Draft Report Mission 12

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

Saint Lucia

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| Title                  | Draft Report Mission 12  
Institutional and Organisational Strengthening of WASCO Saint Lucia and Regional Water Utilities  
Saint Lucia |
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</thead>
<tbody>
<tr>
<td>Date</td>
<td>September 2019</td>
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</tbody>
</table>
| Consultant            | JOINT VENTURE  
CONSULAQUA Hamburg Beratungs-GmbH - Como Consult GmbH  
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<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<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>
</tr>
<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>
<tr>
<td>CR</td>
<td>Customer Relations</td>
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<tr>
<td>GIS</td>
<td>Geographic Information System</td>
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<tr>
<td>GIZ</td>
<td>Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH</td>
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<tr>
<td>HM</td>
<td>Hydraulic Modelling</td>
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<td>HR</td>
<td>Human Resources</td>
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<tr>
<td>HW</td>
<td>HAMBURG WASSER</td>
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<tr>
<td>ISO</td>
<td>International Organisation for Standardisation</td>
</tr>
<tr>
<td>KPI</td>
<td>Key Performance Indicator(s)</td>
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<tr>
<td>M&amp;E</td>
<td>Monitoring and Evaluation</td>
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<td>NL</td>
<td>Northern Line</td>
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<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>ToR</td>
<td>Terms of References</td>
</tr>
<tr>
<td>WASCO</td>
<td>Water Supply and Sewerage Company Inc., Saint Lucia</td>
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</table>
1 INTRODUCTION

This is the Report on Mission 12 of the project “Institutional and Organizational Strengthening of WASCO Saint Lucia and Regional Water Utilities”. The project started on 1st of November 2018, it has a duration of 13 months and is carried out by a joint venture between CONSULAQUA Hamburg, which is a 100% subsidiary of HAMBURG WASSER, public Water Utility of Hamburg, and COMO Consult, both from Germany.

The projects objectives are depicted below.

![Project objectives diagram]

2 MISSION OBJECTIVES, ACTIVITIES AND DELIVERABLES

This mission was undertaken by the Network Management Expert Peter Blawat from 13th September to 27th September 2019. The following pages describe the objectives, activities and deliverables of this mission.

2.1 OBJECTIVES

- Follow up and Implementation of ongoing processes
  - Implementation of modified WOF (Work Order Form)
  - Training in simple surveying methods and creation of sketches
- Analysis of condition and losses along the Northern line - supported by the Leak Detection Unit
- Assessment of functioning and performance of the Leak Detection Unit in context of preventive maintenance
- Support the activities of the material expert group with an introduction to HDPE and following up on the draft SOP for Supply Management.
- Conduct a four day training course on Repair, Documentation, HDPE and specific non-revenue water (NRW) reduction measures (refer to Mission 13 report)
The terms of reference for the mission is attached as Annex 1.

### 2.2 Activities

- Review of modified WOF (Work Order Form)
- Review and finalisation of SOP for Supply Management
- Assessment of functioning and performance of the Leak Detection Unit
- Review of documentation and evaluation on ongoing assessment along the Northern Line with focus on leak detection
- Assessment of ongoing usage of smart meters
- Introduction to HDPE
- Execution of a four-day Regional Training

The agenda for this mission is attached as Annex 2.

### 3 Key Findings and Recommendations

#### 3.1 Assessment of Functioning of the Leak Detection Unit

The Leak Detection Unit is directly under the responsibility of the Water Service Manager.

During mission 12, only one leak detection Technician was available as remaining staff were on annual leave and contract break. The standard team consists of three men for the North and two men for the South. The Senior Technician Wilfred Thomas will continue to be employed with a contract for 6 months after his retirement for the purpose of continued knowledge transfer. In the interim Marvin Jemmott was the Acting Senior Technician within the Leak Detection Unit.

The department has good leak detection equipment. All the important detection devices are available including correlator, listening stick and ground microphone as well as two vehicles.

Due to open and unsafe space within the vehicles (pick up with open cargo area) not all leak detection devices can be carried at all times (Severin case incl. listening stick, ground microphone, and correlator). Therefore, the pre-location with ground microphone is carried out only when needed. The rest of the equipment stays at the head office and is collected when needed. This requires unnecessary work time and transport and proves to be inefficient.

Creating monthly reports, work schedules, maintenance schedules, etc. is also part of the Senior Technician's work, and takes a lot of time. According to the Acting Senior Technician, the leak detection department has the following tasks:

- Pinpointing of leaks
- Reading pressure loggers
- Reading DMA water meters
- Reading pressure gauges
- Night flow measurements
- Random checks
- Reporting to the Water Service Manager

**Recommendations**

It would be useful if the Leak Detection Unit in addition to the actual detection of leaks could focus more on its monitoring tasks in relation to the distribution network and the various DMAs and that monitoring is done in a more planned and systematic way.

The Leak Detection Unit needs relief in the preparation of monthly reports, work schedules, and other maintenance plans, as this takes a lot of time. This planning work should be carried out by the proposed Network Administrator within the Water Services Department. It would provide more time for the Leak Detection crew and result in more effective leak detection, network monitoring and preventative maintenance. A proposal with options for change in structure and division of tasks and responsibilities of the Water Services Department, along with proposals for integrating the function of Network Administrator, is attached as Annex 4 to this report.

The LDU only uses the ground microphone (simple microphone, English production) for all kinds of detection works. For 4-5 years, the Severin equipment (correlator, floor microphone, tactile microphone) has also been available. This equipment is almost new (looks like) and was not charged and it appeared that nobody has really been using this device during the last 5 years. It would be useful to provide some additional training on this to the staff so they can use the whole range of equipment.

**3.2 ASSESSMENT OF THE NORTHERN LINE**

**3.2.1 Preventive maintenance by Leak detection**

As a preventive measure (preventive maintenance) until the rehabilitation of the Northern line, the Leak Detection Officer, GIS team and the Consultant checked and determined 30 access points to the 14” Northern line. These points should be checked periodically (monthly) by the Leak Detection Unit for the sake of preventive maintenance.
3.3 INTRODUCTION TO HDPE

During a meeting with the Design and Construction Department and Support Services Department, the possibilities, advantages and disadvantages of the HDPE material as well as new technical possibilities to replace the “Chamber” system with new working methods and new material were presented by the consultant.

The advantages of the use of HDPE material in the field of service lines for diameters up to 200 mm were part of the discussion. The suggestion to replace the existing 14 Northern line with a 20” HDPE (DN 500, approx. 8000 m), which was suggested by the Design and Construction Department, was critically evaluated by the consultant and is not recommended. The reason for this is the lack of technical know-how in the field of large diameter HDPE.

The construction of large diameter HDPE requires large machines (welding equipment) and a lot of space for the laying of the pipe, since these usually have to be welded above ground. This would mean significant traffic restrictions during construction. The consultant is of the view that the production and delivery of such large pipes as well as the entire logistics, including repair material, would be very challenging. After all, the most important reason to NOT build the Northern Line in HDPE is the complexity to repair such a large HDPE line in case of damages (expertise, experience, repair material, machines).

Recommended material for a new 20” Water pipe:

1) Ductile cast iron with PE coating outside and cement lining inside or
2) Steel with PE coating outside and cement lining inside
Example of a modern steel or ductile pipe with cement lining inside and PE coating outside

Both with focus on the good field coating of the joints during construction.

Example of Field coating

Advantages:

- Existing knowledge and experience with these materials
- Low traffic restrictions during the construction
- Existing experience in repair and handling

Example of Steel and Ductile pipe with PE coating outside and cement lining inside
3.4 SELECTING NEW MATERIALS

The process of selecting new types of materials involves many aspects and should be based on rational criteria and on an existing data base. In general, the introduction and change of material is a very complex topic, which should be implemented in a separate project.

Recommendations

In particular, the following factors related to the introduction of HDPE should be discussed and examined at WASCO, Saint Lucia:

- Which dimensions should be introduced?
- Price (pipes, fittings, compatibility with PVC, repair material)
- Which welding methods? Electro fusion? Butt Welding?
- Equipment (Price: welding machines, generators)
- Availability (Suppliers)
- Storage facilities
- Compatibility with existing material
- Skills of the staff, handling,
- Training of the staff (new construction, Repair)
- Maintenance, repair in case of pipe bursts
- Behavior with UV radiation

What are the reasons for the change?

Data analysis:

- Frequency of pipe breaks on connection lines
- Frequency of pipe breaks on main lines
- Reasons for leaks:
  - leaks on fittings (number / year)
  - leaks at connections (number / year)
  - leaks on pipes (number / year)
  - Damage due to incorrect storage

Advantages and disadvantages of the two pipe materials:

Advantages HDPE (20mm - 200mm):

- Flexible and can be built in one length
- Resistant to axial and radial forces
- Suitable for laying very long house connections or smaller supply lines without connections (diameter between 20 mm and 110 mm) available in rolls up to 100 m
- Joints can be welded (permanent and homogeneous)
- Wide range of fittings and options

Disadvantages HDPE (20mm - 200mm):

- Higher price than PVC
Expensive devices are needed (welding)
- Training and support of the staff necessary
- Great care in welding necessary
- Less resistance to UV rays than PVC (still used in Africa and the Middle East)
- Lower diffusion density than PV

Advantages PVC:
- Cheaper than HDPE
- No additional training and accompaniment of the staff necessary
- Greater resistance to UV rays than HDPE
- Larger diffusion density than HDPE

Disadvantages PVC:
- Inflexible material
- No resistant to axial and radial forces
- Joints must be glued by using of PVC Cement (long curing process before pressure)

3.5 RECOMMENDATION FOR REPLACEMENT OF THE “CHAMBER SYSTEM” FOR ASSETS

This recommendation is not a part of the ToR and based on consultant’s observations during the Mission. The following description is a suggestion regarding improving of work procedures.

During a meeting with the Design and Construction Department to discuss ways of improving work procedures, reducing maintenance on manholes and relieving the budget, the consultant recommended the introduction of new materials and new labour and design procedures for the medium to long term.

The recommendation only applies to extensions of the system or rehabilitation of the old network and involves

- to abolish the construction of new manholes during the construction of a **new network**
  and
- introduction of new materials.

The existing Manholes remain unaffected by this proposal!

The main advantage of the introduction of new materials is the lower costs. The average cost of constructing a new chamber is approximately EC$ 3,000 – 5,000. Also, over time, the chamber has to be maintained which can be costly and labour intensive. A comparison of costs is provided below:
Institutional and Organisational Strengthening of WASCO - SAINT LUCIA

To replace one chamber, it is necessary to buy new materials in accordance with the new (buried) design. The company needs longer Hydrants (approximately the same price as the short one) and special small covers. For the valves the company needs maintenance free valves, extension of spindle and also a small cover (see pictures below).

With the introduction of this new design and material WASCO saves money and manpower.

The big advantages of the system without Chambers are

- accessibility to the assets specialty during the wet season and
- easy operation of it (without pump, long key and manpower to open the chamber) and
- the costs of maintenance are also lower.

### Cost comparison between “buried” Hydrant and Hydrant in Chamber (AVK Price list Germany)

<table>
<thead>
<tr>
<th>Material</th>
<th>Costs of new Material</th>
<th>Costs of Chamber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chamber / Cover</td>
<td></td>
<td>3000 ECS</td>
</tr>
<tr>
<td>1.0 m Hydrant (AVK)</td>
<td>479 €</td>
<td>1.005 €</td>
</tr>
<tr>
<td>Cover</td>
<td>85 €</td>
<td>352 GBP (short)</td>
</tr>
<tr>
<td>Seepage water</td>
<td>58 €</td>
<td>411 €</td>
</tr>
<tr>
<td><strong>Sum</strong></td>
<td><strong>622 €</strong></td>
<td><strong>1.410 €</strong></td>
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</tbody>
</table>

### Cost comparison between “buried” Valve and Valve in Chamber (AVK Price list Germany)

<table>
<thead>
<tr>
<th>Material</th>
<th>Costs of new Material</th>
<th>Costs of Chamber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chamber / Cover</td>
<td></td>
<td>3000 ECS</td>
</tr>
<tr>
<td>Gate Valve (AVK)</td>
<td>647 €</td>
<td>647 €</td>
</tr>
<tr>
<td>Cover</td>
<td>49 €</td>
<td></td>
</tr>
<tr>
<td>Spindle extension</td>
<td>50 €</td>
<td></td>
</tr>
<tr>
<td><strong>Sum</strong></td>
<td><strong>745 €</strong></td>
<td><strong>1.652 €</strong></td>
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</tbody>
</table>

Example of the buried system
3.6 **Smart Meters**

Currently, WASCO operates around 50 smart meters from the German company Diehl. These are ultra-sonic water meters, that are used as reference to mechanical meters when customers doubt the function and accuracy of the standard meter.

The actual "smart function" of remote reading is not used and the infrastructure is missing (software, handheld reader). The possibilities of this technology were presented in the regional workshop.
Recommendations

The first recommendation refers to the already existing 50 domestic smart meters. It is recommended that in the long run WASCO aims at developing its own experience with this technology. The first step should be development of a concept for possible application of a smart metering system, after considering the benefits, costs, infrastructure, remote reading and integration into existing procedures. This concept could be implemented in a small pilot area, after WASCO has obtained the missing equipment.

The second recommendation refers to bulk meters in DMAs. Once the smart meter function for domestic meters works, it could be examined if this technology can be used also for the reading of bulk meters to monitor DMAs.

3.7 SOP “SUPPLY MANAGEMENT”

During a meeting of the Supply Advisory Committee with the Consultant, the SOP was revised together, improved and finalized by the Expert group. The suggestion to create an Advisory Committee has been well received by WASCO and will be proposed to WASCO Management for approval.
3.8 **FINALIZATION OF WOF (WORK ORDER FORM)**

After the meeting with the Senior Supervisor of the Water Services Department the WOF was finalized and the new version is attached as Annex 3. The new WOF will be part of SOPs TD-01 and TD-02 and will be submitted to WASCO Management for approval.

3.9 **REGIONAL TRAINING**

Please refer to Mission 13 report.
### ANNEX 1: TO R FOR THIS MISSION

#### Mission 12

**Draft Terms of Reference**

**Area(s) of focus: Network Management**

<table>
<thead>
<tr>
<th>Expert(s)</th>
<th>Sr. network O&amp;M expert Peter Blawat,</th>
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<tbody>
<tr>
<td><strong>Timeframe and place:</strong></td>
<td>Preparation: 2 days</td>
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<tr>
<td></td>
<td>Mission dates:</td>
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<tr>
<td></td>
<td>➢ Arrival: 13 Sept. 2019</td>
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<td></td>
<td>➢ Departure 28 Sept. 2019</td>
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<tr>
<td></td>
<td>Preparation of Report: 2 Days</td>
</tr>
<tr>
<td></td>
<td>Hamburg</td>
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<td></td>
<td>Castries</td>
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<tr>
<td><strong>Reference to Project:</strong></td>
<td>Network Management third Mission towards “Improved Network Management” (Inception Report Chapter 3.3.)</td>
</tr>
<tr>
<td><strong>Mission Objective</strong></td>
<td>➢ Follow up and implementation of ongoing processes:</td>
</tr>
<tr>
<td></td>
<td>• Implementation of modified WOF (Work Order Form)</td>
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<tr>
<td></td>
<td>• Knowledge about simple surveying methods and creation of sketches</td>
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<tr>
<td></td>
<td>Evaluation of assessment procedure, analysis of capacity, condition and losses along the Northern distribution line supported by leak detection</td>
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<td></td>
<td>Assessment of activities of the leak detection unit in context of preventive maintenance and current procedures.</td>
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<td></td>
<td>Continue and support of the activities of the material expert group (Committee) with introduction to HDPE, follow up to SOP Supply management.</td>
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<td></td>
<td>Conduct a four-day training course on Repair, Documentation, HDPE, specific NRW reduction measures (see attached ‘Regional Upscaling Training’ program in September 2019)</td>
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<tr>
<td><strong>Involved Staff WASCO:</strong></td>
<td>Head and staff of Water Services,</td>
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<td></td>
<td>Head and staff of Customer Services,</td>
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<tr>
<td></td>
<td>Head of Strategic Planning Department and GIS- Coordinator,</td>
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<tr>
<td><strong>Pre-mission requirements</strong></td>
<td>➢ Comments on draft SOPs and recommendation of previous missions by WASCO</td>
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<td></td>
<td>➢ Decision for the implementation of preventive maintenance by WASCO</td>
</tr>
<tr>
<td></td>
<td>➢ Results of preventive maintenance in the PIZ (project implementation zone)</td>
</tr>
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<td></td>
<td>➢ First draft SOP for inspection and reading of bulk meters by WASCO</td>
</tr>
<tr>
<td><strong>Activities according to workplan:</strong></td>
<td>Preparation of Mission: Review documents, planning the activities and develop Agenda of the mission</td>
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<tr>
<td></td>
<td>Video/Skype conference with WASCO</td>
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<td></td>
<td>In Hamburg</td>
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<td></td>
<td>To be scheduled with WASCO</td>
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<tr>
<td>Activities</td>
<td>Meetings/mini workshops with key staff to assess necessary information and agree on content, review results and the end of mission</td>
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<td>---------------------------------------------------------------------------</td>
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<tr>
<td>➢ Review on modified WOF (Work Order Form) and support to implementation with focus on o Documentation of performance Indicators “Leak Info and Valve Info” o Documentation of activities by sketches</td>
<td></td>
</tr>
<tr>
<td>➢ Review of documentation and evaluation on ongoing assessment along the Northern line with focus on o Leak detection ➢ Conduct Leak detection on northern line</td>
<td>Meetings with key staff to assess necessary information and agree on content. Field activities along the Northern line</td>
</tr>
<tr>
<td>➢ Assessment of performance of the leak detection unit with focus on preventive maintenance</td>
<td>Meetings with key staff and Field activities</td>
</tr>
<tr>
<td>➢ Follow up of implementation of SOP “Supply management”</td>
<td>Meetings with key staff</td>
</tr>
<tr>
<td>➢ Introduction to HDPE and consideration of possibilities and difficulties in changing the type of material.</td>
<td>Mini workshop with the new formed Material Expert group</td>
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</tbody>
</table>

**Deliverables:**
- Mission Report
- Update of Report “Supply Management” (Mission 6) with added chapter
- Short report on operations of Leak Detection Unit
- Update of work plan of Northern line

**Tentative program/ agenda**
See separate schedule

**Reference documents**
- Reports and findings of previous missions
- Developed and existing SOPs and guidelines
- All project documents (ToR, Inception Report, Status reports)
# ANNEX 2: TRAINING PROGRAM

## REGIONAL TRAINING ON MEASURES & ACTIVITIES FOR NRW REDUCTION
### SAINT LUCIA, September 24th to 27th, 2019

### Day 01 – Focus on Organization of Repair and Documentation

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>08:30</td>
<td>Welcome and Introduction of Participants, Trainer Team and Programme</td>
<td></td>
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<tr>
<td>09:30</td>
<td>Presentation</td>
<td>Methods &amp; Instruments of Water Loss Reduction</td>
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<tr>
<td></td>
<td></td>
<td>Various approaches and instruments of Water Loss Reduction</td>
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<tr>
<td>10:00</td>
<td>Exercise</td>
<td>The Repair Cycle</td>
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<tr>
<td></td>
<td></td>
<td>Participants structure their current repair work practices, reflect</td>
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<td></td>
<td></td>
<td>activities and discuss improvement measures (break included)</td>
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<tr>
<td>12:00</td>
<td>Lunch</td>
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<tr>
<td>13:00</td>
<td>Presentation</td>
<td>Philosophy and Organization of Repair (M3.4)</td>
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<tr>
<td></td>
<td></td>
<td>Following the sustainable cycle for repair works: Explanation of Steps</td>
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<td></td>
<td></td>
<td>and Purposes. Best practice examples from Hamburg Wasser</td>
</tr>
<tr>
<td>13:30</td>
<td>Presentation</td>
<td>Simple Survey Methods</td>
</tr>
<tr>
<td>14:00</td>
<td>Exercise</td>
<td>Asset Survey and Documentation</td>
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<tr>
<td></td>
<td></td>
<td>Execution of simple survey methods and preparation of sketches for</td>
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<tr>
<td></td>
<td></td>
<td>proper documentation and recording of repair and construction works</td>
</tr>
<tr>
<td>15:15</td>
<td>Presentation</td>
<td>Assessment and Inspection Sheets</td>
</tr>
<tr>
<td>15:30</td>
<td>Exercise</td>
<td>Assessment and Inspection Sheets</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Development of documentation sheets as basis for asset assessment and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>repair and construction works. Reflection of best practices. Preparation for Day (break included)</td>
</tr>
<tr>
<td>16:30</td>
<td>Wrap up of day 01</td>
<td>End</td>
</tr>
<tr>
<td>17:00</td>
<td>Cocktail reception at “Bay Gardens Hotel”</td>
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</tbody>
</table>

### Day 02 – Focus on Condition Assessment and Documentation (Field Work)

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00</td>
<td>View back on day 01, Introduction to Field Assessment</td>
<td></td>
</tr>
<tr>
<td>09:45</td>
<td>Field Work</td>
<td>Condition Assessment &amp; Documentation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assessing condition of WS infrastructure in the field and</td>
</tr>
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<td></td>
<td></td>
<td>documentation with tailor-made Form Sheets</td>
</tr>
<tr>
<td>12:30</td>
<td>Lunch</td>
<td></td>
</tr>
<tr>
<td>13:30</td>
<td>Exercise</td>
<td>Evaluation of Condition Assessments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Evaluation of collected data and clustering according action needed</td>
</tr>
<tr>
<td>14:30</td>
<td>Exercise</td>
<td>Action Plan / Strategy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Planned action or immediate measures? Own staff or contractor?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scheduling of replacement, maintenance or repair (break included)</td>
</tr>
<tr>
<td>16:00</td>
<td>Wrap up of day 02</td>
<td>End</td>
</tr>
</tbody>
</table>
## Day 03 – Focus on HDPE and Maintenance Strategies

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00</td>
<td>View back on day 02</td>
<td></td>
</tr>
<tr>
<td>10:15</td>
<td>Exercise</td>
<td>Maintenance Strategy (group work) Participants apply the general maintenance concept. Understanding general necessity for maintenance (break included)</td>
</tr>
<tr>
<td>12:15</td>
<td>Lunch</td>
<td></td>
</tr>
<tr>
<td>13:15</td>
<td>Exercise</td>
<td>Maintenance Strategy (presentation of results)</td>
</tr>
<tr>
<td>14:15</td>
<td>Presentation</td>
<td>HDPE Pipes: basics, advantages, disadvantages</td>
</tr>
<tr>
<td>14:45</td>
<td>Presentation</td>
<td>Working with HDPE (best practice @ Hamburg)</td>
</tr>
<tr>
<td>15:15</td>
<td>break</td>
<td></td>
</tr>
<tr>
<td>15:30</td>
<td>Discussion</td>
<td>Strategy for the change of material Joint development of a basic strategy for the change of material on Utility level, based on the example of HDPE</td>
</tr>
<tr>
<td>16:15</td>
<td>Wrap up of day 03</td>
<td>End</td>
</tr>
</tbody>
</table>

## Day 04 – Focus on specific Methods & Instruments of NRW Reduction

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00</td>
<td>View back on day 03</td>
<td></td>
</tr>
<tr>
<td>09:30</td>
<td>Presentation</td>
<td>Leaking valves Why is it important? What influence does it have on NRW? Ways to tackle this common problem.</td>
</tr>
<tr>
<td>11:00</td>
<td>Presentation</td>
<td>Smart metering Best practice &amp; experiences from HAMBURG WASSER</td>
</tr>
<tr>
<td>12:00</td>
<td>Lunch</td>
<td></td>
</tr>
<tr>
<td>13:00</td>
<td>Presentation</td>
<td>Purpose of Pressure Management Objectives and different methods of pressure management. Influence on NRW.</td>
</tr>
<tr>
<td>13:30</td>
<td>Exercise</td>
<td>Benefits of Pressure Reduction Assessment of economic benefits that can be expected from the introduction of pressure management</td>
</tr>
<tr>
<td>14:30</td>
<td>Wrap up of the Training, Certificates, Good bye</td>
<td>End</td>
</tr>
</tbody>
</table>
**Annex 3: Work Order Form**

### WASCO Inc. Work Order Form

<table>
<thead>
<tr>
<th>Incident No.</th>
<th>Complaint</th>
<th>Zone</th>
<th>Crew</th>
<th>Date / Time</th>
<th>Leak Detection</th>
<th>Priority</th>
</tr>
</thead>
</table>

**Complaint Information**

- **Name:**
- **Organization:**
- **Street Address:**
- **Community:**
- **District:**

**Location Details**

*Customer's Comments*

**Work Order Details**

<table>
<thead>
<tr>
<th>DMA</th>
<th>Flow</th>
<th>Account No.</th>
<th>Meter No.</th>
<th>Crew Type</th>
<th>Standby</th>
<th>Regular</th>
<th>Night Shift</th>
<th>Quick Response</th>
</tr>
</thead>
</table>

**Job Status**

- Complete
- Not Complete

**Leak Info**

- **Start Date**
- **End Date**
- **Start Time**
- **End Time**

**Damaged Pipe Info**

- **Size**
  - 1/2
  - 1/4
  - 3/4
  - 1
  - 1 1/4
  - 1 1/2
  - 2
  - 3
  - 4
  - Other
- **Material**
  - PVC
  - PI
  - GI
  - ABS
  - Other

**Damage Description**

- Spigot Pipe
- Damaged Joint
- Corroded Pipeline
- Erosion
- Poor Workmanship
- Pipe Above Ground
- Choke
- Closed Valve/Stop
- Pipe Below Ground

**Valve Info**

- **Date Closed**
- **Time Closed**
- **Closed By**
- **Date Opened**
- **Time Opened**
- **Opened By**

**Comments**

- Unable to Locate
- Property Vacant
- Low Pressure
- No Water in System
- Material Shortage
- Private Job
- Estimate Required
- Other

**Outstanding Details**

- Masonry Works
- Road Reinforcement
- Valving
- Other Works

**Equipment Time Information**

<table>
<thead>
<tr>
<th>Name of Provider</th>
<th>Type</th>
<th>Date</th>
<th>Start</th>
<th>End</th>
</tr>
</thead>
</table>

**Action**

- Repair
- Diversion
- Installation
- Replacement
- Investigation
- Valving
- Line Plugged
- Closed Valve
- Flushing

**Flushing Info**

- **Start Date**
- **Start Time**
- **End Date**
- **End Time**
ANNEX 4: PROPOSAL FOR RESTRUCTURING OF THE WATER SERVICES DEPARTMENT

Options for integrating the function of Network Administrator and Leak Detection Unit in the Structure of the Water Services Department

New Key Role: Network Administrator

One new key role is needed to implement the SOPs on Preventive Maintenance (TD-01) and Management and Communication of Disturbances (TD-02): A Network Administrator (NA) or similar position. The role of the NA will include the following competences and responsibilities:

- Preventive Maintenance planning and condition analysis
- Planning and analysis of continuous pressure and flow monitoring
- Network operation and network analysis
- Hydraulic Modelling
- Interface with GIS

The NA would fill a role, which is missing right now. There is a need to appoint a person who has an overview of the whole network and the perspective of “owner” of the network and who is responsible for preparing and monitoring the Operation, Maintenance and Monitoring Schedules for the Distribution Network.

The Network Administrator (NA) will report to the Water Service Manager and oversees the communication between the different units. The NA is authorized to issue guidelines and plans and has a technical responsibility over the whole network. The NA has no line responsibility over staff.

There are different options to integrate the NA position into the structure of the Water Services Department. Two options are presented below:

OPTION 1

This option leaves the current structure of the WS Department unchanged but adds the position of Network Administrator as an assistant to the WS Manager. He/she would act as “the spin in the web” and communicate with all the units within the Department. His/her tasks would be as described above.
Below follow the main tasks of each of the above units.

**Manager Water Services**
- Provide direction and guidance to staff in WS Department
- Arrange for adequate planning and budgeting for the Department
- Arrange for adequate monitoring of O&M of the distribution systems
- Arrange for adequate selection, supply of materials and equipment for WS Department
- Arrange for adequate Operation & Maintenance of the distribution systems
- Oversee and monitor the use of SOPs in the Water Services Department

**Staffing:** Head of WS Department, supporting staff/secretary

**Control Room**
- Receive reports on incidents and complaints from customers and WASCO units and staff
- Prepare WoFs
- Communicate and process WoFs in accordance with SOPs TD-01 and TD-02

**Staffing:** Supervisor and Communication Officers (Control Room)

**Network Administrator**
- Prepare network operation schedules
- Preventive Maintenance planning and condition analysis
- Planning and analysis of continuous network monitoring
- Network operation and network analysis
- Hydraulic Modelling
- Interface with GIS

**Staffing:** Network Administrator, supporting staff

**Transmission and Distribution Unit**
- Operate the distribution system based on scheme prepared by the NA
- Implement repairs based on WOFs received from Control Room and in line with SOP TD-02
- Manage disturbances and communicate in accordance with SOP TD-02
- Report in accordance with SOP TD-02

**Staffing:** Senior Supervisor, Technicians and field teams
Leak Detection Unit

- Reading pressure loggers, DMA meters, pressure gauges in accordance with plan Network Administration/Planning
- Carry out night flow measurements
- Undertake leak detection on WASCO’s network
- Random checks

Staffing: Senior Technician and staff

OPTION 2:

In Option 2 a separate Network Administration and Planning Unit is created, which will assist the Manager WS in preparing all the monitoring, operation and maintenance schedules and plans, carrying out hydraulic analysis, managing the SCADA system and being the focal point with GIS.

In addition, there will be some other changes. The Control Room will be positioned as a staff unit under the Manager Water Services. The Operations Room will receive all calls and reports and complaints from various internal and external sources and forward these to the concerned units in WASCO based on TD-02.

A new Preventive Maintenance Unit will be created, which will exclusively deal with Preventive Maintenance, based on the schedules prepared by the NA/Planning Unit in accordance with TD-01.

The name of the LDU will be changed into Network Monitoring and Leak Detection Unit, to emphasize the monitoring task they are carrying out, based on the schedules prepared by the NA/Planning Unit. A schematic presentation of this option is presented below.

Below follow the main tasks of each of the above units.
Manager of Water Services
- Provide direction and guidance to staff in WS Department
- Arrange for adequate planning and budgeting for the Department
- Arrange for adequate monitoring of O&M of the distribution systems
- Arrange for adequate selection, supply of materials and equipment for WS Department
- Arrange for adequate Operation & Maintenance of the distribution systems
- Oversee and monitor the use of SOPs in the Water Services Department

**Staffing:** Head of WS Department, supporting staff/secretary

Control Room
- Receive reports on incidents and complaints from customers and WASCO units and staff
- Prepare WoFs
- Communicate and process WoFs in accordance with SOPs TD-01 and TD-02

**Staffing:** Supervisor and Communication Officers (Control Room)

Network Administration and Planning Unit
- Prepare and implement network routine operation schedules
- Preventive Maintenance planning and condition analysis
- Planning and analysis of continuous network monitoring
- Network operation and network analysis
- Hydraulic Modelling
- Interface with GIS

**Staffing:** Network Administrator, Planning Engineer, GIS Liaison Officer, supporting staff

Transmission and Distribution Unit
- Operate the distribution system in accordance to schedules prepared by the NA/Planning Unit
- Implement repairs based on WOFs received from Control Room and in line with SOP TD-02
- Manage disturbances and communicate in accordance with SOP TD-02
- Report in accordance with SOP TD-02

**Staffing:** Technicians and field teams

Network Monitoring and Leak Detection Unit
- Reading pressure loggers, DMA meters, pressure gauges in accordance with plan Network Administration/Planning
- Carry out night flow measurements
- Undertake leak detection on WASCO’s network
- Random checks

**Staffing:** Senior Technician and staff

Preventive Maintenance Unit
- Carry out preventive maintenance based on plans prepared by Network Administration
- Prepare preventive maintenance reports in accordance with SOP TD=01
- Prepare WoFs in accordance with SOP TD-01

**Staffing:** Senior Technician and field teams
Analysis of the two Options

The first option has the advantage that the current structure remains more or less intact, so it is easy to implement the change. However, the current structure is not clear on a number of issues and it would be necessary to finetune the responsibilities and reporting lines of the various units.

The second option will require more effort, as it proposes considerable changes to the current organization structure. However, the creation of a new Network Administration and Planning Department would entail potentially huge benefits in the functioning of the department and if properly implemented will result in a much more pro-active and systematic O&M of the distribution system. Also the division in tasks and responsibilities between the two staff units and the operational units is much more clear in the second option.