRW results in considerable inefficiencies and significantly increases the costs of production and distribution. This has also been noted by the National Utility Regulatory Commission (NURC), which oversees tariffs for water and sewerage, and which is pressuring WASCO to improve its efficiency if it wishes to increase its tariffs. In addition, the island’s susceptibility to droughts has raised concerns for ensuring that water is efficiently used and

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\(^1\) The CATS countries include Saint Lucia, Grenada and Dominica, which are the three focal countries, and also Belize, Jamaica, St Vincent and the Grenadines, St Kitts and Nevis and Guyana.
accounted for. Changes in climate call for improved resilience and more efficient use of natural water resources.

It is for the above reasons that WASCO’s Strategic Plan for 2019-2023 has identified the reduction of NRW as its number one priority. WASCO’s Strategic Planning Department has been tasked with formulating a Strategy for the NRW Reduction Program for the next 5 year-planning period. Preparation of this program is ongoing, and in discussions with staff of the Strategic Planning Department, the following components of the plan were identified:

a. Design the organization structure and management and communication mechanism for the NRW Reduction program. Questions to be answered include whether WASCO will work within the current organization structure or rather appoint a dedicated project team or taskforce. Also, the question whether to outsource (part of) the NRW Reduction activities needs to be answered.

b. Define District Metering Areas (DMAs): Reduction of NRW will require a systematic approach, for which it will be necessary to divide its distribution area in well-defined DMAs, which can be isolated from the rest of the system to allow for detailed analysis of the composition of NRW. Also, on the suggestion of its Board, WASCO plans to select a pilot area to test its approaches prior to upsizing the program to other areas in the distribution network.

c. Conduct Water Audits in DMAs, starting with the pilot area. Based on experience gained in water audits in other areas (e.g. Vieux Fort) it will be necessary to prepare selected DMAs prior to carrying out Water Audits, including
   a. ensuring that water meters and valves have been installed,
   b. ensuring that enough detailed GIS data for the distribution system are entered into the system
   c. checking the registration of customers and make sure that their water meters are functioning properly.

d. Ensure that supporting systems such as the Customer Information System (CIS) and GIS are operational and functioning. It is expected that the CIS will become operational during the first half of 2019. The GIS system is currently estimated to only cover 15% of WASCO’s supply area, and it is strongly recommended that data about DMAs are entered into the system prior to carrying out any Water Audit.

e. Strengthen network management and customer services: It is important that prior to and following Water Audits, any DMAs are properly operated in accordance with clear and written operational instructions. Also, the Customer Services Department would need to verify and synchronize their administration with actual field data in the DMA. Currently there are many so-called “inactive” connections in WASCO’s system and also there are a large number of meters that cannot be read by Customer Services for various reasons.

f. Training of staff at all levels: to assist in the above activities it will be necessary to train staff at all levels in preparing for and carrying out Water Audits and following up on its findings.

g. Develop an M&E system for program implementation and results: in order to be able to monitor and evaluate progress and the results of the program, a focused M&E system needs to be set up and implemented.

h. Supporting activities: other activities will be needed, such as i) reviewing and implementing a focused communication strategy in connection with the NRW Reduction Program, ii) calculate the costs of NRW to determine to what extent it will be economically justified to continue with NRW reduction, etc.

i. Last but not least, there is a need to enhance the organization-culture from being reactive to a pro-active way of working, from working in individual sections to collaborating with other departments and from an attitude of dependence to a “yes we can” approach.

The Strategic Planning Department has started work on preparing the NRW Reduction Strategy and is planning to prepare a first draft by February 2019.
2 PROJECT SCOPE AND OBJECTIVES

2.1 PROJECT SCOPE

In view of WASCO’s strategic priorities and in line with the aims of the CATS program, it has been decided to, where possible and applicable, focus project activities in support of WASCO’s program on NRW Reduction. Most activities as defined in the Terms of Reference of the project would fit well within this scope and linking project activities to an existing program within WASCO will considerably increase the chances of achieving a sustainable result. The positioning of the project is schematically presented in the figure below.

![Project Scope Diagram]

Figure 2.1: Project Scope

The project in this way will become part of WASCO’s planned NRW Reduction Program. As this program is still in its infancy stage, the project will support WASCO in developing and testing organizational and technical tools and approaches in tackling NRW Reduction and train its staff at all levels for this purpose. Subsequently, WASCO will be responsible for applying obtained skills and techniques on a nation-wide scale to sustainably address the matter of non-revenue water within its network.

2.2 PROJECT OBJECTIVES

Following from the previous section and because WASCO has just started the NRW Reduction Program, the overall objective of the project will be as follows:

**By the end of 2019 WASCO, is ready to undertake a long term and sustained NRW Reduction Program.**
The project will contribute to the achievement of the above objective but achieving it will also depend on the efforts and resources made available for this purpose by WASCO and other stakeholders.

The immediate objective of the project will be strengthening the organizational and technical capacity of WASCO for NRW Reduction. It will consist of four components, including i) institutional and organizational strengthening, ii) improved network management, iii) hydraulic modelling and iv) GIS and asset management. The project objectives are schematically presented in the figure below:

As the project is part of the regional CATS program, it will work with CAWASA to involve staff of other utilities in the CATS area and the wider Caribbean Region in project interventions where possible and feasible. Also, WASCO and its staff will be encouraged to present experience obtained in the project to other stakeholders in the region where applicable.

2.3 **Geographical Focus**

WASCO is in the process of selecting a pilot area for its NRW Reduction Program, where it plans to conduct a Water Audit sometime in 2019. Before such a pilot area is ready for a Water Audit, it will need to be selected and prepared, to ensure that the necessary meters and valves are installed and functional, the distribution system data are entered in the GIS, the administration of
customers is accurate etc. This is important for accuracy of results, because during the recent Water Audit conducted in July 2018 in Vieux Fort, the reliability of data was only 27%.

The project will work with WASCO and many of the planned interventions will apply to the whole organization and its service area. However, there will also be a number of activities which would benefit from a geographical focus. E.g. in training staff to select DMA’s and carry out water audits, it will be very practical to focus on the pilot area. Also, the focus on a pilot area will help in improving cooperation between the various departments and enhance chances to achieve a lasting impact. The above is schematically presented in the figure below.

![PIOTING OF NEW APPROACHES](image)

Criteria that have been suggested for selecting the Pilot Area include the following:

a. The area should be representative for WASCO’s service area
b. The area should be relatively simple to operate
c. The area should not be too large (between 500 and 3,000 active connections or about 40 kilometre of network)
d. To be used as a DMA, the area should have a boundary with permanently closed boundary valves, and ideally, with one inflow point equipped with the flow and pressure meters.
e. It would be useful if the area has potential for expansion.

In order to utilise the pilot area for the purposes of the consultancy, WASCO will define and prepare the area as soon as possible (early 2019).

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2 Vieux Fort Water Supply Redevelopment Project – Water Audit Report October 2018
3 PROJECT ACTIVITIES AND DELIVERABLES

Project activities and related deliverables have been divided into six groups of activities and for each category one of the key experts is responsible. The activities, deliverables and the names of the experts involved are described below.

3.1 ORGANIZATIONAL STRENGTHENING

3.1.1 Key Findings of the first Mission

During the first mission, the consultants have had extensive consultations with managers of the key operational departments, namely Operations, Water Services, Support Services, Design and Construction, Production and Treatment, Southern Services and Customer Services. In these discussions, the following constraints were mentioned:

a. Management of production and distribution facilities should become more systematic and pro-active. The WASCO organization too often responds to incidents and events instead of focusing on preventive maintenance and the systematic operation of networks and installations. Networks are only partly mapped, and processes and procedures often only exist in the heads of management and staff but are not clearly defined and documented with the result that if key staff would leave the company, a lot of knowledge and experience would be lost.

b. There needs to be much more collaboration between the various departments. It appears that each department is too occupied with its own tasks and hardly has time or energy to communicate with staff of other units. Also, there may be a lack of understanding about the importance and need for collaboration to achieve better results. Currently, many departments within WASCO work to a large extent in isolation. The interface between the organizational units contains significant potential for improvement, e.g. in the definition of quality in internal input-output relationships and roles and responsibilities.

c. During the years, there have been a lot of initiatives to prepare plans, standard operating procedures, etc. However, there is a general lack of following through on these initiatives and of systematic implementation. Several SOPs, which have been elaborated with considerable effort of WASCO staff, still await approval. The question, to what extent technical units can autonomously define and implement technical standards without, at every instance, requiring the approval of higher levels of management, should be explored (subsidiary decision making). The main problem is that as a result, many SOP’s and other reports lay on shelves but are not implemented or used.

d. Budget processes, and possibly other management processes, do not function properly. For example, each year, managers prepare a plan and related budget. However, the approval of these budgets takes a lot of time and even after budgets have been approved, managers must again request approval before they can spend (part of) the approved budgets. This especially applies to the purchasing of capital goods, such as larger equipment or material purchases, cars, etc. Because of this, managers feel a lack of control and a lack of accountability, as managers do not feel that they can be held responsible for decisions taken outside their control.

e. There is a lack of qualified staff at all levels. This has been recognized by the organization and presently a minimum level of academic knowledge and skills is required to be hired. Also,
In the past two years a substantial number of new managers have entered the organization and a succession strategy is being pursued. However, still a lot remains to be done.

f. There are several issues related to WASCO’s Organization Structure. A few key positions are currently vacant, such as the office of Senior Operations Manager, who would have oversight over all technical operations. Also, the structure of WASCO for the Southern part of the island is somewhat dualistic, in a sense that the Southern Services Department in Vieux Fort is a regional unit, whereas all other departments are structured in a central and functional manner. There appears to be some confusion about which units are directed from the Head Office and which units are directed by the Southern Services Division.

g. The new Head of Communications and Marketing is responsible for internal and external communications for WASCO. She is working on a Communications Plan for WASCO. Currently, WASCO’s reputation among its customers is not very favourable and subject for improvement. However, reputation eventually depends on performance and performance improvements are not created by the Communications Department.

h. Based on recent annual financial reports, it appears that WASCO can cover its operational costs and make small investments to replace (part of) its assets. During the past few years it has reported a small profit on its annual Income Statement. For the financing of larger projects, WASCO depends on third parties. From interviews with management, one is left with the impression that there is a lack of financial resources to adequately operate and maintain the technical facilities and replace outdated installations and pipes.

3.1.2 Approach

The team of consultants is of the view that it will be important for WASCO to start a process of change with the purpose of becoming much more pro-active and systematic in its management of the organization and stimulate cooperation among the various organizational units. The management system should aim at improving service delivery and organizational performance by introducing strong customer focus, more involvement of management and staff at all levels, adopting a process management approach, continuous improvement and working in a more systematic and integrated manner. Schematically, the above is presented in the figure below.

![Figure 3.1: Aiming at Total Quality Management](image-url)
The figure illustrates that the success of introducing whatever technical improvement or innovation depends on management processes. A technical SOP, for instance, is only effective if, after its elaboration, it is approved (decision-making) and introduced, the staff is trained in its application, the application is being followed-up, its effectiveness is evaluated, and necessary adjustments are made. This managerial practice is illustrated in the Deming-cycle (Plan-Do-Check-Act / PDCA).

The results of the Kick-off-workshop on 5th December 2018 and the interviews with key WASCO-staff indicate that the organization’s challenge lies in getting from “Plan to Do” and from there into the full managerial cycle. The focus of the consultancy, therefore, should be placed on activating more strongly the managerial cycle and not just to add more SOPs (= “Plan”). In literature, the above approach is called “Total Quality Management” (TQM), which is documented in among others the ISO norms and standards. WASCO as an organization would greatly benefit from adopting TQM approaches and eventually aim for obtaining ISO 9001 certification in the future.

The current project does not have the resources to support the WASCO organization in realizing all of the above. However, it will apply the TQM principles and approaches in suggesting improvements to the core processes of WASCO’s organization related to NRW Reduction. This involves management of operation and maintenance of the distribution network and customer services.

The consultancy missions in general, and particularly of the team leader and the OD Expert, should be used to support management in activating this managerial cycle around the technical inputs of the other experts.
### 3.1.3 Monitoring and Evaluation – M&E

The M&E activity will have three major components:

- **i)** The first component is to set up a system within WASCO to systematically monitor and evaluate the use and implementation of processes and procedures.
- **ii)** The second component is to monitor progress of implementation of project activities and
- **iii)** the third component is to monitor progress on WASCO’s NRW Reduction programme.

The results of the second and third component of the M&E activity can be used as a basis for a Management Information System (MIS) for WASCO and to facilitate the collection and submission of data to the National Utilities Regulatory Commission (NURC).

With regard to first component of the M&E program, the M&E Expert will work closely with the Strategic Planning Department and the Internal Auditing Department in developing a documented system of processes and procedures, which are well communicated to staff and with regular internal checks and audits to monitor their use and improve their quality.

For the second and third component of the M&E program, a Monitoring and Evaluation (M&E) tool will be developed. It is foreseen to develop this excel-based tool closely together with the Strategic Planning Department of WASCO, which will also be responsible for data collection from other WASCO departments. The following figure illustrates these components schematically:

![Set up Internal Monitoring and Evaluation Tool of Key Performance Indicators and Support Monthly Reporting](image)

**Figure 3.3.:** M&E Tool for Key Performance Indicators

In general, the identification of key performance indicators (KPI) shall be facilitated by a review of existing management reports, by the demanded indicators from the NURC as well as through close communication with the Strategic Planning Department. The tool shall furthermore be designed in a way that allows (different sheets) for a future separation of different network zones, which are all combined in one sheet (cockpit).

In the course of this project, this set-up could be used to monitor and evaluate in specific the performance of a pilot area.
### Workplan

Project resources available for institutional and organizational strengthening of WASCO will not be enough to tackle all issues mentioned in the previous paragraphs. Based on the ToR and the mission findings, an outline of the workplan for organizational strengthening is presented below.

<table>
<thead>
<tr>
<th>NR</th>
<th>Activity&lt;sup&gt;3&lt;/sup&gt;</th>
<th>Deliverable</th>
<th>Time Schedule and Experts</th>
</tr>
</thead>
</table>
| 1  | Identify key workflows and related management tasks and mapping and visualization of key processes and SOPs (A.1.1) | Report and recommendations on key workflows and related SOPs and management tasks including:  
- Templates for process descriptions and SOPs  
- Process descriptions for  
  - Distribution<sup>4</sup>: network management, Operation and Maintenance  
  - Customer Services: management of metering and customer services  
- Recommend improvements including SOP approval processes, SOP implementation delegation of responsibility and accountability | December ’18: start with mapping of processes and SOPs  
February ’19: O&M expert will work with the technical managers on how to improve the key processes and identify and prepare several SOPs  
March 2019: The Project Coordinator will have a workshop with senior management to jointly formulate recommendations for improvement. |
| 2  | Develop templates for process description and SOPs |  |  |
| 3  | Review existing procedures for key workflows and identify potential for improvement (A.1.2) | The above report and recommendations will be derived in a series of mini workshops with key management staff. |  |
| 4  | Assist WASCO in developing a strategy to internalize and sustain processes and SOPs (A.3.1) | Report with recommendations and workshop with management, including a proposal for management of process/SOP development and implementation | June 2019: The Organizational Development Expert and the M&E expert will have several workshops with Board and senior management of WASCO, focussing on strengthening of management processes and developing a strategy for implementing, monitoring and evaluating processes and SOPs. |
| 5  | Assist WASCO in defining the M&E framework for NRW reduction and for implementing processes and SOPs (A.3.2) | Proposals for M&E of process/SOP implementation and for M&E of progress of the project and the NRW Reduction Program |  |
| 6  | Establish linkages between workflows and resource allocation processes (A.3.3) | Workshop with Board & Management and Report with recommendations for improved management processes |  |
| 7  | Review WASCO’s Communication Strategy (A.2.4) | Report on WASCO’s (Internal and external) communication strategy | July 2019: The Project Coordinator will work with WASCO’s Communications and Marketing Office in reviewing WASCO’s Communication Strategy and develop recommendations for improvement |

Table 3.1 Workplan and Deliverables for Organizational Strengthening

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<sup>3</sup> The numbers within brackets after each activity listed in this column refer to the activity numbers in the ToR of the project.

<sup>4</sup> This will include relevant parts of water production (metering, pressure management) but will not involve other aspects of production such as water treatment.
3.2 IMPROVED PLANNING

3.2.1 Key Findings during the first Mission

During the first mission, experts have had various meetings with both the General Manager of WASCO and the Strategic Planning Manager, resulting in the following key findings:

- WASCO recently completed its Strategic Plan 2019 – 2023, which states the following strategic priorities:
  a. Reduction of NRW by implementing a comprehensive NRW reduction program
  b. Ensure the resilience of all infrastructure for climate change, including the preparation of masterplans and expansion of the use of GIS
  c. Enhance customer service delivery, among others by implementing the Customer Information System (CIS) and training of staff
  d. Enhance operational efficiency by improving governance and management practice and enhancing IT and financial management systems
  e. Develop a high performing workforce, among others by improving performance management systems and improved communication for staff

- The Strategic Planning Department has been given the task to formulate a Strategy for implementing the NRW Reduction Strategy

- WASCO is currently undergoing a Tariff Review, conducted by the National Utilities Regulatory Commission (NURC). The team charged with undertaking this review is led by the Legal Officer/Corporate Secretary and supported by key staff within Finance, Customer Service and the Strategic Planning Departments. WASCO must submit its data by the end of January 2019 and the outcome of the review is expected during the first half of 2019.

3.2.2 Work Plan

The activities and deliverables for this project component are outlined in the table below. The activities have been ranked in accordance with their priority against their relevance to the topic of NRW Reduction.

<table>
<thead>
<tr>
<th>Nr</th>
<th>Task</th>
<th>Deliverable</th>
<th>Time Schedule and Experts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Assist in preparation of the WASCO NRW Reduction Strategy (extra activity)</td>
<td>Contributions to the WASCO NRW Reduction Strategy</td>
<td>January 2019: The Project Coordinator will assist the Strategic Planning Department in this activity(^5)</td>
</tr>
<tr>
<td>2</td>
<td>Update (desk review) the quantification and estimate the cost of NRW losses (B.2.3)</td>
<td>Report with updated estimate of the quantity and financial value of NRW losses</td>
<td>March – April 2019: Project Coordinator will assist the Strategic Planning Dept and the Finance Department</td>
</tr>
<tr>
<td>3</td>
<td>Review existing tariff review practices and develop a strategy for WASCO to respond to NURC on this.</td>
<td>Report with recommendations for a WASCO strategy on tariffs and regulatory tariff reviews</td>
<td>July 2019 Project Coordinator in collaboration with the Strategic</td>
</tr>
</tbody>
</table>

\(^5\) This is an additional task as compared to the ToR. It has been included as NRW Reduction is at the core of the project and because WASCO has only recently decided to prepare a NRW Reduction Strategy. It is estimated that the Project Coordinator and key experts will spend up to 5-person days for this task.
### Table 3.2: Workplan and Deliverables for Improved Planning

<table>
<thead>
<tr>
<th>Nr</th>
<th>Task</th>
<th>Deliverable</th>
<th>Time Schedule and Experts Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>The relevant WASCO units (Legal, Finance, Strategic Dept.) will be involved (A.2.3)</td>
<td>Workshop and Report on the feasibility of smart meters</td>
<td>May – July 2019: The O&amp;M Expert and the Network Management Expert will be responsible for this activity with support of the Project Coordinator, in cooperation with the Strategic Planning - and Customer Services Departments</td>
</tr>
<tr>
<td>5*</td>
<td>Support and training on forecasting water demand (A.2.7)</td>
<td>Report on methodology and training workshop</td>
<td>July 2019: Project Coordinator in collaboration with the Strategic Planning and Design and Construction Departments</td>
</tr>
<tr>
<td>6</td>
<td>Develop methodology for WASCO master planning (A.3.5)</td>
<td>Draft TOR for WASCO master planning, including resilience of infrastructure for climate change</td>
<td>July/August 2019: Project Coordinator and the Planning Expert in collaboration with the Strategic Department and the Design and Construction Department</td>
</tr>
</tbody>
</table>

### 3.3 IMPROVED NETWORK MANAGEMENT

#### 3.3.1 Key Findings during the first Mission

During the first mission, Consultants have had various meetings with the managers of the key departments related to NRW Reduction within WASCO, being Operations, Water Services, Support Services and Customer Services. Together they identified the following key processes within WASCO which are key to NRW Reduction:

- The Operation and Maintenance of the Distribution Network, including production of water as far as it relates to NRW Reduction (this project will not involve itself with the treatment of water and any other water quality issues, unless they relate to the level of NRW).
- The management of Customer Relations, including metering, meter repairs and billing of customers.

Together with the managers of the above departments, a first attempt was made in mapping of the key processes and identifying the activities, procedures and standards that are part of these processes. It appeared that the processes and SOP’s in relation with Customer Services are generally well documented and that SOPs and forms do exist. However, several procedures and standards may be subject to improvement and a lot of attention is needed for their implementation in the field.

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*6 Training events indicated with an asterisk may be suitable for regional upscaling.*
With regard to the technical processes related to operation and maintenance of production facilities and the distribution network (excluding treatment processes), a lot of the processes, procedures and standards are not well documented. Various efforts have been made in the past and a lot of SOPs, checklist and protocols have been produced, but they are currently not used in day to day operations. Also, significant parts of the secondary and tertiary network appear not to be mapped very well and it is estimated that only about 15% of the network has so far been entered in the GIS.

A draft template for SOPs has been proposed in a Working Paper on Process Management, which has been submitted to WASCO separate from this report. It is proposed that WASCO management as well as the key experts of the project team review this template and that during the first mission of the Senior Operation and Maintenance Expert in February 2019 a final template is agreed upon.

The Working Paper on Process Management also presents a guide on Management Tasks related to NRW Reduction as well as options for describing the various processes related to this topic. Also, a list of SOPs received during the mission is included. This issue will be followed up in future missions by the consultancy through the Sr. O&M Expert, the Project Coordinator and the Organization Development Expert.

The Working Paper also includes the findings of a series of mini workshops which took place during the first mission during which a first effort was made to map the key processes and to identify related constraints and possible improvements.

3.3.2 Workplan for Improved Network Management

The activities and deliverables for this project component are outlined in the table below. The activities have been ranked in accordance with their priority against their relevance to the topic of NRW Reduction.

<table>
<thead>
<tr>
<th>Nr</th>
<th>Activity</th>
<th>Deliverable</th>
<th>Time Schedule and Experts involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A Review of Stock Keeping Practices will be carried out during the first and second mission of the O&amp;M expert (A.2.2)</td>
<td>A report with Guidelines and recommendations for improved stock keeping practices.</td>
<td>February and May 2019 by the O&amp;M expert, assisted by a CAH management trainee and the national planning engineer (see staffing schedule in chapter 4) and staff of the financial, technical and Customer Services Department</td>
</tr>
<tr>
<td>2</td>
<td>A Review of Customer Services Practices will be carried out with a view of making optimal use of the new CIS (A.2.5)</td>
<td>Report with recommendations and suggestions for improved CS operations in connection with introduction the new GIS</td>
<td>February and May 2019 by the O&amp;M expert with assistance of a CAH management trainee and in cooperation with Customer Services staff</td>
</tr>
<tr>
<td>3</td>
<td>Review current practice and procedures on installation/repair of meters and connections and feedback into GIS (A.2.1)</td>
<td>Prepare improved SOP/procedure and standards</td>
<td>February 2019 by the O&amp;M expert assisted by the CAH Management Trainee, GIS expert and in cooperation with Customer Services staff</td>
</tr>
<tr>
<td>4</td>
<td>Review communication and procedures related to water disturbances (A.1.3)</td>
<td>Guideline/SOP on communication and reporting related to water disturbances</td>
<td>February 2019 by the O&amp;M expert assisted by the CAH Management Trainee and in cooperation with staff of</td>
</tr>
<tr>
<td>Nr</td>
<td>Activity</td>
<td>Deliverable</td>
<td>Time Schedule and Experts involved</td>
</tr>
<tr>
<td>----</td>
<td>--------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 5* | Assess current workflows and procedures for repair works for pipelines and valves etc. and identify possible improvements  (A.1.4 and A.1.5) | a. Prepare guideline/SOPs for improved management of repair works and  
b. Conduct workshop and training of staff | February 2019: O&M expert with assistance of CAH Management Trainee & WASCO Management  
May 2019: actual training of staff, possible with regional upscaling |
| 6  | Review current practice on inspection of valves/flowmeters/pressure gauges and develop improved analysis and condition assessment form and related SOP for feedback into GIS  (B.1.1) | Workshop and SOP and related forms on inspection of valves, flowmeters and pressure gauges and feedback into GIS | February 2019 by the O&M expert with assistance of the GIS expert and the CAH Management Trainee and in collaboration with staff of technical departments and GIS staff. |
| 7  | Review processes & procedures for assessment of leakages & damages and develop SOP for feedback into GIS  (B.1.2) | Report on process review and SOP including feedback into GIS | February 2019: O&M expert with support of the GIS Expert and the CAH Management Trainee |
| 8  | Sensitization of WASCO management and staff on the importance of accurate flow and pressure management for accurate water balance and NRW calculations  (B.1.3) | Report and workshop with staff and handouts/educational materials for participants | May 2019: O&M Expert with support of the Water Balance expert. |
| 9* | Training on the use of leak detection equipment  (B.2.1) | Report and handouts for workshop with technical staff on the use of leak detection equipment | April 2019: Leak detection Expert |
| 11*| Prepare and support measurement campaign on water losses along the Northern Distribution Line  (B.3.2) | Report with findings and recommendations for follow up action | May – Aug 2019: O&M expert with support of the Leak Detection Expert and the Network Management Expert and Planning Engineer |
| 12*| Training on the use of HDPE pipelines and materials  (A.1.6) | Workshop with technical managers and staff on the use of HDPE materials and handouts | August 2019: Network Management Specialist |

7 The exact scope and timing of activities related to the Northern Distribution Line will be determined during the first mission of the Senior O&M Expert in February 2019 and will involve inputs of herself and of the Network Management Expert, the Water Balance Expert and the Planning Engineer.

8 Setting up a measurement campaign for water losses may also be suitable for regional upscaling and during the first mission of the Senior O&M Expert it will be decided how this could be implemented, e.g. by presenting this as a case study during the Regional Conference of CAWASA in June 2019.
<table>
<thead>
<tr>
<th>Nr</th>
<th>Activity</th>
<th>Deliverable</th>
<th>Time Schedule and Experts involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Review SCADA system and recommend further updates and upgrades. Sound out options for partnership with private enterprise. (B.2.2)</td>
<td>Report on current SCADA system and recommendations for further development</td>
<td>May 2019: O&amp;M Expert</td>
</tr>
</tbody>
</table>

Table 3.3: Workplan for Network Management

3.4 Hydraulic Modelling

3.4.1 Key Findings during the First Mission

Advisory services are needed to strengthen the capacity of WASCO in the field of hydraulic modelling, working with district metering areas (DMAs) and carrying out water audits.

Earlier this year a water audit was carried out by WASCO in Vieux Fort, with the assistance of among others experts from CAH. The report on this activity estimated a NRW percentage of 43% for the area, but with a data validity score of only 27%. Increasing the reliability of data for future water audits therefore is a key issue to focus on in future water audits.

3.4.2 Workplan for Hydraulic Modelling

The activities and deliverables for Hydraulic Modelling are outlined in the table below. The activities have been ranked in accordance with their priority against their relevance to the topic of NRW Water Reduction.

<table>
<thead>
<tr>
<th>Nr</th>
<th>Activity</th>
<th>Deliverable</th>
<th>Time Schedule and Expert Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Workshop on distribution zoning and assist WASCO in defining DMA's for its supply area (C.1.2) and training of staff</td>
<td>Workshop with WASCO staff and report on findings, including handouts for participants</td>
<td>March 2019: Hydraulic Modelling Expert and Water Balance Expert in collaboration with key staff of the technical and Customer Services department</td>
</tr>
<tr>
<td>2</td>
<td>Prepare process for operationalizing DMAs and water balance establishment and training of staff (C.2.1)</td>
<td>Workshop on Water Balancing, SOP and Action Plan to improve data basics for Water Balance, with a focus on implementing DMA in the Pilot Area</td>
<td>March and July 2019: Water Balance Expert in collaboration with key staff of the technical and Customer Services department</td>
</tr>
<tr>
<td>3</td>
<td>Review existing hydraulic model for Castries (C.1.3)</td>
<td>Report with findings and recommendations for improved operations and further development</td>
<td>August 2019: Hydraulic Modelling Expert in collaboration with key staff of technical departments</td>
</tr>
</tbody>
</table>
4. Review of WASCO’s adapted practice on collection and verification of flow and pressure measurement data (C.2.3)

Process description and SOP with possible application in Pilot Area

March 2019: Hydraulic Modelling Expert and Water balance Expert in collaboration with key staff of technical departments

5. Training on flow and pressure management and design of transport and distribution systems including PRVs, reticulation systems and reservoirs (C.1.1)

Workshop and workshop report and handouts for trainees

August 2019: Hydraulic Modelling Expert

6. Assess training needs and conduct workshop on advanced hydraulics and hydraulic modelling (C.2.2)

Workshop and Workshop Report with handouts for trainees

August 2019: Hydraulic Modelling Expert in collaboration with key staff of technical departments

Table 3.4: Workplan for Hydraulic Modelling

3.5 GIS AND ASSET MANAGEMENT

3.5.1 Key Findings during the First Mission

WASCO is working with GIS since 2013 and received technical assistance during a previous consultancy project from CAH experts. Currently the GIS Unit is part of the Strategic Planning Department and consists of 3 staff. GIS is not yet really used by other departments even though it is part of WASCO's Strategic Initiative No 2. The GIS cannot run on WASCO's IT servers and is currently run on a separate server within the GIS Unit.

WASCO’s GIS only includes data on water and wastewater networks (pipes, tanks, watershed maps, topography, statistics). Data for selected areas in Castries were entered into the GIS. In connection with the previous consultancy, discussions were held with the Customer Services and Technical Departments to use routine processes as a supply of data for entering into the GIS and staff was assigned for this purpose. However, this effort was not followed through and currently only approximately 15% of WASCO’s service area is entered into the GIS.

The GIS unit makes use of a Digital Elevation Model, which was informally obtained by the Ministry of Planning and makes use of baseline maps dating from 2009 and the Saint Lucia 1955 West Indies Grid. It also uses ArcGIS version 10.5 with four licenses. Initially two dashboards (asset & operations) have been installed, but due to IT-problems (connection) they 'crashed' and are not in use anymore. During the previous consultancy (2014/2015), some work has been done on the re-activation of these dashboards, but this was not followed up. For measuring, WASCO makes use of Trimble GeoXT (1x); Trimble Geo7x (1x); Trimble Juno series (4x); and rulers and tape.

3.5.2 Workplan for GIS and Asset Management

The activities and deliverables for GIS and Asset Management are outlined in the table below. To realize quick benefits of GIS, it is recommended to focus on a few simple but important processes:

a. Understanding of the existing system environment
b. Identify key GIS-related process(es) (inventory of the current procedure)
c. Identify required information of used items and supported processes (development)
d. Customize existing system environment (implementation)
e. Presentation to the involved departments of WASCO (to show the benefit of GIS for other departments)
The activities for GIS and Asset Management have been ranked in accordance with their priority against their relevance to the topic of NRW Reduction. Key in the approach for GIS and Asset Management will be to work with the Technical and Customer Services Department and the GIS unit to ensure that the GIS is filled with data, so it can become useful to WASCO. Filling the GIS for the selected Pilot Area may be a good start for this. Prior to starting the GIS and Asset Management work it will be of the utmost importance to enable GIS to run on WASCO’s IT servers, to ensure that it can be used by the technical departments.

<table>
<thead>
<tr>
<th>NR</th>
<th>Activity</th>
<th>Deliverable</th>
<th>Time Schedule and experts involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Assess current GIS and recommend improvements, prepare WASCO action plan to accelerate system implementation and further development (D.1.2)</td>
<td>WASCO Action Plan to accelerate GIS implementation of data into the GIS and for further development of the GIS function</td>
<td>March 2019: Senior GIS Expert, staff or WASCO’s GIS section and technical departments</td>
</tr>
<tr>
<td>2</td>
<td>Assess technical field work and linkages with GIS data processing and support the implementation of GIS based processes and field work activities (D.2.1)</td>
<td>Report on current processes and recommendations for improvements (WASCO to test and implement in Pilot Area)</td>
<td>March and Sept 2019: Process Control/GIS Expert and national Planning Expert together with WASCO GIS staff and staff of technical/CR departments</td>
</tr>
<tr>
<td>3</td>
<td>Develop asset inventory system in GIS and support SOP for data input into GIS (WASCO to test and implement in Pilot Area) (D.1.1)</td>
<td>Asset inventory system for GIS and SOP(s) for data input in GIS</td>
<td>March 2019: Senior GIS Expert, in collaboration with O&amp;M Expert and WASCO’s technical and GIS staff</td>
</tr>
<tr>
<td>4*</td>
<td>Define requirements and support in developing and applying Database Dashboards as a link between GIS and the management of network and customer services operations (D.2.2)</td>
<td>Workshop with key staff and a draft strategy and approaches for implementation</td>
<td>March– Sept 2019: Senior GIS Expert and the Process Control/GIS Expert and WASCO GIS staff and technical/CR departments</td>
</tr>
</tbody>
</table>

Table 3.5: Workplan for GIS and Asset Management

3.6 Regional Upscaling

3.6.1 Key Findings during the First Mission

During the first mission, consultants had meetings with the Executive Director of the Caribbean Water & Sewerage Association (CAWASA) and with representatives of the Caribbean Public Health Agency (CARPHA) and GIZ. In these meetings participants emphasized the importance of upscaling the benefits of the project with WASCO in Saint Lucia to other water utilities in the Caribbean Region. This applies to utilities in those countries which are also covered by the CATS program, as well as utilities which are member of CAWASA.

3.6.2 Workplan for Regional Upscaling

In order to realize the regional upscaling, the following interventions are proposed:
Table 3.6: Workplan for Regional Upscaling

Tentatively, the following training events have been identified as suitable for possible participation of staff of water utilities in the Caribbean Region:

1. Training on the use of leak detection equipment (1 day, April 2019)
2. Training on workflows and procedures for repair works for pipelines and valves (1-2 days, May 2019)
3. Training on Demand Forecasting (1 day, July 2019)
4. Training on the use of HDPE pipelines and materials (1 day, July/August 2019)
5. Training on operationalizing DMAs and establish water balances (1 day, July/August 2019)
6. Training on flow and pressure management and the design of transport and distribution systems (max 3 days, August 2019)
7. Applying Database Dashboards as a link between GIS and the management of network and customer services operations (1 day, July/August 2019)
8. Workshop on advanced hydraulics and hydraulic modelling (max 3 days, August 2019)

Many of the training events are planned to be of 1-2 days duration. In order to make the most efficient use of funds, an effort will be made to as much as possible group various training sessions within the period of one week, to avoid unnecessary travel for participants of utilities in other countries in the region. The logistics of inviting the participants from other utilities will be arranged by CAWASA. The Capacity Development Expert will assist where needed and also coordinate this activity with GIZ, CAWASA and the various experts.

As there is no budget for this activity in the project, the costs of participation of staff of other utilities will be funded by either the CATS program or by the participating utilities themselves. The CATS programme is prepared to cover the costs of (a selected number of) participants from other utilities in the CAWAS region.

10 In planning training events, consideration will be given to aligning selected training events with the CAWASA regional conference scheduled for 26-28 June 2019.
CATS-Countries, i.e. Grenada and Dominica, which are the focal countries together with Saint Lucia, and also Belize, Jamaica, St Vincent and the Grenadines, St Kitts and Nevis and Guyana.

Utilities from other countries organised within CAWASA can participate but would have to cover the costs for attending the training events themselves.
4 PROJECT ACTIVITIES AND STAFFING

4.1 PROJECT ACTIVITY AND STAFFING SCHEDULE

The project activity and staffing schedule presented below is based on the planning and time schedules as indicated in chapter 3 of this report. For each sub-group, the activities have been listed in order of priority based on their effect on the Reduction of NRW. During their first missions, each of the key experts will assess if there is a need to propose changes to the list of activities for which he/she is responsible and determine if priorities need to be changed. Any change will be discussed and agreed upon with counterparts and the responsible project managers in WASCO and CATS.

4.2 PROJECT ORGANIZATION AND COMMUNICATION

The project activities are divided in groups. The Project Coordinator and the Key Experts will each be responsible for one or more group of activities. The expert responsible for one group of activities will plan and coordinate the activities in that subgroup with the team members and with WASCO counterpart staff as indicated in the table below. The names of the persons charged with coordination of a group of activities within WASCO and the Project Team are indicated with an asterisk.

<table>
<thead>
<tr>
<th>Function</th>
<th>Project Experts</th>
<th>WASCO Responsible Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Coordination</td>
<td>Jan W. Overbeek - Project Coordinator*</td>
<td>Peter Norville - Strategic Planning*</td>
</tr>
<tr>
<td></td>
<td>Lucatina Ercolano – Training Expert</td>
<td></td>
</tr>
<tr>
<td>Organizational Strengthening</td>
<td>Thomas Holtkamp - Org. Devt. Expert*</td>
<td>Peter Norville - Strategic Planning*</td>
</tr>
<tr>
<td></td>
<td>Valeria Corallo, M&amp;E Expert</td>
<td>Strategic Planning, internal Audit</td>
</tr>
<tr>
<td>Improved Planning</td>
<td>Jan W. Overbeek - Inst. Devt. Expert*</td>
<td>Peter Norville – Strategic Planning*</td>
</tr>
<tr>
<td></td>
<td>Lucatina Ercolano - Training</td>
<td>Mandille Alcee – Strategic Planning</td>
</tr>
<tr>
<td>Network Management</td>
<td>Linnea Foelster – O&amp;M Expert*</td>
<td>Jim King – Water Services*</td>
</tr>
<tr>
<td></td>
<td>Peter Blawat – Network Mgt Expert</td>
<td>Raphael Eudovique - Production</td>
</tr>
<tr>
<td></td>
<td>Michael Kersting, Leak Detection Expert</td>
<td>Tera Victor - Support Services</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Zita Leslie - Customer Services</td>
</tr>
<tr>
<td>Hydraulic Modelling</td>
<td>Raul Trujillo Alvarez – Hydraulic</td>
<td>Kelvin Emilien – Design &amp; Construction*</td>
</tr>
<tr>
<td></td>
<td>Modelling Expert*</td>
<td>Jim King – Water Services</td>
</tr>
<tr>
<td></td>
<td>Marc Luedtke, Water Balance Expert</td>
<td>Peter Norville – Strategic Planning</td>
</tr>
<tr>
<td>GIS and Asset Management</td>
<td>Matthias Voigtlaender, GIS Expert*</td>
<td>Peter Norville – Strategic Planning</td>
</tr>
<tr>
<td></td>
<td>Anja Voigtlaender, GIS Expert</td>
<td>Nicholai Hyacinth – GIS coordinator*</td>
</tr>
<tr>
<td>Regional Upscaling</td>
<td>Jan W. Overbeek – ID Expert*</td>
<td>Peter Norville – Strategic Planning</td>
</tr>
<tr>
<td></td>
<td>Lucatina Ercolano, Training Expert</td>
<td>Ignatius Jean - CAWASA</td>
</tr>
</tbody>
</table>

Table 4.1 Project Staffing and Coordination

Within the project team, the Project Coordinator will coordinate with each of the Key Experts, who in turn will coordinate the work within their respective groups. The Key Experts will also be responsible for validating the quality of the reports and other deliverables in the group for which they are responsible. The project team has also created a joint project site where it keeps copies of all documents it receives in the course of the project. The project will assist WASCO to set up a similar project directory.
### Figure 4.1: Project Activity and Staffing Schedule

#### Activity Schedule

<table>
<thead>
<tr>
<th>Activity</th>
<th>Lead</th>
<th>Support</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Steering Committee Meetings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation of Project Inception Report</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation of Project Progress Reports (March, July) and Final Report (Nov)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Organisational Strengthening

1. Review, identify and mapping of key workflows and processes related to NRW (OD, IO)
2. Develop templates for workflows and SOPs (OD, IO)
3. Review existing procedures and identify potential for improving key processes (DM, OD)
4. Assist in preparing WASCO Strategy for managing existing and new processes and SOPs (DD, IO)
5. Assist in developing an internal M&E scheme for workflow and SOP implementation (OD, ME)
6. Establish links between workflow/SOP/standards and resource allocation processes (DD, IO)
7. Review WASCO Communication Strategy (internal, external) (IO, OM)

#### Improved Planning

8. Support Preparation of WASCO NRW Reduction Strategy (IO, OM)
9. Update assessment of NRW and quantify costs of NRW losses (IO, OM)
10. Review relation with Water Regulator and existing tariff practices (IO, ME)
11. Assess the feasibility of smart meters (PE, OM)
12. Assist in forecasting of future water demand (IO, PE)
13. Develop recommendations for Masterplanning of WASCO's future projects (IO, PE)

#### Improved Network Management

15. Review Customer Services Practices and CIS (DM, IO)
16. Prepare SOP on installation/repair of meters and connections & feedback in GIS (DM, GIS)
17. Prepare guidelines on communication around water disturbances (DM, PE)
18. Prepare SOP on repair works and training of management & staff (DM, PE)
19. Prepare SOP on inspection of valves, flowmeters & pressure gauges (DM, HM)
20. Prepare SOP for assessment of leakages and damages and feedback in GIS (DM, PE)
21. Sensitization of importance of accurate flow & pressure management (DM, HM)
22. Training on the use of leak detection equipment (LD, OM)
23. Support analysis of capacity and condition of the Northern Distribution Line (DM, HM)
24. Support measurement campaign of the Northern Distribution Line (DM, HM)
25. Training on the use of HDPE pipelines and materials (DM, PE)
26. Assess current SCADA System and prepare recommendations (DM, HM)

#### Hydraulic Modelling

27. Assist in defining DMA's and training of WASCO staff (HM)
28. Develop SOP and train WASCO staff on DMA implementation (HM, PE)
29. Review existing hydraulic model for Castries (HM)
30. Prepare SOP on collection and verification of flow measurement data (HM, PE)
31. Training on flow & pressure management & design of transport/distribution systems (HM)
32. Workshop on advanced hydraulics and hydraulic modelling (HM)

#### GIS & Asset Management

33. Assess current GIS System and recommend improvements (GIS, OM)
34. Structure linkages between field processes and GIS Data Processing (GIS, OM)
35. Recommend GIS based inventory system and develop SOP on data entry in GIS (GIS, OM)
36. Develop Database Dashboards for improved O&M and Management (GIS)

#### Regional Upscaling

37. Develop and implement training plan for utilities in the Caribbean Region (CD, IO)
38. Develop proposals to establish Center of Excellence/Competence Center (CD, IO)

#### Staffing Schedule

<table>
<thead>
<tr>
<th>Function</th>
<th>Name</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>TL</td>
<td>JWO</td>
<td>95</td>
</tr>
<tr>
<td>Senior O&amp;M Expert</td>
<td>CM, LF</td>
<td>42</td>
</tr>
<tr>
<td>Senior Hydraulic Modelling Expert</td>
<td>CM, KT</td>
<td>41</td>
</tr>
<tr>
<td>Junior GIS Expert</td>
<td>GS, MV</td>
<td>23</td>
</tr>
<tr>
<td>Junior Organizational Expert</td>
<td>CD, TH</td>
<td>30</td>
</tr>
<tr>
<td>M&amp;E Expert</td>
<td>ME, VC</td>
<td>34</td>
</tr>
<tr>
<td>Capacity Development Expert</td>
<td>CD, LE</td>
<td>20</td>
</tr>
<tr>
<td>Network Management Expert</td>
<td>HM, FB</td>
<td>28</td>
</tr>
<tr>
<td>Leak Detection Expert</td>
<td>LD, MM</td>
<td>10</td>
</tr>
<tr>
<td>Planning Engineer (National)</td>
<td>PE, LA</td>
<td>40</td>
</tr>
<tr>
<td>Water Balance Expert</td>
<td>WB, ML</td>
<td>24</td>
</tr>
<tr>
<td>Process Control System/GIS Expert</td>
<td>GS, AV</td>
<td>20</td>
</tr>
<tr>
<td>Balance SF Experts</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>
In preparation for each mission, a detailed ToR will be prepared and submitted to WASCO and CATS. 1-2 weeks prior to each mission, a video or skype meeting will be organized between the expert and his/her counterpart within WASCO. Use will be made of the video and skype facilities available in WASCO. In these meetings, the ToR and purpose of the mission will be discussed between the project experts and their WASCO counterparts, as well as the tentative program and any other requirements. An outline ToR for each mission is attached as Annex 3 to this report.

4.3 **PROJECT STEERING AND REPORTING**

The project Steering Structure is schematically presented in the figure below.

![Proposed Project Steering Structure](image)

*Fig. 4.2. Proposed Project Steering Structure*

Project progress and activities will be overseen by a Steering Committee, headed by the General Manager of WASCO. Representatives from CAWASA and the CATS Program will also be represented in the Steering Committee. The Strategic Planning Manager of WASCO and the Project Coordinator will also be members of the Steering Committee.

The Project Coordinator will during each of his missions prepare a short progress report, in which he will summarize progress for each of the activities and related deliverables and any constraints or issues that may affect project progress. The progress reports will be an input for the meetings of the Project Steering Committee.

Within WASCO, the Strategic Planning Manager will be coordinating project activities. He will communicate various aspects of project with the focal persons for each group of activities within the WASCO Organization. Where needed, working groups will be created.

Within CATS Mr. Timo Schirmer has been appointed as project manager and he will be the focal point for the project within GIZ and participate in the Steering Committee Meetings.
4.4 **PROJECT BUDGET FOR TRAINING AND EQUIPMENT**

For workshops and trainings, a budget of up to 20,000 EUR is foreseen against provision of evidence (e.g. for room rentals, supplies). Travel costs of participants attending workshops and trainings from utilities in “CATS countries” other than Saint Lucia (Belize, Dominica, Grenada, Guyana, Jamaica, St. Kitts & Nevis, St. Vincent & The Grenadines) will be covered separately by the CATS programme and are not part of this contract. For participants from Saint Lucia, no travel costs will accrue. Travel costs of participants attending workshops from “non-CATS countries” will have to be covered by the respective utilities. Organisational aspects in relation to participation of individuals from utilities other than WASCO will be arranged by CAWASA in collaboration with the CATS programme and where necessary by WASCO.

In addition, the project budget also includes an allocation for equipment of Euro 25,000. It is proposed to use this allocation to buy equipment needed for the training of WASCO staff. This may include leak detection equipment, measurement devices, and other items needed in the preparation for and implementation of water audits. The specific items to be purchased under this budget line will be determined by the technical key experts in consultation with WASCO.

Finally, there is a budget line of Euro 5,000 for office equipment. This budget line will mainly be used to buy office equipment and software needed for the conduct of the project. The specific items will be determined by the Technical Experts in consultation with WASCO.

4.5 **PROJECT STAKEHOLDERS**

A Stakeholders Analysis has been carried out by project staff in close consultation with the Strategic Planning Department of WASCO. The analysis has defined key stakeholders, primary and secondary stakeholders, and stakeholders with a more general interest in the project but who are not directly involved. The results of the analysis are presented in more detail in the following figure and paragraphs.
KEY STAKEHOLDERS

“Key stakeholders are those actors without whose support and participation the targeted results of a project normally cannot be achieved, or who may even be able to veto the project, in which case they are termed “veto players”

- WASCO NRW Implementation Team: Represents the core team of WASCO staff who are directly involved in the NRW Reduction Program as well as the project activities, and who are responsible for follow-up, implementation and steering of activities from WASCO side.
- WASCO Steering Committee: As outlined in section 4.3, the steering committee is headed by the General Manager of WASCO and is responsible to oversee the projects progress and activities.
- CATS, Saint Lucia: As the project is part of the CATS program – which aims at improved management of natural resources to strengthen resilience against climate change and sustainable development for its member countries – the responsible entities (CARPHA, GIZ) are key Stakeholders.
- CAWASA: In order to facilitate the inclusion of other regional water and sanitation utilities into selected project activities (e.g. training measures) as well as to spread the word about the word about WASCOs NRW reduction program, CAWASA is seen as key Stakeholder and has been involved in the project directly from the beginning.
- Consultant: The consultants team members are representing a diverse group (organisational and technical experts), responsible to conduct the projects activities together with the involved WASCO personnel.

PRIMARY STAKEHOLDERS

“Directly benefiting from or affected by a the project - may include anyone with a functional or financial interest in the performance of WASCO”

- WASCO Board members: The WASCO Board has defined NRW Reduction as its core priority for the next 5-year planning period and the results of the project will directly contribute to achieving part is this strategic objective. Also, the Board is closely involved in taking fundamental (operational and technical) decisions that will affect the project and WASCO’s NRW Reduction Program. Thus, it is of utmost importance to integrate the Board not only in the outcomes, but moreover in the process of designing WASCOs NRW reduction activities.
- WASCO Communications: Public and customer relations should play a prime role in involving the public into ongoing NRW activities. Existing and already utilised tools like WASCO homepage, facebook, WhatsApp groups and presentations at cash desks should be used. Furthermore, the link to radio or TV stations could be further exploited.
- WASCO domestic customers: Are directly affected and thus interested in any improvement of service e.g. with respect to increased water supply hours or response to complaint. An increase of customer satisfaction can be furthermore linked to a positive impact on collection efficiency.
- NURC: The National Utilities Regulatory Commission (NURC) is a multi-sector independent regulatory body which is responsible for regulation of water supply and sewerage services, as well as electricity supply services in Saint Lucia. Currently, WASCO is involved in a tariff review process. The envisaged M&E tool for WASCO is
expected to facilitate the future collection and submission of key performance indicators to the NURC.

- Besides WASCO Communications, the general media play a significant role not only in Saint Lucia, but also at the regional level. Depending on the topic and the envisaged target audience, they represent either a primary or secondary Stakeholder. Furthermore, private sector representatives (commercial / touristic), staff / management at wider Caribbean utilities as well as the regional CATS program are also categorised at this stage as hybrid-Stakeholders.

SECONDARY STAKEHOLDERS

“Have an indirect relationship with WASCO and tend to have – even without direct engagement – a very influential character”

- Other secondary Stakeholders – Stakeholders that are not directly affected/engaged by/in the project – include the General public (not customers), the Ministry of Health, governmental customers, community-based organisations, local government units, Ministry of Agriculture, Fisheries, Physical Planning, Natural Resources & Cooperatives (incl. Water Resources Management Agency) as well as other GIZ projects / interventions in the region. Besides, even if the Sir Arthur Lewis Community College is currently regarded as secondary Stakeholder, they might be increasingly involved during the project, e.g. for facilitation of regional workshops or as part of the development of a concept for a centre of excellence (focus: vocational training).

BROADER LEVEL STAKEHOLDERS

- Based on the outcomes of the Stakeholder mapping session, the WASCO Workers Union, NGOs, as well as the Physical Planning Department have been identified as Stakeholders that might play a more prominent role in the future implementation of WASCO’s NRW Reduction Programme but not specifically for the current project.

As part of the formulation of WASCO’s NRW Reduction Strategy, the above Stakeholder Analysis will be reviewed again with regard to the role each of the above group of stakeholders will play and how to engage with them as part of the program.
## PROJECT RISKS

The following Key Risks have been identified for the project:

<table>
<thead>
<tr>
<th>Nr</th>
<th>Risk</th>
<th>Proposed Actions to mitigate the Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The limited project resources are spread over too many activities, with the risk that key objectives are not achieved.</td>
<td>In the workplan in this Inception Report, project activities and related deliverables have been ranked in accordance to their priority, as related to achieving the overall project objective, which is to prepare WASCO for implementing a sustained NRW Reduction Program. The Project Coordinator and the Key Experts will assess during their first missions, the likelihood that they are able to produce the key deliverables in their group of activities. If not, they may propose changes to the project activities, to be considered and approved by the Project Steering Committee.</td>
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</tbody>
</table>
| 2  | During their first mission, experts have observed that the key issue that needs to be addressed by the project, is to strengthen the organization and management within WASCO rather than to increase technical know-how and skills. However, most project activities and resources (about 67%) are allocated to preparing technical guidelines and advice and providing technical training. There is a risk that by mainly focussing on technical support, the overall objective of the project will not be achieved. | The following actions are proposed to mitigate this risk:  
a. All project experts have been made aware of the importance to focus on organizational and management issues within the context of their respective activities. E.g. rather than focussing on re-writing a specific SOP, they will focus on assisting WASCO managers in getting these SOPs implemented. Rather than writing an operation manual, they will together with WASCO managers work on bringing more systematic and pro-active approaches to their work.  
b. The above measure can to some extent be applied. However, the project team is bound to their ToR and the deliverables specified therein. To address the risk of too little focus on organizational strengthening, it is therefore recommended to add additional resources to this project program component, by e.g. adding additional days to the input of the Organizational Development Expert and allowing for 1-2 additional missions. This would increase chances that the technical objectives of the project are achieved and sustained over time by the management of WASCO. A proposal with justification for this will be proposed by the consultant during the first quarter of 2019. |
ANNEXES

ANNEX 1: LIST OF PERSONS MET

Water and Sewerage Company Inc, (WASCO), Saint Lucia

Mr. Francis Denbow, Chairman of the Board of Directors
Mr. Paul Joseph, Member of the Board of Directors
Mr. Edmund Regis, General Manager
Mr. Peter Norville, Manager Strategic Planning
Mr. Mandille Alcee, Trainee Manager
Mr. Jim King, Manager Water Services
Mr. Raphael Eudovique, Acting Head of Operations
Ms. Zilta Leslie, Manager Customer Services
Mr. Kelvin Emilien, Manager of Design & Construction
Mr. Tera Victor, Manager of Support Services
Ms. Keren Monrose, Head of Southern Services
Mr. Nicholai Hyacinth, GIS Supervisor
Mr. Matthew Francis, Head of Metering, Customer Services Department
Mr. Linus Deterville, Internal Auditor
Ms. Dorcia Callendar, Manager HRM Department
Ms. Nicola Benjamin, Corporate Secretary and Manager Legal Affairs
Ms. Gennifer Faissal, Finance Manager
Ms. Sherry Ann Williams, Head of Communication and Marketing Office
Mr. Gregory Tench, Manager IT Department

Caribbean Water and Sewerage Association (CAWASA)

Mr. Ignatius Jean, Executive Director

Caribbean Aqua-Terrestrial Solutions (CATS)

Mr. Horst Vogel, Head of Programme
Mr. Timo Schirmer, Environmental Engineer, Project Manager
Mr. L. Forbes Robertson, Head Environmental Health and Sustainable Development, CARPHA

National Utility Regulatory Commission (NURC)

Ms. Skeeta Carasco, Regulatory Economist
Ms. Manendra George, Consumer Relations Officer.
ANNEX 2: WORKSHOP REPORT

WORKSHOP OBJECTIVES

- To kick-start the project as a WASCO-internal change process focussed on non-revenue-water (NRW) supported by GIZ via this consultancy
- Create a common understanding of scope, objectives, and content of change process
- Identify and agree on key intervention areas and factors of success
- Understand stakeholder involvement and agree on steering needs for the change process
WORKSHOP AGENDA

- Building on the past: WASCO’s “lifeline” of Non-Revenue-Water – What are our lessons learned?
- Non-Revenue-water: A reminder of the dimensions of NRW. 5 Working Groups elaborate, which WASCO-activities relate to NRW and what are the corresponding core challenges
- Prioritize WASCO activities related to NRW and their corresponding challenges
- Plenary reflection: What is needed to ensure that changes are going all the way to implementation in WASCO?
- Management Team: What can collaboration across organizational silos contribute to successful change?

WASCO staff formed a line according to the length of their contract with WASCO. A large part of the staff had been recruited before 2000, the “senator” joined in 1970! Respect!

Then, in three groups (1970-2000, 2000-2016, and 2016-2019), WASCO’s NRW-lifeline was drawn: over the years, how positive, neutral, or negative the NRW-issue was perceived by the staff?
Influenced by recommendations made under the CATS I – Programme, this envisaged ‘follow-up’ project is supporting WASCO and, where applicable, representatives of sister organizations in other CARICOM countries in improving institutional and organizational aspects.

The starting point of the cooperation between WASCO and the Consultant Team dates back to June 2014. Under the umbrella of the Strategic Alliance for Water Loss Reduction (STA) major improvements areas for NRW reduction at WASCO were identified and as part of a following one-year consultancy implemented.

This project – 12/2014 to 12/2015 - aimed to assist WASCO explicitly in in the fields of Network Management, Hydraulic Modeling, GIS, Leak Detection and Energy Efficiency.
Therefore it is necessary to:

- Align the project with WASCO Strategy
- Involve WASCO Management in project formulation
- Set-up WASCO-internal steering
- Communicate the project within the WASCO organization
- Set-up learning mechanisms for WASCO staff
- Ensure efficient communication between WASCO, Consultants and GIZ

Project Scope

Focus the Institutional, Organizational and Technical Project Activities on Reduction of NRW, because

- NRW reduction is the first priority in WASCO Strategic Plan 2019-2023
- Aligns with overall objectives of the CATS program
- New Regulator will require efficient operations
- NRW reduction touches on almost all aspects of WASCO Organization and Operations
- Focus improves chances to sustain project results

Project Objective

By the end of 2019 WASCO is ready to undertake/start a sustained NRW program
BACKGROUND –
PROJECT’S MAJOR COMPONENTS

• Prepare/update NRW Reduction Strategy for WASCO
• Set up structure, communication mechanisms and staffing for NRW Reduction
• Define DMAs and select pilot(s)
• Prepare for Water Audit(s) and improve O&M practices
  o Mapping / Metering input and output / Clean up customer administration / Review and optimize O&M procedures for selected areas and train staff
• Develop/improve/operationalize supporting systems, such as
  o CIS / GIS and asset registration / Stock keeping practices
• Identify and prepare SOPs for all key processes
• Training of WASCO staff
• Develop M&E system for program implementation and results
• Supporting activities (tariffs and NRW costing, SCADA, hydraulic modeling, regional training)

WASCO NRW LIFELINE

Three „age-groups“ at work: Senators, middle-aged and juniors”
The three "age-groups" present

WASCO NRW LIFELINE

WASCO NRW LIFELINE 1970-2000

Green cards for lessons learned
NRW LIFELINE - LESSONS

- The value of water became an issue only after corporatization
- NRW-Reduction needs strategic planning
- NRW-Reduction implementation needs follow-up
- NRW-Reduction needs operational standards
- The maintenance mechanism needs to be further developed
- There is no service and maintenance manual and schedule
- Implementation requires resources
- WASCO needs to involve staff to increase the chances of implementation
- The strategy and the NRW-reduction program requires internal and external communication
- There is too much ad hoc approach in NRW, no action plan or emergency plan
- The treatment plant rehabilitation is not productive?
- The isolation of aspects of projects is a constraint. The JCD-Millet intake – raw water line left out
- Collaborate – no more organizational silos!
- Let’s stop blaming each other or be defensive and take on a proactive “we can do it” mindset

NRW DIMENSIONS – INTRODUCTION (WATER BALANCE SHEET)

<table>
<thead>
<tr>
<th>Authorized consumption</th>
<th>Unbilled authorized consumption</th>
<th>Apparent losses</th>
<th>Real losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Billed authorized consumption</td>
<td>4 Unbilled metered consumption</td>
<td>6 Unauthorized consumption (= Theft of Water &amp; Illegal Connections)</td>
<td>9 Leakage on transmission and distribution mains</td>
</tr>
<tr>
<td>2 Billed unmetered consumption</td>
<td>5 Unbilled unmetered consumption</td>
<td>7 Customer meter inaccuracies</td>
<td>10 Leakage and overflows at storage tanks</td>
</tr>
<tr>
<td>3 Billed unmetered consumption</td>
<td></td>
<td>8 Data handling errors</td>
<td>11 Leakage on service connections up to customer</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Non-revenue water</th>
<th>NRW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Revenue water</td>
<td></td>
</tr>
</tbody>
</table>
Inception Report

Institutional and Organisational Strengthening of WASCO - SAINT LUCIA

NRW DIMENSIONS – PRESENTATION

NRW DIMENSIONS – PRIORITIZATION

Each staff could make a priority 1 and a priority 2 choice.
NRW DIMENSIONS – PRIORITIES

One group took the managerial perspective on NRW-reduction
NRW DIMENSIONS – PRIORITIES

1/23/2019

NRW DIMENSIONS – PRIORITIES

1/23/2019
## NRW Dimensions – Aspects and Priorities

### Billed Metered Consumption

**Responsibilities & Tasks:**
- Customer Service: Metering & Billing Department (Read meters and meter readings to bill customers) / Credit Control: Revenue collection / Addressing queries & making adjustments / Billing of customers & preparation of invoices / Delivery of past due notices

**Challenges & Constraints:**
- Meters not sufficient for system & main line / Locations & accessibility of meters / Installation & procedures & standards not adhered to by WASCO / Pressure reducing valves / No standard maintenance regime / Read accuracy & timely / Error reading accurately & timely / Manual reading & recording of meters / Manual entering of data in WASCO / Age of meters / Size of meters / Meters to read (tight and low flows)

### Billed Unmetered Consumption (0%/1%)

**Responsibilities & Tasks:**
- Meters unable to read / Billets / Drop meters / Water losses / Bad debts / Unidentified / Valued properties / Usage

**Challenges & Constraints:**
- Incorrect mapping of meters & dwellers / Vertical / Environment / Equipment to detect meters / Insufficient billing

### Unbilled Metered Consumption

**Responsibilities & Tasks:**
- Cleaning, Maintenance / Rebuilding / Replacement of WTPs / WASCO Water Trucks / Fire hydrants / Finishing of lines

**Challenges & Constraints:**
- Necessary for technicians / wastewater / Fire hydrants / Waste water (retreat WASSCO line is replaced)

### Unbilled Unmetered Consumption (1%/10%)

**Responsibilities & Tasks:**
- Customer Service: Metering & Billing Department (Read meters and meter readings to bill customers)

**Challenges & Constraints:**
- Meters not sufficient for system & main line / Locations & accessibility of meters / Installation & procedures & standards not adhered to by WASCO / Pressure reducing valves / No standard maintenance regime / Read accuracy & timely / Error reading accurately & timely / Manual reading & recording of meters / Manual entering of data in WASCO / Age of meters / Size of meters / Meters to read (tight and low flows)

### Unauthorized Consumption (1%/10% = Theft of Water & Illegal Connections)

**Responsibilities & Tasks:**
- Customer Service: Metering & Billing Department (Read meters and meter readings to bill customers)

**Challenges & Constraints:**
- Meters not sufficient for system & main line / Locations & accessibility of meters / Installation & procedures & standards not adhered to by WASCO / Pressure reducing valves / No standard maintenance regime / Read accuracy & timely / Error reading accurately & timely / Manual reading & recording of meters / Manual entering of data in WASCO / Age of meters / Size of meters / Meters to read (tight and low flows)

### Data Handling Errors (0%/1%)

**Responsibilities & Tasks:**
- Billing Division: Customer Service Department / IRC: Reports for tariff adjustments

**Challenges & Constraints:**
- System Inaccuracies / Software / Human Errors (Data Entry) / Data Processing / Water Consumption usage (monthly) / Regulatory compliance / Potential for revenue growth

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**Date:**
- 1/23/2019

**Page:**
- 27

**Image:**
- NRW Dimensions – Aspects and Priorities

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**Date:**
- 1/23/2019

**Page:**
- 28

**Image:**
- NRW Dimensions – Aspects and Priorities
NRW DIMENSIONS – ASPECTS AND PRIORITIES

Real loses:
- Combined
  - Leakage on transmission and distribution mains
- Challenges:
  - Age of infrastructure
  - Quality of Materials
  - Poor storage of spare parts

Water loses:
- Combined
  - Leakage and overflows at storage tanks
- Challenges:
  - Strategic plan
  - Preventive Maintenance by departments
  - Inadequate monitoring devices
  - Financial constraints

Leakage on service connections up to customer
- Challenges:
  - Financial constraints

Most of WASCO staff is very confident ... and ...

1/28/2019
NRW Dimensions – Priorities: Will this work out?

Management Team: What can collaboration across organizational silos contribute to successful change?
NRW DIMENSIONS – PRIORITIES: WILL THIS WORK OUT?

Management Team: What can collaboration across organizational silos contribute to successful change?

A lot!

CONCLUDING WORDS FROM THE CONSULTANTS’ TEAM LEADER

1/29/2019

35
CLOSING WORDS FROM THE HEAD OF STRATEGIC PLANNING DEPARTMENT

FAMILY PHOTO
### ANNEX 3: OUTLINE TERMS OF REFERENCE FOR PROJECT MISSIONS

<table>
<thead>
<tr>
<th>Proposed Time</th>
<th>Duration (on site)</th>
<th>Expert(s) involved</th>
<th>Key Tasks and Deliverables</th>
</tr>
</thead>
</table>
| Dec 2018      | 2.5 weeks          | Project Coordinator, M&E Expert, Org. Devt. Expert | • Establish relations with WASCO, CATS, CAWASA  
• Identify key challenges and constraints for WASCO  
• Present and adapt project strategy  
• Conduct Stakeholders’ Assessment  
• Prepare and commit to Project Workplan and Steering and Communication structure |
| February 2019 | 2 weeks            | Sr. O&M Expert, CAH Mgt. Trainee            | • Review existing technical processes and recommend improvements  
• Review Stock Keeping Practice  
• Review Customer Service Practise and CIS  
• Prepare SOP on installation/repair meters & feedback in GIS  
• Prepare guidelines for water disturbances  
• Prepare SOP on repair works  
• Prepare SOP on inspection of valves etc.  
• Prepare SOP on assessment of leakage & feedback in GIS  
• Plan for analysis and measurement of Northern Distribution Line (see footnote 7 in the report) |
| March 2019    | 2 weeks            | Project Coordinator                        | • Finalize report on technical and CR processes and recommendations  
• Assist in finalizing WASCO NRW Reduction Strategy (started in January 2019)  
• Prepare outline ToR for WASCO Master planning  
• Prepare project progress report and attend Steering Committee Meeting |
| March 2019    | 2 weeks 1 week     | Sr. GIS Expert, Systems Control Expert      | • Assess current GIS system and prepare Action Plan  
• Establish linkages between fieldwork and GIS data entry  
• Recommend GIS based inventory system and develop SOP on data entry  
• Develop outline for database Dashboard for improved O&M |
| April 2019    | 2 weeks            | Sr. Hydraulic Expert, Water Balance Expert  | • Assist in defining WASCO DMA’s  
• Develop SOP for preparing DMA’s and for implementing water audits  
• Develop SOP on collection of measurement data  
• Prepare for analysis and measurement campaign of Northern Distribution Line |
| April 2019    | 1.5 weeks          | Leak Detection Expert                       | • Training on the use of Leak Detection Equipment  
• Prepare for measurement campaign on the Northern Distribution Line (scheduled for May 2019) |
| May 2019      | 2 weeks            | Sr. O&M Expert                             | • Finalize review on stock keeping practice  
• Finalize review of CS practice and IS  
• Training on SOP on Repair Works  
• Sensitization on the importance of flow mgt.  
• Continue support analysis of capacity and condition of the Northern Distribution Line  
• Support measurement campaign on the Northern Distribution Line |
<table>
<thead>
<tr>
<th>Proposed Time</th>
<th>Duration (on site)</th>
<th>Expert(s) involved</th>
<th>Key Tasks and Deliverables</th>
</tr>
</thead>
</table>
| June 2019     | 1.5 weeks         | Sr. Org. Devt. Expert | • Assist in preparing WASCO Strategy for managing processes and SOPs  
                                       • Establish links between workflows, SOPs and resource allocation processes |
| June 2019     | 10 days           | M&E Expert          | • Assist in developing WASCO M&E scheme for workflow and SOP implementation and KPIs |
| June-July 2019| 2 weeks           | Project Coordinator | • Review WASCO Communication Strategy  
                                       • Update assessment of NRW and quantify costs of NRW losses  
                                       • Review relation with NURC and recent tariff reviews  
                                       • Develop methodology and training on demand forecasting  
                                       • Prepare Project Progress Report and attend Project Steering Committee Meeting |
| July 2019     | 3 weeks           | Water Balance Expert | • Assist WASCO in preparation of Water Audit for pilot area  
                                       • Train WASCO Staff on DMA implementation for pilot area  
                                       • Finalize SOP on the collection and validation of measurement data |
| August 2019   | 2 weeks           | Sr Hydraulic Expert | • Review hydraulic model for Castries and recommend improvements  
                                       • Training on flow & pressure management & design  
                                       • Workshop on advanced hydraulics and hydraulic modelling |
| August 2019   | 2 weeks           | Network Mgt Expert  | • Training on the use of HDPE materials  
                                       • Assess current Scada System and prepare recommendations  
                                       • Assess feasibility of smart water meters  
                                       • Follow up on measurement campaign for water losses along the Northern distribution line |
| Sept 2019     | 2 weeks           | Systems Control Expert | • Review progress on field processes and GIS data entry  
                                       • Finalize GIS based inventory system and SOP  
                                       • Review progress on Database Dashboard Development |
| Oct 2019      | 1.5 weeks         | Capacity Devt Expert | • Prepare proposals for Center of Excellence with CAWASA  
                                       • Assist in preparation of project final report |
| Nov 2019      | 2 weeks           | Project Coordinator | • Finalize proposals for Center of Excellence with CAWASA  
                                       • Prepare Project Final Report and attend Steering Committee Meeting |
| Jan – Sept 2019 | Intermittent 40 days | National Planning Engineer | • Assist all experts in preparation for and follow up on missions  
                                       • Assist the project coordinator in preparing outline for WASCO Masterplanning  
                                       • Assist WASCO Management in monitoring the implementation of SOPs  
                                       • Assist various project experts in preparing for and conducting training of WASCO staff  
                                       • Assist various project experts in the collection and validation of data of WASCO operations |